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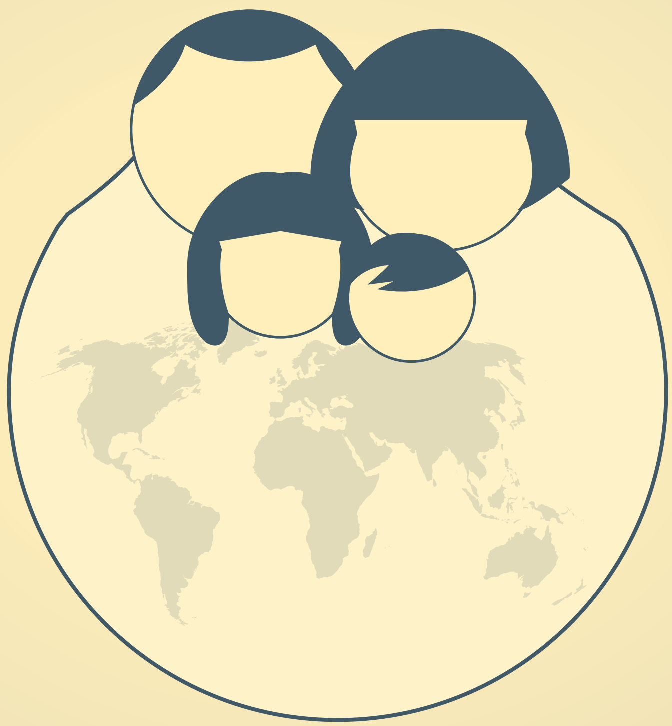
Completing the Fertility Transition



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DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
Population Division

Population Bulletin of the United Nations

COMPLETING THE FERTILITY TRANSITION

Special Issue Nos. 48/49 2002

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DESA

The Department of Economic and Social Affairs of the United Nations Secretariat is a vital interface between global policies in the economic, social and environmental spheres and national action. The Department works in three main interlinked areas: (i) it compiles, generates and analyses a wide range of economic, social and environmental data and information on which Member States of the United Nations draw to review common problems and to take stock of policy options; (ii) it facilitates the negotiations of Member States in many intergovernmental bodies on joint courses of action to address ongoing or emerging global challenges; and (iii) it advises interested Governments on the ways and means of translating policy frameworks developed in United Nations conferences and summits into programmes at the country level and, through technical assistance, helps build national capacities.

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PREFACE

The Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat is responsible for providing the international community with up-to-date and scientifically objective information on population and development. The Population Division provides guidance to the United Nations General Assembly, Economic and Social Council and the Commission on Population and Development on population and development issues and undertakes regular studies on population levels and trends, population estimates and projections, population policies and population and development interrelationships.

The past few decades have witnessed significant changes in fertility levels. Since 1965, for example, world fertility has declined from 5.0 to 2.7 births per woman. Many countries have recorded striking declines in total fertility rates. And in many others, fertility levels have clearly started to decline. Approximately 40 per cent of the population of the world live in those countries that have begun but not completed their fertility transition. These countries include some of the largest in the world; for example, India, Indonesia, Brazil, Bangladesh, Mexico, the Philippines, the Islamic Republic of Iran and Egypt. How will fertility progress in these countries? Will fertility stagnate? Will it decline to around the replacement level? Or will fertility follow the example of the European countries and decline to below replacement level? The outcome of this fertility transition will determine the population size of the world in the twenty-first century.

With this in mind, the Population Division organized the Expert Group Meeting on Completing the Fertility Transition, 11 to 14 March 2002. This meeting examined the prospects of fertility decline in countries currently having intermediate-fertility levels. The central focus of the meeting was whether those less developed countries will follow the patterns experienced by the more developed countries, that is, attain fertility levels at or below replacement. Or will the fertility levels of those countries stagnate at some intermediate level and remain well above replacement?

This meeting is the third that the Population Division has organized to increase understanding of likely fertility trends in the diverse countries of the world. The first meeting, the Expert Group Meeting on Below Replacement Fertility, was held in 1997.[1] Among other things, the meeting played a key role in leading the Population Division to revise its assumptions for future fertility change in these countries as part of the 1998 and subsequent revisions of its official United Nations world population estimates and projections. In 2001, the Population Division organized the second fertility meeting, Workshop On Prospects for Fertility Decline in High Fertility Countries.[2] This meeting considered the prospects for fertility decline in high fertility countries. In particular, the experts investigated the factors that hinder or facilitate fertility declines that currently have high levels of childbearing.

The United Nations gratefully acknowledges the MacArthur Foundation for providing partial support for financing this meeting.

This publication, as well as other population information, may be accessed on the web site of the Population Division at www.unpopulation.org. For more information about this publication, please contact the office of Ms. Hania Zlotnik, Director, Population Division, United Nations, NY, 10017, tel. (212) 963-3179 or fax (212) 963-2147.

[1] United Nations Population Division. Below Replacement Fertility. *Population Bulletin of the United Nations*, Nos. 40/41, 1999, New York.

[2] United Nations Population Division. United Nations Workshop on Prospects for Fertility Decline in High Fertility Countries, New York, ESA/P/WP.167, 2001.

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Various symbols have been used in the tables throughout this report, as follows:

- **..** Two dots indicate that data are not available or are not separately reported.
- **—** An em dash indicates that the amount is nil or negligible.
- **-** A hyphen indicates that the item is not applicable.
- **–** A minus sign before a figure indicates a decrease.
- **.** A full stop is used to indicate decimals.

Details and percentages in tables do not necessarily add to totals because of rounding.

Countries and areas are grouped geographically into six major areas: Africa; Asia; Europe; Latin America and the Caribbean; Northern America; and Oceania. These major areas are further divided geographically into 21 regions. In addition, the regions are classified as belonging, for statistical convenience, to either of two general groups: more developed or less developed. The less developed regions include all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia. The more developed regions comprise Australia/New Zealand, Europe, Japan and Northern America.

The group of least developed countries currently comprises 49 countries: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia.

Executive summary

The United Nations Population Division, with the support of the MacArthur Foundation, convened the Expert Group Meeting on Completing the Fertility Transition, at United Nations Headquarters in New York, from 11 to 14 March 2002. The purpose of the meeting was to discuss guidelines for fertility change proposed by the Division for use in intermediate-fertility countries, defined as countries with total fertility between 2.1 and 5 children per woman in 1995-2000. The Population Division uses fertility guidelines to prepare the official United Nations population projections for every country and region in the world. Until recently, the guidelines stipulated that fertility in intermediate-fertility countries would not fall below replacement level by 2050. This has become less and less tenable as fertility in more and more countries, developing as well as developed, has fallen to and remained at levels well below replacement.

The proposed guidelines stipulate that fertility in the intermediate-fertility countries will decline to 1.85 children per woman by 2050, rather than the 2.1 children per woman in the current guidelines. This is a momentous change, both because of the large population of the intermediate-fertility countries (43 per cent of world population in 2000), and because of the many implications of sustained below-replacement fertility. The four-day meeting was attended by over 40 population experts representing all regions of the world. Thirty background and country papers were presented, including a keynote address by Mr. Jack Caldwell, Professor at the Australian National University.

After considerable discussion, the experts generally endorsed the revised guidelines for the projection of fertility in intermediate-fertility countries. As stated by Mr. Caldwell, "there no longer seem to be any barriers to most countries reaching replacement level and subsequently falling below that level". The experts stressed, however, that because of the moderately high levels of fertility in these countries, and also because of the population momentum resulting from nearly a century of rapid population growth, world population is expected to add another 3 billion persons over the next 50 years. The experts recommended that when projecting the level of fertility, the pace of decline be reduced as lower levels are reached. It was also suggested that projected fertility levels be checked for consistency with the implied changes in the proximate determinants of fertility, especially with respect to likely increases in contraceptive prevalence.

This report provides a summary record of the meeting, including the agenda, organization of work, list of participants, list of documents, and summaries of the 30 papers presented and of the discussions that occurred during the meeting. This report and the background and country papers presented at the meeting are available online at the Population Division's website, www.unpopulation.org.

Comments and suggestions on the meeting and this report are welcome and may be addressed to Ms. Hania Zlotnik, Director, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, New York, N.Y., 10017, fax (212) 963-2147.

PART ONE

REPORT OF THE EXPERT GROUP MEETING ON COMPLETING THE FERTILITY TRANSITION

Introduction

The United Nations Population Division, with the support of the MacArthur Foundation, convened the Expert Group Meeting on Completing the Fertility Transition, at United Nations Headquarters in New York, from 11 to 14 March 2002. The purpose of the meeting was to discuss guidelines for fertility change proposed by the Division for use in intermediate-fertility countries, defined as countries with total fertility between 2.1 and 5 children per woman in 1995-2000. The proposed guidelines anticipate that by 2050 fertility in the intermediate-fertility countries will fall below the level required for long-term population replacement. These guidelines represent an important break with traditional demographic views about the future of fertility and with the guidelines used by the Population Division to project the fertility of intermediate-fertility countries in the *2000 Revision* of the official United Nations projections.

The meeting was opened by Mr. Joseph Chamie, Director of the Population Division, who noted that this meeting was the third in a series. The first meeting, held in 1997, focused on future fertility assumptions in low-fertility countries. The report and papers of that meeting were published in the monograph "Below-replacement fertility" (United Nations, 2000). The second meeting, held in 2001, focused on future fertility assumptions for high fertility countries (United Nations, 2001).

Mr. Chamie noted that an impressive group of scholars from all over the world had gathered in New York for this meeting. Many of them had prepared background or country papers covering a broad range of topics and providing case studies on countries in all regions of the world, and the discussions held at the meeting promised to be exciting. Historically, Mr. Chamie said, the Population Division has played a leading role in the population field. Since its establishment in 1946, it has maintained a tradition of addressing key population and development issues. Mr. Frank Notestein, first Director of the Division, spoke with vision and boldness about the expected evolution of the world population when he addressed the first meeting of the Population Commission in 1947. A major achievement of the Commission was the convening of the first global intergovernmental conference dealing with population and development held in Bucharest in 1974. This groundbreaking United Nations conference was followed by the 1984 Mexico City Conference and, 10 years later, by the International Conference on Population and Development held in Cairo in 1994.

Mr. Chamie concluded his introduction by noting that the Population Division aimed to continue the tradition of addressing the most critical and challenging questions in the population field with scientific rigour, clarity and boldness. With the assistance of the experts gathered at the meeting, he said, those goals would be furthered during the coming four days of discussion and debate. Mr. Chamie then invited the moderator for the opening session, Ms. Afsani Bassir-Pour, United Nations correspondent for *Le Monde,* to begin the session.

REFERENCES

United Nations (1999). Below-replacement fertility. *Population Bulletin of the United Nations*, Nos. 40/41, New York.

United Nations (2001). United Nations workshop on prospects for fertility decline in high fertility countries. Working Paper No. ESA/P/WP.167.

Completing the fertility transition: issues and a proposal

The first session provided the focus for the Conference as a whole by presenting the proposed guidelines for the projection of fertility. The background paper for this session was prepared by the United Nations Population Division and presented by Ms. Sabine Henning.

THE FUTURE OF FERTILITY IN INTERMEDIATE-FERTILITY COUNTRIES

Population Division

Two considerations prompted a revision of the existing guidelines for the projection of fertility in the intermediate-fertility countries, Ms. Henning said. The first was the growing number of developing countries whose fertility was already below replacement level. The experience of China and several countries or areas in Eastern and South-Eastern Asia and in the Caribbean, she said, indicate that the transition to low fertility will not necessarily stop at replacement level.

The second consideration was the finding that socio-economic factors alone could not explain the onset of fertility decline, especially given the diversity of social, economic and cultural settings in which the transition to low fertility was occurring. Recent studies of the fertility transition indicate that it has been driven mainly by the diffusion of information, ideas, values and norms regarding fertility control. The pervasiveness of fertility reductions and the implied normative and behavioural changes suggest that a similar process might be driving the persistence of below-replacement fertility in developed countries. This diffusion could lead to similar behavioural change in other societies, causing below-replacement fertility to spread from one social group to another and from one country to another.

The key revision to the guidelines, Ms. Henning said, was that the target level of fertility reached by 2050 (that is, on or before 2045-2050) in the medium variant for the intermediate-fertility countries would be changed from 2.1 children per woman as in the *2000 Revision* to 1.85 children per woman. In the low and high variants, the target fertility levels for intermediate-fertility countries would be 1.35 and 2.35 children per woman, respectively. No changes would be made to the guidelines for the projection of fertility in high-fertility countries or to those for low-fertility countries.

Ms. Henning concluded by noting that, until recently, demographers had thought that the demographic transition would end by producing a stable state in which fertility remained constant at replacement level and total world population stabilized. It now appeared likely, she said, that the world as a whole might experience an extended period of below replacement fertility leading, eventually, to a reduction of world population. This change in thinking about long-term trends in future population growth was momentous.

Discussion

Discussion of the issues raised by this presentation continued throughout the meeting as participants raised points stimulated by subsequent presentations. This section incorporates some of the pertinent points made in subsequent sessions as well as the discussion that immediately followed the presentation of the revised guidelines. Section VIII of this report presents more conclusions of the meeting concerning the proposed United Nations guidelines.

There was general agreement that fertility in the intermediate-fertility countries would decline to levels below replacement, but a diversity of views was expressed on how soon this might happen. It was pointed out that the developing countries in which fertility had already fallen to below replacement level were not representative of all developing countries. It was also noted, however, that the intermediate-fertility countries in which fertility had fallen rapidly to levels just above replacement were a very heterogeneous group. Some participants questioned whether fertility in some intermediate-fertility countries would really fall below replacement level by 2050. Other participants expressed confidence that fertility would fall below replacement level in many of the most populous intermediate-fertility countries, despite possibly lagging economic development.

It was suggested that, on the one hand, that reducing fertility from 3.3 to 2.1 children per woman in some of the intermediate-fertility countries would be difficult, but also that declining fertility would bring about changes in the lives of women that would promote further fertility decline. As fertility declined, women became increasingly free to adopt social and economic roles that did not involve childbearing. Consequently, the potential for further fertility reductions would increase as rising proportions of women would remain unmarried or voluntarily childless within marriage.

It was noted that the rate of fertility change depended on the level of fertility attained. Declines would tend to be slower at higher levels of fertility when the transition was starting than when the transition had gained momentum and somewhat lower levels of fertility had been reached. The pace of decline would slow, however, as fertility approached 2 children per woman. This pattern of fertility change should be incorporated in projections of future fertility, rather than the pattern of linear decline that seemed to underlie most of the projected fertility trends for intermediate-fertility countries in the *2000 Revision*. With such a change, the "target" level of fertility could be thought of as a "floor" below which fertility would not fall.

Several participants felt that using a single target value for all intermediate-fertility countries was not advisable and suggested that different targets might be used for different regions of the world. It was pointed out, however, that the countries making up the world regions were already too diverse to justify a regional approach of this kind, though this diversity might be taken account of by grouping countries in other ways.

Keynote address

Following the presentation of the proposed new guidelines a keynote address was presented by Mr. John Caldwell, Professor at the Australian National University.

THE CONTEMPORARY POPULATION CHALLENGE

John C. Caldwell

Mr. Caldwell began by saying that the present time was an unexpectedly critical one for population change and policy. Huge population growth would continue for another 50 years, but the Governments of developed countries seemed to be losing interest in the issue. The immediate challenge was to maintain some of the attitudes, policies and foreign assistance expenditures that had so far sustained the fertility decline in the developing world. If this did not happen, then slow or stationary world population growth might be attained with a population of 10, 11 or 12 billion persons rather than with 8 or 9 billion persons. The difference such figures could make in terms of long-term environmental sustainability would be enormous. A lower population size in the future was likely, Mr. Caldwell said, if developed countries did not become too fixated on their own prospects of population decline in coming decades. One concern was that technical aid for family planning programmes in developing countries would continue to fall if the prospect of population decline in developed countries became an all-absorbing policy concern in these countries. Another concern would arise if, as seemed likely in the long-term future, countries with below-replacement fertility adopted pronatalist policies aimed at stabilizing population numbers. If that happened, countries all over the world, including those that might still have relatively high fertility levels, might tend to follow suit and adopt pronatalist measures as well.

The most difficult aspect of future demographic behaviour in the world would likely be international migration. The pressure from both legal and illegal migrants to enter the developed countries would probably be far greater than the numbers those countries desire. The growth of large cities in developing countries also raised a number of issues. In particular, questions about the health levels of the poor living in those cities had to be answered by quantitative inquiry to give direction to remedial measures. Further specialized work was needed, finally, to delineate and measure the impact of the HIV/AIDS epidemic.

Mr. Caldwell concluded by observing that there no longer seemed to be any barriers to most countries reaching below replacement fertility levels. Whereas we once thought of the demographic transition as leading to a stationary population where population growth would be zero, more recently we have thought in terms of a maximum population followed by a long period of perhaps accelerating reductions. This might not be a bad outcome.

Global issues impacting the fertility transition

Moderator François Héran introduced the four speakers in turn. The discussion of the four papers is summarized in section E below.

IMPACT OF THE 1994 INTERNATIONAL CONFERENCE ON POPULATION AND DEVELOPMENT

Jason L. Finkle

Mr. Finkle discussed the political dynamics and patterns of influence that gave shape and substance to the International Conference on Population and Development, "the Cairo Conference". The Conference was part of a process that did not end with the adjournment of the meeting, he said. It has continued for many years thereafter as Governments and international organizations of all kinds struggle to accommodate, or at times ignore, the Cairo Programme of Action. At the same time, the role of past United Nations population conferences in shaping the Cairo Conference and its aftermath must be recognized.

The United Nations population conferences, Mr. Finkle said, have evolved through three stages. First came the epistemic gatherings of Rome in 1954 and Belgrade in 1965, where participants were invited as experts. Their aim was to discuss scientific ideas, and more general problems, and to encourage population research and training in the Third World. They were neither authorized nor inclined to make "commitments" on behalf of their Governments. Notwithstanding the intellectual value of these meetings, they did not satisfy many nations that were concerned, if not alarmed, by rapid population growth in the developing world. This led to the second stage, the intergovernmental conferences at Bucharest in 1974 and Mexico City in 1984. Here the focus shifted from expertise to policy. In the minds of donor Governments and population activists, the main purpose of these conferences was to make Governments aware of population problems and to encourage and assist them in lowering their birth rates. Cairo represented a third stage in this evolution, marked by the massive presence and active involvement of non-governmental organizations (NGOs). Mr. Finkle said that this was actively promoted by donor nations, partly out of frustration with what they perceived as bureaucratic inefficiency and a generally poor quality of governance. This fundamentally changed the dynamic of the Conference and was in no small part responsible for the shift from population and development to gender issues and reproductive health.

Assessing the impact of the Cairo Conference on Government policies and programmes throughout the world is a complex and difficult task. Work that Mr. Finkle had done with Jack Kantner suggested that direct and immediate impacts were limited, and indeed that some policies and programmes have not been affected at all. Rhetorical compliance as reflected in statements by national leaders may contribute to a change in policy, but change may come slowly and incompletely. It may be too much to expect conferences to prescribe population policies.

More important than the specific programmatic changes that Cairo recommended was the clear and unqualified demand that women be equal partners with men in every phase of life and therefore, implicitly, the recognition of the comparative disadvantage of women at the present time. One major reservation, Mr. Finkle noted, was that the objectives of Cairo were not advanced, in his opinion, by using a population conference to fight for women's rights. The Beijing Conference was the appropriate forum for that.

THE ROLE OF INTERNATIONAL FUNDING IN FUTURE FERTILITY DECLINES AMONG INTERMEDIATE-FERTILITY COUNTRIES

Steven W. Sinding

Mr. Sinding began by saying that his paper examined the role of external funding in past fertility declines and speculated about future fertility declines in the intermediate-fertility countries. The work had begun with an attempt to show by statistical methods that countries with a high level of political will and significant external assistance achieved more rapid fertility declines, other things being equal, than other countries. Regrettably, no statistically significant findings emerged. This should not be interpreted to mean that political will and external funding are irrelevant, however, but rather that they were inadequately measured and that their effect was washed out by other, unmeasured factors. In particular, during much of the Cold War, money flowed to developing countries for geopolitical rather than developmental reasons.

A better approach, Mr. Sinding suggested, might be to select pairs of countries, with one country in each pair experiencing more rapid fertility decline. One could then explore differences between each pair of countries that might account for the different rate of fertility decline. While this lacks the elegance of multiple regression analysis, it is more contextual and more appealing to the common sense of well-informed observers. From the experience of such countries as Bangladesh, Ghana, Indonesia and Kenya, Mr. Sinding concluded that external aid could not substitute for sound development policies, population policies, and political will. Where these factors are present, however, external assistance can significantly accelerate fertility decline.

Will future external funding produce more rapid fertility decline in the intermediate-fertility countries? Mr. Sinding did not think that it would, not because external funding does not matter, but because he did not think that this funding would be forthcoming. Assistance for population programmes has fallen regrettably short of the goals set at the Cairo Conference. There seems to be a broad decline of interest, he said, in population growth as a matter of international and public concern on the part of countries and international agencies. This was evident in the absence of Cairo goals in the United Nations Millennium goals, in the failure of the forthcoming environment conference at Johannesburg to mention population as a factor in environmental problems, and in the growing media preoccupation with ageing and below-replacement fertility. It seemed unlikely that this trend would be reversed, or that external assistance for programmes to reduce fertility would increase in the future. The "population movement" that originated in the 1960s may have nearly run its course. Domestic resources and the continued momentum of the small family norm that this movement helped create may be far more important for future fertility declines than external assistance.

EXAMINING CHANGES IN THE STATUS OF WOMEN AND GENDER AS PREDICTORS OF FERTILITY CHANGE ISSUES IN INTERMEDIATE-FERTILITY COUNTRIES

María E. Cosío-Zavala

Ms. María Cosío-Zavala proposed the introduction of a gender perspective into the study of fertility transition, because gender relations have a critical but neglected influence on fertility behaviour. Her presentation reviewed four studies of these influences and noted indicators and results that seem particularly relevant to the study of declining fertility. A study of five Asian countries used several indicators of women's autonomy, including economic decision-making authority, freedom of personal movement, freedom from threat of bodily harm, and access to economic resources. Studies in Africa provide evidence of two models of reproductive behaviour. In the traditional model, high fertility is associated with low autonomy of women. In the modern model, low fertility is associated with high autonomy of women. Studies in Latin America have focused on male and female roles in child-rearing. A study in Nigeria of couple's agreement on the wife's autonomy looked at several indicators of woman's authority to determine whether some indicators are more strongly related to reproductive outcomes. The six indicators used reflect wives' involvement in household economic decisions, their contributions to household expenditures, their decision-making power, and the level of agreement between husbands and wives on the wife's authority. One interesting finding is that husbands in Nigeria are more likely than wives to be contraceptive users if they approve of family planning. Another study using individual level data from three sites in South Asia argued that gender systems influence the pace at which fertility transition proceeds and pointed to two conclusions. First, female autonomy plays an important role in reproductive behaviour. Second, there is strong evidence that gender systems play a strong role in explaining reproductive behaviour even after controlling for women's autonomy. The role of women's decision-making power in Mexico's rapid fertility decline may be evaluated using a national survey on family planning. The results of this study show that women's empowerment is positively associated to women's use of contraception.

The gender perspective, Ms. Cosío-Zavala concluded, enriches the theoretical framework for studying fertility decline in developing countries. Several indicators that have been developed are very useful in providing explanations. Most studies to date, however, examine only contraceptive intentions and desired family size. They do not distinguish between fertility reduction due to postponement or avoidance of marriage and fertility reduction due to contraceptive use. More research is required, but substantial progress has been made in understanding how gender systems influence fertility decline.

THE IMPACT OF HIV-1 ON FERTILITY IN SUB-SAHARAN AFRICA: CAUSES AND CONSEQUENCES

Simon Gregson, Basia Zaba, and Susan-Catherine Hunter

Ms. Basia Zaba began by describing the possible impacts HIV might have on fertility. It is important to point out in this connection that 2.1 children per women represents replacement level only if mortality risks are low. For the United Nations group of least developed countries, for example, replacement-level fertility is 2.7 children per woman.

Ms. Zaba noted that HIV affects fertility through both biological mechanisms operating on HIV-positive women and through social mechanisms operating on both HIV-positive and HIV-negative women. HIV-negative women are affected as a result of behavioural change resulting from personal and social circumstances created by the epidemic. Biological factors include fetal loss, amenorrhoea, increased susceptibility to other sexually transmitted diseases, decreased spermatogenesis, decreased coital frequency due to illness, and increased widowhood. The male factors affect HIV-negative women as well as HIV-positive women. Social factors include increased divorce and decreased remarriage, decreased breastfeeding, increased condom use, less extramarital and premarital sex, contraception to avoid leaving orphans, and "insurance" and "replacement" reactions to increased child mortality. Behavioural changes aimed at reducing the risk of AIDS will often have fertility consequences, though these may not be intended.

Analysis of data from community surveys together with models of the impact of HIV on fertility suggests that the fertility of HIV-positive women is 10 to 50 per cent lower than fertility of HIV-negative women at ages 20 years and over. The differential is larger in high fertility countries. The impact of the epidemic is much larger than its impact on HIV-positive women, however, because of population selection effects and behavioural change among HIV-negative women.

Discussion

It was noted that assessment of the direct impact of the Cairo Conference on Government policies and programmes may not be appropriate, even if this is the long run objective. The Conference served rather to define and redefine a universe of discourse within which population issues are discussed over the long term. It was very appropriate for Mr. Finkle's paper to focus on ideology as a feature of international conferences. A "political correctness" emerged at the Bucharest Conference, and it was concerned far less with population than with the "new international economic order". The same may be true of the Cairo Conference, which shifted emphasis away from family planning and toward reproductive health services. This does not necessarily lead to a loss of focus on population and development, however, nor was the feminist agenda that emerged at Cairo inconsistent with a focus on population and development. There was proper worry about the human cost to women entailed by excessive emphasis on family planning targets. Moreover, addressing concerns of women is an enabling condition for successfully addressing population and development issues. On the whole, national governments appear to be pragmatic about population. They continue to see population as important for development. It is important, however, to get NGOs which became involved at Cairo more sensitized to population issues.

Mr. Sinding's contention that preoccupation with low fertility has drawn attention away from the problem of rapid population growth was questioned. It was noted that in Europe, where the world's lowest fertility level countries are located, there is considerable concern with population growth. Mr. Sinding replied that while this was true, there was at the same time little funding of population programmes by these Governments. Indeed, because immigration from relatively rapidly growing countries is a sensitive issue in Europe, there is a tendency to back away from such funding. Countries do not want to appear to be resisting immigration by promoting population control in the countries from which their immigrants originate. In support of Mr. Sinding's contention it was pointed out that two messages about population growth are being broadcast: that it may be too slow in some countries, but too fast in some other countries. In contrast, during the 1960s, there was a single message that all countries should attempt to reduce population growth. There is reason to worry that, over the long term, pronatalist policies of low-fertility countries may spread to higher fertility countries.

It was suggested that Government policies to raise fertility are inherently more difficult than policies to reduce fertility. This is because the latter have to compensate parents for the children they do not have, whereas the former have to compensate parents for both the costs of raising additional children and for the opportunity costs of having children they would not otherwise have had. Mr. Sinding replied that one reason demographers have been surprised at the speed of fertility declines is that they have not appreciated the impact of policy. They tend to think that demographic behaviour is peculiarly resistant to Government intervention. They were wrong with respect to the decline of fertility in the high fertility countries, however, and they may yet be shown wrong about the difficulty faced by policies to raise fertility in countries with below-replacement-level fertility. In response, however, it was suggested that policies are of minor importance compared to mass political movements. The response to 30 years of low fertility in Europe has been muted, but there has not yet been any significant population decline. Should population decline by one third, a political and social response would probably be forthcoming.

The nature of policy impacts was clarified by way of a comparison between Mexico and Brazil. Mexico has a population policy. Brazil has none. Fertility has declined rapidly in both countries. This does not mean that policy is irrelevant, however. There is much more abortion in Brazil than in Mexico. Fertility decline may occur without supporting policy, but only by incurring a serious social cost. Policy can facilitate adaptation to changes that would have occurred in any case. Fertility decline is not the only issue.

It was noted that world population will increase by more than one billion persons between 2000 and 2015, that almost all of this growth will be in the developing countries, and that much of it will be in the world's least developed countries, many of which still have high fertility. Another participant questioned Mr. Sinding's assertion that support for population and development issues is in decline, citing interest on the part of the Government of the United States and various private foundations. In response, Mr. Sinding noted that several of these foundations had recently closed down their population programmes. Another participant noted that though external funding is important, it is not necessarily the most important factor. The Islamic Republic of Iran, for example, received no external funding after the revolution, yet fertility there has declined very rapidly and is now just above replacement level.

Mr. Sinding said that it was very important to return to a broad view of population in development planning, committed to such issues as primary education and to health care. He noted also that the population industry, though perhaps in decline, is still "alive and kicking". Finally, he emphasized the importance of understanding the concept of the momentum of population growth and of developing policies to address it. Where is funding likely to go? What is the alternative to early and frequent childbearing?

Concerning Ms. Cosío-Zavala's paper, it was noted that the status of women is very much a social concept. In some contexts, women who have many children and who do not have to engage in paid employment may have higher status than other women. In some countries in which gender inequity is increasing we nonetheless observe rapid fertility decline. This suggests that there is no clear relation between the two phenomena. It was suggested that we should perhaps be less insistent about the predictive value of gender variables. Between 1996 and 1998 fertility declined in all groups in South Africa, but there was no increase in the status of women. The explanation seems to have been, rather, that women realized the economic advantages of small families.

It was suggested, with respect to Ms. Zaba's presentation, that the biggest impact of the HIV/AIDS epidemic is likely to be on *uninfected* women, that there may be a large behavioural response as consciousness of the epidemic develops. Another participant noted that an analysis of the most recent census data has found no evidence of an increase in widowhood in Kenya despite a severe HIV/AIDS epidemic. It appears that when a woman loses her husband she is absorbed into her husband's brother's family. If this new marriage is consummated, the brother's family is at risk. Ms. Zaba responded that there is indeed levirate marriage, but that there is pressure to keep it symbolic (unconsummated) precisely because of the risk of HIV-infection. In response to a question on the issue of survival of HIV-infected children, Ms. Zaba noted that estimates of child mortality due to AIDS have been revised on the basis of new evidence from community studies. Unfortunately, HIV tests for children are much more expensive than tests for adults, so that this data is generally obtained only in clinical settings. It was pointed out that the most recent Demographic and Health Survey in Mali includes AIDS seroprevalence tests for adults.

Levels, trends and determinants of fertility

The meeting continued with four background papers on levels and trends of fertility in the intermediate-fertility countries and on the determinants of these levels and trends.

FERTILITY LEVELS AND TRENDS IN COUNTRIES WITH INTERMEDIATE LEVELS OF FERTILITY

Population Division

The background paper for this session was prepared by the United Nations Population Division and presented by Ms. Hanta Rafalimanana. The paper focused on 54 intermediate-fertility countries with a population of 1 million or more persons in 2000, including 12 countries in Africa, 21 countries in Asia, 20 countries in Latin America and the Caribbean, and 1 country in Oceania. For the past three decades, fertility has been declining in all of these countries. The pace of decline is higher for higher fertility countries and lower for lower fertility countries. The changing age pattern of fertility suggests that older women contributed most to the decline, with the exception of North Africa, where rising age at marriage resulted in lower birth rates for younger women. Though contraceptive use levels are high, levels of unmet need for contraception remain high as well, suggesting a potential for further fertility decline. In many countries, fertility declined more rapidly for women with no education than for women with secondary or higher education, and more rapidly for rural women than for urban women. However, declines had occurred in all socio-economic groups considered, even in countries where development was lagging. The central questions remained, whether fertility in these countries will decline to replacement or below-replacement levels without further improvement in socio-economic conditions, and whether relatively low fertility could be sustained without those improvements.

Family structure and the Decline of fertility in intermediate-fertility countries in West Africa

Thérèse Locoh

Ms. Locoh began by noting that her paper concentrates on the West African countries, particularly on Ghana, Cameroon, Côte d'Ivoire, Nigeria and Togo. Only Ghana has entered the group of intermediate-fertility countries, but the others are close, with total fertility rates just over 5 children per woman. Fertility in West Africa is strongly influenced by social norms and family arrangements. There is a preference for large families. Children are cared for by the adult members of their lineage as much as by their parents. Marriage occurs early and polygamy is practiced. Matrimonial systems in West Africa, which have been favourable to high fertility, are changing. Family influence on matrimonial decisions has declined, as shown by increasing mean age at marriage, declining age difference between spouses, a slight decline in polygamy, and an increase in marital dissolution. Large, multigenerational households are common, but so are female-headed households. The countries where fertility has started to decline are also the countries in which female-headed households are most common. Extended families play an important role in child rearing, but economic problems may have weakened this role and it is now observed that some young, educated urban adults are adopting a more nuclear family-centred way of life that implies a need to limit the number of children they have.

Though rapid transformation of family structures in West Africa has been observed, the fertility consequences are uncertain. The most important impact of rising female age at marriage may be that it will allow young women to become more independent and take a larger role in decisions that concern them. With respect to relations between spouses, two trends have been observed, rising autonomy for women and closer relationships between spouses. Both of these may lead to lower fertility. Contraceptive use is not common, even in the countries with lowest fertility. Fertility has declined as a result of birth spacing, separation of spouses, and unions without co-residence. In several West African cities, including Douala, Yaoundé, Accra and Abidjan, total fertility rates have declined to between 2 and 3 children per woman. This decline may spread to other cities in the region. The motivation for smaller families is present, but availability of contraceptives is limited.

Will the small family norm be adopted in West Africa in less than 50 years? Probably not in the countries of the Sahel as a whole. It will be adopted in the larger cities, but not necessarily in the smaller cities or in rural areas.

EDUCATION AND FUTURE FERTILITY TRENDS, WITH SPECIAL REFERENCE TO MID-TRANSITIONAL COUNTRIES

John Cleland

Mr. Cleland said that his paper addressed the relationship between education and fertility decline in the intermediate-fertility countries, and more particularly whether this relation suggests that fertility in these countries will decline to below replacement levels. The paper presented a simple model of the way in which the relationship between education and fertility changes during the fertility transition. In pre-transitional societies the link between education and fertility is weak and variable. Most persons have received little or no formal schooling and fertility differentials are small. As fertility decline begins, fertility differentials by schooling tend to increase because family size declines first among the best educated and last among the least educated. Family size among the least educated declines after a lag, however, whence fertility differentials by education begin to decline. Toward the end of the transition, they tend to disappear. Abundant evidence supports this temporal model of the changing relation between education and fertility.

The temporal perspective, Mr. Cleland emphasized, provides greater insight into the possible role of schooling in future fertility decline than the more common cross-sectional perspective. The reproductive behaviour of the best-educated elite probably provides the best guide for the future behaviour for the rest of the population. Well-schooled couples represent a vanguard of change that less well-schooled couples are likely to follow in the future. Historical evidence strongly suggests that convergence between education strata will come about as the fertility transition ends. There is probably no better guide to fertility forecasting at the national level than to assume that the less privileged strata will follow the path of the most privileged. To be sure, the speed with which this happens may vary greatly between countries. A corollary of this temporal perspective is that detailed consideration of future trends in schooling and their impact on fertility may be a poor investment of time and resources.

FEMALE LABOUR-FORCE PARTICIPATION

Lin Lean Lim

Ms. Lim began by observing that recent increases in women's labour force participation in the intermediate-fertility countries will not necessarily lead to lower fertility. An inverse relation between female labour force participation and fertility will be observed only if certain conditions hold. Two of the most important conditions are, first, that circumstances make it difficult for women to engage simultaneously in childbearing and labour force participation, and second, that the satisfaction that women derive from work exceeds that which they derive from having children. Many of the jobs that women have been engaged in do not provide superior satisfaction, however, and many do not seriously conflict with childbearing. Increases in women's labour force participation appear to have been accompanied by a general deterioration in the quality of work and therefore cannot be supposed to lead to lower fertility.

Ms. Lim's presentation identified numerous indicators of the quality of women's labour force participation, including the proportion in wage and salary employment, the level of security of income provided by employment, whether or not employment is home-based, the level of occupational segregation, and whether the employment provides incentives to the use of child labour. She suggested in conclusion that attempts to link women's labour force participation to fertility should go beyond labour force participation rates and examine the quality of employment.

Discussion

The discussion began with the background paper on levels, trends and determinants of fertility. One expert raised a caution on the use of statistics from the Gulf countries, noting that many of them have a very large proportion of foreign workers. Total fertility rates at the national level may be rather low on account of this, but the native populations in these countries have some of the highest levels of fertility in the world. Ms. Rafalimanana replied that this had been duly taken account of in the estimates presented in the background paper. Another expert noted that there have been major changes in marriage behaviour in some areas of South-East Asia, with proportions of women never married around age 30 years rising in some areas from around 10 to nearly 30 per cent.

Several meeting participants expressed appreciation for Ms. Locoh's presentation on family structure and fertility in West Africa. It was noted that there is a low fertility belt that runs across West Africa, though this is obscured by Nigeria's extending so far north, and that rural-urban fertility differentials are larger here than anywhere else in the world. Several participants regretted the lack of similar studies for Latin America.

Mr. Cleland's conclusion that detailed study of future trends in schooling and their impact on fertility could be a poor investment of resources was questioned by several participants. It was pointed out that while education differentials may indeed become less important in the future, they continue to be of interest and importance during the transition. It was also noted, however, that the "value added" of these studies for projection purposes needed to be kept in mind, since it is possible to spend a great deal of time and effort on them without seeing much change in the projection results. The more basic work of getting accurate estimates of fertility levels for the recent past should take priority.

It was noted that changing educational composition in India explains only about 20 per cent of fertility change. Most of the change is due to fertility decline among illiterate women. As education has become more widespread, and as knowledge increasingly comes from many sources other than schools, the meaning and perception of education in society as a whole has changed. Women with little or no education may recognize a quality-quantity trade-off for their children and choose to have fewer children so that the children they do have can become better educated. Children with fewer siblings benefit both from less dilution of family resources available for education and from not having to spend time helping their mother take care of younger brothers and sisters.

Ms. Lin's contentions regarding the quality of women's labour force participation were generally accepted. One participant was puzzled by the pattern of the data for Asia and the Pacific and raised the question of whether labour force participation data was measuring different things in different countries, drawing attention to the importance of investigating data problems.

National policies and programmes

Two papers were presented during this session. The moderator, Mr. Dov Friedlander, introduced the papers and presided over the following discussion.

VIEWS AND POLICIES CONCERNING POPULATION GROWTH AND FERTILITY AMONG GOVERNMENTS IN INTERMEDIATE-FERTILITY COUNTRIES

Population Division

The background paper for this session was prepared by the United Nations Population Division and presented by Mr. Anatoly Zoubanov. His presentation reviewed the policies and views of Governments of the intermediate-fertility countries on fertility, family planning, reproductive health, and related matters. The majority of intermediate-fertility countries had policies to reduce fertility during the past 25 years. The proportion of Governments with a policy to lower fertility rose from 47 per cent in 1976 to 63 per cent in 2001. The percentage of intermediate-fertility countries providing direct support for family planning has increased during the past 25 years. Following the adoption of the Programme of Action at the Cairo Conference in 1994, many Governments have been revising their national population and health policies and integrating family planning with comprehensive reproductive and general health policies.

EFFORT MEASURES FOR FAMILY PLANNING ACTION PROGRAMMES: PAST TRENDS AND FUTURE PROSPECTS

John A. Ross

Mr. Ross noted that while other papers presented to this meeting have been concerned with fertility, his paper dealt with family planning programme efforts and changes in contraceptive prevalence. A review of contraceptive prevalence trends for the intermediate-fertility countries led to the following observations: upward movement has been remarkably even; there is no evidence of plateauing; there is considerable variation in level; and central tendencies in Asia, Latin America, and North Africa and the Middle East are remarkably similar. Mr. Ross then raised the question of how high contraceptive prevalence and programme effort measures might go. A ceiling for contraceptive use may be in the range of 80 to 85 per cent. Prevalence of 75 to 85 per cent is generally consistent with replacement level fertility. Both positive and negative influences will impinge on future trends in programme effort and its effect on contraceptive use. The net effect will vary from one country to another, but most programmes have ample room for improvement and the past record is encouraging. There has been as yet no sign of a fall-off in contraceptive use in the intermediate-fertility countries and their programme effort scores have been rising. Both trends, however, are linked to changes in social settings whose continuation is not entirely assured.

Discussion

One participant asked to what extent the measures of family programme effort referred to in Mr. Ross's paper reflected Government ideas and behaviour and to what extent they reflected public demand. Another participant asked how the programme effort methodology handled the diversity of implementation at the sub-national level that results when family planning programmes are decentralized. Mr. Ross responded that the effort measures were derived from questions addressed to persons knowledgeable about the country's family planning programme. In the case of decentralized programmes, the respondents were supposed to "take an average" over the entire country in formulating their answers. The measures did not incorporate any direct component reflecting demand for contraception. It was suggested that Mr. Ross's paper underscored several comments made earlier in the meeting that what countries do bears little relation to the pronouncements of international conferences. Still, it was said, the programme effort analysis was encouraging. The discussion concluded with a brief comment on the situation in Mexico, where contraceptive use is at about 70 per cent and programme effort may be as high as it will get.

Future expectations for fertility

THE END OF THE FERTILITY TRANSITION IN THE DEVELOPING WORLD

John Bongaarts

Mr. Bongaarts began by noting that reproductive behaviour has changed rapidly in much of the developing world over the past four decades. Recent fertility declines have been more rapid and pervasive than was expected. Conventional theories have little to say about the pace of fertility decline or the level at which fertility will stabilize at the end of the transition. The objective of his study was to identify regularities in the past record that may provide clues to future trends. There were three principal conclusions. First, the future course of fertility will depend crucially on human development, as suggested by regression analysis of past trends in fertility and (representing human development) literacy and life expectancy at birth. Second, the pace of fertility decline will slow as countries approach the later stages of the fertility transition. This is to be expected, but Demographic and Health Surveys taken during the 1990s have indicated that fertility decline has stalled in several large intermediate-fertility countries that had previously seen substantial fertility declines. Third, average fertility can be expected to remain significantly above replacement level until at least 2025. The proportion of developing countries with fertility below two, currently one in ten, will no doubt rise over time, but it will almost certainly be less than one half by 2020-2025.

THE PROXIMATE DETERMINANTS DURING THE FERTILITY TRANSITION

Jean-Pierre Guengant

Mr. Guengant began by noting the importance of "proximate determinants" for projecting future fertility in the intermediate-fertility countries. Since the early 1980s, the United Nations Population Division has made periodic assessments of the level and trend of contraceptive use in all countries of the world for which data is available. The latest assessment, *Levels and Trends of Contraceptive Use as Assessed in 1998* (New York: United Nations, 2000), includes projected contraceptive prevalence at the regional level up to 2025 derived from the fertility assumptions of the *World Population Prospects: the 1998 Revision* (New York: United Nations, 2001). It is important to review these relations between fertility and contraceptive prevalence trends in the intermediate-fertility countries.

Mr. Guengant had carried out an analysis of these data using the FAMPLAN computer programme. Keeping in mind the limitations of the data, he computed the contraceptive prevalence required to reach the 2025 and 2050 fertility levels in the *2000 Revision* for each of eight developing regions provided that all other factors remain constant. For Western Asia, for example, contraceptive use should reach 66 per cent by 2035 to reach a total fertility rate of 2.3 children per woman, the projected low variant value given in the *2000 Revision.* This and similar exercises suggest that it cannot be taken for granted that fertility in all of these countries will soon reach replacement level. In concluding, Mr. Guengant noted that while he did not propose that fertility should be projected by projecting its proximate determinants, he did strongly recommend that the relationship between fertility projections and proximate determinant projections be explored when making projections.

Discussion

Discussion began with a comment on Mr. Bongaarts' paper. If the Population Division had arranged for a meeting on this subject for European countries during the 1960s, it was suggested, the meeting would have come to the same conclusion: that fertility would not fall so quickly. Multiple regression analysis, in particular, can be misleading. Mr. Bongaarts noted that the United States had below replacement fertility during the 1930s and that the many demographers who predicted continuing low fertility on this basis failed to anticipate the "baby boom". Similarly, the United States Census Bureau missed the "baby bust" as late as the early 1970s. This was a failure of "momentum" forecasting that should not be repeated, Mr. Bongaarts added.

Regarding the negative relationship between fertility and literacy, it was noted that causation may work in both directions. In many societies, declining fertility means that children spend less time and effort helping their mother care for younger siblings and are therefore better able to take advantage of educational opportunities. A discussion ensued concerning the quality of the Demographic and Health Survey (DHS) data that indicated stalls in fertility decline. It was pointed out that fertility surveys frequently indicate a huge but spurious decline in fertility just before the survey is taken, a pattern clearly revealed when two or more surveys are available for the same country. Mr. Bongaarts agreed that this was the case, but noted that the trend indicated by successive surveys will be accurate if the error in the estimates is the same in each survey.

One participant noted that economist Herbert Stein once said that "a trend that can't continue won't continue". But what reason is there to expect fertility to level off at 2.2 children per woman rather than 1.8 children per woman, or some other number? And shouldn't the variables in Mr. Bongaarts regressions include the communications explosion? Mr. Bongaarts noted in response that we don't expect any country to hit the target level of fertility exactly. We want a number for the target that will minimize the difference between actual and target fertility taken over all countries. Another participant called attention to the importance of "unwanted fertility". This has been extremely important in the United States, where unwanted fertility has been at about 0.5 children per woman and did not change between the early 1980s and the early 1990s. Mr. Bongaarts agreed with this observation.

On the matter of "proximate determinants" and fertility decline, one participant suggested that projecting fertility by projecting intermediate variables would lead to very conservative projections, mainly because of limitations in the measurement of abortion and spousal separation. Mr. Guengant replied that he fully recognized both the practical and the theoretical limitations of the proximate determinants framework and that it was not his suggestion to base fertility projections solely upon it. Proximate determinant models can shed useful light on the issue, however, by calling attention to discrepancies between projections of fertility and projections of contraceptive prevalence.

Reflections of ambassadors

Mr. Joseph Chamie, Director of the United Nations Population Division and moderator of the session, began by saying how honoured the meeting was to have representatives from four Permanent Missions to the United Nations, Egypt, the Islamic Republic of Iran, Brazil and Mexico. Mr. Chamie then introduced the four speakers in turn.

His Excellency Mr. Ahmed Aboul Gheit (Egypt)

His Excellency Mr. Aboul Gheit focused on the implications of fertility and population trends for the future of Egypt. The Egyptian Health Ministry has said that a new baby is born in Egypt every 2.3 seconds and that by 2025 the Egyptian population will be between 93 and 100 million persons. In 1913, by comparison, the country had only 13 million persons. This was a very large increase. Only 4 per cent of Egyptian land is arable. Much of the country is desert, without rain, so agriculture depends on the river Nile. This situation is compounded by the loss of arable land to development. The population of Cairo is now 23 million persons. Consider then, His Excellency said, what Egyptian policy-makers face in contemplating the year 2025. We are about 70 million persons today. Adding another 30 million will require creating 600,000 to 800,000 jobs annually, and we hope to eradicate illiteracy by 2025. How are we to stabilize the demographic explosion? We have been taking the necessary steps, in family planning programmes, in health, and in education. No village is without a health center, and people are learning the negative consequences of having a large family. His Excellency Mr. Aboul Gheit concluded by noting the role of globalization in demographic change. Television is everywhere and has affected family planning behaviour in Egypt.

His Excellency Mr. Nassrollah Kazemi Kamyab (Islamic Republic of Iran)

His Excellency Mr. Kazemi Kamyab focused on education and health care as two elements that have strongly influenced reproductive health programmes, family planning programmes, and fertility behaviour in the Islamic Republic of Iran over the past two decades. There have been tremendous achievements in these areas as a result of a comprehensive socio-economic and cultural process that has integrated all relevant sectors. Even at the neighbourhood level, for example, traditional meetings for Koran recitation have included question and answer sessions on reproductive health issues. By the end of the 1990s, more than 97 per cent of all children were enrolled in primary education. Adult literacy has risen from less than 60 per cent in 1988 to more than 80 per cent at the end of the 1990s, and the adult literacy rate for women nearly doubled, rising from 46 per cent to 80 per cent. Strong political commitment to achieving these results has been matched by the development of policies and programmes and an efficient infrastructure.

In 1988, His Excellency noted, the Islamic Republic of Iran initiated a wide range of reproductive health and family planning programmes. These were integrated into the primary health-care system and have been vigorously implemented. As a result, the maternal mortality rate has fallen from 237 maternal deaths per 100,000 women in 1988 to 37 per 100,000 in the late 1990s. Immunization coverage for children is almost universal, and child mortality has fallen from 173 child deaths per 1,000 births to 33 per 1,000 births. The modern contraceptive prevalence rate has risen to 55 per cent and the population growth rate has been reduced from 3.2 per cent in 1986 to 1.4 per cent in 2001.

His Excellency concluded by highlighting some of the challenges that the Islamic Republic of Iran will be facing in the near future. The main challenge, he said, will be the high rate of unemployment, which is straining public resources. If private investment and higher education do not relieve the situation, the public sector will need to provide more resources. As the children of the "baby boom" of the early 1980s will soon be reaching marriage age, provision of reproductive health and family planning will need more financial and human resources. In the Ministry of Health this has been seen as a crisis that will require tremendous effort and strong support of multilateral institutions, especially UNFPA. Finally, education and health depend to a large extent on Government funding, and this makes them vulnerable to changes in Government income and spending patterns. Increasing the role of the private sector in these activities could reduce such vulnerabilities.

Mr. José Ramón Lorenzo, First Secretary (Mexico)

Mr. Lorenzo noted that Mexican Government population policy dated back to 1974, at which time the Government became more open to the idea of a relation between family planning and unemployment and poverty. Population policies have had a large impact. In 2001 Mexico had a contraceptive use rate of 70 per cent. Regarding the future, Mr. Lorenzo said, the Government expected that the infant mortality rate will continue to decline. The population growth rate has been declining, and it is expected that population will begin to decline by 2044. Before then, however, a large increase in working age persons, as well as older persons, will have occurred. The future presents opportunities and challenges. Declining numbers of births will make it possible for health services and education to achieve higher coverage and quality. There will be less pressure to provide jobs and less pressure for people to migrate abroad. The Government expects, Mr. Lorenzo said, that the level of out migration will drop. Challenges include the aging of the population and increasing demand for health services for the elderly. The Government is very much aware of these issues and has reformed the pension system in anticipation. It is anticipated that the aging of the population will result in a shift in the balance of electoral power.

Mr. Alex Giacomelli da Silva, Second Secretary (Brazil)

Moderator Joseph Chamie introduced the presentation, noting that the representative from Brazil would speak briefly, after which Ms. Ana Maria Goldani would provide further information about the situation in Brazil. Mr. da Silva noted that the population of Brazil more than tripled between 1952 and 2000, from 52 million to 170 million people. Life expectancy at birth has increased from 40 to 68 years and the total fertility rate has declined from 6.2 to 2.3 children per woman. Mr. da Silva said that these are important facts and then asked Ms. Goldani to proceed with her remarks. Ms. Goldani began by saying that Brazil should be regarded as an "outlier" in the history of the demographic transition. Though Brazil is a wealthy country with low fertility, it has no official family planning programme. Several policies of the Brazilian Government implemented between 1975 and 1985 had unanticipated effects. They created a demand for family planning services which was met by sterilization. This is why sterilization has played a major role in Brazil's fertility decline.

Discussion

One participant asked, with respect to Egypt, about the role of the Imams in family planning. How have they interpreted the Koran in this context? It was said in reply that the idea that the Koran is against family planning is a stereotype, that there is nothing against family planning in the Koran. Islam is a very pragmatic religion. The Government of Egypt was very successful in recruiting religious leaders for family planning work.

Another participant asked how the decline in infant mortality in the Islamic Republic of Iran was achieved. The reply was that since the early 1980s the Islamic Republic of Iran had made many efforts to eradicate poverty. Rural areas were the focus, and there was extensive investment in rural agricultural development, health care and immunization, and especially in education. The Iranian experience was very impressive, it was noted. What was the role of religious leaders in family planning? What methods were used? The religious leadership in the Islamic Republic of Iran appreciates very strongly the importance of family planning and reproductive health, was the reply. The Health Ministry has used the large number of Koran recitation meetings as a way to disseminate information. The Ministries of Health and Education were both successfully involved in this work, as were women's non-governmental organizations. Regarding contraceptive methods, 60 per cent of use is of modern methods. Additionally, couples have very comprehensive workshops before marriage. Health-care facilities provide contraceptives, and private entities get Government subsidies for this purpose as well. The work is mostly supported by public sector funds. There seems to be a broad consensus on the importance of these programmes.

Back to the future: proposed United Nations assumptions

Mr. Joseph Chamie, Director of the Population Division, moderated the session and opened the discussion by making several points. First, he said, meetings of this kind provide necessary input to the work of the Population Division, which benefits greatly from the expertise of the participants. Second, he stressed, world population growth is not over. The medium variant projection in the *2000 Revision* shows world population growing from 6.1 billion in 2000 to 9.3 billion in 2050, an increase of 3.2 billion persons, or more than 50 per cent. Nearly all of this growth will occur in the less developed countries of the world, and much of it will occur in urban areas. Half of the growth will occur in a handful of countries, including Bangladesh, China, India, Indonesia, Nigeria and Pakistan. It is necessary to focus on these countries. World population has not stabilized, Mr. Chamie emphasized. Population momentum will cause world population growth to continue for many decades even if the level of fertility in the intermediate-fertility countries falls below replacement by 2050.

A third important point, Mr. Chamie continued, is that although fertility in the intermediate-fertility countries is expected to continue to decline, the rate of decline is likely to decrease as lower levels are reached. This may be compared to a train coming into a station. It cannot enter the station at full speed, it must slow down as it approaches. A fourth point is the principle, adopted in the Programme of Action of the International Conference on Population and Development (ICPD) in Cairo, that all couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children. Fifth, there will be great variation in the future. The Population Division takes account of the HIV/AIDS epidemic in our projections, but it does not attempt to forecast disasters. The Division's projections generally anticipate an improving human situation and continued progress in human welfare. Finally, returning to the specific focus of this meeting, the Population Division is proposing below-replacement fertility as a guideline for projecting fertility in the intermediate-fertility countries. In doing so, the Division is looking beyond 2025, as its mandate requires. Based on this meeting the Division will probably revise the target fertility level to 1.8 or 1.9 children per woman, rather than the 1.85 children per woman originally proposed, to avoid giving a spurious impression of accuracy.

Mr. Chamie then opened the meeting for general discussion. As the discussion proceeded, many participants thanked the Population Division for a constructive, useful and successful meeting that had broken new ground on an important subject.

Several participants endorsed the idea of revising the 1.85 children per woman target in the proposed guidelines to 1.9 children per woman. Three reasons were given in support of this change. First, it would be very odd for the target level for the intermediate-fertility countries to be lower than the target level for the low fertility countries. Second, the two digits after the decimal conveys a spurious impression of accuracy. Third, the existence of "tempo" effects, which it may be assumed will in the future operate for intermediate-fertility countries as they are operating now for low fertility countries, argues for choosing a higher rather than a lower value.

Discussion then turned to the general issue of the proposed new guidelines for projecting fertility for the intermediate-fertility countries in the *2002 Revision* of the official United Nations world population estimates and projections. Various views were expressed, some on general issues affecting all or most countries, others on the situation of particular countries. It was noted that there were two visions of the long term, the vision of a homogenizing world, and the vision of a world increasingly divided by economic and social disparities. The globalization of world communication has made the second of these visions more dangerous than ever before because people in less developed countries all over the world tend to be aware of the disparity between their situation and the situation in the most developed countries. At the same time, the idea of globalization tends to make people in more developed countries forget that we are still living in a divided world. The idea that all intermediate-fertility countries will move toward a fixed target level of fertility below replacement level associates most naturally with the vision of a homogenizing world. It is not necessarily the case, however, that a world of considerable disparity with respect to economic and social development implies a world of similarly disparate fertility levels, for adversity as well as development may lead to low fertility.

Various views were expressed on the applicability of the proposed new guidelines. Some participants doubted that a decline from the current 3.2 children per woman in intermediate countries to below 2.1 children per woman would happen so easily as the new guidelines might seem to suggest. The preconditions for such a decline, including social development and support for family planning and reproductive health programmes, cannot be assumed to be automatically present, it was said, particularly if the idea that high fertility and population growth are no longer problems takes hold among policymakers, funding institutions and the general public. Other participants argued that moving the target fertility level below 2.1 children per woman was a move in the right direction. Fertility decline begets further fertility decline, it was observed, by changing women's lives. As women spend less of their lives bearing and rearing children, they are free to take up other pursuits, including further education and labour force participation. This leads to a new social situation in which some women decide to remain childless, and in which families attach more importance to having "quality" children, particularly with respect to education, than to having a large number of children.

The discussion then proceeded to related but more general issues. Several participants expressed concern over the difficulties of taking "outliers" and "surprises" into account when making population projections. The situation in some countries had deteriorated rather than improved in recent decades, it was observed, and there was a clear possibility of further deterioration in the future. It is difficult to take account of this in projections, but it is important not ignore or dismiss such evidence. Projections assume a surprise-free world, but we know that there will be surprises, even if we can't predict them and incorporate them into our projections.

It is important to address the many challenges posed by future population growth, it was suggested, including the challenges of large and rapidly expanding cities with inadequate infrastructure and, in several of the largest developing countries, the possibility of water shortages. In this connection several participants urged the Population Division to focus more on the near midterm and less on the long term. What is likely to happen over the next few decades merits more emphasis, it was suggested, than some distant statistical target. The midterm and the longer term are different, since small populations like Pitcairn Island and large countries like China are different.

Several participants expressed concern over the message that the proposed new guidelines might send to policymakers, funding agencies, and the general public. People who are not demographers tend not to understand that a decline in completed fertility does not imply an immediate decline in population growth; that even an instantaneous reduction of complete fertility to below replacement fertility level would be followed by 50 or more years of continued population growth before population growth rates fall to zero. The continued decline of fertility in developed countries is important in this context. Back in the 1960s, the message with respect to world population growth was the same for developed and developing countries. Now that fertility in the developed world is well below replacement level and some countries face population decline, the message tends to be very different for developed and developing countries.

Rapporteur's overview

Griffith Feeney

Moderator Joseph Chamie, Director of the Population Division, asked the Rapporteur for the Expert Group Meeting, Mr. Griffith Feeney, to present his overview. Mr. Feeney began by saying that three themes had been addressed during this meeting: how we make projections, what we need to know to make them, and why we bother making them. On why we project, Mr. Feeney said, John Caldwell's keynote address reminded us of the larger picture. There is one point of his in particular that should be driven home. We have not seen the end of huge population growth. Consider a mere three numbers from the tens of thousands contained in the Population Division's *2000 Revision*. There were 1.7 billion persons in the less developed regions as of 1950. In 2000 there were 4.9 billion persons in the less developed regions. Growth from 1950 to 2000: 3.2 billion persons. The projected (medium variant) number of persons in the less developed regions in 2050 is 8.1 billion persons. Growth from 2000 to 2050: another 3.2 billion persons. We are in the middle of a century of rapid world population growth. The end is in sight, but it is still at least 50 years away. To dismiss world population growth as a fundamental issue for the future of humanity is absurdly short sighted and could incur a terrible human cost.

So how can it be that we hear that one philanthropic foundation after another is "going out of the population business"? One reason may be that population disasters have been predicted unceasingly by the population crisis industry for the past 50 years, and these predictions have been, by and large, wrong. If you count yourself in the population crisis group, consider what part of the blame for the current state of disinterest lies with yourself and your colleagues. In any case, consider the moral of the story of the little boy who cried wolf. It is not that wolves never come. It is that constant, ill-considered warnings endanger us all because wolves do sometimes come.

What do we need to know to make projections? Many things, to be sure, but one to single out here is: why does fertility decline? Tim Dyson gave us the answer loud and clear: fertility declines because mortality declines. What happens during the demographic transition is not that "fertility declines", though this does indeed happen. What happens during the demographic transition is that family size—measured as the number of living children, the only measure that counts—shoots up because mortality risks have fallen. Fertility decline then reestablishes family size at more or less what it was before. This is straight out of Kingsley Davis's classic "multiphasic response" paper, *Population Index*, *1963*. The biggest impact has been on the lives of women. The enormous time, energy and emotion they used to spend on bearing and raising children, most of whom died before reaching adulthood, can now be spent on other things. And if you think we see a lot these days about such topics as women's status and gender inequality, let me suggest that you have not seen anything yet. This is a change that will play out over many generations.

One other point needs to be made in this connection. Many factors influence the level of fertility. None, individually or jointly, determine it. There are no "determinants" of fertility. As long as fertility is declining, this observation can be dismissed as merely persnickety. When we come to considering where fertility decline will end, however, it becomes fundamental. What studies of so-called "determinants" of fertility tell us is that if factor A goes up a bit, fertility tends to go down a bit, or if factor B is lower, fertility will tend to be higher. This is true of the lowliest univariate regression, and it is equally true of what Norman Ryder once called "these Cadillacs of multivariate analysis". This kind of thinking simply is not useful for deciding such questions as whether fertility will stabilize at 2.1 children per woman or 1.85 children per woman.

Demographers have been roundly ridiculed here for the silliness of the 2.1 children per woman target. This is quite wrong. Having projected fertility tend to replacement level is not arbitrary at all. It is a carefully calibrated statement about the place of man in the universe. We have been around for a million years or so. We want to stay around. We are not greedy. We do not want more than our share of the biosphere. But we do not want to just up and disappear, either. Having said this, the evidence of the below-replacement fertility countries shows that, for less cosmic time horizons, the end of the fertility transition is going to be more complicated than we anticipated. Riad Tabbarah's paper points the way for us here. Reading his last paragraph, you probably nodded in agreement with the statement that "there is no magic attached to" replacement level fertility. But then a few sentences further on you read that "the two child ideal seems to be predominant". It seems there is a deep human need here for "magic numbers". We cannot even get out of the paragraph without coming back to one.

This should give us pause. Humanity has been around for a million years or so. Until this upstart demographic transition came along, how many children did the typical human family have? About two—surviving to reproductive age. It is certainly true that 2.1 children per woman is not "hard-wired" into the human constitution. But the two child family may well be. This leads us to Alaka Basu's point about the importance of distinguishing family size for women who become mothers from non-marriage and childlessness. Parity-specific measures may be the best way to think about where fertility decline ends. Unfortunately, we lack proper data for many low-fertility countries. Ironically, for this purpose, we have better data for Iran than for the United Kingdom.

Let us return, finally, to the Population Division's vision of the end of demographic history in the intermediate-fertility countries, presented in the first session of this meeting. They want your input. How have we come out? The first conclusion is that a breakthrough below 2.1 children per woman is a possibility for many of the intermediate-fertility countries. A second conclusion is that there should be less focus on targets and more on how they are arrived at. In particular, the pace of decline should be adjusted as fertility declines. A third conclusion is that it would be well to do some checking of projected fertility trends against projected trends in the proximate determinants of fertility. It should be noted, finally, that the Population Division's projections will not end with the *2002 Revision*. We are engaged in a process that will go on through many subsequent *Revisions*.

Conclusion

Mr. Chamie asked keynote speaker Mr. John Caldwell, Professor at the Australian National University, to provide some further reflections on the meeting. Mr. Caldwell began by congratulating the Population Division on the whole history of its achievement. Its population projections of the 1940s and 1950s changed the world, he said, but these were not "scare" messages. The first principle for the Population Division must always be to adhere to truth and to ensure the scientific integrity of its projections. If this were to be lost, all would be lost. A second principle must be to provide information. The real contribution of the Population Division to action is to make its projections known. Perhaps the Division could produce different kinds of reports, he suggested, reports that would spell out some of the implications of the voluminous and highly detailed projection numbers contained in *World Population Prospects*.

Long-range projections influence action more than you might imagine, Mr. Caldwell added. The world ecosystem is under stress, and this is inherently a long-term phenomenon. Population is not the only important part of the picture, but it is a very important part. We should be careful, he continued, not to get too far away from specifics. sub-Saharan Africa, for example, is at present less than 10 per cent of world population, but in the coming decades it is likely to rise to more than 20 per cent of world population. Yet this region is beset by more economic, health and development problems than any other major world region. This region could well become the main focus of international development efforts in the future.

We have moved a long way, Mr. Caldwell concluded, perhaps too far away, from the old idea of population and development. The International Conference on Population and Development (ICPD) said very little, in fact, about population and development. The Population Division should not slight its measurement of the impact of population growth on development.

Closing of the meeting

Mr. Chamie noted with appreciation the many efforts of the Population Division staff in preparing for and supporting the meeting, He asked the participants to join him in a round of applause, which was heartily returned. He then quoted the founding Director of the Population Division, Frank Notestein, writing in February 1947.

> "We all recognize that the great task which faces the United Nations—the task of building a peaceful world with a richer life for all its peoples—involves population problems at many points. It involves improvement of the people's health, physical and mental abilities, and productive capacities; and achievement of better balance between population and economic resources. It may involve changes in the distribution of population over the face of the globe. If we are successful in solving these global problems the generations of tomorrow will be a healthier, stronger, better educated and happier human race."

These observations, Mr. Chamie concluded, are as applicable today as they were when they were written over 50 years ago.

Appendix: Summary of country papers

COMPLETING THE FERTILITY TRANSITION: THE CASE OF ARGENTINA

Edith Alejandra Pantelides

Ms. Pantelides presented an overview of past demographic trends in Argentina and speculated about the future. The level of fertility in Argentina toward the end of the nineteenth century was about 7 children per woman. Fertility began to decline during the early twentieth century, falling to 3.2 children per woman for 1940-1945. The total fertility rate remained nearly constant at this level for the next 40 years. A slow decline to 3.0 children per woman for 1965-1970 was followed by a sharper rise to 3.4 children per woman in 1975-1980. Secular decline appears to have resumed after 1975, with fertility falling to 2.6 children per woman for 1995-2000. Argentina's demographic transition was unusual in that mortality decline occurred more or less simultaneously with fertility decline. There was no pronounced and sustained rise in population growth rates during the period of fertility decline. There is no national level contraceptive prevalence data, but local surveys suggest that knowledge of contraception is very high among young men and women. Use of contraception is probably widespread. A rise in fertility after 2000, such as was observed after 1970, appears unlikely. The social and economic landscape of Argentina is changing rapidly and in previously unexplored directions, but the long history of fertility decline has established norms and behaviours that have a strong inertia. Fertility will probably continue to decline, but the persistence of positive values regarding family and parenthood will probably maintain fertility at above-replacement level for another 10-15 years, as shown by the medium variant United Nations projection.

WHEN WILL BANGLADESH REACH REPLACEMENT-LEVEL FERTILITY? THE ROLE OF EDUCATION AND FAMILY PLANNING SERVICES

Mizanur Rahman, Julie DaVanzo and Abdur Razzaque

Fertility in Bangladesh declined from over 6 children per woman in the early 1970s to 3.4 children per woman in 1992. During the 1990s, however, the decline may have stalled, for surveys in 1995 and 1998 both show a total fertility rate of 3.3 children per woman. This paper explores the possibility of renewed fertility decline in Bangladesh. More specifically, it asks how long it might take, and what conditions might be required, for fertility to fall to replacement level. The approach is to ask whether there is any group of women in the country which has already reached replacement level. Calculation of total fertility rates for three educational attainment of women categories and three household economic condition categories from Matlab Demographic Surveillance System data shows that women with secondary education had below-replacement level fertility for 1995-1998 in all three household economic condition categories. Female educational attainment has increased very rapidly over the past three decades. The future trend of female educational attainment was projected, taking account of household economic condition because this influences access to education. Future total fertility rates are calculated from the projected distribution of educational attainment, assuming in effect that the changing composition of women by educational attainment is the only factor influencing fertility. This calculation indicates that fertility in Bangladesh would fall to about two children per woman by 2025. This is consistent with the medium variant United Nations projection for Bangladesh in the *2000 Revision*. Since future fertility may be influenced by other factors, including improved supply of family planning services and rapidly changing socioeconomic conditions, this projection may be conservative.

WHAT WILL HAPPEN TO BRAZILIAN FERTILITY?

Ana Maria Goldani

Despite the absence of an official family planning policy, fertility in Brazil fell from over 6 children per woman during the early 1960s to 2.2 children per woman in 2000. This decline came with a rise in female sterilization among young, married women, which rose from near zero to 39 per cent in 1996. Despite the efforts of the women's movement and attempted initiatives in public family planning services, Brazilian women in the 1990s continue to face an dramatic choice, to get sterilized or to risk an unwanted pregnancy that must either be continued or clandestinely aborted. Brazilian demographers expect fertility to fall below replacement during the next decade, a survey conducted by the author found, but there were divergent views on the rate of decline, on how low fertility would fall, and on the prospects of a return to replacement-level fertility in the future. All those surveyed thought, however, that fertility would remain at below-replacement levels for the next 50 years. The medium variant United Nations projection for Brazil given in the *2000 Revision* is overly cautious about the speed of fertility decline, with total fertility rates higher than expected by Brazilian demographers. The medium variant gives a 2050 population for Brazil of 247 million persons, 40 million more than a recent population projection for Brazil produced by the United States Bureau of the Census. The future level of fertility in Brazil will be influenced by the availability of family planning services, by Government policies affecting women families, and by the progress of gender equality. Gender equality may be the key to avoiding persistent below-replacement fertility.

INDIA'S CHANGING DATES WITH REPLACEMENT FERTILITY: A REVIEW OF RECENT FERTILITY TRENDS AND FUTURE PROSPECTS

P. N. Mari Bhat

Mr. Mari Bhat reviewed current levels and trends of fertility in India at the state and national level and suggested on this basis when India is likely to reach replacement level fertility. Analysis of fertility trends in 16 major states of the country suggests that they may be fit by a Gompertz curve. A fitting procedure taking account of the possibility of changing completeness of the Sample Registration System (SRS) provided parameter estimates indicating that the pace of fertility decline in the northern states is not inherently slower than the pace of decline in the southern states. Fertility in the southern states is lower because the decline there began earlier, and perhaps also from a lower level. Fertility in India is declining because couples are adopting the idea of having only a few children but investing more family resources in their future. More than half of recent fertility decline is due to smaller families among illiterate women. Illiterate women are sending more of their children to school, especially first born daughters, who are released from the burden of taking care of younger siblings. Three points should be observed when projecting fertility for India: base period fertility should be adjusted for under enumeration of births in the SRS; an S-shaped curve, such as the Gompertz, should be used in preference to a linear decline; and because of vast regional differences, total fertility rates (TFRs) should be projected at the state level and the all-India TFRs derived as weighted averages of the projected values for the states. Using a corrected TFR of 3.4 children per woman for 1997, estimated values of the Gompertz parameter *b*, representing the pace of fertility decline, and a lower TFR limit of 1.7 children per woman, the all-India TFR is projected to decline to 2.14 children per woman for 2016-2020.

ON THE FUTURE OF HUMAN FERTILITY IN INDIA

Tim Dyson

Mr. Dyson discussed the trend and level of fertility in India during the coming decades. Before turning to specifics, however, he addressed two general questions. First, what explains fertility decline? Second, why do some countries have below replacement fertility? The answer to the first question is mortality decline. Confronted with a major fall in the death rate, no society can sustain a total fertility rate (TFR) of five or six births per woman for more than a few decades. Many social, cultural and economic factors influence the timing and pace of decline, but the fundamental cause of all fertility transitions is mortality decline. The answer to the second question is that, because of mortality decline, women become more like men. In high fertility, high mortality societies, women's relatively short lives are dominated by bearing and rearing children. Fertility decline opens up completely new educational and employment possibilities for women. It becomes possible for women to lead lives largely independent of men. Below replacement level fertility is a direct consequence of initial decline of fertility from the levels required to sustain populations exposed to high mortality. Only a fundamental renegotiation of gender roles, in which men become more like women, with respect to child-rearing roles in particular, is likely to alter the tendency to below replacement fertility.

When considering future fertility in India it is important to estimate and project fertility at the state level and aggregate results over states to obtain national level projections. Because of the great differences between states, national projections based on national level data will show a slower pace of fertility decline than national projections aggregated from state level projections based on state level data. Total fertility is falling in virtually all of India's states. It is unlikely, in any state, that the TFR will stagnate for long at a level substantially above replacement level. While interventions in some states may accelerate this decline, the declines are on balance probably better regarded as having a momentum of their own. For the core northern states like Bihar and Uttar Pradesh, sustained levels of below replacement level fertility are probably several decades off, and fertility levels in the north may remain higher than those in the south. An all-India TFR projection derived from state level TFR projections shows fertility declining to 2.1 children per woman during 2016-2020.

CAUGHT IN TRANSIT: QUESTIONS ABOUT THE FUTURE OF INDONESIAN FERTILITY

Terence H. Hull

Attempts to predict future fertility in Indonesia are frustrated by the lack of reliable demographic data. The quality of the 2000 population census was impaired by budget cuts, and governmental decentralization plans implemented in 2001 are problematic for data collection. Nonetheless, available data indicate a continuation of key demographic trends. Contraceptive prevalence, age at marriage, educational attainment and female labour force participation continue to rise in the face of dramatic economic decline. As of 1995-1997, fertility was estimated to be 2.8 children per woman, only 0.6 children per woman above replacement level. Some Indonesian observers fear that poor women will "retreat into childbearing" in the face of economic crisis and diminishing alternative opportunities. The poor may reject this option, however, because they still desire education for their children and see economic problems as barriers to be overcome by investing more in each child. The thinking of individual Indonesians has changed in ways that imply moderate to low fertility, but whether fertility will be moderate or low depends on the context in which they live. Prediction of future fertility therefore requires predicting future society. With Indonesian observers struggling to do this on an annual basis, 2050 seems an impossible distance to contemplate.

RECENT CHANGES AND THE FUTURE OF FERTILITY IN THE ISLAMIC REPUBLIC OF IRAN

Mohammad Jalal Abbasi-Shavazi

Mr. Abbasi-Shavazi reviewed population policies and fertility trends in the Islamic Republic of Iran over the past three decades, suggested possible explanations for declining fertility, and speculated about future fertility levels. Fertility in the Islamic Republic of Iran was over 6 children per woman during the early 1980s. By the end of the 1990s it had reached replacement level (2.26 children per woman). A comprehensive explanation of this decline must take account of its timing and pervasiveness. It began before the shift to an antinatalist policy, and it was observed in all major population subgroups, old as well as young women, rural as well as urban areas, and in all provinces of the country. The family planning programme implemented in 1989 made an important contribution. By mobilizing various Government organizations and the mass communication network, the programme succeeded in diffusing ideas throughout the country about the value of small families and about methods of family limitation. Contraceptive prevalence rose from 37 per cent in 1976 to 72 per cent in 2000. The programme enjoyed the support of religious leaders, which legitimized it in the society at large. Declining infant mortality was a factor as well. The infant mortality rate declined from 114 infant deaths per thousand births in 1975 to 34 per thousand in 1994. The establishment of a health network and its extension to rural and deprived areas was a key factor in reducing infant mortality. Economic hardship relative to material aspirations very likely played an important role as well. The cost of living has risen dramatically in recent years, and young people tend to delay marriage until they can get a salaried job. The increasing cost of rearing children, particularly the cost of education, is another important factor. There has been a convergence of fertility behaviour among major population groups, rural as well as urban women, illiterate as well as literate, poor as well as rich.

Will fertility in the Islamic Republic of Iran rise again in the near future, level off, or decline further? Some believe that an end to economic hardship or the disappearance of inherently temporary "tempo" effects may prevent a further fall in fertility, or even result in an increase. Mr. Abbasi-Shavazi expects that fertility will continue to decline for some years. There is still a significant rural-urban differential, and several high fertility provinces. If the convergence observed in the past continues, fertility will decline in these provinces and the rural-urban differential will diminish. Simultaneously, the proportion living in urban areas will almost certainly increase. Educational attainment is rising rapidly, and children of all social classes, including the poor, have access to education. The level of female employment is still low, but it is likely to increase. The Government strongly supports reducing the number of births in the present decade. A two-child policy ("Two is enough") is advertised everywhere, in bus stops, public spaces, cinemas, even on children's toys and chocolate boxes. Population and family planning is a compulsory unit for all university students. All the efforts focused on improving health to promote family planning and reproductive health as well. In short, all of the main influences on the level of fertility appear to be moving in directions that will lower fertility further, though the decline may not be as rapid as in the past.

FERTILITY IN ISRAEL: IS THE TRANSITION TO REPLACEMENT LEVEL IN SIGHT?

Dov Friedlander

Fertility patterns in Israel revolve around three major ethno-religious groups. The Jewish non-religious group, whether of African, American, European or Middle Eastern origin, representing nearly 70 per cent of the population, had a total fertility rate of about 2.1 children per woman as of 1995-2000. Arab Moslems, about 15 per cent of the population, had a total fertility rate of 4 children per woman as of 1995-2000. The Jewish ultra-Orthodox and National Orthodox population, constituting 12-15 per cent of the population, had a total fertility rate of between 6 and 7 children per woman as of 1995-2000. It is unlikely that the level of fertility for the first group will change enough to have a significant impact on fertility at the national level. It is Mr. Friedlander's view that the Moslem population has reached a kind of equilibrium between family size and social, economic and political opportunity. This view implies that the level of fertility will change only if there is an equalization of opportunities between the Arab and Jewish populations. In the absence of such a change, no decline in Moslem fertility should be expected for the foreseeable future. The religious ideology of the ultra-Orthodox Jews is strongly pronatalist. The ultra-Orthodox population receives direct financial support for their independent educational system, generous child allowances for large families, and highly subsidized housing projects for young couples. It seems very unlikely that this will change. Mr. Friedlander's conclusion, therefore, is that Israel's national total fertility rate will remain in the range of 2.5 to 3 children per woman, probably closer to 3 children per woman.

COMPLETING THE FERTILITY TRANSITION: JORDAN, LEBANON, SYRIAN ARAB REPUBLIC

Riad Tabbarah

Education is one of the most powerful factors for the reduction of fertility. The spread of education in the three Arab countries in question during the last three decades has been spectacular, but there is still some way to go to eliminate illiteracy and raise education attainment. Women's education, in particular, has risen spectacularly, but except for Lebanon, gender differences still exist. Women's labour force participation has increased, but significant gender differences remain at all ages. These facts suggest that the fall in fertility that has taken place in the past few decades probably still has some way to go. Another important factor, globalization, has been increasing and this increase may be expected to continue in the future. It is progressively reaching more remote areas in the three countries through modern communication. The economic benefits of globalization have lagged behind its social and cultural influences, however, and this also is likely to continue in the future, creating further pressure on perceived inadequacy of income. Other important factors include rising female celibacy and rising divorce rates. With continued "modernization" and globalization these trends are likely to continue, so that total fertility will decline even if marital fertility remains constant. Considering all these factors, it may be considered fairly certain that fertility in all three of these countries will continue to decline for the foreseeable future. The more difficult question is how low fertility will fall. Among more educated persons in the three societies the two-child ideal seems to predominate, so we may assume that this will be the eventual level of marital fertility. If it is assumed that total fertility will be 20 to 30 per cent less than marital fertility, the eventual level of the total fertility rate would be 1.4 to 1.6 children per woman. This is very similar to the level prevailing in some of the European countries.

KENYA'S FERTILITY TRANSITION: HOW LOW WILL IT GO?

John Blacker

The total fertility rate (TFR) in Kenya as of the late 1970s was about 8 children per woman. Prior to this it had been rising steadily. At some time in the late 1970s or early 1980s there was an abrupt and dramatic change and fertility began to fall with unforeseen rapidity. The first evidence for this came from the 1989 Demographic and Health Survey (DHS), which gave a TFR of 6.7 births per woman for the 5-year period before the survey, more than one child per woman less than the level observed in the early 1980s. The 1993 DHS and the 1998 DHS gave total fertility rates of, respectively, 5.4 and 4.7 children per woman, both for the 3-year period before the survey. Taken at face value, these figures suggest that fertility continued to decline, but that the pace of decline was slowing, from 0.34 births per woman per annum between 1989 and 1993 to 0.14 births per woman per annum between 1993 and 1998.

With respect to the proximate determinants of this decline, most can be attributed to increased contraceptive use. The proportion of currently married women aged 15 to 49 years currently using a modern method of contraception increased from 10 per cent at the 1984 Kenya Contraceptive Prevalence Survey (KCPS) to 18 per cent at the 1989 DHS. Review of the other proximate determinants points to the conclusion that further reductions in fertility will be achieved principally as a result of increasing contraceptive use. Other proximate determinants might be effected by the HIV/AIDS epidemic, however. With respect to the somewhat nebulous concept of ideal family size, it has fallen in parallel with fertility, from 5.8 children per woman in the 1984 KCPS to 4.4 and 3.7 children per woman, respectively, in the 1989 DHS and the 1993 DHS. The 1998 DHS shows a levelling out, with an ideal family size of 3.8 children per woman. This suggests, Mr. Blacker said, that fertility in Kenya is unlikely to level out at less than 3 children per woman over the next several decades. Whether this is above or below replacement level fertility (2.6 children per woman for 2000-2005) depends on the progress of the HIV/AIDS epidemic. Should life expectancy at birth fall as low as 45 years, replacement level fertility would rise above 3 children per woman.

Regarding the level of fertility as far into the future as 2050, Mr. Blacker noted, it was impossible to predict because of the possibility of long-term socio-economic deterioration. The 1999 census of Kenya showed that mortality had increased, and not just because of AIDS. Schooling, housing and other social infrastructure in the country are deteriorating. Living levels are falling and poverty is rising. Should these trends continue, it is hardly conceivable that fertility would fall to 2.1 children per woman. Obviously it is to be hoped that these trends reverse. But, Mr. Blacker said, since he could not predict the future of Kenyan society 50 or 75 years into the future, neither could he predict the level of fertility this far into the future.

FOLLOWING IN THE FOOTSTEPS OF SOUTHERN EUROPE: FERTILITY IN THE MAGHREB

Youssef Courbage

Mr. Courbage reviewed levels and trends of fertility in the five countries of the Maghreb (Algeria, Libyan Arab Jamahiriya, Mauritania, Morocco and Tunisia) and considered the levels that may be reached in the future. Fertility in the Maghreb declined from 7.8 to 2.8 children per woman in a single generation, one of the most rapid fertility declines in the world. Increases in celibacy, age at marriage and contraceptive use played a role. So did rising female educational attainment, urbanization, and rising non-agricultural employment, though it would be misleading to claim that these were driving forces. Poverty resulting from economic crisis may also have contributed to the decline. Religion and population policies may be less important than many would expect. The contrast with the Arab Middle Eastern countries, which have experienced much less rapid fertility decline, is striking. Mr. Courbage suggested that a key factor was the geopolitical situation of the Maghreb. The influence of Western culture is quite strong. The educational systems in all countries except the Libyan Arab Jamahiriya have been heavily influenced by the French educational system. Foreign media have a strong presence in society at large. Extensive migration to Europe has created connections and a sense of affinity with European countries. In contrast, the Arab countries of the eastern Mediterranean are linked more closely to the countries of the Arabian Peninsula and the Persian Gulf. Mr. Courbage believed that fertility in the countries of the Maghreb will continue to decline, perhaps eventually to the levels currently observed in Southern Europe. The current level of fertility for females who have high school or university degrees may be taken as a guide to the future level of fertility in each country.

FERTILITY IN MEXICO: TRENDS AND FORECASTS

Rodolfo Tuirán, Virgilio Partida, Octavio Mojarro and Elena Zúñiga

The authors examined levels, trends and differentials of fertility in Mexico over the past three decades and speculated about the future of fertility in coming decades. The total fertility rate (TFR) in Mexico reached a high of 7.2 children per woman in the early 1960s. The TFR fell at an accelerating pace from 1964 to the late 1970s, falling to just under 5 children per woman in 1978. The decline continued at a decelerating pace, reaching 2.4 children per woman in 2000. Mexico has a population policy that aims to reach replacement level fertility by 2005. Three scenarios for future fertility change have been considered, one in which replacement level is reached in 2005, and two others in which this level is reached in 2015 and 2025, respectively. The first of these is most consistent with past trends. The second two scenarios imply an abrupt break from the pattern of past decline. Levels and trends in contraceptive use, age at marriage and other influences on the level of fertility support the first scenario. This leaves open the question of whether fertility behaviour will continue to change after replacement-level fertility has been reached. The experience of many developed countries shows that fertility decline continues after replacement-level fertility is reached. Among developing countries that began their fertility transition during the 1960s, 8 out of 39 countries have a total fertility rate equal to or below replacement level. It is anticipated that the TFR for Mexico could decline to 1.7 children per woman by 2030 and remain at this level until 2050.

FERTILITY TRANSITION IN NIGERIA: TRENDS AND PROSPECT

Bamikale J. Feyisetan and Akinrinola Bankole

The authors argued that fertility transition in Nigeria has begun, identified some factors that have contributed to the decline, and considered how the transition will develop in the future. Total fertility rate (TFR) estimates for Nigeria present numerous anomalies, but overall evidence indicates that fertility decline began during the mid-1980s from a level of about 7 children per woman, falling to 5.2 children per woman for 1995-1999. The prospects for future fertility decline were addressed by assessing two recent fertility projections: the 1997 projections produced by the National Population Commission of Nigeria and the *1998 Revision* projections of the United Nations Population Division. The medium-variant scenario of the National Population Commission projections shows fertility reaching a replacement level fertility of 2.2 children per woman around the year 2050. The United Nations *1998 Revision* medium variant shows fertility falling to the same level by 2040. The authors considered it highly improbable that fertility in Nigeria would decline this rapidly. It would be more realistic, they thought, to anticipate a TFR of between 2.6 and 3 children per woman by 2050. Considerations supporting this conclusion include continuing high levels of infant and child-mortality risks, with little hope for substantial improvement in the future; the HIV/AIDS epidemic; inadequate support for family planning programmes; and regional disparities in fertility decline.

FERTILITY DECLINE IN THE PHILIPPINES: CURRENT STATUS, FUTURE PROSPECTS

Marilou Palabrica-Costello and John Casterline

The authors considered what factors (social, economic, cultural, programmatic) might facilitate or impede the decline of fertility in the Philippines from its current level to a national average of two births per woman over the next several decades. Fertility in the Philippines has experienced continuous decline from the 1950s to the present, but the total fertility rate (TFR) was above 3.5 children per woman in the mid-1990s. Unadjusted TFR estimates from the National Demographic Survey (NDS) indicate a slackening of the pace of decline between the 1980s and the 1990s and a slower rate of decline during the 1990s than the estimates given in the 2000 Revision of the United Nations *World Population Prospects*. To assess the likelihood that replacement level fertility will be reached during the next few decades the authors considered three factors: desired fertility, unwanted fertility, and changes in marriage patterns.

According to the 1998 National Demographic and Health Survey (NDHS), the wanted fertility rate for the country as a whole was 2.7 children per woman, more than 0.5 children above replacement level. The possibility that desired fertility might fall to replacement level over the next two decades cannot be dismissed out of hand, but the probable future influence of the economy, of cultural values, and of institutional factors and policy instruments suggest that this is unlikely. Survey data show unwanted fertility rising from 16 per cent in 1993 to 18 per cent in 1998. Induced abortion is both illegal and relatively unavailable in the Philippines, and the authors do not expect this to change in the foreseeable future. There are significant programmatic, social, cultural, and economic barriers to contraceptive use. Traditional methods constitute a far higher proportion of all contractive use in the Philippines than in most countries. Contraceptive discontinuation rates remain high, and increased between 1993 and 1998. If desired fertility were to fall to replacement level, couples would be exposed to even longer periods of risk of unwanted pregnancies. With respect to marriage patterns, it seems unlikely that permanent celibacy will increase during the next few decades. The average age at first marriage has been relatively stable in recent decades. While a two or three-year increase is possible, there is at present no evidence that such an increase will occur.

In concluding the authors noted several influences on future fertility. The total fertility rate in the Philippines is at present about 1.5 births per woman above replacement level, desired fertility remains above replacement level in all major segments of the population, and unwanted fertility is relatively high. These three influences tend to a slower rate of fertility decline. There is some prospect that changes in marriage patterns might contribute to further fertility decline, but there is no evidence that such changes are under way. The authors are led to the conclusion that it is unlikely that fertility in the Philippines will decline to replacement level over the next two decades.

FERTILITY TRANSITION IN SOUTH AFRICA AND ITS IMPLICATIONS ON THE FOUR MAJOR POPULATION GROUPS

Leon Swartz

Fertility in South Africa began to decline among all major population groups prior to the end of apartheid. This decline occurred in the face of impoverishment, inequality and disempowerment of women. This is in stark contrast to other parts of sub-Saharan Africa, where poverty has tended to be associated with high fertility. This paper investigates the factors contributing to the decline of fertility in South Africa. For South Africa as a whole, fertility was high and stable between 1950 and 1970, with an average of six to seven children per woman. The fertility level as of 1999 was 2.9 children per woman. The Government began to provide strong support for family planning in the 1960s, and in 1974 launched the well-funded National Family Planning Programme. The results were impressive and unprecedented in sub-Saharan Africa. By 1983 over half of all eligible women were practising contraception. South Africa's programme was conceived and implemented by a minority white Government intent on slowing the growth of the majority black population, but many black women adopted family planning despite the nature of the programme. Various factors converged to create a situation where women had to accept primary responsibility for child-rearing without access to productive resources. Their response was to control their fertility, not as a result of educational and career aspirations or an affluent lifestyle, but as a survival strategy. Fertility is still valued highly in South Africa, as it is in the rest of sub-Saharan Africa. Despite relatively low fertility, the high levels of unwanted and teenage pregnancies and the high unmet need for contraception are major concerns. Many women still lack control over their reproductive choices.

ON THE PROSPECTS FOR ENDLESS FERTILITY DECLINE IN SOUTH ASIA

Alaka Malwade Basu

Global fertility decline, meaning the decline of fertility in most or all countries of the world, should not be confused with global fertility convergence, meaning the decline of fertility to a common level in most or all countries. Global fertility decline is under way, but geographical and cultural variation will temper the move to global fertility convergence for many decades to come. This contention is supported both by the differences between fertility in the developing world and by the wide range of variation in the proximate determinants of fertility, including marriage, contraceptive use, and abortion. Ms. Basu's paper used lessons drawn from this variation to argue that future fertility in South Asia might not fall to the very low levels observed in many more developed countries today.

Studies of the proximate determinants of fertility decline in developing countries typically distinguish between rising age at marriage and declining fertility within marriages, but the experience of developed countries suggests that increases in the level of non-marriage may be more important than changing age at marriage. High levels of non-marriage, as much as low levels of marital fertility, may be responsible for the very low total fertility rates observed in some developed countries. High levels of non-marriage are probably still many decades away in South Asia. This will restrain future fertility decline in the region.

It is also important to consider the distribution of marital fertility by the number of children born to families. The implications of a decline in marital fertility that results from a decline in proportion of families with large numbers of children may be very different from the implications of a decline resulting from a rise in the proportion of couples with no children. The experience of the United States and of European countries suggests that sustained below replacement fertility requires a relatively high level of childlessness within marriage. Based on cultural imperatives in South Asia, it is most unlikely that there will be a significant rise in voluntary childlessness within marriage. The ideological change that accompanies a move from larger to smaller families is compatible with existing norms governing family life. A move from small families to voluntary childlessness is not compatible with these norms. This move would require a normative shift inconsistent with existing trajectories of development, education and modernization.

Regarding the pace of fertility decline, it need not be uniform throughout the transition. There may be periods where the decline slows or ceases while certain influences or enabling conditions "catch up". In the case of India, for example, women may be perfectly willing to have fewer than 4 or 5 children, given falling infant and child mortality and readily available contraceptive services, but unwilling to forego the one son, or preferably two sons, that they consider essential for economic, social and spiritual reasons. The level of fertility in India may therefore stagnate for a time at around 3 children per woman while education and modernization supporting smaller numbers develop. The recent stagnation of fertility decline in Bangladesh supports this idea. In conclusion, Ms. Basu cautioned that medical technology might allow South Asian patriarchal fertility demands to be met even with rapid fertility decline by allowing a preponderance of sons to be born.

Annexes

AGENDA

Monday, 11 March 2002		
Morning	I.	Opening of the meeting
	II.	Keynote address
Afternoon	III.	Global issues impacting the fertility transition
Tuesday, 12 March 2002		
Morning	IV.	Levels, trends and determinants of fertility
Afternoon	V.	National policies and programmes
Wednesday, 13 March 2002		
Morning	VI.	Future expectations for fertility
Afternoon	VII.	Reflections by eminent persons
Thursday, 14 March 2002		
Morning	VIII.	Back to the future: proposed United Nations assumptions
Afternoon	IX.	Rapporteur's overview
	X.	Conclusion
	XI.	Closing of the meeting

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Background papers	
UN/POP/CFT/2002/BP/1	The contemporary population challenge (John C. Caldwell)
UN/POP/CFT/2002/BP/2	Impact of the 1994 International Conference on Population and Development (Jason L. Finkle)
UN/POP/CFT/2002/BP/3	The role of international funding in future fertility declines among intermediate-fertility countries (Steven W. Sinding)
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PART TWO

BACKGROUND PAPERS

The future of fertility in intermediate-fertility countries

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ABSTRACT

This paper reviews the status of the fertility transition and the processes that have led to the nearly universal reductions of fertility achieved so far. The state of current knowledge, buttressed by the actual experience of a growing number of countries, suggests that lengthy periods of below-replacement fertility are likely to be common in the future. Revised guidelines for the United Nations the *2002 Revision* for the projection of fertility in today's intermediate-fertility countries are proposed based on the recognition that replacement-level fertility is not necessarily hard-wired in the evolution of populations. The proposed guidelines imply that, under the medium variant, approximately 80 per cent of the world population will be projected to have below-replacement fertility before mid-century.

INTRODUCTION

Since the late 1960s, when the baby-boom that had raised fertility levels in many parts of the developed world was rapidly turning into a baby-bust, very low fertility has prevailed in many of the countries that had embarked early on the demographic transition. Thus, fertility levels have remained consistently below 2.1 children per woman for at least 25 years in 20 European countries and Japan, and by 1995-2000 a further 44 countries were exhibiting below-replacement fertility. Although such low levels of fertility are mostly characteristic of European countries, they have not been confined to that major area. Several Caribbean islands (Barbados, Cuba, Guadeloupe, Martinique, Puerto Rico and Trinidad and Tobago) as well as a number of countries or areas in Eastern and South-Eastern Asia (China, the Democratic People's Republic of Korea, Hong Kong Special Administrative Region of China, Macao Special Administrative Region of China, the Republic of Korea and Singapore) are also part of the group and have the distinction of having joined it even though their fertility began to decline well after 1950. That is, for these countries, just as for the early starters, the decline of fertility has not stopped at replacement level and, in this "post-transitional phase", fertility may not necessarily return to replacement level over the foreseeable future.

In its fifty years of preparing population estimates and projections for all countries and areas of the world, the United Nations Population Division has been concerned with the challenge of projecting the future fertility levels of countries with very low fertility. Already in the *1968 Revision*, the medium-variant projection for Japan kept its fertility levels slightly below replacement level for part of the projection period, and in the *1978 Revision*, China was projected to exhibit below-replacement fertility by 2000. However, until the late 1980s, when projections were being made with a time horizon that extended only to 2025, the number of countries whose fertility was projected to be or remain below replacement level for a good part of the projection period was small. In the 1990s, as the number of countries with very low fertility increased, a more systematic treatment of those countries became necessary. To review the guidelines for the projection of fertility in countries with below-replacement fertility, the Population Division convened in 1997 a meeting of experts to discuss the causes of the changes observed and the prospects for the maintenance of below-replacement fertility over the long run. The assumptions underlying the *1998 Revision* were the first to reflect the debates and conclusions reached during that meeting.

In 2001, a similar meeting of experts was convened to discuss prospects for countries where fertility had not yet begun to decline or where fertility declines were incipient. The importance of those countries was underscored by the results of the *2000 Revision* where their fertility was projected to decline more slowly than in the *1998 Revision.* As a result of such a change, the high-fertility countries would contribute about a quarter of a billion additional persons to the world population by 2050, in spite of the substantial reductions in fertility projected under the medium variant. Were those reductions in fertility to be postponed further or to be less substantial than projected, the resulting population growth would have been even more marked.

Lastly, a further development that merits consideration is the discussion of future prospects for the decline of fertility to levels below replacement in the numerous countries that are already far advanced in the fertility transition. If, following the precedent set by their European counterparts, most of those countries were to progress to below-replacement levels as they complete the transition to low fertility and maintain such levels for prolonged periods, both the growth of their populations and the speed of population ageing would be affected. It is therefore the purpose of this meeting to discuss the array of factors that seem relevant in explaining the persistence of very low fertility and to assess their likely relevance and impact for countries that are still undergoing the transition from high to low fertility, most of which have reached intermediate-fertility levels. The aim of such an assessment is to provide some guidance in the formulation of specific assumptions about future fertility levels for those countries. This paper presents a general approach to the formulation of projection assumptions and sets forth concrete proposals regarding the future path of fertility for the intermediate-fertility countries.

The issues

The prolonged prevalence of below-replacement fertility levels leads eventually to outright reductions of the population unless net migration gains are also sustained and sufficiently large to counterbalance the decline in the number of births. Furthermore, in the absence of migration, the lower the level of fertility attained and maintained, the more rapid the speed of population ageing; and when a population reaches advanced stages in population ageing and a steady decline of the proportion of persons in the reproductive ages sets in, the return of fertility to levels above replacement will not immediately halt the reduction of the overall population. That is, just as a prolonged regime of high fertility produces a population that keeps on growing for at least a generation after below-replacement fertility sets in, prolonged periods of below-replacement fertility create a population whose reproductive dynamics have an in-built momentum toward population decline. In brief, neither sustained fertility levels above replacement nor those below replacement lead to a steady state in terms of population growth. This fundamental principle in population dynamics has explicitly or implicitly guided thinking about long-term fertility trends among demographers in general and in the United Nations Population Division in particular.

Although our knowledge about the dynamics of populations throughout human history is sketchy, it is certain that the trends experienced during the twentieth century have been unique. Never before had the world's population grown so rapidly and for such a prolonged period as in the second half of the twentieth century. And never before had global reductions in the growth rate been achieved by the sustained and expanding reduction of fertility among the peoples of the world. In the 1950s, when population dynamics in the developing world began to be measured systematically, demographers warned of the unsustainable nature of prolonged and rapid population growth. Population projections were a valuable tool in calling attention to the challenges that lay ahead. Perhaps remarkably, the United Nations Population Division projected in the early 1960s that the population in 2000 would be close to 6.1 billion (medium variant), a figure very similar to that estimated in the *2000 Revision*. Even in the late 1950s and early 1960s, when there was still no conclusive evidence suggesting that fertility reductions were about to take place, these projections resulted from assumptions that foresaw important reductions in fertility in almost all regions. The necessity of those reductions to achieve eventually a steady state in which births and deaths would nearly balance each other was a clear, if perhaps unstated, premise guiding the assumptions made.

Today, when there is convincing evidence that reductions of fertility have started in almost all countries of the world, the focus has shifted to discussion about the "end of population growth", a phrase increasingly used to evoke population declines.[1] The results of current population projections are interpreted as meaning that further reductions of fertility are inevitable in every population and scant attention is given to the fact that, even if those fertility reductions materialize as projected, the global population will continue to increase to unprecedented levels and, perhaps more importantly, that most of the population growth expected will be concentrated in specific regions, thus maintaining the heterogeneity of population dynamics at the regional, country and subnational levels for many decades to come.

It is in this context that the key question posed by this meeting arises: should the attainment of the steady state in population dynamics during the next fifty years be the most realistic standard followed by the projections of countries that are far advanced in the transition to low fertility? Or, alternatively, if, as suggested by the experience of developed countries, actual fertility reductions have no respect for the steady state and very often produce levels well below those needed to attain it, which below-replacement level or levels should be projected for the future and how rapidly should they be attained?

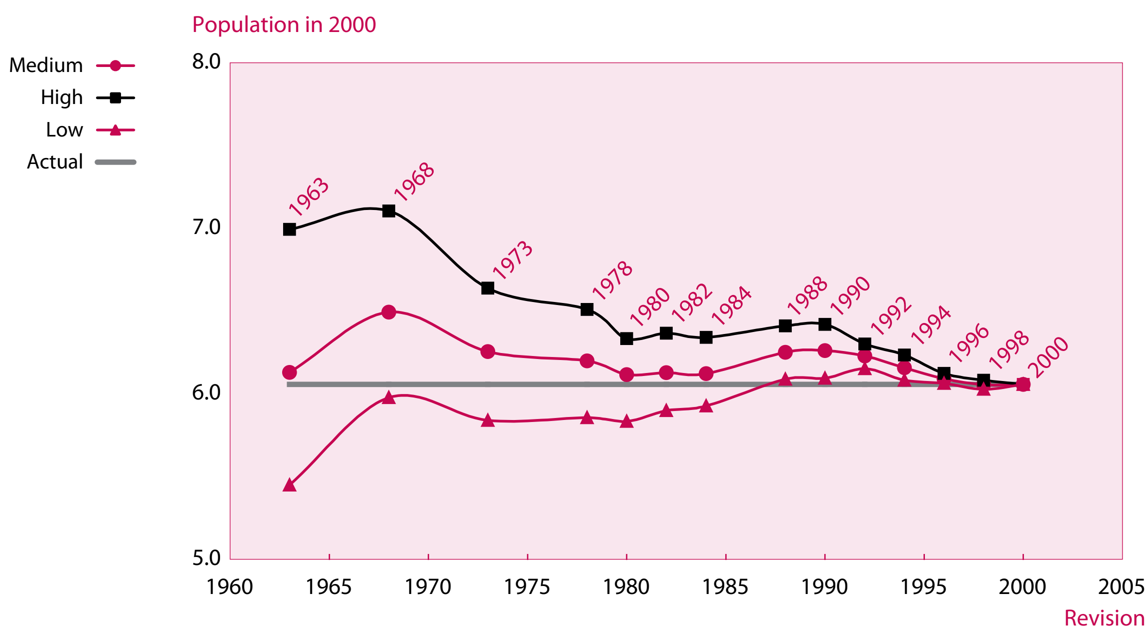
In answering these critical questions it will be useful to bear in mind the implications of different errors. Since no one is likely to predict the future accurately most of the time, errors will necessarily occur. If, for a given country, projected fertility levels over the long run turn out to be higher than those actually experienced by the country in question, the country will eventually have less people and an older population than originally expected but, other things being equal, will likely have more resources per capita than with a larger population. If, on the contrary, projected fertility over the long run turns out to be lower than actual fertility, the needs of larger numbers of people than expected will have to be accommodated. At the regional or world levels, the predominance of the first type of error will result in a higher population than the actual one and the reverse will be true if the second type of error predominates. In the history of the Population Division's population projections, an *a posteriori* assessment suggests that the first type of error has tended to predominate. Thus, as several commentators have remarked before, the medium variant has tended to produce higher populations than actually attained at the world level (figure I). Of course, that overall tendency has been the result of decisions made independently at the country level where, especially in a context of unprecedented fertility reductions, analysts have underestimated, on average, the actual rate of decline. In particular, because it is difficult to predict the onset of fertility reductions in countries where fertility has not yet shown any signs of change, projections have tended to miss the point of inflection. Thus, although by the early 1970s the population projections of the United Nations were already based on the assumption that fertility reductions would eventually occur in all regions, the timing of those reductions was uncertain and was not necessarily forecast accurately for every country. As it turned out, the *1973 Revision* was right in assessing that the last region to experience significant fertility reductions would be Africa, where fertility decline was projected to start toward the end of the 1980s, and that poor socio-economic prospects would generally be associated with slow reductions of

[1] In fact, the possibility of the end of population growth and population decline has been addressed by many authors over the years. In the 1930s, Spengler (1930) and Stuart (1939) wrote articles entitled "When population ceases to grow" and "Population going down", respectively. In 1970, Kingsley Davis (1970) discussed the prospects for the end of population growth in a piece entitled "The climax of population growth: past and future perspectives". In the 1980s, Ben Wattenberg coined the phrase "birth dearth" and published a book with that title focusing on the prospects for countries with fertility below replacement level (Wattenberg, 1987). More recently, Lutz, Sanderson and Scherbov highlighted the issue in an article entitled "The end of world population growth", where they stated that "[human population] growth is likely to come to an end in the foreseeable future" (Lutz, Sanderson and Scherbov, 2001).

fertility, as the experience of the least developed countries as a group exemplifies, despite the notable exceptions that have occurred among them.

The question posed today involves similar challenges. Even if it is established with some certainty that most countries whose fertility is still well above replacement level are very likely to experience long periods of below-replacement fertility in the future, the level of below-replacement fertility that each one of them would attain, the period when that level would be reached and the length of time over which below-replacement fertility would prevail are all uncertain and difficult to forecast. The experience of the current low-fertility countries is varied. In 1995-2000, their total fertility levels ranged from 1.12 children per woman to 2.06 children per woman, with a mean of 1.57 children per woman (table 1). However, for countries where below-replacement fertility has persisted for more than five years, the 1995-2000 value was generally the minimum attained. If the average levels of fertility maintained over the period in which each low-fertility country experienced below-replacement levels were considered instead, that average ranged from a minimum of 1.38 children per woman to a maximum of 2.08 children per woman, having a mean of 1.76 children per woman. Further examination of the trends experienced since 1950 by the low-fertility countries indicates that many of them already were in the last stages of the transition to low fertility by 1950-1955, having reached total fertility levels below 3 children per woman. Since the majority of intermediate-fertility countries of today still have fertility levels above 3 children per woman and the group of low-fertility countries whose total fertility in 1950-1955 was above 3 children per woman includes most of the developing countries that have already seen their fertility drop to below-replacement levels, it is useful to compare the recent levels of fertility of the latter with those of all low-fertility countries. In terms of total fertility levels in 1995-2000, the group of low-fertility countries with high fertility in 1950-1955 had a slightly higher mean total fertility than that of all low-fertility countries (1.71 children per woman versus 1.57 children per woman). In addition, in terms of average levels of total fertility experienced while below-replacement levels have prevailed, the low-fertility countries with high fertility in 1950-1955 have a higher mean than that of all low-fertility countries (1.81 children per woman instead of 1.76 children per woman). From these comparisons and assuming that the past experience of low-fertility countries can provide some guidance

Figure I
Population in 2000 according to different *Revisions*



about the future average levels of below-replacement fertility that today's intermediate-fertility countries might reach and maintain in the future, a rounded value of about 1.8 children per woman seems to be a realistic starting point.

Turning now to the two other issues of concern in projecting below-replacement fertility for intermediate-fertility countries, namely, the timing of the transition to below-replacement fertility and the length of the period over which it should prevail, past experience provides weak guidance on both points. Among the low-fertility countries of today, several experienced a relatively prolonged period of below-replacement fertility earlier in the twentieth century but in most cases fertility rebounded to levels well above replacement during the 1940s, 1950s and even into the 1960s. In most of the low-fertility countries that experienced very low levels of fertility in the 1920s and 1930s, that early transition to below-replacement fertility was not abrupt, but represented rather a continuation of long-term declining trends (Teitelbaum and Winter, 1985). In contrast, for the developing countries that have reached below-replacement fertility levels after 1950, the transition to below-replacement fertility has been less protracted. There is reason to expect, therefore, that if intermediate-fertility countries reach below-replacement fertility, they might do so relatively rapidly, that is, without maintaining low but above-replacement fertility levels for a long time.

There are examples, however, of developing countries where the transition to low fertility occurred fairly early but whose levels of fertility have not fallen as yet even to replacement level. Argentina and Uruguay are cases in point. In both, total fertility was already low by world standards in 1950-1955, at about 3 children per woman, but it has remained consistently above 2.1 children per woman over the next forty-five years, being still 2.6 children per woman in Argentina and 2.4 in Uruguay in 1995-2000. Neither high inflation, recessions, war, high levels of education, nor relatively high levels of female labour force participation have produced below-replacement levels in Argentina. Whether both countries will continue to display such exceptional fertility trends in the future and whether they represent patterns that will repeat themselves in other countries, particularly those in South America, is a matter that will not be easily settled given current evidence.

Lastly, with respect to the persistence of below-replacement fertility, past evidence is not conclusive. As already mentioned, the baby-boom of 1945-1960 interrupted the below-replacement period for many developed countries and there is no guarantee that

Table 1
Indicators of the distribution of selected groups of low-fertility countries[a] according to total fertility

	Total fertility in 1995-2000	Average for period of below-replacement fertility prior to 2000	Projected for 2045-2050 (medium variant)
All low-fertility countries			
Minimum	1.12	1.38	1.61
Lower quartile	1.34	1.65	1.82
Median	1.55	1.74	1.90
Upper quartile	1.77	1.86	1.97
Maximum	2.06	2.08	2.10
Mean	1.57	1.76	1.88
Countries with TF > 3 in 1950-1955			
Minimum	1.15	1.38	—
Lower quartile	1.52	1.69	—
Median	1.76	1.83	—
Upper quartile	1.96	1.96	—
Maximum	2.06	2.08	—
Mean	1.71	1.81	—

a Refers to countries with below-replacement fertility in 1995-2000.

"baby-boomlets" might not occur in the future in other contexts. In fact, earlier *Revisions* of the population projections had generally opted to make the fertility of low-fertility countries return to replacement level, at least in the long run. However, starting with the *1998 Revision*, the return to replacement level by 2050 was no longer considered to be very likely and the total fertility of most low-fertility countries was maintained well below replacement level until 2045-2050. Partly because of that change in thinking, the issue of whether 2.1 is a realistic target level for future total fertility in most developing countries has been raised. If it is agreed that the target level should be changed to a lower number, if would seem appropriate to maintain that level constant until 2045-2050 since the evidence available today is unlikely to permit the forecast of long-term fluctuations in future total fertility. Furthermore, in contrast with the case of low-fertility developed countries, detailed information on fertility trends does not exist for many of the intermediate-fertility countries. Lack of data, therefore, would preclude the analysis of cohort fertility in relation to period fertility to try and ascertain, for instance, if postponement of births might depress period rates only temporarily and if a recuperation would be likely.

In sum, just as the analysts in charge of producing the population projections of the 1960s and early 1970s, those of today are faced with the task of considering whether a second momentous and largely unprecedented change in population dynamics will occur within the next fifty years. Will below-replacement fertility become the norm for the large majority of countries in the world before 2050? Will the period of below-replacement fertility be prolonged in most countries? Just as our predecessors, the main evidence guiding our decisions today is that provided by the experience of the developed countries and the few developing countries that have already blazed the trail toward very low fertility. Given the rapid fertility reductions already experienced by the majority of developing countries, it seems increasingly untenable that their fertility may eventually stabilize at a level considerably higher than the average experienced by developed countries. Despite the theoretical attractiveness of replacement-level fertility, actual populations do not have replacement as an in-built goal, and long-term deviations from replacement level may turn out to be more the rule than the exception, especially if they remain within a narrow range of actual replacement level.

Guidance from theory

Recognizing the crucial importance and unprecedented nature of sustained reductions of fertility occurring in the absence of crisis, population specialists have been studying their causes for at least fifty years. The literature on the subject is rich and varied. However, assessments of the state of knowledge published recently conclude that we are still far from knowing exactly what factors were responsible for triggering and sustaining the marked fertility reductions that have taken place (Bulatao and Casterline, 2001; Casterline, 2001a). Cleland (2001a), for instance, qualifies as "bewildering" the variety of circumstances under which fertility decline has occurred: it has taken place when economic conditions have been improving and when they have deteriorated; it has occurred in populations with high standards of living and in those where standards of living are low; it has taken hold in countries with strong links to the global consumer culture and in those where those links are weak; and it has happened under a wide array of political regimes and policy settings. Although one combination of factors and circumstances may be able to explain the fertility reductions that have occurred in some cases, it cannot do so in other cases.

Casterline (2001b) notes that the earliest efforts to explain the decline in fertility linked it with the other major social and economic transformations that had occurred in the nineteenth and early twentieth centuries in the developed world, namely, industrialization and urbanization. These transformations were seen as increasing the costs of rearing children and decreasing the benefits that children conferred on older generations (Thompson, 1929; Davis, 1945; Notestein, 1945 and 1953). The importance of mortality decline as a precondition for fertility reductions was also recognized (Davis, 1963) and it was argued that changing notions about the family (Aries, 1962, 1980; Caldwell, 1982) and declining adherence to religious and ethical systems (i.e., the increasing "secularization" of populations) also played a part (Lesthaeghe, 1983).

However, when these ideas were put to the test, they did not prove conclusive. In the 1970s, two large projects to analyse the factors leading to fertility decline were started, namely, the Princeton European Project and the analysis of the World Fertility Survey (WFS) data. Both of them reached similar conclusions (Casterline, 2001b; Cleland, 2001b). The Princeton European Project focused on the analysis of aggregate demographic data for the provinces of Europe during the period of their transition to low fertility, namely, 1880-1930 (Coale and Watkins, 1986). The study concluded that the timing of the onset of fertility reductions was only weakly linked to provincial levels of socio-economic modernization but unmistakably linked to language, ethnic or religious cleavages. Moreover, the decline of marital fertility in Europe did not seem to be fuelled by changes in the value of children (Knodel and van de Walle, 1986).

Focusing on developing countries, many of which were just starting the transition to low fertility, the analysis of WFS data reached similar conclusions. As in the European project, socio-economic factors were only weakly linked to the reductions of fertility observed. Women's labour force participation, for instance, was not a predictor of fertility levels in most countries (United Nations, 1985), and the shift from familial to non-familial modes of production did not have the expected effect on family size (Rodríguez and Cleland, 1981). The availability of more data and the expanding number of countries experiencing fertility reductions have not changed these conclusions. A recent study by Bongaarts and Watkins (1996) examined the relationships between the Human Development Index (HDI), the onset of fertility decline, and the subsequent pace of that decline in contemporary developing countries. Once more, the link between the HDI and the onset of fertility decline proved to be weak, since countries began the fertility transition at very varied levels of HDI. However, those that began the transition having reached relatively high levels of socio-economic development, generally maintained faster rates of fertility decline.

According to Casterline (2001b), "confronted by the findings of the Princeton project, scholars turned to other explanations to augment, or even to supplant, the dominant theoretical framework in which the primary causal forces underlying fertility decline were mortality decline and the paradigmatic economic and social changes that occurred in Europe in the nineteenth and early twentieth centuries". The alternatives proposed have been loosely collected under the label of "diffusion theories". The Princeton European Project proved that the explanatory power of variables measuring industrialization, urbanization, State centralization, bureaucratization and other aspects of socio-economic status at the province level had at best modest effects in predicting the onset of fertility declines in conventional regression analysis. As a result, better models of how diffusion and resistance to diffusion may work in societies that are sharply divided along linguistic, ethnic or religious cleavages have been developed. In a sweeping review of the evidence, Cleland and Wilson (1987) suggest that no version of demand theory, that is, economic formulations invoking the need for structural changes in the position of individuals as a precondition for fertility reductions, can ultimately account for the onset, pace and geographic location of fertility reductions in the developing world. Instead, these reductions appear to be driven by ideational changes stemming from processes of diffusion. Similar conclusions had been reached earlier by Caldwell (1982), who suggested that ideational change (i.e., "westernization") precedes and is partially independent of changes in the forms of production and of population distribution. Bongaarts and Watkins (1996), after reviewing aggregate empirical evidence on the relation between socio-economic factors and the onset and pace of fertility decline, also conclude that much of the decline observed has been propelled by the transmission of information and ideas regarding fertility control. Their conceptualization of what is being transmitted includes both processes of diffusion among individuals and families (at the level of local networks and peers) and at the level of communities or countries (global and national networks).

In their reviews of diffusion processes and the fertility transition, Casterline (2001b) and Cleland (2001b) suggest that an overarching explanation for that transition probably needs to make use of a "blended theory" in which, as Cleland (2001b) puts it: "the engine of demographic change is the structural transformation of societies, and diffusion is the lubricant". One possible blended approach is that suggested by Lesthaegue and Vanderhoeft (2001) based on the three preconditions proposed by Coale (1973) for adaptation to a new mode of behaviour. According to Coale, fertility reductions would occur when couples were ready, willing and able to control family size. Lesthaegue and Vanderhoeft interpret readiness to mean that the new forms of behaviour must be advantageous to the actor involved, that is, their utility must be evident and outweigh their disutility. In this sense, readiness encompasses or is equivalent to the microeconomic cost-benefit calculus that actors use in making decisions. The notion of willingness refers to considerations of legitimacy and normative acceptability (that is, conformity with ethical, religious or other societal norms) of the new pattern of behaviour. To assess the level of willingness it is crucial to understand to what extent a new form of behaviour runs counter to established traditional beliefs or codes of conduct and whether the actor can overcome existing moral objections and fears. Lastly, ability involves access to new techniques that make the new forms of behaviour possible. In the case of fertility control, the notion of ability depends on the accessibility to adequate contraceptive methods mediated by the costs involved both in concrete and psychological terms.

Clearly, this formulation of Coale's proposal merges the concerns of the economic and diffusion approaches. With respect to fertility reductions, diffusion can play a part in both increasing willingness and ability. Willingness is affected by the diffusion of ideas that transform the normative environment and legitimize the control of fertility. Such diffusion may be officially promoted through established programmes and focused interventions. Ability can also be enhanced by programmes that make modern contraceptive methods widely available and take steps to reduce not only the material costs associated with their use but also the psychological costs involved. Application of the models developed by Lesthaegue and Vanderhoeft clearly show how fertility reductions can be delayed or slowed if any of the three necessary conditions poses a barrier to the adoption of behaviours to limit family size.

In comparison to the state of theory regarding the transition from high to low fertility, the state of that regarding the achievement and maintenance of below-replacement fertility is less advanced. However, it is useful to review the history and state of the former because the latter is probably at the stage the theory of the fertility transition was in the early 1970s. The literature addressing the causes and persistence of below-replacement fertility has largely focused so far on the importance of socio-economic factors acting at the level of communities or countries. As Lesthaegue and Willems (1999) indicate, there are two dominant theoretical approaches cited to understand the persistence of below-replacement fertility. The first relies on economic theory and has two dominant versions: (*a*) the theory of increased female autonomy, proposed by Becker (1981) and other neoclassical economists; and (*b*) the theory of relative economic deprivation, advanced by Easterlin (1976) and colleagues. In both theories, rising female schooling and employment are crucial determinants of low fertility. According to Becker, rising education of women increases the opportunity costs of childbearing for women and therefore leads to postponement of marriage, motherhood and lower fertility. According to Easterlin and colleagues, high and rising consumption aspirations can be better satisfied in dual-earner families, a situation that leads to increased labour force participation of women, postponement of parenthood and lower fertility. Oppenheimer (1988) has further suggested that the increasing education of women raises women's aspirations regarding the qualifications of a future spouse and therefore prolongs the search in the marriage market thus postponing marriage or even precluding it altogether if the appropriate partner is not found.

The second approach relates changes in value orientations to family building. For a number of European countries, Lesthaegue and Willems (1999) report that "consistent statistical associations have been found between such value dimensions as secularization, weaker civil morality, accentuation of individual autonomy, 'postmaterialism', symmetric gender roles, female emancipation, and tolerance of new sexual groups on the one hand, and a preference for cohabitation over marriage, delayed parenthood, and lower overall fertility on the other hand". These associations persist even when other socio-economic variables are controlled for, including female labour force participation, type of employment and education.

Other authors who have tried to address the causes of prolonged periods of very low fertility have proposed arguments of a similar nature. Chesnais (2000), in identifying recent changes leading to post-modernity and the baby bust, talks about "social atomization and related feminism", indicating that high levels of education and the possibility of having their own independent identity allow women to forego marriage and focus on their personal achievement rather than on reproductive goals. He notes that the proportion of single women aged 25-29 in many European countries has reached unprecedented levels and that the proportion of one-person households, where women predominate, has also been rising as a result of both celibacy and divorce. Chesnais also argues that the availability of collective pension benefits has put a downward pressure in childbearing since it is no longer necessary to have several children to ensure old-age economic viability. In fact, the individual's economic interest is better served by maximizing his or her career prospects since the number of children raised is not taken into account in computing pensions. Dorbritz and Hohn (2000) add that changes in the basic social institutions of marriage and the family have a major influence in reducing childbearing. In developed countries, people no longer marry and remain married until death. High divorce rates are common. Furthermore, married people often live apart for prolonged periods, in pursuing individual careers or other interests. Rising ages at marriage, increasing childlessness and celibacy, and high divorce rates seem to be the traits of the "post-modern" society.

However, analysis of trends in low-fertility countries reveals more variability that this discussion would lead one to expect (United Nations, 2000a; Lesthaegue and Willems, 1999). Age at marriage or age at first birth has increased dramatically in some countries but not in others; cohabitation before marriage is common in some countries and not in others; high levels of illegitimacy (births conceived outside marriage) are common in some countries and not in others; policy stances vary considerably among the low-fertility countries; in some countries there is clear evidence that the current very low levels of fertility are the result of postponement but in others the normal indicators of postponement play a small part in explaining below-replacement levels. This "bewildering" situation, to borrow Cleland's adjective for the host of circumstances in which fertility declines have occurred, provides a weak basis for ascertaining which factors can indicate today whether a country whose current fertility has still an intermediate level will reach below-replacement levels 20 or 30 years from now.

That populations with quite different levels of socio-economic development and varied demographic trends regarding family formation have reached and maintained below-replacement levels of fertility for relatively prolonged periods suggests that some kind of diffusion process may be at work. What is diffused is not yet clear: values, attitudes, individualism, feminism, consumerism, secularization? But whatever it turns out to be, it may be as potent as the diffusion of ideas that has already taken place and that seems to be at the root of many of the transitions from high to low fertility that we have witnessed so far. This line of argument, which posits that the diffusion of ideas and values can be a powerful force leading to very small family sizes, would justify the revision of the guidelines regarding the projected fertility of intermediate-fertility countries.

Another important conclusion drawn from this discussion is that the search for lead indicators of fertility reductions likely to result in below-replacement levels as a precondition for the formulation of revised projection guidelines would not be a fruitful endeavour. Not only is it unlikely that a few easily measurable factors would act as lead indicators but, in addition, it may be necessary to project their values in the future to try to ascertain if they warrant a future reduction of fertility to below-replacement levels. Such exercise will probably result in less reliable projections of fertility than those derived from current methods mainly because most economic, social or diffusion indicators are likely to be far more volatile than population trends. In this regard, it is of interest to recall the results of the report by the Panel on Population Projections of the National Research Council (Bongaarts and Bulatao, 2000). In assessing the adequacy of lead indicators to project total fertility from one five-year period to the next, the Panel found that, for countries in the middle of the transition to low fertility, the rate of fertility change in the period immediately preceding the reference period had the strongest predictive power for the rate of change in the reference period when compared with other socio-economic factors (i.e., infant mortality, female secondary school enrolment, and percentage urban). However, the predictive power of the rate of fertility change declined for periods further apart and it was virtually nil for trends more than 10 years into the future. For countries very far advanced in the transition, the analysis did not find any useful predictor of future fertility trends, even over a five-year horizon.

Lastly, it is worth noting that one clear implication of the theories of fertility decline is that the availability of effective contraceptive methods is an important condition facilitating the maintenance of very low fertility levels. It is an empirical finding that most societies with below-replacement fertility levels has very high levels of contraceptive prevalence, normally surpassing 65 or 70 per cent of women of reproductive age and in some cases reaching levels as high as 85 per cent. If the intermediate-fertility countries of today are to reach below replacement fertility, their levels of contraception will have to rise significantly. The attainment and maintenance of below-replacement fertility (or even of fertility at about replacement level) will generally involve easy access to a modern contraceptive method for most women on a sustained basis.

The parameters of the problem

The issue of whether intermediate-fertility countries will reach and maintain below-replacement levels of fertility before 2050 needs to be addressed with respect to specific countries, namely those that are already far advanced in the transition to low fertility but where total fertility remains above 2.1 children per woman, with this value taken as the marker of below-replacement level. Before the transition to low fertility started, most of the 143 countries in the developing world had total fertility levels of 5 children per woman or higher. Today, only 49 countries still do. Among the rest, 73 had a total fertility ranging from 2.1 children per woman to just under 5 children per woman in 1995-2000, and 21 already had below-replacement fertility. In addition, one developed country, Albania, also had a total fertility in the range of 2.1 to 5 children per woman. Since fertility declines among developing countries have averaged about one child per decade during 1950-2000, it is feasible that most countries with total fertility levels below 5 children per woman in 1995-2000 may reach total fertility levels of 2 children per woman or less over the projection span (2000-2050) even if, as observed, the speed of fertility decline decelerates as lower levels of fertility are reached. Consequently, the set of countries considered as candidates to reach below-replacement fertility during the projection period includes all those whose total fertility in 1995-2000 was estimated to range from 2.1 children per woman to just under 5 children per woman (table 2). The 74 countries in the group accounted for 43 per cent of the world population in 2000 and include such populous countries as India, Indonesia, Brazil, Bangladesh, Mexico, the Philippines, Viet Nam and Egypt, listed in order of decreasing population size.

Table 2 shows selected indicators of past fertility trends for the set of 74 countries or areas that will be identified from here on as the “intermediate-fertility countries”.

Based on the estimated levels of total fertility for every five-year period from 1950-1955 to 1995-2000, table 2 indicates the maximum and the minimum total fertility reached during 1950-2000 as well as an estimate of the average decline per decade implied by the maximum and minimum values of total fertility and an estimate of average declines (or increases) per decade between 1975-1980 and 1995-2000. On the basis of such indicators, it is clear that for the vast majority of the intermediate-fertility countries the highest fertility levels were reached early in the 1950-2000 period and that the lowest levels correspond to those estimated for 1995-2000. That is, fertility reductions started about 40 to 45 years ago in this group of countries and have generally continued unabated up to 1995-2000. However, some exceptions to this general trend are evident. French Guiana and Guam, for instance, experienced an increase in total fertility between 1975-1980 and 1995-2000.

Furthermore, the speed of the decline of fertility for each particular country has varied over time. Countries whose fertility declined significantly early on are more likely to have reached low levels of total fertility and, given the time elapsed since the start of the decline, could have already attained below-replacement fertility if they were prone to do so. To detect countries where the decline of fertility may have decelerated sufficiently so as to cast doubts about whether they might be ready to proceed to below-replacement levels in the near future, a comparison of the average declines per decade calculated for the whole period of decline and that calculated since 1975 is made. When the average decline for 1975-2000 is lower than that estimated as of the start of fertility reductions, a slowdown of the rate of decline has occurred. Slowdowns have been fairly common, but they generally involve just a small difference between the average rates of decline for the two periods considered. However, important differences are noticeable in the cases of Réunion in Africa; East Timor and Malaysia in Asia; Bahamas, Chile, Costa Rica and Guyana, and to a lesser extent Jamaica and Venezuela in Latin America and the Caribbean; and in Fiji and Samoa in Oceania. Further examination of fertility trends indicates that in East Timor an increase of fertility occurred after 1975; that fertility in Chile and Réunion has been below 3 children per woman since 1980 but reductions since then have been very slow; and that fertility remains high in Samoa where it has changed little since 1980.

Other countries with strikingly slow declines of fertility during 1950-2000 are Argentina, Israel and Uruguay, all of which attained relatively low fertility levels early on and have not shown signs of reaching even replacement level, let alone levels below that. The identification of countries such as these, where the long-term decline of fertility has not automatically led to levels below replacement is important because, in reviewing the guidelines for the projection of future fertility declines, it will be necessary to justify that their fertility will eventually reach below-replacement levels or, alternatively, to treat them as exceptional cases if their fertility is not projected to dip below replacement level.

Table 3 presents another view of the current status of the intermediate-fertility countries. It displays, for comparison purposes, the most recent data on contraceptive prevalence in terms of the proportion of women of reproductive age using some method of contraception and the proportion of women of reproductive age using modern methods, together with a measure of the average change per decade in the proportion of women using some method. In addition, the table shows the total fertility estimates for 1995-2000 derived from the *2000 Revision*, the estimated rate of change per decade of total fertility between 1975-1980 and 1995-2000, an estimate of actual replacement level fertility for each country in 2045-2050, the lowest value of total fertility projected according to the medium variant of the *2000 Revision* (also called the target level), and the beginning year of the five-year period in which that target level will be reached according to the medium variant of the *2000 Revision.* These data highlight the fact that in the *2000 Revision* the vast majority of the intermediate-fertility countries were projected to reach a total fertility of 2.1 children per woman long before 2045-2050 and, consequently, their

Table 2
List of intermediate-fertility countries according to total fertility level in 1995-2000 and indicators of the speed of fertility decline

Major area or country	Total fertility 1950-1955	1975-1980	1995-2000	Maximum	Minimum	Period in which maximum is reached
World	**5.01**	**3.90**	**2.82**	**5.01**	**2.82**	**1950-1955**
Africa	6.71	6.56	5.27	6.84	5.27	1960-1965
1. Réunion	5.65	3.28	2.30	5.85	2.30	1955-1960
2. Tunisia	6.93	5.69	2.31	7.25	2.31	1960-1965
3. South Africa	6.50	5.00	3.10	6.50	3.10	1950-1955
4. Algeria	7.28	7.18	3.25	7.38	3.25	1960-1965
5. Egypt	6.56	5.27	3.40	7.07	3.40	1960-1965
6. Morocco	7.18	5.90	3.40	7.18	3.40	1950-1955
7. Cape Verde	6.60	6.70	3.56	7.00	3.56	1960-1965
8. Libyan Arab Jamahiriya	6.87	7.38	3.80	7.59	3.80	1970-1975
9. Botswana	6.50	6.37	4.35	6.90	4.35	1960-1965
10. Western Sahara	6.53	6.05	4.40	6.53	4.40	1950-1955
11. Ghana	6.90	6.90	4.60	6.90	4.60	1950-1955
12. Kenya	7.51	7.90	4.60	8.12	4.60	1960-1965
13. Lesotho	5.84	5.74	4.75	5.86	4.75	1955-1960
14. Swaziland	6.50	6.49	4.80	6.50	4.80	1950-1955
15. Sudan	6.50	6.30	4.90	6.67	4.90	1955-1960
Asia	5.88	4.17	2.70	5.88	2.70	1950-1955
1. Lebanon	5.74	4.31	2.29	6.36	2.29	1960-1965
2. Viet Nam	5.75	5.89	2.50	7.25	2.50	1960-1965
3. Indonesia	5.49	4.73	2.60	5.67	2.60	1955-1960
4. Bahrain	6.97	5.23	2.63	7.18	2.63	1960-1965
5. Mongolia	6.00	6.65	2.70	7.33	2.70	1970-1975
6. Turkey	6.90	4.65	2.70	6.90	2.70	1950-1955
7. Brunei Darussalam	7.00	4.40	2.80	7.00	2.80	1950-1955
8. Uzbekistan	5.97	5.58	2.85	6.80	2.85	1960-1965
9. Kuwait	7.21	5.89	2.89	7.41	2.89	1965-1970
10. Kyrgyzstan	4.51	4.05	2.89	5.39	2.89	1960-1965
11. Israel	4.16	3.41	2.93	4.16	2.93	1950-1955
12. United Arab Emirates	6.97	5.66	3.17	6.97	3.17	1950-1955
13. Iran (Islamic Republic of)	7.00	6.00	3.20	7.00	3.20	1950-1955
14. Malaysia	6.83	4.16	3.26	6.94	3.26	1955-1960
15. Myanmar	6.00	5.30	3.30	6.00	3.30	1950-1955
16. India	5.97	4.83	3.32	5.97	3.32	1950-1955
17. Turkmenistan	6.00	5.32	3.60	6.75	3.60	1960-1965
18. Philippines	7.29	5.50	3.64	7.29	3.64	1950-1955
19. Qatar	6.97	6.11	3.70	6.97	3.70	1950-1955
20. Tajikistan	6.00	5.90	3.72	6.83	3.72	1970-1975
21. Bangladesh	6.70	5.70	3.80	7.10	3.80	1960-1965
22. Syrian Arab Republic	7.09	7.44	4.00	7.79	4.00	1965-1970
23. East Timor	6.44	4.31	4.35	6.44	4.31	1950-1955
24. Jordan	7.38	7.38	4.69	8.00	4.69	1960-1965
25. Nepal	5.75	5.65	4.83	6.06	4.83	1960-1965
Europe	2.66	1.97	1.41	2.66	1.41	1950-1955
1. Albania	5.60	4.20	2.60	5.98	2.60	1955-1960

Total fertility				Population (in millions)		
Period in which minimum is reached	Decline per decade from maximum to minimum	Decline from 1975-1980 to 1995-2000	Indication of slowdown of pace of decline	2000	2050	Major area or country
1995-2000	**0.5**	**0.5**		**6 056.7**	**9 322.3**	**World**
1995-2000	0.4	0.6		793.6	2 000.4	Africa
1995-2000	0.9	0.5	Slowdown	0.7	1.0	1. Réunion
1995-2000	1.4	1.7	—	9.5	14.1	2. Tunisia
1995-2000	0.8	1.0	—	43.3	47.3	3. South Africa
1995-2000	1.2	2.0	—	30.3	51.2	4. Algeria
1995-2000	1.0	0.9	Slowdown	67.9	113.8	5. Egypt
1995-2000	0.8	1.3	—	29.9	50.4	6. Morocco
1995-2000	1.0	1.6	—	0.4	0.8	7. Cape Verde
1995-2000	1.5	1.8	—	5.3	10.0	8. Libyan Arab Jamahiriya
1995-2000	0.7	1.0	—	1.5	2.1	9. Botswana
1995-2000	0.5	0.8	—	0.3	0.6	10. Western Sahara
1995-2000	0.5	1.2	—	19.3	40.1	11. Ghana
1995-2000	1.0	1.7	—	30.7	55.4	12. Kenya
1995-2000	0.3	0.5	—	2.0	2.5	13. Lesotho
1995-2000	0.4	0.8	—	0.9	1.4	14. Swaziland
1995-2000	0.4	0.7	—	31.1	63.5	15. Sudan
1995-2000	0.7	0.7		3 672.3	5 428.2	Asia
1995-2000	1.2	1.0	Slowdown	3.5	5.0	1. Lebanon
1995-2000	1.4	1.7	—	78.1	123.8	2. Viet Nam
1995-2000	0.8	1.1	—	212.1	311.3	3. Indonesia
1995-2000	1.3	1.3	—	0.6	1.0	4. Bahrain
1995-2000	1.9	2.0	—	2.5	4.1	5. Mongolia
1995-2000	0.9	1.0	—	66.7	98.8	6. Turkey
1995-2000	0.9	0.8	Slowdown	0.3	0.6	7. Brunei Darussalam
1995-2000	1.1	1.4	—	24.9	40.5	8. Uzbekistan
1995-2000	1.5	1.5	Slowdown	1.9	4.0	9. Kuwait
1995-2000	0.7	0.6	Slowdown	4.9	7.5	10. Kyrgyzstan
1990-1995	0.3	0.2	Slowdown	6.0	10.1	11. Israel
1995-2000	0.8	1.2	—	2.6	3.7	12. United Arab Emirates
1995-2000	0.8	1.4	—	70.3	121.4	13. Iran (Islamic Republic of)
1995-2000	0.9	0.5	Slowdown	22.2	37.8	14. Malaysia
1995-2000	0.6	1.0	—	47.7	68.5	15. Myanmar
1995-2000	0.6	0.8	—	1 008.9	1 572.1	16. India
1995-2000	0.9	0.9	Slowdown	4.7	8.4	17. Turkmenistan
1995-2000	0.8	0.9	—	75.7	128.4	18. Philippines
1995-2000	0.7	1.2	—	0.6	0.8	19. Qatar
1995-2000	1.2	1.1	Slowdown	6.1	9.8	20. Tajikistan
1995-2000	0.9	1.0	—	137.4	265.4	21. Bangladesh
1995-2000	1.3	1.7	—	16.2	36.3	22. Syrian Arab Republic
1975-1980	0.9	0.0	Slowdown	0.7	1.4	23. East Timor
1995-2000	0.9	1.3	—	4.9	11.7	24. Jordan
1995-2000	0.4	0.4	—	23.0	52.4	25. Nepal
1995-2000	0.3	0.3		727.3	603.3	Europe
1995-2000	0.8	0.8	Slowdown	3.1	3.9	1. Albania

Table 2
List of intermediate-fertility countries according to total fertility level in 1995-2000 and indicators of the speed of fertility decline (*continued*)

	Total fertility					
Major area or country	1950-1955	1975-1980	1995-2000	Maximum	Minimum	Period in which maximum is reached
Latin America and the Caribbean	5.89	4.49	2.69	5.97	2.69	1960-1965
1. Suriname	6.56	4.20	2.21	6.56	2.21	1950-1955
2. Brazil	6.15	4.31	2.27	6.15	2.27	1950-1955
3. Uruguay	2.73	2.89	2.40	3.00	2.40	1970-1975
4. Bahamas	4.05	3.22	2.40	4.50	2.40	1960-1965
5. Chile	4.95	2.95	2.44	5.33	2.44	1955-1960
6. Guyana	6.68	3.94	2.45	6.77	2.45	1955-1960
7. Jamaica	4.22	4.00	2.50	5.78	2.50	1965-1970
8. Argentina	3.15	3.44	2.62	3.44	2.62	1975-1980
9. Panama	5.68	4.05	2.63	5.92	2.63	1960-1965
10. Saint Lucia	6.00	5.20	2.70	6.94	2.70	1955-1960
11. Mexico	6.87	5.30	2.75	6.96	2.75	1955-1960
12. Colombia	6.76	4.34	2.80	6.76	2.80	1950-1955
13. Costa Rica	6.72	3.89	2.83	7.11	2.83	1955-1960
14. Dominican Republic	7.40	4.70	2.88	7.40	2.88	1950-1955
15. Peru	6.85	5.38	2.98	6.85	2.98	1950-1955
16. Venezuela	6.46	4.47	2.98	6.66	2.98	1960-1965
17. Ecuador	6.70	5.40	3.10	6.70	3.10	1950-1955
18. El Salvador	6.46	5.60	3.17	6.85	3.17	1960-1965
19. Belize	6.65	6.20	3.41	6.65	3.41	1950-1955
20. French Guiana	5.00	3.30	4.05	5.02	3.30	1960-1965
21. Paraguay	6.50	5.15	4.17	6.55	4.17	1960-1965
22. Honduras	7.50	6.60	4.30	7.50	4.30	1950-1955
23. Nicaragua	7.33	6.40	4.32	7.33	4.32	1950-1955
24. Bolivia	6.75	5.80	4.36	6.75	4.36	1950-1955
25. Haiti	6.30	5.96	4.38	6.30	4.38	1950-1955
26. Guatemala	7.09	6.40	4.93	7.09	4.93	1950-1955
Oceania	3.87	2.78	2.41	4.10	2.41	1955-1960
1. French Polynesia	6.00	4.23	2.60	6.50	2.60	1960-1965
2. New Caledonia	5.00	3.90	2.60	5.30	2.60	1960-1965
3. Fiji	6.63	4.00	3.20	6.79	3.20	1955-1960
4. Guam	5.53	3.52	3.95	6.03	3.08	1960-1965
5. Samoa	7.30	4.89	4.51	7.30	4.51	1950-1955
6. Vanuatu	7.60	5.75	4.59	7.60	4.59	1950-1955
7. Papua New Guinea	6.24	5.87	4.60	6.29	4.60	1960-1965

projected fertility remained constant at 2.1 children per woman for lengthy periods (30 years or more). If recent history is any guide to the future, no population has achieved as yet such a perfect match of actual fertility levels with replacement level. Especially over lengthy periods, fluctuations in trends may be expected, and the possibility of surpassing replacement level or falling below it over lengthy stretches cannot be discarded. The expectation so far has been that, on average, the fertility of actual population will eventually fluctuate around replacement level and therefore the constancy of that level in the long run is appropriate. The change of assumptions being considered now implies that a level

Total fertility				Population (in millions)		
Period in which minimum is reached	Decline per decade from maximum to minimum	Decline from 1975-1980 to 1995-2000	Indication of slowdown of pace of decline	2000	2050	Major area or country
1995-2000	0.9	0.9		518.8	805.6	Latin America and the Caribbean
1995-2000	1.0	1.0	—	0.4	0.4	1. Suriname
1995-2000	0.9	1.0	—	170.4	247.2	2. Brazil
1995-2000	0.2	0.2	No change	3.3	4.2	3. Uruguay
1995-2000	0.6	0.4	Slowdown	0.3	0.4	4. Bahamas
1995-2000	0.7	0.3	Slowdown	15.2	22.2	5. Chile
1995-2000	1.1	0.7	Slowdown	0.8	0.5	6. Guyana
1995-2000	1.1	0.8	Slowdown	2.6	3.8	7. Jamaica
1995-2000	0.4	0.4	No change	37.0	54.5	8. Argentina
1995-2000	0.9	0.7	Slowdown	2.9	4.3	9. Panama
1995-2000	1.1	1.3	—	0.1	0.2	10. Saint Lucia
1995-2000	1.1	1.3	—	98.9	146.7	11. Mexico
1995-2000	0.9	0.8	Slowdown	42.1	70.9	12. Colombia
1995-2000	1.1	0.5	Slowdown	4.0	7.2	13. Costa Rica
1995-2000	1.0	0.9	Slowdown	8.4	12.0	14. Dominican Republic
1995-2000	0.9	1.2	—	25.7	42.1	15. Peru
1995-2000	1.0	0.7	Slowdown	24.2	42.2	16. Venezuela
1995-2000	0.8	1.2	—	12.6	21.2	17. Ecuador
1995-2000	1.1	1.2	—	6.3	10.9	18. El Salvador
1995-2000	0.7	1.4	—	0.2	0.4	19. Belize
1975-1980	1.1	-0.4	Increase	0.2	0.5	20. French Guiana
1995-2000	0.7	0.5	Slowdown	5.5	12.6	21. Paraguay
1995-2000	0.7	1.1	—	6.4	12.8	22. Honduras
1995-2000	0.7	1.0	—	5.1	11.5	23. Nicaragua
1995-2000	0.5	0.7	—	8.3	17.0	24. Bolivia
1995-2000	0.4	0.8	—	8.1	14.0	25. Haiti
1995-2000	0.5	0.7	—	11.4	26.6	26. Guatemala
1995-2000	0.4	0.2		30.5	47.2	Oceania
1995-2000	1.1	0.8	Slowdown	0.2	0.4	1. French Polynesia
1995-2000	0.8	0.7	Slowdown	0.2	0.4	2. New Caledonia
1995-2000	0.9	0.4	Slowdown	0.8	0.9	3. Fiji
1980-1985	1.5	-0.2	Increase	0.2	0.3	4. Guam
1995-2000	0.6	0.2	Slowdown	0.2	0.2	5. Samoa
1995-2000	0.7	0.6	Slowdown	0.2	0.5	6. Vanuatu
1995-2000	0.5	0.6	—	4.8	11.0	7. Papua New Guinea

below replacement will be reached by most intermediate-fertility countries before 2050. Once a target level below replacement is adopted, projections will be prepared following the same strategy as heretofore, that is, by establishing the target period when the target level will be reached and then keeping that level constant until the end of the projection period. Because of the size and importance of many of the intermediate-fertility countries, this strategy will reduce considerably the total fertility of the world as a whole and will likely reduce to below-replacement levels the total fertility of the world starting in 2040 or earlier. The crucial importance of this outcome cannot be overemphasized.

Table 3
Measures of contraceptive use and indicators of past and future fertility trends for the intermediate-fertility countries according to the 2000 revision

Country or area	Population in 2000 (millions)	Contraceptive prevalence: Reference date	Percentage of women using a method (all methods included)	Percentage of women using modern methods	Average change per decade in percentage of women using all methods
Total fertility below 2.5					
Brazil	170.4	1996	76.7	70.3	10.9
Viet Nam	78.1	1997	75.3	55.8	24.6
Réunion	0.7	1990	66.6	61.7	—
Jamaica	2.6	1997	65.9	62.6	12.5
Bahamas	0.3	1988	61.7	60.1	—
Lebanon	3.5	1996	61.0	37.0	3.2
Tunisia	9.5	1994	60.0	51.0	17.9
Guyana	0.8	1975	31.4	28.3	—
Suriname	0.4	—	—	—	—
Uruguay	3.3	—	—	—	—
Chile	15.2	—	—	—	—
Total fertility between 2.5 and 3.0					
Colombia	42.1	2000	76.9	64.0	18.2
Costa Rica	4.0	1992	75.0	64.6	6.6
Mexico	98.9	1995	66.5	57.5	19.1
Peru	25.7	1996	64.2	41.3	14.1
Turkey	66.7	1998	63.9	37.7	12.0
Dominican Republic	8.4	1996	63.7	59.2	15.2
Bahrain	0.6	1995	61.8	30.6	14.0
Mongolia	2.5	1998	59.9	45.7	—
Kyrgyzstan	4.9	1997	59.5	48.9	
Panama	2.9	1984	58.2	54.2	5.1
Indonesia	212.1	1997	57.4	54.7	20.3
Kuwait	1.9	1996	50.2	40.9	17.3
Venezuela	24.2	1977	49.3	37.7	—
Saint Lucia	0.1	1988	47.3	46.1	6.6
Albania	3.1	—	—	—	—
French Polynesia	0.2	—	—	—	—
New Caledonia	0.2	—	—	—	—
Argentina	37.0	—	—	—	—
Brunei Darussalam	0.3	—	—	—	—
Uzbekistan	24.9	—	—	—	—
Israel	6.0	—	—	—	—
Total fertility between 3.0 and 3.5					
Iran (Islamic Republic of)	70.3	1997	72.9	56.0	17.6
Ecuador	12.6	1999	65.8	50.1	16.1
El Salvador	6.3	1998	59.7	54.1	12.7
South Africa	43.3	1998	56.3	55.1	8.4
Egypt	67.9	2000	56.1	53.9	12.0
Malaysia	22.2	1994	54.5	29.8	16.4
Morocco	29.9	1995	50.3	42.4	20.4
India	1 008.9	1998	48.2	42.8	12.7
Algeria	30.3	1992	46.7	42.9	18.7
Belize	0.2	1991	46.7	41.8	—

2000 Revision (medium variant)					
Total fertility in 1995-2000	Average change per decade in total fertility from 1975-1980 to 1995-2000	Actual replacement level in 2045-2050	Target level	Target date	Country or area
Total fertility below 2.5					
2.27	1.02	2.08	2.10	2005	Brazil
2.50	1.69	2.09	2.10	2005	Viet Nam
2.30	0.49	2.03	1.90	2010	Réunion
2.50	0.75	2.08	2.10	2010	Jamaica
2.40	0.41	2.09	2.10	2010	Bahamas
2.29	1.01	2.08	1.90	2015	Lebanon
2.31	1.69	2.10	2.10	2000	Tunisia
2.45	0.75	2.16	2.10	2010	Guyana
2.21	1.00	2.08	1.70	2010	Suriname
2.40	0.25	2.07	2.10	2015	Uruguay
2.44	0.26	2.06	2.10	2020	Chile
Total fertility between 2.5 and 3.0					
2.80	0.77	2.09	2.10	2030	Colombia
2.83	0.53	2.07	2.10	2030	Costa Rica
2.75	1.28	2.09	2.10	2020	Mexico
2.98	1.20	2.11	2.10	2020	Peru
2.70	0.98	2.08	2.10	2005	Turkey
2.88	0.91	2.13	2.10	2025	Dominican Republic
2.63	1.30	2.07	2.10	2005	Bahrain
2.70	1.97	2.10	2.10	2005	Mongolia
2.89	0.58	2.07	2.10	2005	Kyrgyzstan
2.63	0.71	2.08	2.10	2015	Panama
2.60	1.07	2.08	2.10	2005	Indonesia
2.89	1.50	2.05	2.10	2015	Kuwait
2.98	0.74	2.08	2.10	2020	Venezuela
2.70	1.25	2.10	2.10	2015	Saint Lucia
2.60	0.80	2.10	2.10	2005	Albania
2.60	0.81	2.07	2.10	2015	French Polynesia
2.60	0.65	2.07	2.10	2015	New Caledonia
2.62	0.41	2.06	2.10	2015	Argentina
2.80	0.80	2.07	2.10	2010	Brunei Darussalam
2.85	1.37	2.09	2.10	2005	Uzbekistan
2.93	0.24	2.08	2.10	2015	Israel
Total fertility between 3.0 and 3.5					
3.20	1.40	2.08	2.10	2010	Iran (Islamic Republic of)
3.10	1.15	2.10	2.10	2020	Ecuador
3.17	1.22	2.09	2.10	2025	El Salvador
3.10	0.95	2.21	2.10	2015	South Africa
3.40	0.93	2.08	2.10	2010	Egypt
3.26	0.45	2.08	2.10	2015	Malaysia
3.40	1.25	2.08	2.10	2015	Morocco
3.32	0.75	2.13	2.10	2015	India
3.25	1.96	2.09	2.10	2010	Algeria
3.41	1.40	2.07	2.10	2010	Belize

Table 3
Measures of contraceptive use and indicators of past and future fertility trends for the intermediate-fertility countries according to the 2000 revision (*continued*)

Country or area	Population in 2000 (millions)	Contraceptive prevalence			
		Reference date	Percentage of women using a method (all methods included)	Percentage of women using modern methods	Average change per decade in percentage of women using all methods
Total fertility between 3.0 and 3.5 (*continued*)					
Fiji	0.8	1974	41.0	35.1	—
Myanmar	47.7	1997	32.7	28.4	31.8
United Arab Emirates	2.6	1995	27.5	23.6	—
Total fertility between 3.5 and 4.0					
Turkmenistan	4.7	2000	61.8	53.1	—
Bangladesh	137.4	1999	53.8	43.4	16.7
Cape Verde	0.4	1998	52.9	46.0	—
Philippines	75.7	1998	46.5	28.2	10.6
Qatar	0.6	1998	43.2	32.3	9.9
Libyan Arab Jamahiriya	5.3	1995	39.7	25.6	—
Tajikistan	6.1	—	—	—	—
Guam	0.2	—	—	—	—
Total fertility greater than 4.0					
Nicaragua	5.1	1998	60.3	57.4	19.6
Paraguay	5.5	1998	57.4	47.7	13.7
Jordan	4.9	1997	52.6	37.7	12.1
Honduras	6.4	1996	50.0	41.0	15.4
Bolivia	8.3	1998	48.3	25.2	14.9
Kenya	30.7	1998	39.0	31.5	15.4
Guatemala	11.4	1998	38.2	30.9	10.1
Syrian Arab Republic	16.2	1998	36.1	28.3	8.2
Botswana	1.5	1988	33.0	31.7	13.0
Nepal	23.0	1996	28.5	26.0	13.0
Haiti	8.1	2000	28.1	22.3	4.0
Papua New Guinea	4.8	1996	25.9	19.6	—
Ghana	19.3	1998	22.0	13.3	6.6
Swaziland	0.9	1988	19.9	17.2	—
Sudan	31.1	1992	8.3	6.9	2.6
Lesotho	2.0	1977	5.3	2.4	—
French Guiana	0.2	—	—	—	—
East Timor	0.7	—	—	—	—
Western Sahara	0.3	—	—	—	—
Samoa	0.2	—	—	—	—
Vanuatu	0.2	—	—	—	—

A comparison of recent fertility estimates with the available data on reported levels of contraceptive prevalence indicates that there are marked discrepancies between the 2 for a number of countries. The Sudan, for example, has very low levels of contraceptive prevalence and, although its total fertility is estimated at nearly 5 children per woman, its level may have been underestimated. In the case of Lesotho, the lack of recent data on contraceptive prevalence does not allow a similar check. Possible discrepancies between contraceptive prevalence and the estimated levels of total fertility may also exist in the cases of Guyana, the Libyan Arab Jamahiriya, Myanmar and the United Arab Emirates. In preparing new estimates, the reasons for these discrepancies will need to be analysed further.

2000 Revision (medium variant)					
Total fertility in 1995-2000	Average change per decade in total fertility from 1975-1980 to 1995-2000	Actual replacement level in 2045-2050	Target level	Target date	Country or area
					Total fertility between 3 and 3.5 (*continued*)
3.20	0.40	2.09	2.10	2020	Fiji
3.30	1.00	2.16	2.10	2010	Myanmar
3.17	1.24	2.07	2.10	2015	United Arab Emirates
Total fertility between 3.5 and 4					
3.60	0.86	2.10	2.10	2015	Turkmenistan
3.80	0.95	2.09	2.10	2025	Bangladesh
3.56	1.57	2.08	2.10	2020	Cape Verde
3.64	0.93	2.09	2.10	2015	Philippines
3.70	1.20	2.07	2.10	2020	Qatar
3.80	1.79	2.08	2.10	2015	Libyan Arab Jamahiriya
3.72	1.09	2.11	2.10	2025	Tajikistan
3.95	-0.22	2.08	2.10	2025	Guam
Total fertility between greater than 4					
4.32	1.04	2.10	2.10	2030	Nicaragua
4.17	0.49	2.10	2.10	2035	Paraguay
4.69	1.35	2.08	2.10	2030	Jordan
4.30	1.15	2.13	2.10	2030	Honduras
4.36	0.72	2.13	2.10	2030	Bolivia
4.60	1.65	2.21	2.10	2025	Kenya
4.93	0.74	2.11	2.10	2035	Guatemala
4.00	1.72	2.08	2.10	2025	Syrian Arab Republic
4.35	1.01	2.34	2.10	2025	Botswana
4.83	0.41	2.10	2.10	2035	Nepal
4.38	0.79	2.21	2.10	2040	Haiti
4.60	0.64	2.14	2.10	2040	Papua New Guinea
4.60	1.15	2.14	2.10	2030	Ghana
4.80	0.85	2.27	2.10	2035	Swaziland
4.90	0.70	2.14	2.10	2030	Sudan
4.75	0.50	2.27	2.10	2035	Lesotho
4.05	-0.38	2.08	2.10	2045	French Guiana
4.35	-0.02	2.15	2.10	2020	East Timor
4.40	0.83	2.08	2.10	2030	Western Sahara
4.51	0.19	2.09	2.10	2035	Samoa
4.59	0.58	2.12	2.10	2035	Vanuatu

However, assuming that all the data are correct, significant reductions of fertility achieved without marked increases in contraceptive prevalence could only have come about by major changes in the other proximate determinants of fertility (i.e., the timing of marriage or the start of exposure to the risk of childbearing, changes in fecundability associated with post-partum abstinence, amenorrhoea and breastfeeding, and foetal loss whether natural or induced) and are unlikely to maintain their momentum for long. Analyses of the relation between contraceptive prevalence and fertility levels indicates that below-replacement levels are usually not attained with contraceptive prevalence lower than 50 per cent (barring cases in which abortion levels are high) and, in fact, contraceptive levels above 70 per cent are more common among populations with very low fertility (United Nations, 2000b). Consequently, assuming that fertility will eventually reach below-replacement levels in all intermediate-fertility countries can be considered equivalent to assuming that their populations will reach very high levels of use of effective contraceptive methods. The likelihood of that change may need to be taken into account in deciding if some intermediate-fertility countries will be more likely than others to reach below-replacement fertility.

Lastly, in discussing assumptions about future fertility levels, the Population Division has long used a total fertility of 2.1 children per woman as equivalent to replacement level. In fact, the actual level of fertility that would produce perfect population replacement over the long run varies according to the level of mortality to which the population is subject. Since the projections prepared by the Population Division have generally incorporated changing levels of mortality over the projection period, actual replacement-level fertility changes over that period. However, because in the pre-AIDS era projected levels of mortality for all countries were assumed to decrease consistently in the future, by the end of the projection period they were generally low enough to ensure that actual replacement-level fertility was close to 2.1 children per woman. Since 1990, when the impact of HIV/AIDS began to be explicitly incorporated into the projections of certain countries, mortality decreases have ceased to be the rule, especially as the number of countries significantly affected by the epidemic continues to grow. In the *2000 Revision* the populations of 45 countries had to be projected taking account of HIV/AIDS and in all of them some increases in mortality were projected, at least over the short and medium term. Some of these countries are among the intermediate-fertility countries and it is appropriate to note, therefore, that for them a total fertility of 2.1 children per woman may already be below actual replacement level (see table 4). This fact may need to be considered in proposing assumptions on future fertility trends for these countries.

Table 4
Actual replacement-level total fertility for intermediate-fertility countries that are highly affected by HIV/AIDS

Country	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
Africa										
Botswana	3.36	3.10	2.82	2.66	2.56	2.50	2.46	2.42	2.39	2.34
Ghana	2.48	2.41	2.34	2.29	2.24	2.20	2.18	2.16	2.15	2.14
Kenya	2.64	2.58	2.49	2.43	2.37	2.33	2.30	2.27	2.24	2.21
Lesotho	3.30	3.48	3.29	3.04	2.84	2.68	2.55	2.44	2.35	2.27
South Africa	2.69	2.83	2.80	2.70	2.61	2.51	2.42	2.35	2.27	2.21
Sudan	2.55	2.48	2.42	2.36	2.31	2.26	2.21	2.18	2.16	2.14
Swaziland	3.39	3.43	3.04	2.73	2.55	2.44	2.37	2.33	2.30	2.27
Zimbabwe	2.82	2.64	2.50	2.41	2.35	2.31	2.28	2.26	2.24	2.22
Asia										
India	2.35	2.30	2.25	2.22	2.20	2.18	2.16	2.15	2.14	2.13
Myanmar	2.52	2.44	2.36	2.30	2.26	2.22	2.20	2.18	2.17	2.16
Thailand	2.11	2.10	2.09	2.08	2.08	2.07	2.07	2.07	2.07	2.07
Latin America and the Caribbean										
Bahamas	2.14	2.13	2.11	2.10	2.10	2.10	2.10	2.09	2.09	2.09
Brazil	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.09	2.08
Dominican Republic	2.21	2.20	2.19	2.18	2.16	2.18	2.16	2.15	2.14	2.13
Guyana	2.26	2.26	2.26	2.26	2.25	2.24	2.22	2.20	2.18	2.16
Haiti	2.53	2.47	2.42	2.38	2.34	2.31	2.28	2.26	2.23	2.21
Honduras	2.24	2.22	2.20	2.19	2.17	2.16	2.15	2.14	2.14	2.13

In sum, the task of revising the assumptions made about the future of fertility in the intermediate-fertility countries involves at least five decisions:

1. The selection of a target level of fertility that all (or most) of the intermediate-fertility countries will reach before 2050 in the medium variant.
2. The determination, for each country, of the period in which the target level will be reached in the medium variant.
3. Determining whether that level will be maintained or not to the end of the projection period.
4. Establishing the target levels for the low and high variants, and modifying the target period if necessary.
5. Determining if certain countries need to be treated as exceptions on the basis of explicit criteria.

Before proceeding to present the proposed revised assumptions for the intermediate-fertility countries, it is useful to review the assumptions adopted to project fertility in the *2000 Revision*.

Assumptions on the future of fertility underlying the *2000 Revision*

The *2000 Revision* includes six projection variants. Four differ among themselves with respect to the assumptions made regarding the future course of fertility. To describe them, countries are divided first into three groups:

1. High-fertility countries: Countries that until 2000 had no fertility reduction or only an incipient decline;
2. Medium-fertility countries: Countries where fertility has been declining but whose level is still above replacement level (2.1 children per woman in 1995-2000);
3. Low-fertility countries: Those with fertility at or below replacement level (2.1 children per woman in 1995-2000) plus a few with levels very close to replacement-level fertility that are judged ready to drop below replacement level in the near future (2000-2005).

Medium-fertility assumption:

1. Fertility in high-fertility countries is generally assumed to decline at an average pace of nearly 1 child per decade starting in 2005 or later. Consequently, some of these countries do not reach replacement level by 2050.
2. Fertility in medium-fertility countries is assumed to reach replacement level before 2050.
3. Fertility in low-fertility countries is generally assumed to remain below the replacement level during the projection period, reaching by 2045-2050 the fertility of the cohort of women born in the early 1960s or, if that information is lacking, reaching 1.7 children per woman if current fertility is below 1.5 children per woman or 1.9 children per woman if current fertility is equal or higher than 1.5 children per woman.

High-fertility assumption:

1. Fertility in high- and medium-fertility countries remains above the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children above that reached by the medium-fertility assumption in 2045-2050.

2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman above that reached by the medium-fertility assumption in 2045-2050.

Low-fertility assumption:

1. Fertility in high- and medium-fertility countries remains below the fertility in the medium-fertility assumption and eventually reaches a value of 0.5 children below that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman below that reached by the medium-fertility assumption in 2045-2050.

Constant-fertility assumption:

For each country, fertility remains constant at the level estimated for 1995-2000.

Proposed assumptions for the *2002 Revision*

Before setting the proposed assumptions for the *2002 Revision* in a manner paralleling those for the *2000 Revision*, we address the different decisions that are to be made.

- *The target level of fertility for the medium variant*: If intermediate-fertility countries are to attain some level of fertility that is below 2.1 children per woman, the proposed target level is 1.85 children per woman. That value is exactly halfway in between the target levels for the low and the medium variants of previous *Revisions,* including the *2000 Revision*. In addition, it is very close to the average level of total fertility projected for the low-fertility countries in 2045-2050 according to the *2000 Revision* (1.88 children per woman) and not too far above the average level of fertility experienced over recent periods by countries with below-replacement fertility (see table 1). If, as in previous *Revisions*, target levels for the high and the low variants are set so as to encompass a range of about 0.8 of a child or one child around the target level of the medium variant, the target level for the high variant would be 2.25 to 2.35 children per woman, a value well above replacement level, and that for the low variant would be 1.35 to 1.45 children per woman, closer to the average level of total fertility that low-fertility countries display today (1.5 children per woman). That is, the range of 1.35 to 2.35 children per woman (or the alternative, 1.45 to 2.25 children per woman) would seem sufficiently wide to cover the cases in which below-replacement fertility fails to materialize and fertility remains above replacement level as well as those in which fertility drops even further in the below-replacement range.
- *Determination of the target period*: The target period for each country will be determined in a manner consistent with target periods already used in the medium variant of the *2000 Revision.* That is, unless revised estimates of past fertility trends change considerably, the general guideline will be to select a target period for the attainment of below-replacement fertility that is later than the current target period for the attainment of replacement level.
- *Maintaining the level of below-replacement fertility until the end of the projection period*: The new target level will be treated in the same way as replacement level has been treated in previous *Revision*s. Once the target level is reached, it will be maintained to the end of the projection period.
- *Target levels for the high and low variants*: It is proposed that for the intermediate-fertility countries the target levels for the high and low variants remain half a child above and below that of the medium-fertility variant. Given the greater

uncertainty surrounding the attainment of below-replacement fertility by many intermediate-fertility countries, a narrowing of the range for the high and low variants does not seem advisable at this time.

- *Determining exceptions*: Just as in other *Revisions*, the target level may need to be modified for certain intermediate-fertility countries in the light of past trends or other relevant information. It is suggested that such determination be based on consideration of at least the following: past fertility trends and evidence of stagnation of fertility levels; very low levels of contraceptive prevalence that may cast doubt about the sustainability of rapid fertility declines; the impact of HIV/AIDS and its implications for actual replacement level; and the characteristics of population policies and programmes.

In a manner parallel to the *2000 Revision*, the proposed assumptions for the *2002 Revisions* are presented in terms of three groups of countries:

1. High-fertility countries: Countries that until 2000 had no fertility reduction or only an incipient decline (generally, those with total fertility in 1995-2000 at or above 5 children per woman);
2. Intermediate-fertility countries: Countries where fertility has been declining but whose level is still above replacement level (higher than 2.1 children per woman in 1995-2000);
3. Low-fertility countries: Those with fertility at or below replacement level (2.1 children per woman in 1995-2000).

Medium-fertility assumption:

1. Fertility in high-fertility countries is assumed to decline at an average pace of at most one child per decade. The pace of decline will be set taking into account the socio-economic and related conditions of each country. Owing to their continued high fertility, the countries in this group will not necessarily have a total fertility below replacement level by the end of the projection period.
2. Fertility in intermediate-fertility countries is assumed to reach 1.85 children per woman before 2050. Once that level is reached, total fertility remains unchanged at that level until the end of the projection period.
3. Fertility in low-fertility countries is generally assumed to remain below the replacement level during the projection period, reaching by 2045-2050 the fertility of the cohort of women born in the early 1960s or, if that information is lacking, reaching 1.7 children per woman if current fertility is below 1.5 children per woman or 1.9 children per woman if current fertility is equal or higher than 1.5 children per woman.

High-fertility assumption:

1. Fertility in high and intermediate-fertility countries remains above the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children above that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman above that reached by the medium-fertility assumption in 2045-2050.

Low-fertility assumption:

1. Fertility in high and intermediate-fertility countries remains below the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children below that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman below that reached by the medium-fertility assumption in 2045-2050.

Constant-fertility assumption:

For each country, fertility remains constant at the level estimated for 1995-2000.

The implications

The implications of the proposed guidelines for future fertility in the *2002 Revision* are momentous. The expectation that the intermediate-fertility countries will have below replacement fertility contrasts markedly with the current assumption that their fertility will stabilize at replacement level. The implementation of the proposed fertility assumptions, in the medium variant, means that before 2050, approximately 80 per cent of world population will be projected to have below-replacement fertility.

Even with the proposed fertility assumptions, world population will still be growing by mid-century. However, the rates of population growth will be much lower than currently projected. In such a case, the somewhat hyperbolic claim that the "end of population growth" is near will be slightly closer to the truth than it has been heretofore.

The state of current knowledge does not provide elements to affirm with certainty that below-replacement fertility levels are inevitable. However, that knowledge, buttressed by the actual experience of a growing number of countries, suggests that lengthy periods of below-replacement fertility are likely to be common in the future. In addition, the attainment of below-replacement fertility seems likely because there has been so much success in reducing fertility from levels of 5, 6 or 7 children per woman to 2, 3 or 4 children per woman. Today, the intermediate-fertility countries still have moderately high-fertility levels and it is the speed at which those levels have been falling that suggests that reductions of fertility will not necessarily stop at exactly the replacement level.

In sum, the proposed guidelines for the projection of fertility in intermediate-fertility countries are based on the scientifically sound recognition that replacement level fertility is not necessarily hard-wired in the evolution of populations. In the past, analysts of the United Nations Population Division showed foresight in projecting population. In the late 1940s, for example, they anticipated future rapid rates of population growth. In the 1960s and early 1970s, they projected major reductions of fertility when there was still scant evidence suggesting that such reductions were to occur. Today, the Population Division foresees the continuation of unprecedented changes in the dynamics of population growth. Given the experience of today's low-fertility countries and the insights gained in understanding the processes leading to the virtually universal transition from high to low fertility, it seems likely that below-replacement fertility will be common in the future. The fertility level proposed, 1.85 children per woman, represents only a modest, but significant, deviation from the replacement level. If attained and maintained, below replacement fertility will lead first to the slowing of population growth rates and then to slow reductions in the size of world population.

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The contemporary population challenge

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The present is unexpectedly a critical time for population change and policy. We are little more than halfway through the great population growth spurt that began in the middle of the twentieth century, but developed-country Governments seem to be losing interest in the issue. This loss of interest may have a significant demographic impact. The probable reasons for the declining interest are a vague belief that the present demographic change has a momentum of its own, a reaction to the International Conference on Population and Development (ICPD) in Cairo in 1994 which may misinterpret the complex document that came out of that meeting, and a preoccupation with below-replacement-level fertility in the developed world.

Huge population growth is not now past history. United Nations estimates and medium projections (United Nations, 2001a) show a world population numbering 2.5 billion in 1950, 6.1 billion in 2000 and 9.3 billion in 2050. The next half-century will see almost as many people added to the world's population as the last half-century, and thereafter there may be one or two billion more people before growth comes to a halt. Global fertility decline is believed to have traversed over four fifths of the journey from a total fertility rate of 5.0 in 1950 to 2.1 in 2050. But because of population growth momentum and an ever-expanding base population, the additions to world population did not peak until the 1990s at around 80 million per year, and are only a little below that now.

There are two main messages for future-gazers and policymakers. The first is that projections are far from certain. The second is that projections are necessarily based on past experience—including past policy experience—and, if this changes, then the projections must do so too.

The lack of certainty is shown by the fact that for 2050 the United Nations provides, in addition to the Medium Projection of 9,322 million, a Low Projection of 7,866 million and a High Projection of 10,934 million. The High Projection is over 3 billion or almost 40 per cent above the Low Projection. Another recent projection, by Lutz and others (2001), provides a 2050 median figure of 8,797 million, with an 80 per cent probability of it falling between 7,347 and 10,443 million. The latter projection's "most likely" figure for 2050 is about half a billion below that of the United Nations but still implies huge growth and great uncertainty about its magnitude.

Most analysts have preferred during recent years to employ the United Nations Medium Projection because it has proved in these years to be remarkably accurate. This period of near-certainty may be passing. Two years after its release in 1999 of the 1998 projections, the United Nations produced revised figures raising the 2050 Medium estimate by 413 million people, 96 per cent of the difference being attributable to new figures for Africa and Asia, mostly in sub-Saharan Africa and South Asia. The United Nations Population Division said that 59 per cent of the upward adjustment was explained by countries (mostly in sub-Saharan Africa) failing to begin fertility declines as early as expected, and 32 per cent was because of greater sluggishness than anticipated in fertility decline in such large countries as Bangladesh, India and Nigeria.

Twentieth-century projections were based on twentieth-century experience, and that was propelled by a near-consensus among powerful donor countries and their citizens about the need to give population control high policy priority and adequate funding.[1] This played a role in developing-country Governments adopting population policies that brought down levels of fertility and population growth faster than socio-economic change alone would have done. It also played a role in the development of contraception suited to large-scale family planning programmes in poor, undereducated countries. That consensus is now held with less fervour and this is reflected in funding and first world leadership. The result will almost certainly be slower fertility decline and greater population growth which must be reflected in adequate population projections.

[1] My own analyses of experience are to be found in Caldwell and Caldwell (1986).

The reasons for the loss of fervour are several. One is the initial success in reducing fertility, and its reflection in United Nations and other statistics. The world is less homogeneous than the reaction to these changes suggested. Fertility decline was persistent in relatively well-off and educated Latin America and in rapidly economically developing parts of East and South-East Asia. However, there was the potential for problems elsewhere which was often not noted, but which can be observed in the three large countries pinpointed in the most recent United Nations projections as being unexpectedly sluggish.

There are many reasons why the fertility transition may be slow in some parts of sub-Saharan Africa. Among the people there are cultural resistances and among Governments a lack of enthusiasm for leadership in the area: for these reasons national family planning programmes are unlikely to be like those of Asia or to have the same effect. There is also a very low level of development, with a high proportion of the population practising subsistence farming. Here extra hands produce extra food, and there will be extra hands where few children go to school. There are 20 countries in sub-Saharan Africa where women still have six or more children and there is little sign of fertility decline. These 20 countries average an infant mortality rate over 150 per thousand, a life expectancy of 45 years and a per capita gross national income in purchasing power parity of a little over US$ 850 (1999). Perhaps more significantly, only half their girls of primary school age are in school as are one third of those of secondary school age (net enrolment ratios). Compared with African countries like Ghana, Kenya and South Africa, where there have been marked falls in fertility, their infant mortality rates are two to three times higher, their income levels lower and their girls' secondary school enrolment level half. Ghana and Kenya laid the foundation of their fertility decline before the African economic crisis which began in the mid-1980s. Their populations already assumed that children's health could be guarded by modern medicine and that both boys and girls would normally go to school. The subsequent economic crisis and the family financial outlays associated with cost recovery in structural adjustment programmes did not reverse these assumptions but rather convinced many parents that their educational and health expectations could be maintained only if they had children more widely spaced. The poorer countries did not participate in this two-step process but are still beset by few and fee-charging schools and health facilities. They are also facing the beginning of demographic transition in an era of AIDS. Except in a few, mostly Southern African countries, the African fertility decline is largely an urban phenomenon, since the nature of families, the occupations of adults and the roles of children and expectations for them are very different in the towns from those in the countryside. The slow movers tend to be less urbanized than the countries where fertility decline is taking place, and especially tend to lack big cities. Finally, the higher-fertility countries have often had more immediate concerns than demographic ones, for they include most of sub-Saharan Africa's war-torn countries: Liberia, Sierra Leone, Eritrea, Somalia, Uganda, Angola and the Democratic Republic of the Congo.

Threshold explanations are not now popular, but some explanation of this kind is probably relevant to the situation in the large sluggish countries of South Asia. Bangladesh is probably the prime example, a country where a comparatively expensive and efficient family planning programme, assisted by a marked degree of socio-economic change, halved its birth rate during the late 1970s and 1980s, only to find that the total fertility rate stagnated around 3.3 through the 1990s. As a consequence, the 2000 United Nations Population Projections show it reaching replacement fertility 30 years later than did the 1998 projections. What had not been previously taken into account is that Bangladesh is the poorest country in the world to have reduced the total fertility rate to 3.3, and it has done so with an infant mortality rate around 70, more than twice the level found in East and South-East Asia. Bangladesh achieved such low fertility partly by overcoming the problems of purdah by having family planning workers call at every house with the hormonal contraceptive methods favoured in Muslim societies, but ironically donors, with less funding for family planning programmes, are now calling for a greater resort to centralized services and the use of permanent or long-term methods. India, which has largely funded its own programme, has long sought cheapness with its concentration on sterilization. It has achieved extraordinary success in its south but to a much lesser extent in its Hindi belt of large northern states (where child mortality is also relatively high). There are similarities in Nigeria where the southern half of the country has paralleled the fertility decline of Ghana and Kenya, but where the poorer, higher-mortality and solidly Muslim north, like neighbouring the Niger and Chad, maintains high fertility.

ICPD produced a Programme of Action, which, like the product of other international consensuses, was complex, not entirely internally consistent and easily misunderstood. It proclaimed that the population movement was no longer to be driven by demographic fears, while at the same time devoting a good deal of space to population growth and its implications. It placed its main emphasis on improving the female situation, especially in the areas of education and reproductive health, while partly justifying or at least noting that this would mean demographic gains in terms of lower child mortality and declining fertility. It sought to achieve reproductive health programmes of a type that the best family planning programmes had always hoped for. Nevertheless, it discouraged many involved in existing family planning programmes by seeming to condemn what they had hitherto regarded as past successes and by appearing to ask for more than their countries' health services could provide in the foreseeable future. It has almost certainly also confused donors who had not previously considered that the much more expensive national educational and health services warranted the same proportional support as did the family planning programmes.

But Western donor support for family planning programmes has also been weakened by the realization that the end of demographic transition may not take the form of equal birth and death rates but of below-replacement fertility. This appears to have been achieved already in countries where 44 per cent of the population of the world lives, and began to manifest itself in sustained fertility declines in developed countries from the 1970s. It is partly a product of more girls going to school and more women being in the workforce, but it is also the product of forces released by the global effort to limit population growth, namely, the invention of better contraception, and the moral support for young couples or young women having few children. Many policymakers have now heard the argument that the move to limit population growth in developing countries was either never necessary or no longer necessary. Indeed, the impression has been given that ultimately fertility decline would be a disaster for all countries in that they would move towards a situation where over 30 per cent of the population would be aged, in the sense that they were over 65 years of age (Japan is to reach this level in 2030), and that this would place an unbearable burden on the working population in supporting old-age pensions and health services by means of high taxes.

The demographic situation is, in fact, much more complex than this, although these complexities have been insufficiently, or unconvincingly, spelled out to Governments. First, not everyone is convinced that China is below or far below replacement-level fertility, and without its inclusion the proportion of the world's population in this category is halved to 22 per cent. Secondly, very low fertility (total fertility rates under 1.6), with little chance that completed cohort fertility will eventually come close to replacement level as older women continue to have births deferred from their younger years, is largely confined to Central, Eastern and Southern Europe, Japan and the Republic of Korea, and possibly Canada, around 750 million or one eighth of the human race. Thirdly, population momentum ensures that crisis even in these countries is not imminent. If the present situation continues, it will be one third of a century before Italy, Spain and Japan experience population decline of half of one per cent per annum and 30 per cent or more of their populations over 65 years, and half a century before Germany does.

My point here is that the rich nations should still be primarily concerned with world population growth. By 2050 global population could be 8.9 billion, as the 1998 United Nations Revision Medium Projection calculated, or 9.3 billion as calculated in the 2000 Medium Projection. It could also be the 10.9 billion of the 2000 High Projections or, increasingly unlikely, the 7.9 billion of the 2000 Low Projection. The peak global populations could range between 9 billion and 12 billion; or, according to the Lutz and others (2001) 80 per cent probability projections, between 8 billion and 12 billion. With regard to the long-term stability of the world's ecosystems and our ability to feed everyone adequately and to give them a reasonably good life, that margin of 3-4 billion extra people may be critical. We may well be able to achieve these aims with 12 billion people but we are much more certain of being able to do so with 9 billion, and risking the additional 3 billion does not seem to be a worthwhile experiment.

Just what is likely to happen in the rich countries? The simple answer is that low fertility will continue to characterize these societies. But the situation is far from simple. Because total fertility rates are at present depressed by a continuing deferment of the age of women at marriage and childbearing, most overstate the threat to population replacement. In Europe, Scandinavia, France, the United Kingdom, Ireland and perhaps even the Netherlands will probably come close to replacing themselves, as will the United States. In any case, the traditional countries of immigration, the United States, Canada, Australia and New Zealand, are unlikely to experience declining population. On the other hand, much of Southern, Eastern and Central Europe, as well as Japan and the Republic of Korea, will face declining population if present trends continue. But two points are important: first, even with present trends, substantial declines are in most cases decades away; secondly, fertility rates may not remain so low.

The reason that fertility may not remain so low is that nationalism is not dead. When real decline is experienced, policies and popular sentiments are likely to turn towards espousing motherhood in a way that may make similar efforts in the 1930s or in Eastern Europe between the 1950s and 1970s look puny. The post-1960s fertility declines were the result not merely of economic change, but also of a changing attitude to small families and even childlessness, partly arising from the "population explosion" debate. My guess is that in the coming decades we will see the opposite occurring, with popular and Governmental lauding of two- and even three-child families, and quite dramatic policy changes to make them possible. The present very low fertility is less the realization of parental family-building aims than the product of the financial difficulties experienced by families in high-consumption societies not having two breadwinners, and by the massive problems faced by mothers in continuing with their education or work or maintaining their position and rate of promotion in employment. These difficulties arise from insufficient support from Governments, employers and husbands. We know that, when Sweden poured money into free pre-school support in the 1980s and early 1990s (for gender-equity, not demographic reasons), fertility rose to replacement levels, only to fall again by one third when these expenditures were cut back as Sweden met the criteria for joining the European Union. The time may come when it is the achievement of motherhood that is linked to getting university scholarships, paying house mortgages and remaining on the fast promotion track.

Such policy and social changes may not be promoted merely by demographic nationalism but also by a variant of the women's movement and by powerful forces aiming at greater gender equity. Italy is already becoming introspective about the causes of its very low fertility as social scientists link it to husbands' failure to share domestic duties and childcare, and relate this in turn to men marrying late after years of living as young adults in their parents' homes with mothers teaching them to expect to do nothing in the way of domestic tasks. What is to be hoped is that Governments in developed countries can become sufficiently sophisticated to deal with a bipolar world, so that their domestic population policies are separated from their technical aid attitudes to high-fertility countries.

Low fertility is rapidly changing the age structures of developed countries and demographers will continue to monitor this. Whether this portends economic disaster is open to question. The main employed age group, 20-64 years, a more sensible definition for rich countries than 15-64 years, remains a constant proportion of the population at around 56 per cent. The only change is that the burden of dependency shifts from supporting the young to doing the same for the old. This is an important emotional issue in the West where the young tend to be a family responsibility involving direct family expenditure while the old are a state responsibility paid for by family taxation. This picture is not universal, and, in any case, the changed effect on the national economy is probably not as great as most of the debate has suggested. Moreover, there is a tendency to underrate the efficiency of the modern economy and to overrate its potential for employment. It has shown itself quite capable of producing rising standards of living while up to 10 per cent of the workforce is unemployed and another 5-10 per cent prematurely retired. Thus, although the tax base for supporting the aged could be adequately broadened by increasing the retirement age to 70 years, this may not be necessary. In fact, the economy may be at its healthiest if we do not do this, carrying with it, as the policy would, the need to provide unemployment relief for 65-69-year-olds.

Intermediate-fertility-level countries

I now wish to turn briefly to the larger "intermediate-fertility-level countries". These are defined by the United Nations Population Division as countries with total fertility rates in the range 2.2-4.9. For this analysis, I have defined "large" as being characterized in 2000 by a population of 30 million or more (United Nations, 2001b). This group constitutes 18 countries (Algeria, Egypt, Morocco, the Sudan, Kenya, South Africa, Mexico, Argentina, Brazil, Colombia, Turkey, Bangladesh, India, the Islamic Republic of Iran, Indonesia, Myanmar, the Philippines and Viet Nam) with a total population of 2,260 million or 46 per cent of that of the developing world, 63 per cent without China. India alone constitutes 45 per cent of their population. For analytical purposes I will add three more large high-fertility-level countries to form an "extended" group: Nigeria, the United Republic of Tanzania and Pakistan. Thus extended, the 21 countries constitute 53 per cent of the population of the developing world (72 per cent without China), and India forms 39 per cent of the total.

The United Nations Population Division has been right to be cautious about overstating the speed of fertility decline. In comparison to other sources (DHS, INED, PRB), however, it seems now to be overstating the Bangladesh TFR, given as 3.6 in the *World Population 2000* and 3.7 by averaging the 1995-2000 estimate and 2000-2005 medium projection in the 2000 Review of the *Population Prospects* (United Nations, 2001a). A more probable estimate would seem to be around 3.3. Conversely, the TFRs of North Africa (Algeria, Egypt, Morocco, the Sudan) appear to be understated, although less so in the averaged projections than in the *World Population 2000* sheet (United Nations, 2001b). It might also be noted that some countries are difficult to treat as a single unit. In Nigeria the TFR in the relatively poor Muslim north is still around 7.0 while in the richer, more educated and predominately Christian south it is in the 4-5 range, comparable with Ghana and Kenya. Conversely, in the Sudan it is the richer Muslim north that is characterized by lower fertility.

There no longer seem to be any barriers to most countries reaching replacement-level fertility and subsequently falling below that level; certainly not an income barrier for the Republic of Moldova and Armenia, with per capita purchasing power parity incomes (pci ppp) similar to that of India, exhibit TFRs of 1.4 and 1.1, respectively. Similarly, religious barriers are not insuperable, with fertility in Catholic Italy and Spain being little more than half replacement level, and in Muslim North Africa declining persistently. Threshold analysis has fallen into some disrepute, but low-fertility levels are significantly correlated with high per capita incomes, low child mortality, high female educational and employment levels, and urbanization. Employing such measures (pci ppp over US$ 2,000; under-five mortality below 75 per 1,000 births; over 30 per cent of girls in secondary school; and over 40 per cent urbanization), 13 of the 21 countries examined here seem likely to exhibit below-replacement-level fertility well before 2050: a group in South America (Argentina, Brazil, Colombia and Mexico), another group in North Africa (Algeria, Egypt, Morocco), five Asian countries (Indonesia, the Islamic Republic of Iran, the Philippines, Turkey, Viet Nam) and one in sub-Saharan Africa (South Africa). Those less likely to do so by these criteria are the Sudan, Nigeria, Kenya, the United Republic of Tanzania, Bangladesh, India, Pakistan and Myanmar. If another factor is added, Government resolve in the form of an efficient family planning programme likely to be kept in place as fertility declines, then India, and possibly Bangladesh, could be transferred to the first group. Latin American fertility decline may have been retarded by the Catholic Church, as is evidenced by Argentina, which has a pci ppp around that of Hungary or the Czech Republic, but has been characterized by a TFR which over half a century from 1950 to 2000 fell only from 3.2 to 2.6. Nevertheless, there may be a delayed parallel with the experience of Italy, Spain and Portugal, where TFRs were in the range 2.5-2.9 in 1965-1970, above those of Northern and Central Europe, but where now, at 1.1-1.5, they are below those of Northern Europe. Very low fertility may not even require employment for all women. Ever-higher levels of children's education, enforced by the principle of keeping up with the Joneses, may be enough. The foundation for fertility decline in Africa was laid by economic development, but subsequently the major force in reducing fertility seems to have been the costs of providing education and health care for children as African economies found themselves in trouble, and ensuing structural adjustment programmes imposed user-pays fees for these services. Among the Indian urban elite single-child families are no longer rare.

Other factors may be more important, particularly the globalization of markets and the consumer society, the aim of giving all girls a good education, and the belief that educated women should be employed outside the home. This has been given a new twist by the analysis of the factors determining Italy's very low fertility. It has been argued that many women cannot manage to stay successfully in the workforce in a patriarchal society where husbands give little help with child care and other domestic work, and where the State does not intervene to help with preschool childcare or employment provisions that do not penalize women for dropping out of the workforce while they have young children. It has also been argued that men are conditioned not to help in the household by their mothers during the long period of being in the parental house until marriage at, on average, almost 30 years of age. This has been compared with supposedly more helpful husbands in Northern Europe and the United States and more helpful Governments in Northern and Central Europe. The irony of this comparison is that the Mediterranean patriarchal model is far more common in the world than the Northern European model and characterizes Latin America, North Africa, sub-Saharan Africa, Western Asia, South Asia and East Asia. If the analyses of the Italian situation are correct, then below-replacement fertility may characterize most of the world by 2050.

My hunch about the *2000 Revision* is that it is largely on the right track except for the medium projection bottoming so widely at a total fertility rate of 2.1 which is unlikely to prove the lower limit for the majority of countries. My interpretation of the evidence is that the caution about Bangladesh was justified but that it has now been somewhat overdone in terms of when replacement fertility will be reached. I suspect also that replacement fertility will be reached earlier than the 2000 medium-revision postulates in the cases of Argentina, Colombia and Mexico, and possibly South Africa and Pakistan.

But, as argued earlier, the whole situation could be changed by the development in Europe of strong pro-natalist attitudes and policies.

CONCLUSIONS

Will the whole world move toward below-replacement fertility? The experience of such non-Western societies as Japan and the Republic of Korea suggest that this will be so. Nearly the whole world is heading towards agreement that ever-higher educational levels are needed, that females should be educated as much as males, and that educated women should be in the workforce if they wish to be; and it seems that most wish to be. Both China and India are likely to keep national family planning programmes in position even with below-replacement fertility, and each would probably be sanguine about some decline in population size. Such movements will not stop the world's population from reaching 8, 9 or 10 billion, but they will help achieve an ultimate stationary or declining total.

The most painful aspect of the world's future demographic behaviour is likely to be international migration. International migration has until now been restricted by the fact that much of the world's population was illiterate and rural and practised subsistence farming. Such people usually do not want to leave home especially for very different societies, and know that they would find it hard to cope with the inevitable social and psychological transitions. Economic and social globalization and the spread of education have changed this position dramatically and until such time as the developing world is developed we face the distressing situation where the pressure from both legal and illegal migrants to enter the rich countries will be far greater than the numbers these countries are willing to admit. The efforts taken by the rich countries to restrict the flow threaten to change the nature of these societies and to increase racism. The settlement countries will certainly take enough immigrants to sustain population growth. The reaction in Europe is less certain. In European countries where the indigenous population is declining, a considerable immigrant stream would certainly sustain numbers, but the faster indigenous numbers declined the greater would be the ethnic diluting effect of immigration.

Demographers will also have more routine work to do in important but less politically fraught areas such as morbidity and mortality change and internal migration and urbanization. The two are not totally independent, for the growth of huge cities in poor countries raises questions about the health levels of the poor that must be answered by quantitative inquiry in order to give direction to remedial measures. Even in developed countries there is a growing interest in health differentials by social class, extent of education and residential environment, and the demand for such information will certainly rise. Specialized work will also be needed for specific crises, such as delineating and measuring the impact of the AIDS epidemic. The urbanization of the world is an extraordinary phenomenon, from little more than one-third of the human race living in towns in 1970, to about two thirds in 2025, and perhaps 80 per cent not long after the middle of the twenty-first century. We are monitoring this growth but are doing little about elucidating its nature or its effects.

The immediate challenge is to maintain some of the attitudes, policies and expenditure patterns that have so far sustained the developing world's fertility decline. If this does not happen, then slow or stationary population growth may be attained not with 8 billion people, but with 9, 10, 11 or 12 billion. The differences in long-term environmental sustainability could be huge. The lower figures are likely to be attained if the West does not become too fixated on population decline over the next two or three decades. The minor concern is that technical aid for developing-country family planning programmes will continue to fall if declining population becomes an all-absorbing policy concern. The major concern is that the whole world is likely to follow the new policies and strategies for stabilizing population numbers in low-fertility countries, even in those countries with moderately high fertility.

We once thought of the end of demographic transition being a stationary population, around 10 billion. More recently we have thought in terms of a maximum population, followed by a long period of perhaps accelerating decline. This might not be a bad outcome. There is now a real possibility that measures to halt population decline will have a global impact in the second half of the twenty-first century, leading either to continuing modest population growth or to an oscillating global population as ideologies and policies replace each other. In the long run, much depends on environmental evidence and ideologies.

Population concerns, practitioners and university courses are unlikely to disappear. This could happen if population stasis were to be achieved, but this seems increasingly unlikely.

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Impact of the 1994 International Conference on Population and Development

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This paper was initially intended to assess the impact of the Cairo Conference on a group of countries designated by the United Nations Population Division as "intermediate-fertility countries". As you will see, I have taken the liberty of reformulating the question in terms more manageable for me. Thus, instead of attempting to identify and measure the "Cairo effect" on fertility trends, this paper will consider the political dynamics and the patterns of influence that gave shape and substance to Cairo. We should not, however, consider Cairo as a brief meeting that took place in Egypt in September 1994; rather, it should be regarded as a process that began at some unidentifiable date prior to the conference when various actors began thinking and discussing how the conference could benefit their interests or, in other cases, how to prevent the conference from damaging their interests. In the conceptual scheme employed by this paper, the conference process does not end with the adjournment of the meeting but continues for years thereafter as groups and Governments struggle to accommodate—or at times ignore—Cairo's Programme of Action. The impetus for much of the political, bureaucratic and diplomatic manoeuvering post Cairo is the formidable challenge of influencing signatories to the document to comply with its recommendations.

Population conferences are little less than a movable feast, allowing all countries to select their favourite delicacy and to reject other offerings they find unappealing or even offensive. This characterization applies to all three intergovernmental population conferences convened by the United Nations: Bucharest 1974, Mexico City 1984 and Cairo in 1994. At Bucharest, the first major population conference of the modern era, delegations from the third world, the industrialized Western nations, the Holy See and the communist bloc all found within the final set of recommendations approved by the conference a basis to claim victory for their side. Victory was also claimed on the grounds that the conference document was prevented from going as far as one group or another wanted. This has been the pattern of all three major population conferences. Bucharest, in many important respects, established a pattern that has been followed, more or less, by subsequent population conferences.

What is sometimes overlooked is that before the first intergovernmental conference on population at Bucharest, there had been two prior population conferences, in Rome in 1954 and in Belgrade in 1965, that were convened jointly by the United Nations and International Union for the Scientific Study of Population. Delegates to these conferences constituted an epistemic community—a community of experts who shared certain commonalities like competence, perspective, academic training, scientific values etc. Participants to the Rome and Belgrade meetings, in contrast to subsequent United Nations conferences on population, were invited in their individual capacities as experts and not as representatives of Governments or organizations. They were neither authorized nor inclined to make "commitments" on behalf of their Governments; rather, their purpose was to discuss scientific ideas and more general problems relating to population as well as to encourage population research and training in the third world.

Notwithstanding the intellectual value of these meetings of experts, they did not satisfy the needs and expectations of that group of nations that were concerned, if not alarmed, by the unprecedented rate of population growth in the developing world. The United States, which previously opposed any governmental effort that used American public funds to limit population growth, changed its stance in the mid-1960s and became the most vigorous advocate of population control in response to the growing sentiment that rapid population growth was a hindrance to development and the fact that contraceptive technologies were now available to limit fertility. In 1967, prompted by a voluntary contribution of several million dollars from the United States, the United Nations also showed a willingness to play a more activist role and created the United Nations Population Fund to assist countries in achieving their population goals.

With these changes, the focus of United Nations population conferences shifted from expertise to policy. In the minds of donor Governments and population activists, the main purpose of population conferences became, arguably, the effort to make Governments more aware of their population problems and to encourage and assist them in lowering the birthrate. Conferences became intergovernmental and participants comprised Government officials, academics, politicians and representatives from Government and civil society who were selected by their Governments.

Frustrated by what they perceived as bureaucratic inefficiency and a generally poor quality of governance, donor nations turned to the private sector and non-governmental organizations (NGOs) to deliver the goods and services to citizens. While donors and international agencies argue that civil society is being called upon to complement the work of Government, others, including many third world officials, see outside support of NGOs not merely as a complement to Government but as the creation of an alternative Government.

The general thesis I am presenting is that United Nations population conferences have gone through three stages. First, epistemic gatherings where experts were invited qua experts and were primarily, but not exclusively, accountable to their peers—fellow experts. Second, in an effort to have greater influence over national population policy, the United Nations, with the encouragement of the United States and other industrial nations, replaced the "meeting of experts" with a meeting of Governments. Cairo, and the events preceding and following this most famous of all population conferences, represents the third stage in the evolution of United Nations population conferences.

The major forces in the population movement have attempted to make population conferences a diplomatic lever to alter policy and behaviour in high-fertility societies. To advance their goal, they have felt a need to broaden the base of policymakers at conferences, involve experts, their Governments, and then non-governmental organizations. As they have allowed the participant base to expand, the new entries showed less concern with demographic issues and population change and were consequently able to effect conference outcomes in a way more consistent with their interests.

While Cairo, like Bucharest and Mexico City, was an intergovernmental conference, NGOs were far more prominent, active and influential than at earlier conferences. Not only had NGOs developed a transnational advocacy network that commanded recognition, but also by the time of Cairo the major donor nations were relying on NGOs and the doors to conference participation were far more open to them. While there was no great change in the formal process in preparation for the Cairo Conference, there were changes in the early 1990s enabling large numbers of NGOs to acquire accreditation and participate extensively in the preparation of the Programme of Action. The Cairo process was influenced by the participation of a broad coalition of more than 1,500 NGOs whose interests spanned development, reproductive and adolescent health, women's rights and empowerment, violence against women, female genital mutilation, the rights of indigenous people and family planning, but paid little serious attention to the determinants or consequences of population growth.

The pattern of massive NGO participation at Cairo, as well as many United Nations conferences during the 1990s, has now been recognized as a new and distinct form of transnational politics and policymaking (Wapner, 1995; Clark, Friedman and Hochstetler, 1998; Keck and Sikkink, 1998). In preparation for a series of conferences held in the 1990s, women's groups—by then a transnational advocacy network—saw an opportunity to assure that their special concerns regarding women's rights and health would be strongly endorsed by each of the conferences. Long before the Cairo conference itself, according to numerous members of women's rights groups, a strategy was developed by them to deliver their message to the entire series of conferences in a way that would enable them to build victory upon victory. The success of this approach was predicated on the realization by women's groups that NGOs in the 1990s were in closer contact with one another across borders and that United Nations conferences provided a more congenial atmosphere for NGOs than in the past.

As the Western population establishment sought ways to utilize the machinery of intergovernmental conferences to strengthen the commitment of member States to adopt population policies, they found the initiative passing to those countries they were trying to influence. As the locus of international policymaking shifted from the Western imperium to a more universal, unpredictable, and sometimes chaotic assemblage of newly created nations, the press, NGOs and other interest groups, there was a concomitant movement in the focus of the meetings. Not only were neo-Malthusian concerns somewhat overshadowed by the claims of poor countries for a new international economic order that would alleviate their poverty, neo-Malthusianism itself began to fall out of favour in the West.

What we also may be witnessing is a paradoxical situation that while at the moment various United Nations conferences, including population conferences, appear to have become an integral component of the international system, there is evidence of a counter-attack on the increasing importance of the role of conferences in policymaking. Contrary to the widely circulated view, the counter-attack is not explained satisfactorily as hostility to the Cairo agenda. There are those who are sympathetic to the substance of Cairo, but object to the idea that an international conference would formulate social policies for their own country; they see this as an external intrusion into national policymaking. In effect, they are objecting to external violations of the domain of the State.

The difficulties and complexities of assessing the impact of the Cairo Conference on the public policies of member Governments of the United Nations is vividly illustrated—not exaggerated—by the following account based on an experience Jack Kantner and I had while conducting research in India. It was several years after Cairo, whose Programme of Action condemned the use of "targets" in family planning programmes on the grounds that they led to coercion. Among the very first countries to change its policies to conform to certain provisions of the Cairo Programme of Action was India, the second most populous nation in the world. Press releases and newspaper stories throughout the world announced that India, in compliance with the Cairo recommendations, had banned the use of targets in its family planning programme. Months after this ban had been announced, Dr. Kantner and I were given a copy of the newly adopted population policy for the State of Andhra Pradesh, a state in south-east India with a population of over 66 million. In reading the document, we found that it contained family planning targets of various sorts. It was clear that targets did not have the same obnoxious quality in the eyes of state officials in India as it did to delegates to the Cairo Conference. It was equally true that family planning officials defended targets as an effective tool of management.

What I have described is a situation where a United Nations population conference, in which India was represented, voted to support the adoption of a recommendation that all Governments ban family planning targets. Indian NGOs, particularly women's health and women's rights NGOs, seemed to have been present and active during the entire process. The Government of India responded to the Cairo declaration as well as to other domestic pressures by declaring an end to targets in family planning programmes. Nevertheless, targets were included in the population policy of the State of Andhra Pradesh. This account underscores the difficulties in translating global policy into practice at the field level. Rhetorical compliance or the statements of national leaders may contribute to a change in policy; however, the Indian federal system does not place responsibility for health and family planning in the hands of the central Government in New Delhi. It remains, instead, a responsibility of the state.

The Cairo Programme of Action consisted of a number of recommendations to be acted upon by Governments. Some of the recommendations are an expression of ideals and a vision of a more just and equitable world. Other recommendations specify actions that Governments can readily take in compliance with the Cairo agenda. As the saying goes, the devil is in the details. Since it is virtually impossible for any Government, especially those in developing nations, to implement the totality of Cairo simultaneously, what then should the priorities be and how should they be adjusted to account for different social systems, wealth, education and all the other factors that contribute to diversity. These are of course issues that national Governments are forced to contend with. In the case of some countries, the task is little less than overwhelming.

As the call at Bucharest, irrespective of the formal language of the conference, was for basic changes in the world economic system, so too did Cairo sound a message that superseded almost all other provisions in the Programme of Action. Chapter IV of the Cairo Programme of Action, entitled "Gender equality, equity and empowerment of women", declares "the empowerment and autonomy of women and the improvement of their political, social and economic and health status is a highly important end in itself. In addition, it is essential for the achievement of sustainable development." These words, along with the advocacy of reproductive rights and health, registered as the central message of Cairo with most conference participants and NGOs. Lost in the shuffle and acclaim for the Cairo agenda was the concern over population size and growth, issues which demographers and other population specialists still considered to be of great importance. As the United Nations has convincingly demonstrated in its population projections, world population growth is not about to cease, notwithstanding population stabilization or decline in a minority of nations. South Asia and Africa assure the continuation of world population growth well into the present century.

It may be too much to expect conferences to prescribe population policies. If the adoption and implementation of programmes endorsed by Cairo are the criteria which we use to assess the impact of Cairo, the results at this point in time are simply not clear. Numerous studies have reported on the Cairo impact—or lack thereof. On the basis of reading World Bank and other United Nations reports, the numbers tell me that female enrolment in school is increasing, life expectancy for women is going up and infant mortality is declining. These trends, all favourable and consistent with the Cairo recommendations, were also favourable since the 1950s and 1960s. There is no visible change in the trend line since Cairo.

Conferences demonstrate that population and demographic issues are not uppermost in the value scheme of nations. I suspect both supporters as well as critics of Cairo have often been looking at the wrong indicators. In the minds of many, both supporters and critics, Cairo set forth a vast social programme and asked the world to take heed. More important than the specific, programmatic changes that Cairo advocated is the clear and unqualified demand that women be equal partners with men in every phase of life. In other words, it was a demand for equality, a recognition of the special needs, as well as the comparative disadvantage of women at the present time.

We need not be reminded that Cairo was not a meeting of corporate executives working out a strategy and a plan to maximize profits. Cairo, along with its faults and deficiencies, was a gathering that articulated the vision and ideals of large numbers of people, both men and women. International conferences do not govern, much less bind, the behaviour of States. They can, however, present ideas and recommendations to all nations in an ongoing effort to formulate a set of norms that will over time be embraced by people and Governments everywhere. The creation of an international regime is a slow and cumbersome process as evidenced by the problems encountered by those attempting to control nuclear proliferation or atmospheric pollution. As for the negative impact of Cairo, I have a major reservation: the objectives of Cairo were in no way advanced by using a population conference to fight the good fight over women's rights. The Beijing conference on women was the appropriate battleground for the struggle over gender equality, even though there are those who claim that Beijing would have been impossible without Cairo.

There is a particular irony in the demonization of family planners that pervaded the corridors of the Cairo conference and has become part of the gestalt of many women's rights groups. My own observations of family planners were that they were usually pediatricians, nurses, family health physicians and social workers. They hardly matched the profile of a single-minded, population controller who was determined to prevent births in any way or by any method at hand. As a political scientist, I recognize the benefits gained by a social movement or advocacy group when it is able to forge greater unity because of a common foe. As a social scientist, however, I find it disagreeable to present a caricature of family planners—just as I find it disagreeable to characterize feminists or right-to-lifers.

I have been challenged by a very astute woman on the United Nations staff regarding my "defense" of family planners. She points out that she found them a decent lot with genuine concern for women and men for whom they were attempting to provide services. She said it was not people at this level who should be faulted, but rather the top officials of agencies who set policies and disbursed funds. I think there is something, but not everything, to what she said. The leadership of international assistance agencies started with the assumption that rapid population growth was detrimental to development and that if the population growth rate could be reduced, it would be good for economic growth. Growth would be of benefit to the nation as well as the individual. In short, they were advocates of a development approach, an approach that had received the endorsement and support of national Governments, bilateral agencies and multilateral organizations.

Cairo set forth a new and different model, or paradigm if you prefer. The focus would shift from the society, or nation or community, and would place the individual, particularly women, at the centre. Population activities would be aimed at women's reproductive health, women's rights and status, and women's empowerment. The radical aspect of this new paradigm was not women's rights or status, but the strong demand that population assistance and family planning programmes should not start with a concern for society; instead, it should have as its goal the benefit of the individual. Essentially, the purpose was changed from development to welfare. It was a shift from the macro to the micro.

Whether welfare efforts will yield a greater good is problematic. We do know that donor nations have not met the financial targets set at Cairo; developing countries have not embraced Cairo thoroughly; more rhetorical obeisance than programmatic support has been given to Cairo. What we may be seeing is that development, societal concerns and a macro focus have greater support among aid-givers and the Governments of developing countries than does a policy that focuses on the individual's welfare concerns and a micro approach. It may well be that we are learning that a development and family planning vessel has a greater capacity to carry reproductive health as part of its cargo than the reverse. I do not regard what I have just said as a normative prescription. It arises out of a long-standing commitment to development as well as a serious interest in United Nations conferences as instruments for social change and development.

In recent days I have heard and read numerous references to the folly of the Club of Rome and its prophets, to the alarm cries of Paul Ehrlich and the Paddock brothers. As I hear a recitation of the faults of those whose advocacy supplanted their scholarship, I am also reminded of those who, more than a quarter of a century ago, proclaimed the end of the population explosion. How many billion people have we added to the world since “the end” was proclaimed?

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The role of international funding in future fertility declines among intermediate-fertility countries

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The intent of this paper is to speculate on the course of future fertility in "intermediate-fertility countries" on the basis of an examination of the role that external funding has played in fertility declines in the recent past. My hope was to be able to show that the level of external funding has played some part in determining the pace of fertility decline in many countries to date and to be able to argue, therefore, that the pace and extent of future declines may be affected by prospective external funding.

"Intermediate-fertility countries" are defined by the United Nations Population Division, the organizers of the conference for which this paper was prepared, as having total fertility rates (TFRs) above replacement level (2.1) and below 5.0. There are around 74 such countries in the world today, nearly all of them in the developing world regions of Asia, Africa, the Middle East and Latin America.

In what follows, I looked at three sets of parameters for a subgroup of 20 countries, including many of the largest countries in this group: the pace of fertility (TFR) decline between 1955-1960 and 1995-2000; the amounts of external and domestic funding committed to population programmes in 1982, 1986 and 1989;[1] and the countries' "programme effort" scores in 1999. I attempted to select a cross-section of countries from various regions, with differing levels of external support, and with differing degrees of "political will" to reduce fertility. The countries differ quite substantially with respect to how conducive their "social setting" is and has been to fertility decline. Seven of the countries are in Asia (Bangladesh, India, Indonesia, Malaysia, Nepal, the Philippines and Viet Nam), three in sub-Saharan Africa (Botswana, Ghana and Kenya), six in Latin America (Brazil, Colombia, the Dominican Republic, Guatemala, Mexico and Peru) and four are in the Middle East/West Asia/North Africa (Egypt, the Islamic Republic of Iran, Morocco and Tunisia).

[1] Data by recipient country were not available for subsequent years—a severe constraint on the analysis.

Other papers in this conference are examining a broad range of additional determinants of fertility decline in the intermediate-fertility countries. Collectively, it is hoped, they will provide a fairly comprehensive explanation of previous fertility decline as well as a plausible and compelling guide to the future. This paper recognizes that a host of factors other than public policy and expenditure levels affect the course of fertility change. Indeed, it is probable that for most countries, these other factors are considerably more important than either policy or spending in explaining fertility decline. Yet, there is a considerable literature suggesting that political commitment and the commitment of financial resources can and do significantly influence the timing and the pace of fertility transition.

Berelson laid out a framework in the 1970s that remains a valid way to appraise whether and when fertility will decline in a country. He juxtaposed what he called the social setting—whether and to what extent various socio-economic conditions were conducive to spontaneous fertility decline; and programme effort—the degree to which

Table 1

Country	Total fertility rate[a]					Total external funding [b]		
	1955-1960	1965-1970	1975-1980	1985-1990	1995-2000	1982	1986	1989
Bangladesh	6.90	6.80	5.70	4.80	3.80	36, 148	43, 311	49, 923
Botswana	6.70	6.80	6.37	5.40	4.35	508	283	631
Brazil	6.15	5.38	4.31	2.96	2.27	6, 987	7, 666	11, 973
Colombia	6.76	6.18	4.34	3.17	2.80	5, 854	3, 571	6, 498
Dominican Republic	7.40	6.68	4.70	3.61	2.88	1, 813	1, 139	2, 133
Egypt	6.97	6.56	5.27	4.58	3.40	3, 943	11, 850	16, 712
Ghana	6.90	6.90	6.90	6.00	4.60	620	1, 876	4, 772
Guatemala	6.93	6.60	6.40	5.80	4.93	1, 826	2, 490	5, 504
India	5.92	5.69	4.83	4.08	3.32	20, 113	23, 415	32, 401
Indonesia	5.67	5.57	4.73	3.50	2.60	27, 307	18, 894	13, 632
Iran (Islamic Rep. of)	7.00	6.80	6.00	5.60	3.20	0	121	597
Kenya	7.82	8.12	7.90	6.75	4.60	6, 957	4, 908	20, 277
Malaysia	6.94	5.94	4.16	4.00	3.26	1, 194	2, 030	1, 458
Mexico	6.96	6.82	5.30	3.61	2.75	11, 168	5, 555	10, 629
Morocco	7.18	7.09	5.90	4.60	3.40	3, 626	5, 634	8, 642
Nepal	5.76	5.92	5.65	5.31	4.83	6, 561	8, 525	5, 697
Peru	6.85	6.56	5.38	4.00	2.98	2, 539	4, 452	7, 952
Philippines	7.13	6.50	5.50	4.55	3.64	19, 532	7, 697	7, 905
Tunisia	7.04	6.89	5.69	4.12	2.31	4, 649	1, 555	3, 904
Viet Nam	6.55	7.25	5.89	4.02	2.50	2, 368	2, 529	10, 845

[a] United Nations Population Division, *World Population Prospects: the 2000 Revision*, Volume 1: Comprehensive Table.
[b] Thousands of US dollars. "Global Population Assistance Report 1982-1989", UNFPA, 1991, Table 10.
[c] Millions of US dollars. Government plus Consumer spending. *Source*: "Family planning expenditures in 79 countries: a current assessment by Population Action International".
[d] Millions of US dollars. World Bank plus Donor Assistance. *Source*: "Family planning expenditures in 79 countries: a current assessment by Population Action International".
[e] Millions of US dollars. Source: "Family planning expenditures in 79 countries: a current assessment by Population Action International".
[f] Expressed as per cent of maximum. Table A.14. Appendix A. Profiles for family planning and reproductive health programs by John Ross, John Stover, and Amy Willard.
[g] Expressed as per cent of maximum. Sum of all indices, maximum of 120. Table A.14. Appendix A. Profiles for family planning and reproductive health programs by John Ross, John Stover and Amy Willard.
[h] Absolute difference between TFR 1985-1990 and TFR 1995-2000.
[i] The per cent change between TFR 1985-1990 and TFR 1995-2000.

the Government commits itself to bringing fertility down. To some degree, Berelson argued, each dimension can substitute for the other: countries with highly conducive social settings need apply much less programme effort than countries with constrained social settings; and countries with weak social settings need far more political will and programme effort to achieve fertility declines equivalent to those of the more socio-economically favoured countries. Levels of funding and the programme effort scores can be regarded as measures of political will.

I had hoped that it would be possible to show that countries with high levels of political will and significant external assistance achieved more rapid fertility declines, ceteris paribus, than countries in which either or both factors were lower. Looking at programme efforts scores (Ross et al., 1999) and internal funding levels (PAI 1995) as measures of political will, and at external funding (UNFPA, 1982, 1986 and 1989) as an exogenous (although not unrelated) factor, I hoped to find some patterns or sug-

Country	1995 Expenditures on family planning			Programme effort score		Change in TFR 1985-1990 and TFR 1995-2000	
	Domestic expenditures[c]	External funding[d]	Total funds[e]	Policy score[f]	Overall score[g]	Absolute difference[h]	Per cent change[i]
Bangladesh	35.7	99.7	135.4	69	69	1.00	20.8
Botswana	.4	2.0	2.4	65	66	1.05	19.4
Brazil	125.8	11.6	137.4	43	43	.69	23.3
Colombia	22.5	6.1	28.6	47	66	.37	11.7
Dominican Republic	2.3	3.6	5.9	65	67	.73	20.2
Egypt	24.7	17.9	42.6	67	59	1.18	25.8
Ghana	2.7	8.6	11.3	65	52	1.40	23.3
Guatemala	1.5	10.8	12.3	37	57	.87	15.0
India	260.1	100.5	360.6	69	68	.76	18.6
Indonesia	186.2	32.4	218.6	87	84	.90	25.7
Iran (Islamic Rep. of)	33.3	7.7	41.0	58	61	2.40	42.9
Kenya	3.5	26.7	30.2	48	56	2.15	31.9
Malaysia	17.4	2.1	19.5	54	54	.74	19.0
Mexico	94.6	13.9	108.5	72	74	.86	23.8
Morocco	13.8	10.0	23.8	59	63	1.20	26.1
Nepal	2.3	5.2	7.5	62	51	.48	9.0
Peru	3.4	7.8	11.2	58	59	1.02	25.5
Philippines	10.5	20.4	30.9	65	60	.91	20.0
Tunisia	9.2	8.3	17.5	79	82	1.81	43.9
Viet Nam	7.7	7.3	15.0	85	67	1.52	37.8

gestions of association. Regrettably, none emerged from the analysis. I reproduce the table (see table 1) using raw data and four regressions here to show that no significant associations were found. Fertility declines in the 20 countries are not related in any statistically significant way with any of the independent variables: "programme effort", internal funding, or external funding.

Why would this be the case? I do not think the lack of statistical association means that neither political will nor external funding had anything to do with the fertility declines these countries experienced. Rather, I think the relationship between these factors and fertility decline was so confounded by other factors that the effect of political will and external funding more or less washed out. The "other factors" that might account for the absence of a correlation almost certainly include such powerful fertility determinants as female education, infant/young child mortality, urbanization, female non-agricultural employment, and women's autonomy, among others.

In addition, I suspect that the methodological approach I selected to try to identify the independent effect of funding and policy was inappropriate or, perhaps more accurately, insufficient. I was not able to gather data that would have permitted time-lagging, such that expenditures at Time 1 could be related to fertility levels at Time 2, for example. John Cleland, in his article "Different Pathways to Fertility Decline", may have chosen a better approach. He selected pairs of countries that, at least in statistical terms, were quite similar with respect to a host of socio-economic development measures and levels of pre-transition fertility. In each pair (the Democratic People's Republic of Korea and the Republic of Korea, the Philippines and Indonesia, Colombia and Mexico, Bangladesh and Pakistan), one country experienced significantly faster fertility decline than the other. Cleland attributed the differences to the extent to which ideational change occurred in these societies, as well as (and partly because of) the quality and strength of their population policies and family planning programmes.

While this approach lacks the elegance of multiple regression analysis, it is more contextual in nature and appeals to the common sense of informed observers. It helps us to understand why fertility fell much faster in Bangladesh than in Pakistan, in Indonesia than in the Philippines, in the Republic of Korea than in the Democratic People's Republic of Korea. Indeed, I believe that in each case, it is clear that a strong Government commitment, manifested in strong public statements by the political leadership and significant commitment of internal budgetary resources, and backed by external financial support, accounts for much of the observed difference in fertility outcomes.

The papers presented at this conference by Bongaarts and Ross, taken together, answer many of the questions about the relative importance of socio-economic development and programme effort in explaining fertility decline. Bongaarts shows quite persuasively that socio-economic development level remains a powerful determinant of the level at which fertility decline begins and later slows, while Ross shows that social setting and programme effort generally co-vary and that programme effort makes an important difference in the pace at which fertility declines. Indeed, both Bongaarts and Ross assert that family planning programmes, by improving the efficiency with which couples can avoid unwanted pregnancies, have brought fertility levels much lower, much faster than would have happened in their absence. Caldwell makes much the same point rather forcefully.

So, what of external funding? Has it made a difference and will it make a difference in the future? Part of the reason for the weak correlation between external funding levels and fertility decline is that money often has flowed to countries for reasons that are essentially unrelated to their commitment either to fertility reduction or to development. During much of the Cold War, money flowed for geopolitical rather than developmental reasons, so that countries with weak commitments to either development or population policies, such as Pakistan, Nepal, the Philippines, former Zaire (now the Democratic Republic of the Congo), Somalia, and El Salvador, to name a few, received significant funding (including, in many cases, ostensible population assistance) despite their acknowledged lack of interest or inability to use the resources well. On the other hand, Bangladesh has become the prime example of a country which, by dint of an exceptional political commitment backed by generous external aid, produced fertility declines all out of proportion to what its progress on the conventional development indicators would have predicted. Other countries which have "outperformed expectations" based on development indicators are Kenya, Ghana and Indonesia (particularly during the 1970s)—all major recipients of external aid.

I conclude from this that external aid cannot substitute for sound development policies, population policies and political will but where the latter are present, external assistance can significantly accelerate the process of fertility decline. Examples of a few countries in which I believe external assistance has accelerated fertility declines, beyond those just mentioned, are the Republic of Korea, Thailand, Egypt, Jordan, Tunisia, Morocco, Zimbabwe, Botswana, Mexico, Brazil, Costa Rica, the Dominican Republic, Ecuador and Peru. Where population policy is imbedded in a progressive set of development policies and the Government is able to use external assistance effectively, this assistance can make—and has made—a large difference in the pace at which fertility declines.

This brings me finally, to the future, and the principal purpose of this conference: will future external funding produce more rapid fertility decline than demographers would otherwise expect? I fear not—not because external funding doesn't matter, but because I worry that it won't be there, at least in significant quantities. The record on development assistance since the end of the Cold War has been abysmal. Since 1990, ODA levels have been essentially flat in nominal terms, which means they have actually declined in real terms. For more than a decade, development assistance has languished, in part because, as in the United States, the political imperative diminished, and in part because, as in Japan and Germany, economic malaise (in the former) and competing domestic priorities (in the latter) intervened.

On top of that, assistance for population programmes has fallen well short of the goals set at the International Conference on Population and Development in 1994. The Cairo ICPD estimated that $17 billion a year would be required from all sources by 2000 to implement the programme of action. The reality is that at most, countries are spending half that much on an annual basis. Furthermore, the donor share of the $8-9 billion currently being spent amounts to no more than perhaps $2.0 billion—well under half of the $5.6 billion Cairo called for. Now, it is possible, because the Cairo agenda is quite broad, that $17 billion represents somewhat more than would be required if fertility reduction were its sole objective, but in truth $17 billion is quite a conservative estimate and is probably well within the range of what ought to be spent if the only goal were to "complete the demographic transition". As Caldwell notes, there is reason to be concerned about this decline in support for population programmes. In addition to the fact that the slowing pace of decline in fertility in many intermediate-fertility countries may be attributable to declining international resources available to support population programmes, there is the very significant fact that we are in the era of the largest cohort of reproductive aged people in history. Even assuming that desired fertility among these people is consistent with replacement, or near-replacement, fertility, international funding could make a major difference in how much unplanned or unwanted childbearing actually occurs. Because the numbers are so large, the consequences of even small differences in unwanted fertility will also be very large.

In addition to the stagnation in overall funding and the failure to make much progress on the ICPD funding goals, I nonetheless sense a broader decline in interest in population growth as a matter of international and public concern among both countries and international agencies. Signs of this declining sense of urgency are all around us: in the absence of ICPD goals in the Millennium goals; in the failure of the forthcoming environment conference at Johannesburg to even mention population as an important causative factor in environmental problems; in the apparent consensus not to have another decennial intergovernmental conference on population and development in 2004; in the virtual absence of sexual and reproductive health considerations in WHO- and World Bank–led discussions of health sector strategies and policy reform; and in growing media preoccupation with aging and below replacement fertility, such that the central demographic theme in international political discourse has shifted from concern about population growth to concern about the consequences of rapid fertility decline and low fertility levels.

It seems to me unlikely that this trend away from concern about high fertility will be reversed and that external assistance for programmes to reduce fertility will once again increase. Funding is likely to be available in the coming years, perhaps even in more generous amounts than in the past, to promote health sector reform and to deal with such pressing health problems as HIV/AIDS. Some of this funding may strengthen services that promote sexual and reproductive health and could, as a consequence, help to reduce unwanted fertility. But the absence of a sense of urgency about high fertility at senior policy levels, either in donor capitals or in most developing countries, suggests to me that the "population movement", as it has existed since the 1960s, may be close to having run its course. Thus, if external assistance ever was a major factor in promoting the rapid fertility declines that have occurred in most parts of the developing world over the past four decades, it seems most unlikely to be a major factor in the foreseeable future. Far more important than external assistance will be domestic resources and a continuation of the global momentum toward a small family norm that the population movement helped to stimulate in the 1960s and 1970s and that now appears to be in evidence virtually everywhere.

Examining changes in the status of women and gender as predictors of fertility change issues in intermediate-fertility countries

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The 1994 Cairo International Conference on Population and Development (ICPD) focused attention on the role of women's empowerment in influencing reproductive behaviour. However, there is no complete agreement on how this concept should be defined and measured (Presser, 1997; Mason, 1997; Mason and Smith, 2000; Kritz and Makinwa-Adebusoye, 2001). Because women's authority can be measured in different ways as well as reproductive attitudes or practices, results of empirical studies are different depending on the indicators used. This has been pointed by the discussion by Kritz and Makinwa-Adebusoye of a Mason and Smith's article (Mason and Smith, 2000).

This debate must be linked to the general debate over the causes and trends of fertility decline in developing countries. In this paper, we propose the introduction of a gender perspective in explaining fertility transitions, as a theoretical point of view that has been missing in the debate. Gender relations have an important role in explaining fertility behaviour, a critical and neglected process in explaining fertility transitions. We also present some empirical findings in large intermediate-fertility countries as Nigeria, Mexico and India.

EXPLAINING FERTILITY TRANSITIONS

Empirical studies have shown that fertility transitions in many cases differ substantially from what would be expected and that there is a wide variation in the pace and timing of the transitions. The relation between development and fertility is a complex one, and many theoretical frameworks have been proposed to explain it, even if "there is no consensus on an alternative theory to replace demographic transition theory" (Hirschman, 1994).

Over the past four decades, rapid fertility transitions have been observed in developing countries in Asia, North Africa and Latin America. The causes of these trends have been explained by different theories, beginning with the classical statement of the demographic transition theory by F. Notestein (1945) relating fertility reduction with modernization, urbanization, industrialization, education etc. A debate has arisen on the basis of a great deal of empirical research and it has been stated that the decline of fertility started at really different levels of development. The link between indicators of development and fertility has not been proven with existing data in developing countries (Cleland and Wilson, 1987) even if "most contemporary analysts accept development as one of the driving forces of fertility transition, but they vigorously debate the precise variables and processes involved" (Bongaarts and Watkins, 1996). Institutional factors introduced by McNicoll (1981) were able to explain some of the differences in the pace and the timing of many fertility transitions, like for instance in the case of rural China. The arguments of the strong role of the family planning programmes and the availability of services by the state accelerating the pace of reproductive change, like for example, in Bangladesh (Robinson, 2001; Cleland and others, 1994) and the role of social development levels—notably educational levels and health patterns as reflected in life expectancy—have also been cited as contributing to the transition in developing areas (Caldwell, 1982). These indicators have a strong predictive effect, but in addition, and related to social development, are different familial systems and gender hierarchies that can explain differences in reproductive behaviour (Malhotra and others, 1995; Dyson and Moore, 1983; Jejeebhoy, 2001; Kazi and Sathar, 2001; Visaria, 1996; Kabeer, 1985). Using individual level data, asking men and women about their relations, and using analyses of the prevailing gender systems in each context (Malhotra and others, 1995; Dyson and Moore, 1983; Miller, 1997) leads to a much broader understanding.

Microeconomic theories of Gary Becker (1972), Easterlin (1978), Caldwell (1982) introduced the central role of the models of individual decision-making and the link between generations. The analysis of individual behaviour proved to be relevant in understanding fertility decisions. In 1973, A. J. Coale summarized the findings of the Princeton "European Fertility Transition" project in setting three preconditions for the adaptation to a new mode of behaviour: readiness, willingness and ability. The notion of "readiness" refers to advantages for the actor, i.e., to the microeconomic cost-benefit evaluation of the advantages of reducing fertility at the familial or individual level. "Willingness" refers to normative acceptability and legitimacy of the new behaviour. "Ability" refers to the accessibility of these innovations. Lesthaeghe and Vanderhoeft (1999) presented this model as RWA, a complete theory allowing integrating economic and non-economic paradigms of transitions to new forms of behaviour and avoiding the sterile debate "economics versus culture".

INTRODUCTION OF A GENDER PERSPECTIVE

Harriet Presser underlined in 1997 the lack of analysis of the gender systems prevalent in most demographic researches and she made a warning about the importance of this dimension in explaining female and male reproductive behaviour. The concept of a gender system is the most general one because, as Karen Mason (1997) notes, it comprises the entire complex of interactions, roles, rights and statuses that surround being male versus being female in a given society or culture. However, some gender sensitive researches began since the 1980s. One important pioneer research has been a set of surveys in five Asian countries (Mason and others, 1989). The project's aim was to investigate the determinants of women's autonomy and power and their relationship to women's reproductive intentions and behaviour. Surveys were conducted in five countries: India, Malaysia, Pakistan, the Philippines and Thailand, with different gender norms. In South India gender norms are somewhat more egalitarian than in North India and family structure less disadvantageous to new brides (Mason, 2000; Dyson and Moore, 1983).

The data sets of this project, supported by the Rockfeller Foundation, are one of the first to try to operationalize the concept of autonomy among women from different cultural and religious cultures, and to assess its relationships to reproductive behaviour. Similar studies were conducted in five Asian countries, namely India, Malaysia, Pakistan, the Philippines and Thailand (Mason and others, 1995). Women respondents were asked not only about their education and their work status but also about a variety of dimensions of autonomy within their married lives, including their decision-making authority, their personal freedom of movement, control over economic resources, wife-husband power relations, and other attitudes.[1]

[1] Women in these surveys were asked a battery of questions concerning their autonomy and power within the household. From these responses, 5 dimensions of autonomy have been selected, and indices for each created: (*i*) economic decision-making; (*ii*) mobility; (*iii*) freedom from threat from husband; (*iv*) access to economic resources; and (*v*) control over economic resources. *Economic decision-making authority* is represented by information on the participation of women in 3 economic decisions: the purchase of food, major household goods and jewellery. The index sums the number of these three purchases in which the woman participates, assigning a score of 1 if she only participates in the decision and 2 if she also has the major say. The index thus ranges from 0 to 6.

DHS surveys were also analysed using a gender perspective (Kishor, 2000) and beginning with the gender module of the Egyptian DHS survey, husbands and men were asked about their reproductive behaviour and attitudes in many DHS surveys like in Nicaragua, Burkina Faso, Mali, Ghana, etc. Using a gender perspective based on DHS surveys of West Africa (Burkina Faso, Côte d'Ivoire, Ghana, Mali), Andro and Hertrich (2001) give some consistent conclusions. They show the evidence of two models of reproductive behaviour. The first model, mostly among the old generations, is linked to the traditional model of high fertility. Demand for contraception comes from a small minority,[2] with a higher educational attainment and residence in urban areas since childhood. It is associated with the idea of male power and weak conjugal links (Andro and Hertrich, 2001). Women are highly dependent and have little or no power of decision, or are limited to some badly appreciated domestic duties (Garcia and Oliveira, 2001). In some cases, women's social roles are much more autonomous than domestic ones (Duarte, 1999).

The second model is observed in the young generations. It has a strong link with socio-economic characteristics of partners, urban residence and high education. In this case, discussion between husbands and wives about family planning is frequent and also approval of family planning by both partners. In this perspective, spousal agreement on reproductive matters is the best indicator in determining future reproductive behaviour, as well as potential contraceptive practice, even when people are too young to already use contraceptive methods to limit family size (Andro and Hertrich, 2001).

Other studies were conducted in Latin America (Garcia and de Oliveira, 2001; Duarte, 1999) focusing mainly on male and female roles in the reproductive work:

> "The gender perspective has helped redefine studies on family life by considering as reproductive activities or reproductive work a whole range of tasks undertaken in the domestic sphere or linked to it, that are necessary for the everyday, generational reproduction of households as well as the reproduction of the labour force. As it is known, the development of this perspective has revealed that women are primarily responsible for the organization and/or performance of reproductive work (such as household chores, looking after children, managing the family budget, organizing consumption, etc.). Concern over men's participation in the domestic sphere increases when women's growing presence in economic activities is added to their well-known participation in these reproductive tasks, and increasingly accurate information becomes available on the significant overload caused by the double shift. Within this context, there has been a sharp rise in the number of studies on the division of labour within households to determine the varying degrees of participation of their members in the various activities and to establish the degree of involvement of men in the family sphere (Garcia and de Oliveira, 2001)".

Since the Cairo and Beijing conferences, as a result of the demands of various women's groups, there has been particular emphasis on the need to examine the degree of men's involvement in family life and in the promotion of their participation in the various stages of socio-biological reproduction (such as the decision to have children, pregnancy, childbirth, post-natal care, and looking after and raising children in general). The absence of men in the analysis of fertility and birth control had been criticized since the mid-1980s from a gender perspective. The role of men in the family, sexuality, and biological reproduction is posited as being crucial, both for the advancement of knowledge and for achieving greater equity between men and women (Garcia and de Oliveira, 2001).

After this rapid review, we think that much more research is needed to understand how gender interacts with demographic change, especially with fertility. However, in this paper we address some of these issues by presenting empirical results dealing with how gender systems influence reproductive outcomes in Nigeria, India and Pakistan

Mobility: the mobility index sums the number of 5 places—the health centre, community centre, the home of a relative or friend, a fair and the next village—to which the woman can go unescorted. The index thus ranges from 0 if the woman must be escorted to every place, to 5 if she can move about unescorted to every place.
Freedom from threat: the index of freedom from threat ranges from 0 to 3: a zero is assigned if women both fear their husbands and are beaten by them; 1 if they are beaten but do not fear their husbands; 2 if they fear but are not beaten; and 3 if they neither fear nor suffer beating at the hands of their husbands.
Access to economic resources: the index of access to economic resources sums responses to four questions: (*a*) having a say in how household income is spent; (*b*) getting cash to spend; (*c*) being free to purchase small items of jewellery; and *(d)* being free to purchase gifts. The index ranges from 0 to 4.
Control over economic resources: fewer questions were asked about women's actual control over economic resources. The index ranges from 0 to 3 and includes (*a*) whether any of the family's valuables (land/jewellery/vessels) belong to the woman (that is, are in the woman's own name) and are controlled by her; (*b*) whether she has or had some or the major say (assigned a value of 0.5 and 1.0 respectively) in the disbursal of her dowry; and (*c*) whether she expects to support herself in old age through her own savings (Sathar, Callum, Jejeebhoy, 2001).

[2] See also a study on the pioneers of reproductive change in Mexico in Juarez (Quilodrán, Zavala de Cosío, 1996).

and Mexico. The aim is to present indicators having a strong predictive impact on fertility trends. We also use papers presented at the "gender" sessions at the General Population Conference of IUSSP in Bahia, Brazil (August, 2001).

Couple's agreement on wife autonomy: the case of Nigeria

In a paper studying couple's agreement on wife autonomy in Nigeria, Kritz and Makinwa-Adebusoye (2001) look at several different measures of women's authority in order to determine whether some dimensions have stronger and more robust relationships to reproductive outcomes. In addition, they compare how authority indicators based on wives', husbands' and couples' perceptions differ from each other and look at whether women's authority, when based on partner agreement, has a stronger relationship to reproductive outcomes than authority measures based on women's reports alone. Finally, they examine whether women's authority influences the contraceptive use of husbands and wives when they approve or disapprove of family planning. To study these issues, they use survey data from five Nigerian ethnic groups that have different gender traditions.

In this study, six measures of women's authority are used. The first two measures assess wives' involvement in household economic decisions and wives' contributions towards household expenses. Three measures are used to evaluate women's decision-making power: one measure concerns whether women participated in family decisions related to child-rearing and childbearing; the second assesses whether husbands are justified to leave their wives if certain conditions hold; and the third looks at whether husbands and wives talked about family planning in the last year. This is treated as a measure of women's authority based on reasoning that husbands who are willing to talk with their wives do so because they accord them some respect and want their opinion. Being able to express an opinion in a traditional society implies a certain degree of authority. The sixth measure of authority assesses whether husbands and wives agree that wives have more authority today than they did in their mothers' time, a normative evaluation of husbands' and wives' perceptions regarding gender change. Husbands and wives may perceive that gender norms are changing even though a restrictive approach toward gender characterizes their own interpersonal power relations. The most robust relationships occurred for three measures, namely whether wives have more authority today than they did in their mother's time; authority over family decisions; and communications with husbands about family planning. Wives' authority on economic matters showed the weakest relationships to the three reproductive measures examined (Kritz and Makinwa-Adebusoye, 2001).

This result recommends the use of different indicators of women's authority rather than a single one. They also indicate that women's authority is more closely related to family planning approval and contraceptive use than it is to preferences for no more children. Disagreement between husbands and wives over women's household authority indicate that levels of couple disagreement are quite high on several of the measures of women's authority.

Several interesting findings emerge. First, that husbands are more likely than wives to be contraceptive users if they approve of family planning regardless of whether their wife approves of it. There is also a consistent pattern for wives, namely that women's authority was associated with how couples resolved their disagreements about family planning.

A debate has arisen whether most husbands and wives have or don't have agreement on reproductive matters and about the influence of authority structures within households in determining reproductive behaviour (Mason and Smith, 2000; Bankole and Singh, 1998, Kritz and Makinwa-Adebusoye, 2001). In her paper with Smith (2000), Mason has focused mainly on one measure of reproductive preferences: the will for no more children. While Kritz and Makinwa-Adebusoye also find relatively low disagreement between husbands and wives on that issue, they find twice as much disagreement on family planning approval and contraceptive use (Kritz and Makinwa-

Adebusoye, 2001). Their findings that women's authority is mainly important in shaping how couples resolve their disagreement but becomes weakened at the ethnic group level is consistent with Mason's argument that authority structures are largely attributes of socio-cultural aggregates such as ethnic groups. In many societies, particularly those in Africa, there is considerable heterogeneity within countries and the research literature shows that there are large differences between husbands and wives in reproductive outcomes (Becker, 1996 and 1999; Dodoo, 1998; Bankole and Singh, 1998; Andro and Hertrich, 2001). The results in Nigeria suggest that husband-wife authority at the individual level is a very important factor in accounting for how couples resolve their disagreements over these issues. Although the effect is weakened when separate analyses are conducted within relatively homogenous ethnic groups, it is still possible to observe the impact of individual differences in wife authority on contraceptive use (Kritz and Makinwa-Adebusoye, 2001). Gender systems are really significant to explain all these results, as we will see in the next cases, in South Asia.

Gender, region, religion and reproductive behaviour in India and Pakistan

Using data at an individual and community level from three sites in South Asia, Zeba Sathar, Christine Callum and Shireen Jejeebhoy (2001) propose the argument that in South Asia, gender systems play a central role in conditioning the pace at which the fertility transition proceeds, and accounts thereby for the variation in the pace of demographic change across the region. They explore the extent to which the autonomy of women accounts for the different paces of fertility change and contraceptive practice in three sites in South Asia—Uttar Pradesh and Tamil Nadu in north and south India respectively, and Punjab in Pakistan. South Asia is generally characterized by the subordinate role of its women and their limited ability to invest in their children's futures and make independent decisions about childbearing (Sathar, Callum and Jejeebhoy, 2001).

The objectives of the study are to explore empirically the links between female autonomy and such aspects of reproductive behaviour as fertility preferences and contraceptive behaviour in three culturally distinct sites in South Asia, namely Tamil Nadu and Uttar Pradesh in India and Punjab in Pakistan. Sites in Uttar Pradesh in north India and Punjab, Pakistan represent settings that have been slow to experience reproductive change, and continue to experience considerable unmet need; sites in Tamil Nadu in southern India represent settings that are less gender stratified and in which reproductive behaviour is more in line with women's intentions. At the same time, the analysis explores the extent to which region, nationality and religion influence aspects of reproductive behaviour and their links to female autonomy. While similar work has compared the north-south cultural difference within India, the discussion is expanded with the inclusion of data from Pakistan as an additional cultural identity in the subcontinent (Sathar, Callum and Jejeebhoy, 2001).

Data are drawn from these three states. A total of over 3,000 currently married women aged 15-40 comprises the sample. The inclusion of these dimensions of female status in this data set allows for a better understanding of women's status and the extent to which education and economic activity are reliable proxies for autonomy more generally (Sathar, Callum and Jejeebhoy, 2001). Reproductive and contraceptive behaviour—desire for additional children, contraceptive practice, and met need—are examined in respect of three blocks of explanatory variables. First are "development" variables, notably household possession of modern durables, access to toilet facilities, brick-walled homes and electricity. Also included are measures of the educational levels of women and their husbands. A second set comprises a series of indices of female autonomy measuring such dimensions as mobility, decision-making, access to and control over resources and freedom of threat from husbands (see Jejeebhoy, 2000; Jejeebhoy and Sathar, 2000). A third block covers region, nationality and religion.

There are considerable differences across communities in several respects. Punjabi women are, by and large, better off than women from both Uttar Pradesh and Tamil Nadu: on average, Punjabi women own a larger number of modern goods. Within India, while Tamil Nadu and Uttar Pradesh appear to be similar in the aggregate, there are large differences by religious group on several economic indicators (Sathar, Callum and Jejeebhoy, 2001). The situation is reversed when educational attainment levels are considered. Economic prosperity in Punjab is not matched in terms of educational investments, particularly in the case of females. Now it is Tamil Nadu women that are best off, irrespective of religious affiliation, and those from Punjab and Uttar Pradesh who lag behind (Sathar, Callum and Jejeebhoy, 2001).

Levels of autonomy are uniformly higher among women in Tamil Nadu, irrespective of their religious affiliation, than women in either Punjab or Uttar Pradesh. The relative role of religion and region in influencing women's autonomy provides clear evidence of the important role of region over political boundaries and religion (Jejeebhoy and Sathar, 2000). Considerably greater variation is observed in such dimensions of autonomy as decision-making and mobility, than others, particularly freedom from threat. And although female autonomy in Uttar Pradesh and Punjab tends to be largely similar, Punjabi women appear to have considerably more decision-making authority and control over resources, and somewhat more limited mobility than women from Uttar Pradesh.

As in the case of female autonomy, differences in reproductive behaviour tend to reflect regional more than national and religious differences. For example, the mean number of children ever born and surviving (standardized for age) remain substantially—almost 50 per cent—lower among Hindu and Muslim women of Tamil Nadu than the other three groups; however, among the three northern groups, fertility levels of Punjabi women fall between those of Muslim and Hindu women from Uttar Pradesh. Among other sociodemographic indicators, there is little difference in infant and child mortality levels, but considerable variation in marital ages: Punjabi women report the highest age at marriage (18.2), an age largely comparable to Tamilian Hindu women, moderately higher than that recorded by Tamilian Muslims and substantially higher than that recorded by women from Uttar Pradesh. Few proportions of women in all of these sites had a say in the choice of marriage partner or timing (Jejeebhoy and Sathar, 2000).

Reproductive choice is more likely to be reflected in such measures as desire for additional children, contraceptive practice and method choice as reported at the time of the survey. The differences between Muslims and Hindus in Uttar Pradesh are notable. While Muslims and Hindus have similar reproductive intentions in Tamil Nadu, in Uttar Pradesh a greater proportion of Hindu women want no more children, and correspondingly, current contraceptive use is higher among Hindus in both states of India but the difference is starker in Uttar Pradesh (Sathar, Callum and Jejeebhoy, 2001).

> "Findings suggest that once age at marriage and especially the number of sons are controlled, each reproductive outcome tend to be explained by a somewhat different set of factors. Neither household economic conditions nor measures of female autonomy (with the exception of mobility) have a significant bearing on desire for no more children. Rather it is a primary, and especially secondary school education that appears to influence preferences for more children. On the other hand, a host of factors, including economic status indicators and education, as well as most of the autonomy indicators (with the exception of control over resources) variously explain contraceptive use and met need. For contraceptive use, secondary education remains significant, and husband's secondary education and household economic conditions come into play. Of the autonomy measures, mobility, and access to resources are positively associated with the likelihood of contraceptive use".
>
> Finally, met need is explained by household economic status, namely ownership of goods and, to a lesser extent, husband's education. It is also explained by such measures of autonomy as access to resources, mobility, economic decision-making and

> freedom from threat. In this case women living where they were born who want no more children are more likely to be current users suggesting that proximity to natal kin may indeed play a role in enhancing women's ability to realize contraceptive decisions" (Sathar, Callum and Jejeebhoy, 2001).

Some important conclusions may be drawn from this study. First, the region of South Asia distinguishes powerfully the autonomy and reproductive levels of South Asian women. Tamilian women—irrespective of their religion—are significantly different from women from Uttar Pradesh or Punjab—they not only experience considerably higher levels of autonomy, but also are considerably more likely to want no more children, practice contraception, and have met their family planning needs. Second, female individual autonomy levels play an important role in determining patterns of reproductive and contraceptive behaviour in South Asia. However, these influences are not uniform. The relative influences of individual autonomy indicators and the more structural factors vary over the different reproductive and contraceptive behaviour and choice indicators, and further research is needed to probe these differences (Sathar, Callum and Jejeebhoy, 2001).

> "Third, there is strong evidence that gender systems—as measured by region of South Asia—persist in playing a strong role in explaining reproductive and contraceptive behaviours and choice, even after controlling for women's autonomy. For the most part this influence surpasses that either nationality or religion. Women from Tamil Nadu—largely irrespective of religion are significantly more likely than those from Uttar Pradesh or Punjab to practice contraception, and have met their need for family planning, even after a host of socio-demographic and autonomy indicators are controlled. Patterns experienced by women in the two northern sites of South Asia resemble each other, despite national and religious differences. The results of the multivariate analysis do suggest that religion and nationality have a significant influence on predicting reproductive behaviour (both intentions and action upon those intentions), however these influences are considerably weaker than that exerted by region. They also suggest that being a Muslim or a Hindu has quite different ramifications for reproductive behaviour depending on the region of residence" (Sathar, Callum and Jejeebhoy, 2001)".

Women's autonomy and power and use of contraception in Mexico

The rate of fertility reduction and the spread of contraception use have been very rapid in Mexico in the last three decades. It is possible to evaluate the role of women's decision-making power in this process by using a national survey of family planning (ENAPLAF, 1995). This survey included questions related to wife's autonomy and decision-making power in the family and its relation to the use of contraceptives. Wife's decision-making refers to women's ability to express their opinion and influence on family decision processes, while indicators for wife's autonomy are referred to married women's capacity to take initiatives and actions without asking for their partner's approval. A decision-making power index was estimated by adding five variables of each woman. By adding information concerning women's autonomy in nine dimensions, an index of women's autonomy provided a proxy of her general level of autonomy relative to her husband. The results show that on average most women reported making decisions jointly with their husbands but that Mexican married women do very poorly in terms of autonomy (Casique, 2001).

The results of this study confirm that women's empowerment (autonomy and decision-making power) is positively associated to women's use of contraception in Mexico, but the two indicators have different effects. Women's autonomy index shows a stronger effect on women's likelihood of being in need of contraception as well as on women's likelihood of using a modern-temporal method than decision-making power does. A quite heavy effect on women's likelihood of using contraception is related to husband's agreement with contraception, except for women with high decision-making power and high autonomy. Women's likelihood of using a definitive method (sterilization) does not show a significant relationship with any of the women's empowerment indicators included. Finally, the proportion of women in need of contraception but not using any contraceptive methods, related to husband's will against fertility control and women's lack of knowledge regarding contraceptive methods, show a significantly reduced prevalence among more empowered women (Casique, 2001).

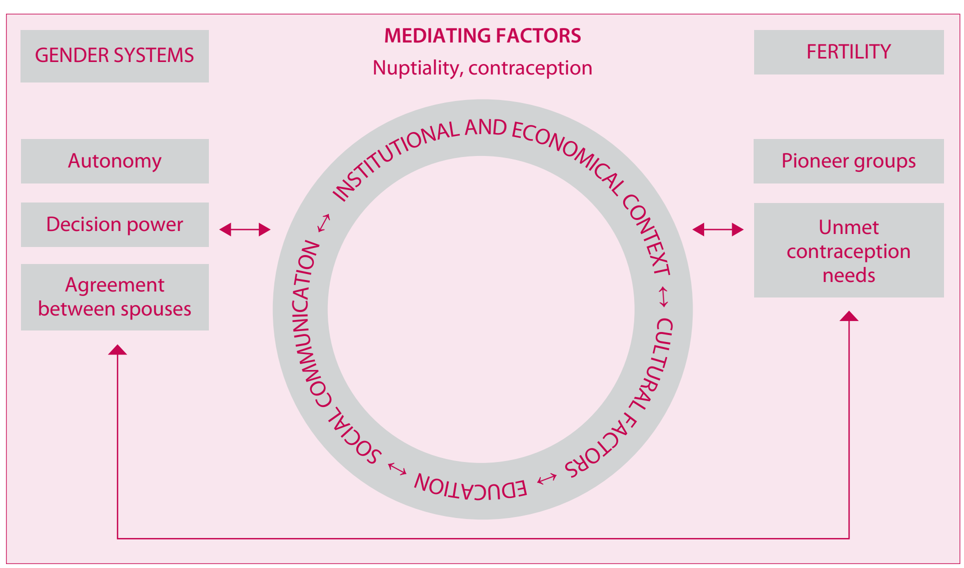
In another study, in some large urban areas, Garcia and de Oliveira (2001) show that despite women's growing labour force participation in Mexico, being a provider continues to have an extremely symbolic connotation for men and women alike. It is associated with the idea of male power, and the notion of support, protection, representation of the family (wife and children), responsibility and the defence of one's honor. It is also valued as an indicator of masculinity.

Some tentative conclusions

Using a gender perspective is an important enrichment of the theoretical framework in predicting reproductive behaviour for developing countries. Some of the indicators proposed by the different studies reviewed in this paper are very useful in providing explanations, like communication between spouses and agreement (or disagreement) of husband and wife on reproductive decisions (size of the family, contraceptive use…). Some indexes of women's empowerment have been tested and they show a strong link with fertility intermediate variables. In addition, they have a strong link with socio-economic factors like education. Revealing "pioneer" attitudes in men, women and spouses has a high predictive value for future use of family planning methods in couples (figure I).

However, most studies examine only contraceptive intentions or use, the desire for more children or the size of desired family. They don't make a difference between two patterns of fertility reduction: the first one, by postponing age at marriage, an important

Figure I.
Mediating factors—nuptiality and contraception



age difference between spouses (like in North Africa), and/or no individual choice of the partner (like in South Asia); the second one, by the spread of contraceptive use, though sometimes accompanied by a rise or a stable level of adolescent fertility rates (like in some Latin American countries). Gender perspectives have to be used for understanding and analysing both patterns.

Among the arguments explaining the different patterns of the fertility transitions, economic development levels are highly questionable, given the low levels of economic development in many of the regions where fertility declined sharply (India, Nigeria, Mexico etc.). Using individual level data and asking men and women about their relations between them and between all the members of the family and household, and replacing these analysis in the context of each specific gender system, is a promising method to arrive to a much broader understanding of fertility trends, though few studies exist, with some debate between them (Kritz and Makinwa-Adebusoye, 2001; Mason and Smith, 2000). We need more research before attaining definitive conclusions. After this rapid review, we think, however, that there have been substantial progress in the way of understanding how gender interacts with demographic change, especially with fertility.

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The impact of HIV-1 on fertility in sub-Saharan Africa: causes and consequences

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INTRODUCTION

The mortality impacts of the HIV epidemic in sub-Saharan Africa are profound—adult mortality has doubled or trebled even in communities in which prevalence remains below 10 per cent (Timaeus, 1998; Boerma and others, 1998), and life expectancy in many countries is falling rapidly. The social and demographic consequences of this unprecedented mortality increase have been the main focus of demographic research on the epidemic, but in this paper we turn to a field which has received less attention: the links between HIV and fertility.

Rationale for the study of HIV and fertility

HIV epidemics have become a significant influence on fertility in badly affected areas of sub-Saharan Africa. Population-based surveys in south-western Uganda (Gray and others, 1997) and analyses of data from antenatal clinics in a number of other countries show 25-40 per cent lower fertility in women with HIV (Zaba and Gregson, 1998). While some of this sub-fertility reflects prior disposition to other sexually transmitted infections (STIs) among HIV incident cases (Ross and others, 1999), about half results directly from the infection itself. Furthermore, persuasive evidence for extensive changes in fertility-related behaviour resulting from HIV epidemics and measures taken to control the spread of infection is emerging from community studies. In some cases, behaviour change is concentrated among infected members of the population, but other changes are more widespread. A few of these behaviour modifications are the result of conscious intentions to alter fertility; but most are undertaken without considering the fertility effects or regardless of these consequences. Finally, changes in population composition, due to greater mortality in groups at higher risk of infection, add to the fertility effects of HIV epidemics when viewed at the population level (Zaba and Gregson, 1998).

These interactions between HIV and fertility have a number of important consequences for HIV surveillance and for understanding demographic trends in areas of high seroprevalence. Low fertility in HIV positive women generally means that HIV prevalence data collected at antenatal clinics will understate true levels of infection among women of reproductive age. HIV induced population level reductions in fertility will complicate analyses of fertility transition in countries in the early stages of fertility transition. They will magnify the reduction in population growth caused by increased mortality but offset the latter's effect on population structure. An HIV epidemic will result in fewer orphans than previously anticipated and its effect on early childhood mortality will be smaller.

In many respects, the precise nature of these consequences will depend on the mechanisms through which HIV affects fertility and vice versa. For example, subfertility in HIV positive women could reduce over time if it is a consequence of STD acquired prior to HIV infection (Garnett and Gregson, 1998), but will persist if it results directly from the HIV infection. Understanding the causes of the HIV fertility relationship is therefore an important precursor to understanding the consequences. Understanding sexual behaviour, a field which demographers have studied because of its importance as a fertility determinant, is of paramount importance in the fight against AIDS.

Aims and overview of the paper

In this paper, we begin by reviewing the areas of overlap between the cultural, socio-economic and proximate determinants of HIV epidemics and fertility. These common determinants underpin the mechanisms through which different patterns of fertility-related behaviour are associated with contrasting HIV epidemics. After this, we focus on the changes in fertility likely to occur during the course of a major HIV epidemic, identifying specific mechanisms, examining the current evidence for changes through these mechanisms, and considering their potential fertility effects.

The conceptual framework of the underlying processes of change occurring in an HIV epidemic is incorporated into a mathematical model, and used to study the effects on population-level fertility and broader patterns of long-term demographic change. We illustrate how this model can be applied by showing how epidemics of similar magnitude could have different fertility effects in countries at different stages of development. The mathematical model is also used to examine the implications of the relationship between HIV and fertility for surveillance of an epidemic based on data from antenatal clinics. Finally, we use the model to demonstrate how this relationship has important consequences for the wider demographic and socio-economic impact of HIV epidemics in sub-Saharan Africa by examining the effects on population growth and age structure.

CAUSES OF THE IMPACT OF HIV ON FERTILITY

Common cultural and socio-economic determinants of HIV and fertility

It has been suggested that the cultural and socio-economic factors that shape marriage and fertility in sub-Saharan Africa might also limit the effectiveness of AIDS control strategies (Bledsoe, 1991). If so, many of the factors that promote high fertility in African societies would be expected to facilitate HIV transmission. Furthermore, some of the processes of change that bring about reductions in fertility will simultaneously influence the course of local HIV epidemics. Evolution of cultural norms and practices resulting from processes such as increased urbanization, migration, education, secularization and technological innovation have been linked to the onset and progression of fertility transition in many societies (Caldwell and others, 1992) and is also likely to influence patterns of spread of HIV epidemics.

In table 1, we identify some of the cultural, social and economic factors and processes that influence both fertility change and patterns of spread of HIV infection. Factors are categorized according to whether they are important determinants of fertility level, of HIV prevalence in the female population, or whether they influence both. The high-fertility norm in pre-transition societies makes it difficult for couples to maintain consistent condom use even where the risks of HIV transmission are high. In these respects, cultural systems that support high levels of fertility are more open to extensive

HIV transmission. However, the situation is more complicated than this. Other aspects of cultural systems associated with high fertility, such as early marriage and taboos on premarital sexual intercourse, can act to restrict the spread of HIV infection. Features of traditional culture such as prolonged breastfeeding and sexual abstinence, which support prolonged birth spacing and suppress levels of natural fertility, can increase HIV transmission. Polygamy, which tends to reduce birth rates slightly (Pebley and Mbugua, 1989), is often associated with relatively low levels of extramarital sex and could therefore limit the size of some HIV epidemics (Frank, 1992; Gregson and others, 1999a). Equally, there are traditional practices not directly related to fertility outcomes but which affect levels of HIV transmission. Male circumcision, which appears to afford some protection against STIs including HIV (Caldwell and Caldwell, 1993; Moses and others, 1990), is one such practice.

Processes of social change, driven in part by local economic development, are frequently associated with fertility declines. Typically, more urbanized, better educated, secular populations, with lower child and adult mortality rates, are characterized by low or falling birth rates. Increased spousal separation due to labour migration can also lower fertility. However, these processes will have mixed implications for HIV control. Economic development, urbanization and secularization, and the accompanying increases in spatial mobility and more liberal sexual mores, will generally facilitate the spread of HIV infection. Increases in income differentials may also contribute to greater heterogeneity in rates of sexual partner change and lead to less assortative mixing patterns, which, in combination, can increase the size of HIV epidemics (Garnett and Anderson, 1993). Such patterns are particularly likely where the socio-economic status of women is low in relation to men (Bassett and Mhloyi, 1991). At the same time, higher levels of education should increase the feasibility of AIDS control initiatives especially those aimed at increasing knowledge and awareness of the risks of HIV transmission. Better health facilities should provide a stronger basis for controlling other STIs which act as cofactors in sexual transmission of HIV. Equally, proper screening of blood donations for transfusions and safe practices for the use of sharp instruments in medical settings are more practicable in such conditions and access to regular

Table 1
Cultural, social and economic factors and processes which affect fertility levels and may also influence HIV prevalence

Effect of factor on fertility		
Positive effect	**Negative effect**	**No known effect**
A. Factors which tend to increase HIV prevalence		
High-fertility norms	Cultural norms supporting prolonged birth spacing	Absence of male circumcision
Cultural or religious opposition to contraception		
Cultural norms supporting universal marriage		Testing out of potential marital partners
Monogamous marriage system		
Low status of women relative to men	Extensive urbanization	Liberal sexual mores
Low contraceptive (condom) availability	Extensive labour migration	Substantial income differentials
B. Factors which may influence HIV prevalence, but direction of association is uncertain		
High infant and child mortality	High per capita income	
Taboo on induced abortion	High female education levels[a]	

[a] Initially more educated individuals appear to be at higher risk of HIV infection. However, as epidemics progress and more information becomes available through schools and media-based education programmes, this differential may be reversed (Kilian, et al., 1998).

condom supplies is easier to ensure. If social development can facilitate fertility decline, it may be that cultural and religious resistance to condom use will also dissipate faster in more developed societies.

Relationship between respective proximate determinants of HIV and fertility

The socio-economic factors discussed above influence HIV transmission and fertility through an overlapping set of proximate determinants—table 2. A factor can have a positive effect on fertility but a negative effect on the size of an HIV epidemic—or vice versa—because it influences different proximate determinants. For example, urbanization may reduce fertility inter alia by reducing coital frequency within stable unions but can facilitate the spread of HIV by increasing rates of partnership formation. As we shall see, the contrast in direction of effects can also reflect opposing directions of influence on a common proximate determinant.

Broadly speaking, proximate factors affecting sexual partnership formation and dissolution and coital frequency within partnerships are important determinants of both HIV prevalence and fertility. However, the pattern of concurrent partnerships, a powerful influence on the prevalence of STIs (Morris and Kretzschmar, 1997; Watts and May, 1992), is not a determinant of fertility level, except if it acts through other factors such as coital frequency. Factors governing non-sexual HIV transmission among adults do not affect fertility. Similarly, biological determinants of fecundity influence HIV prevalence only indirectly (Zaba, 1994).

In a number of instances factors affecting both HIV and fertility act in the same direction. For example, extensive sexual activity and low condom use are associated both with higher fertility and higher HIV prevalence. However, this is by no means universal. High rates of divorce and widowhood reduce fertility—birth rates being lower outside marriage—but, other things being equal, increase HIV prevalence. This is because new regular partners often are already infected and, in some cases, a series of short-term

Table 2
Proximate determinants of fertility and adult HIV prevalence

Effect of factor on fertility		
Positive effect	**Negative effect**	**No known effect**
A. Determinants which tend to increase HIV prevalence		
Higher proportion ever entering sexual relations	Longer duration of post-partum abstinence	Extensive concurrent partnerships
Younger age at onset of sexual relations	Extensive temporary separations	Contaminated blood transfusion
Higher coital frequency	Higher incidence of divorce	Needle sharing
Lower prevalence of barrier contraception	Higher widowhood incidence	
Older age at terminal abstinence	Greater STI induced infertility	
Higher union reformation rate after separation/widowhood		
B. Determinants which may influence HIV prevalence, but direction of association is uncertain		
Young age at menarche		
Low induced abortion		
Low use of non-barrier contraception		
Shorter duration of breastfeeding amenorrhoea *		
Older age at menopause		

* Affects pediatric but not adult HIV infection.

relationships occurs before a new stable relationship is established. In African settings, women entering second marriages frequently become second wives in polygamous unions (Timaeus and Reynar, 1998) or marry men who have also been separated. Thus, second husbands, typically, have had more previous partners than first husbands and are more likely to be sources of HIV infection.

The effects of short-term spousal separation— e.g., due to labour migration—and post-partum abstinence also work in opposite directions on HIV and fertility. High levels of spousal separation and long duration of post-partum abstinence both reduce fertility but decreased exposure to HIV infection from the regular partner is offset by the higher risk from casual partners. Husbands are at particular risk if they move to settings where prostitution is common—e.g., mining areas in South Africa (Campbell, 1997). Where post-partum abstinence is practised, the taboo applies most strictly to women (Awusabo-Asare, 1996) and husbands may become infected if they resort to casual partners when their wives are sexually unavailable.

With respect to other STIs, biological and behavioural factors combine to exert opposite pressure on fertility levels and HIV prevalence. STIs—and particularly those that cause genital lesions—can facilitate HIV transmission (Greenblatt and others, 1988) while those that cause cervicitis, salpingitis and PID can result in infertility (Arya and others, 1973; World Health Organization, 1988). Childbearing is an important source of status in most African societies and men frequently reject infertile partners. Often this leads to behaviour associated with heightened risk of HIV infection (Boerma, 1996). A woman's anxiety to prove her fertility can hasten her participation in a new sexual relationship. Where there is no other means of socio-economic support, she may become involved in commercial sex work. Again, factors, which reduce fertility, increase the likelihood of HIV infection. This is true even for women who are infertile for reasons unrelated to STIs, though, in the African context, STI sequallae are thought to account for most cases of primary infertility (Larsen, 1994).

Individual and population level effects of HIV on fertility

The extensive areas of overlap between the socio-economic and proximate determinants of HIV epidemics and fertility provide many possible pathways through which an HIV epidemic can lead to changes in the fertility of an affected population. The principle potential mechanisms are listed in table 3. The list includes mechanisms that take effect at the individual and population levels. Individual level changes include both purely behavioural responses and changes that involve alterations in reproductive physiology. Those that primarily affect currently infected women will probably be less significant at the population level. Even in severely affected populations, a minority of women have HIV infection at any one time and an even smaller fraction are at the more advanced stages of infection when effects such as reduced coital frequency and increased amenorrhoea are most pronounced. Other behaviour changes—e.g., delayed onset of sexual relations and increased condom use—could encompass the majority of the population and endure for a long time after the epidemic passes its peak.

Many of these mechanisms will reduce fertility, but others will offset this effect. The relative importance of the different mechanisms will vary between populations so that their net effect on fertility will also vary. In particular, the likely nature and scale of the net effect of an HIV epidemic of any given size on the fertility of a population will depend inter alia on the point in the demographic transition which has been reached. A variety of factors including pre-existing patterns of contraceptive use and sexual union formation will influence the nature of the behavioural response to the epidemic. Added to this is the question of intent. Will there be a conscious effort to raise fertility in response to HIV-driven increases in death rates? In high-mortality populations, couples may plan

Table 3
Hypothesized direction of effects of an HIV epidemic on fertility

Bio-social change		All* women	HIV+ only	Overall effect
A.	Individual level			
BS1	Increased widowhood	–	–	–
BS2	Reduced coital frequency due to increased morbidity	–	–	–
BS3	Increased spontaneous abortions and stillbirths	–		–
BS4	Increased amenorrhoea	–		–
BS5	Lower fecundity due to poor nutrition and low spermatogenesis	–	–	–
BS6	Reductions in other sexually transmitted infections		+	+
	Behaviour change			
BH1	Delayed onset of sexual relations		–	–
BH2	Reduction in pre and extra marital sexual relations		–	–
BH3	Delayed marriage—possibly resulting in increased celibacy		–	–
BH4	Reduced polygyny		+	+
BH5	Increased divorce	–	–	–
BH6	Reduced remarriage	–	–	–
BH7	Switching of family planning method from pill to condom	+	+	+
BH8	Reduction in breastfeeding	+	+	+
BH9	Reduction in post-partum abstinence		+	+
BH10	Condom use among previous non-contraceptive users	–	–	–
BH11	Less contraception due to insurance and replacement effects	+	+	+
BH12	More contraception and abortion to avoid infant infection and orphanhood	–	–	–
B.	Population level			
P1	Change in population age and sex-structure			+/–
P2	Excess mortality among infertile women			+
P3	Excess mortality among hormonal contraceptive users			+
P4	Excess mortality among women with multiple partners			+

* May affect HIV+ women disproportionately.

large families to "insure" against losing children[1] or decide to speed up their pattern of childbearing when a child dies—i.e., to consciously "replace" the child (Ware, 1977). In an HIV epidemic, individuals who know they have HIV—and, possibly, others too —could seek to accelerate their childbearing.

In table 4, we re-classify the mechanisms listed in table 3 according to whether they can be regarded as conscious actions taken with the intention of influencing future fertility. A number of the actions take the form of deliberate responses to the epidemic. However, only two of these—the insurance and replacement effects following infant death; and increased contraception to avoid vertical transmission and orphanhood—represent conscious attempts to influence fertility and these act in opposing directions. Anxieties about adverse effects on maternal and child health and the possibility of orphanhood could outweigh desires for increased fertility in many instances. The net aggregate effect of such changes among HIV positive women would be minor because women who know they have HIV form a small minority of the HIV infected, and as noted earlier, those living with HIV are themselves a minority of the total population at any given time. For those who do know they are infected, fertility concerns may be uppermost in the minds of those with very few children. However, by the time they are aware of their infection,

[1] For example, Ankrah suggests that "women may have more pregnancies to offset the perceived threat of infant mortality and ensure the survival of at least some offspring" (PANOS Institute, 1992).

Table 4
Individual level changes arising from an HIV epidemic which could affect fertility: deliberate and unintended changes

	Nature of HIV response			
	Intended		Unintended	
Nature of fertility consequences	Possibility of HIV transmission	Due to woman being HIV+	Due to woman being HIV+	Due to wider HIV epidemic
Intended to change fertility	BH11-BH12	BH11-BH12		
Unintended fertility consequences	BH1-BH10*, BS6	BH6-BH8, BH10	BH5-BH6, BH8, BS2-BS5	BS1-BS2, BS5-BS6

* In the case of BH8 (reduction in breastfeeding), the change would be to prevent possible mother-to-child transmission. In each of the other cases, the change would be to prevent the woman's own infection. Mechanisms can fall into more than one category. For example, divorce may occur following diagnosis of HIV infection in either partner. Where the woman is infected, her partner may divorce her, which would be an unintended event from the woman's point of view (column 3). In the reverse situation she might divorce the husband to reduce her own chances of becoming infected, which would be an intended event (column 1).

most will already have two or more children and, for these women, concerns about the care and well-being of existing children may be paramount (Setel, 1995). The insurance effect could be stronger for women who are unsure whether they have HIV (probably the majority) but these women will also be anxious to limit their own risk of becoming infected. How individual women react will clearly depend on the local cultural context and their own personal socio-economic circumstances.

This said, the analysis in table 4 highlights the possibility that a number of unintended changes in the proximate determinants of fertility could result in substantial changes in actual fertility outcomes. These include physiological changes affecting HIV negative women with HIV positive partners (column 4) as well as those that directly affect infected women (column 3). They include deliberate actions taken to avoid HIV transmission which have unintended and unrecognized consequences for fertility. Changes in some fertility determinants could occur in any of these ways. For example, other things being equal, infected women who experience higher levels of foetal loss and infant death will breastfeed and abstain for shorter periods—i.e., an unconscious natural "replacement effect" will occur. Equally, women worried about passing on HIV infection to their newborn children may adopt shorter periods of breastfeeding even if they are unsure about their own HIV status. Women who fear their partners might "stray" if denied sex for too long might shorten the traditional abstinence period, while others who suspect their partners may be infected already could prolong post-partum abstinence.

Mechanisms and empirical evidence for changes in fertility determinants

The nature and expected scale of changes in birth rates following an HIV epidemic of a given size will reflect the combined effects (including interactions) of the various mechanisms identified and will vary according to the local context. In the second part of this paper, we will consider how the relative and combined effects of the different mechanisms could be influenced by the underlying socio-economic and demographic context and will examine the overall significance of changes specific and non-specific to HIV infected women. Before doing so, we will describe the individual mechanisms in more detail and review the current evidence for changes in the proximate determinants of fertility. To date, the full effects of HIV epidemics on mortality have been felt in only a small number of populations and only a few population-based studies of fertility impact have been undertaken. Where substantial and lasting behaviour change takes place only after increasing mortality has been recognized locally, the nature and potential extent of such changes will be obscured in early studies. Nonetheless, there is already sufficient evidence to substantiate a prima facie case for HIV epidemics becoming a major influence on fertility in badly affected populations.

Changes affecting all women

In reviewing the biosocial and behavioural impact of HIV on fertility, we start by considering changes that may affect women irrespective of their serostatus and then look at changes which predominantly or exclusively affect HIV positive women. In the wider context, the principal biosocial impacts of HIV on fertility are likely to follow from the close inter-relationships between HIV, other STIs, and infertility. Primary and especially secondary sterility remain common in many sub-Saharan African countries (Larsen, 1994) and the link between untreated STIs and sub-fertility is well established (Arya, Nsanzumuhire, and Taber, 1973; Sherris and Fox, 1993; WHO: Rowe, and Vikhlyaeva, 1988). To the extent that HIV increases susceptibility to other STIs or adversely influences the natural history and response to treatment of these infections (Laga, 1992), an epidemic will tend to increase the prevalence of these infections and thereby reduce fecundity. On the other hand, ulcerative and probably non-ulcerative STIs can act as cofactors in sexual transmission of HIV (Greenblatt and others, 1988; Laga, 1992; Latif and others, 1989). Improved STI diagnostic and treatment services can reduce the incidence of new HIV infections (Grosskurth and others, 1995) and are promoted as an effective measure to counter epidemics. Where these services succeed in reducing the prevalence of other STIs, there will be an upward pressure on fertility (Garnett and others, 1992). Indeed, improved STI services are believed to have contributed to the early rise in birth rates seen in the initial stages of fertility transition in many developing countries (Dyson and Murphy, 1985).

Reductions in rates of partner change also would be expected to slow the spread of STIs (Allen and others, 1992) and therefore increase birth rates. Increased use of condoms would also reduce the prevalence of STIs and associated sterility but the resulting upward pressure fertility would be offset by their contraceptive effect. These individual relationships have been demonstrated in empirical studies, but, as yet, there are few data on their net effect at the population level. On balance, HIV control driven STI treatment programmes seem most likely to increase fecundity, particularly amongst the HIV negative, but more studies are needed to test this hypothesis.

Uninfected as well as infected women can have regular partners who are HIV positive, but the likelihood of this is greater among the latter. Where her partner is infected, a woman's fertility can decline due to his reduced fecundity, either because coital frequency is lower (Dublin and Blattner, 1993) or because spermatogenesis is reduced (Krieger and others, 1991; Martin and others, 1991). In the minority of cases where the partner has been diagnosed as HIV positive or is suspected of being infected, condom use may be more likely. Finally, in areas of high HIV prevalence, the incidence of widowhood will also increase. Many of these women will be infected themselves and some will not outlive their partners for very long. Even so, for those who survive and do not remarry, birth rates will fall. Increasingly, widow remarriage is perceived as problematic because of the dangers of further HIV transmission (Gregson and others, 1997b).

The best available evidence on behavioural responses to HIV epidemics which affect fertility comes from a few small-scale quantitative and qualitative studies (Asiimwe-Okiror and others, 1997; Gregson and others, 1997b, Mukiza-Gapere and Ntozi, 1996). Larger surveys of knowledge, attitudes, beliefs and practices (KABP) have also reported changes in behaviour, but are hard to evaluate. Reporting bias is a major difficulty and some questions are insufficiently well specified—e.g., questions on condom use often fail to draw distinctions between casual and regular partners or consistent and occasional use. The scope of behaviour change investigated in such surveys rarely extends beyond rates of partner acquisition and condom use.

Premarital sex and pregnancies are common in sub-Saharan Africa and age at first marriage is young (Gage and Meekers, 1994). It was initially thought that the HIV epidemic would result in higher levels of female sexual activity at young ages, as men would seek younger partners believing they would present a lower risk of infection (PANOS

Institute, 1989). However, results from a longitudinal study in urban areas of Uganda point to a rise in ages at first sex and first marriage associated with recent increases in AIDS cases (Asiimwe-Okiror and others, 1997). This association is supported by findings from focus group discussions held with young people in six districts of Uganda. Participants reported fear of marriage because they were unsure of the serostatus of their prospective partner (Mukiza-Gapere and Ntozi, 1996). Another Ugandan study (Carpenter and others, 1997) found declining fertility among the never married; evidence of declining premarital sexual activity. Gregson (1977b) found that in two rural areas of Zimbabwe young women with greater awareness of the risks of HIV infection delayed sexual debut. Since significant proportions of women are sexually active before marriage in many sub-Saharan African populations (Carael, 1995), reductions in premarital sex or increase in condom use within premarital unions because of fear of AIDS will reduce rates of pre-marital pregnancy. Where premarital pregnancies precipitate early marriage, their reduction will cause an increase in age at marriage and further reduce teenage fertility.

Anecdotal reports of marital breakdown following diagnosis or suspicion of HIV infection are numerous.[2] Staff at counselling-testing clinics in Uganda recount stories of couples breaking up on the spot upon receiving the HIV test results and there have also been many reports of women and children being abandoned by husbands (Ndinya-Achola and others, 1990). However, the choice for a woman with an infected or unfaithful husband is rarely straightforward. In Zimbabwe, as elsewhere, divorce frequently cuts women off from conventional family and economic resources and increases the chances of their becoming involved in commercial sex. Not surprisingly, HIV prevalence is particularly high among divorced women (Gregson and others, 1995). A number of women interviewed said divorced women could experience difficulties in remarrying and the possibility of HIV infection emerged as a significant new reason why this was problematic (Gregson and others, 1997b). Non-married women already have much lower birth rates than other women and reduced coital frequency and more regular use of condoms because of HIV would suppress extramarital fertility further.

In the Zimbabwe study, women were asked whether the AIDS epidemic had made them change their minds about how many children they would like or the timing of their next birth. Almost half said they now wanted fewer children and a similar proportion reported a preference for a delay in the timing of the next birth. Very few wanted to increase or accelerate their childbearing (Gregson and others, 1997b). Birth rates are already falling in Zimbabwe, so it is possible that the pattern of response was influenced by a more general and widespread desire to reduce fertility. Given underlying cultural pressures such as the enhanced status associated with motherhood and the importance of survival by living descendants, the AIDS epidemic might have been expected to reverse this trend, at least among younger women. However, there was no evidence of an association between greater awareness of the risks of HIV infection and increased desired family size. Any conscious replacement or insurance effects would so far seem to be weak in this population.

HIV epidemics could increase contraceptive use and alter the mix of methods used due to the need to protect against infection and through the impetus they give towards more open discussion about sex and reproductive health. Changing patterns in contraceptive method could occur, as some methods are protective against HIV infection while others may act as cofactors in HIV transmission (Daly and others, 1994). New methods, such as the female condom, may provide women with greater protection against sexually transmitted HIV infection (Ray and others, 1995). The International Planned Parenthood Federation and some western Governments have recommended combinations of contraceptive methods because condoms can be a relatively unreliable method of family planning (Doppenburg, 1993; Gordon and Klouda, 1989). However, many failures result from incorrect use and effectiveness may improve with more intensive HIV led education programmes. In much of sub-Saharan Africa, there are substantial practical and cultural difficulties in achieving a high uptake of condoms.[3] For example, few women are

[2] Participants in Mukiza-Gapere and Ntozi's focus groups reported instances of both increases and reductions in marital stability. Some stated that unfaithfulness is more likely to result in divorce than in the past while others maintained that the epidemic had reduced episodes of unfaithfulness, so that divorce was now less common (Mukiza-Gapere and Ntozi, 1996).

[3] Many authors have noted the cultural obstacles to achieving widespread condom use in African societies (Ankrah, 1991). Others have pointed to the potential for more active education on condoms (Mbizvo and Adamchak, 1989) and the desirability of confronting men directly as "fully rational humane beings who understand what is vital for the protection and assurance of his own survival and that of his wife and posterity" on the need for a change in attitudes and behaviour, particularly in the context of severe HIV epidemics.

familiar with condom use and condoms are associated with casual rather than long-term childbearing relationships (Mehryar, 1995).

Modern contraceptive methods have become increasingly popular in Zimbabwe over the past decade and account for much of the recent fertility decline (Mandishona, 1989; Parirenyatwa, 1995). Condoms are more widely used as the principal method of contraception but are still employed by only 8 per cent of current users of modern methods. A small minority of rural women (6 per cent) report changing method since hearing about AIDS; almost all of these now use condoms and one third use the pill and condoms in combination (Gregson and others, 1997b). In urban areas, intensive peer education and condom distribution programmes have led to substantial increases in reported condom use within casual relationships; a finding substantiated by a recent fall in STI cases (Wilson and others, 1994). In Uganda, where the epidemic is more advanced, increases in condom use have been reported among adolescents and adults (Asiimwe-Okiror and others, 1997; Konde-Lule and others, 1997; Kilian and others, 1998). Given the low underlying levels of contraceptive prevalence in Uganda (Kaijuka and others, 1989), these increases also may have reduced unplanned pregnancies.

Breastfeeding is almost universal in sub-Saharan Africa and contributes towards long periods of post-partum insusceptibility to conception. Breastfeeding is also a significant mechanism for vertical HIV transmission (Dunn and others, 1992; Van de Perre and others, 1991), a fact which, until now, has not been publicized in African communities because of the wider benefits of breastfeeding to infant and maternal health (World Health Organization, 1995). However, many women suspect that HIV can be transmitted via breastmilk and some have abandoned the practice (Gregson and others, 1997b). More widespread knowledge of the link between breastfeeding and infant infection will probably reduce breastfeeding further particularly where there are viable alternatives. To the extent that this results from increased provision (and take-up) of voluntary counselling-testing services for pregnant women, the majority, whose test results are negative, may be persuaded to continue breastfeeding. However, overall, there is likely to be some upward pressure on fertility, particularly where contraceptive prevalence is low.

Post-partum abstinence continues to be practised by many African women, albeit for shorter periods than in the past (Caldwell and Caldwell, 1977; Caldwell and others, 1989). Men in rural Zimbabwe cited female post-partum abstinence as a reason for having extramarital affairs. Women feared HIV infection because they suspected their partners had other relationships and, in some cases, shortened their abstinence periods to reduce this possibility (Gregson and others, 1997b). Male extramarital relationships are common in many African populations (Carael, 1995) and it seems unlikely that it is only in Zimbabwe that these occur more frequently during periods when wives are abstaining. Where husbands become infected during these periods, wives are at particularly high risk of infection when sexual relations are resumed, because their husbands' infections are recent and highly contagious (Hudson, 1993). Equally, if a woman becomes infected while she is breastfeeding, the risk of vertical transmission is heightened. Thus, a period of female post-partum abstinence during which the husband has other relationships followed by resumption of sexual activity before breastfeeding is terminated could result in the infection of both partners and the child. If more women become conscious of these aspects of HIV transmission, further adjustments in abstinence and breastfeeding practices could occur. These changes could spread rapidly, since the idea that sexual relations during breastfeeding can damage the health of the child because the milk is poisoned is a familiar one in African cultures.

Changes particularly affecting women with HIV infections

Lower fertility among HIV positive women has been recorded in clinical settings (Allen and others, 1993; Batter and others, 1994; Ryder and others, 1991) and, more recently, in population-based studies (Carpenter and others, 1997; Sewankambo and others, 1994). Data from Uganda suggest that pregnancy rates can be 50 per cent lower, even after allowing for the effects of other factors including the presence of other STIs (Gray and others, 1997). The association may be stronger at older ages (Allen and others, 1993; De Cock and others, 1994; Gray and others, 1997; Johnstone and others, 1988; Stephenson and others, 1996), one possible reason being the greater reduction in fertility typically seen at more advanced stages of HIV infection (Ryder and others, 1991).

The mechanisms causing lower fertility in women with HIV are not currently well understood, but probably reflect a combination of biosocial and behavioural factors. Miscarriage, spontaneous abortion and stillbirths appear to be more common in infected women (Gray and others, 1997; Miotti and others, 1991; Ryder and Temmerman, 1991; Brocklehurst and French, 1998). Increased prevalence of amenorrhoea has also been recorded in women at the later stages of HIV infection (Widy-Wirski and others, 1988) and coital frequency is liable to decline. However, if many children of HIV positive women die in infancy, average periods of breastfeeding and abstinence will tend to be shorter and conception rates could increase. Some of the subfertility observed in a cohort of Ugandan women with known infection dates resulted from lower than average gravidity prior to HIV infection (Ross and others, 1998).

A number of different forms of behaviour change can occur after a positive HIV diagnosis. In rural Zimbabwe, almost all respondents felt that a woman who found she was infected should stop having children. Reasons given included the risk of vertical transmission (which was thought by many to be inevitable) and concern about orphans (Gregson, 1997b). However, what women do when actually faced with the decision may be different. Some may not wish to inform their partners for fear of violence and abandonment (Keogh and others, 1994; Temmerman and others, 1993) and would therefore experience difficulties negotiating continuous contraceptive use. For others—particularly those with few living children—the wish to bear children may over-ride concerns about HIV transmission. This could contribute to the smaller fertility shortfalls seen at younger ages. While condom use has been reported as being higher and contraceptive pill use lower in a controlled study of HIV positive women, usage was thought to be erratic and probably had little overall effect on fertility (Keogh and others, 1994; Ryder and others, 1991; Setel, 1995). In Western countries, HIV positive women, including some black Africans, have higher rates of induced abortion (Stephenson and others, 1996; Thackway and others, 1997), but it is difficult to tell whether this is the case in Africa. Voluntary terminations are known to be common, especially among young single women but are frequently illegal. As a result, unsafe procedures are often used and abortion is a leading cause of maternal mortality (Mpangile and others, 1993; Rogo, 1993). However data from former Zaire suggest that the current excess in induced abortions among infected women in sub-Saharan Africa is small (Ryder and others, 1991).

There are very few direct data on breastfeeding decisions after HIV diagnosis. Infected women living in areas of sub-Saharan Africa areas where diarrhoeal diseases and other potentially fatal infections are common, have generally been advised to breastfeed because of the wider health benefits. Recent WHO guidance proposes disclosure and discussion of the issues with women known to be HIV positive (World Health Organization, 1996). There are very few such women at present, but greater access to voluntary counselling-testing services—which may follow the advent of more affordable therapies for reducing vertical transmission—could lead to reductions in breastfeeding and foetal loss, possibly offset by increases in induced abortions and subsequent contraceptive use, particularly in urban areas.

Finally, women who are diagnosed as HIV infected and reveal this to their partners—or whose partners suspect they are infected—are more likely to experience divorce and separation, will encounter greater difficulties finding a new husband, and will therefore have lower fertility.

Population level effects

The long-term influence of an HIV epidemic on population level fertility extends beyond the aggregated impact of its individual level effects. This is because, over time, it will significantly alter the composition of the population. In the early years of an epidemic, individuals with high rates of sexual partner acquisition and low levels of condom use become infected and die faster than the population as a whole. If not replaced, their representation in the population will decline. If their fertility differs from that of the general population, overall fertility will be affected wherever they comprised a significant fraction of the initial population. We have already noted that infertile women experience higher rates of STIs and partner change and, thus, higher risks of HIV infection. In a major HIV epidemic, the proportion of women who are infertile will decline and population level fertility will tend to increase.

Other population subgroups may also be affected disproportionately with contrasting effects. For example, later in an epidemic, if less educated people respond more slowly to education and information campaigns, they may have higher infection rates (Kilian and others, 1998), a phenomenon which would suppress fertility in some populations. Finally, changes in population age and sex structure can also affect fertility by concentrating the population into more or less fertile age groups and by influencing marriage patterns.

CONSEQUENCES OF THE IMPACT OF HIV ON FERTILITY

Although many of the interactions between HIV and fertility have been observed and documented, there are no empirical studies examining the consequences at the level of the whole population. Indeed, such studies would be very difficult to design, since other secular influences on fertility would have to be controlled for. Documenting the consequences for infected and uninfected people would require wide-scale HIV testing which would not be ethical unless assistance is made available to the participants. In these circumstances, approaches based on mathematical models offer the best opportunities for exploring the impacts of HIV on fertility at the population level. In this section, we employ an extended version of the model developed by Zaba (1994). This is a deterministic stable population model based on multiple decrement life table procedures, which allows for the full range of proximate fertility determinants in both the HIV positive and HIV negative populations. The fertility and mortality consequences of an epidemic are integrated within the model. Thus, it is possible to make estimates of the growth and structure of a stable population in which the HIV epidemic has also stabilized at a level consistent with an assumed per coitus infection risk pattern. A mathematical specification of the model can be found in the original paper.

Expected scale of fertility change—more and less developed countries

In this section, we provide some quantitative illustrations of the potential fertility impact of an HIV epidemic of fixed size in populations at the pre/early and mid/late stages of fertility transition. For the purpose of the exercise, we assume that the former are more developed than the latter and are characterized by more extensive contraceptive use and lower non-HIV related mortality. Table 5 shows the assumptions used for each of the

Table 5
Plausible values of proximate determinant parameters for fertility patterns in less and more developed sub-Saharan African countries facing HIV epidemics

	Theoretical maximum fertility	Less developed country			More developed country		
		Pre-HIV	HIV-	HIV+	Pre-HIV	HIV-	HIV+
Fecundity							
Age-range: [menarche, menopause]	[10,55]	[14,50]	[14,50]	[14,45]	[12,50]	[12,50]	[12,45]
Foetal wastage (x US standard)	1.00	1.10	1.10	1.40	1.05	1.05	1.30
Secondary sterility (%) [low, high]	[10, -]	[30,80]	[30, -]	[- ,80]	[20,50]	[20, -]	[- ,50]
Lactational amenorrhoea (months)	1.5	12	9	6	9	6	3
Sexual unions							
Age at first sex: [earliest, mean]	[12,16]	[12,17]	[13,18]	-	[14,19]	[15,20]	-
Divorce and separation—annual risk (%)	0	5	5	10	10	10	20
Widowhood – male life expectancy	85	50	40	25	60	45	30
Remarriage—maximum annual rate (%)	100	100	80	40	70	50	20
Remarriage—peak age (years)	30	25	25	20	25	25	20
Coital frequency							
Post-partum abstinence (months)	1.5	4	2	6	3	2	4
Terminal abstinence (starting age)	60	50	45	40	55	50	45
Coital frequency—[minimum, maximum]	[.1,.5]	[.06,.3]	[.06,.3]	[.03,.3]	[.06,.3]	[.06,.3]	[.03,.3]
Contraception							
Peak age-specific usage level (%)	0	0	2	2	55	65	65
Age at peak usage (years)	-	-	25	25	35	35	35
Condom use as % of contraception	0	0	100	100	2	20	20

proximate determinants of fertility in these two types of population, both before and in the presence of the HIV epidemic.

In the pre-epidemic phase, important characteristics of the more developed population include a younger age at menarche, lower foetal mortality, and lower levels of sterility, breastfeeding, post-partum and terminal abstinence, all of which would tend to raise its natural fertility levels. However, the more developed population is also assumed to have a later sexual debut, higher contraceptive prevalence, higher rates of sexual union breakdown, and lower rates of re-entry into sexual unions. Sexually active women have the same rates of coital frequency in both populations; in each case, coital frequency declines with duration of current sexual union. Although the two model populations have not been calibrated to represent particular countries, they can be thought of as typifying the pre-transition populations of East Africa (e.g., the United Republic of Tanzania and Uganda) in the less developed case, and the mid-transition populations of Southern Africa (e.g., Zimbabwe and Botswana) for the more developed scenario.

To highlight the contrasting nature of the effects on fertility determinants in these different circumstances, we assumed that HIV reaches a constant endemic prevalence level of around 15 per cent among women of reproductive age in both cases. It is possible, of course, that prior level of development will influence the severity of HIV epidemics but we have not investigated this possibility here. Table 5 shows our assumptions about the changes in fertility determinants occurring among infected and uninfected women in the wake of the epidemic. The differentials include higher foetal loss and a lower mean age at menopause for infected women, who are also assumed to breastfeed for shorter periods, have higher union breakdown rates, lower reformation rates and lower coital frequency within unions. We do not model changes reflecting deliberate attempts to alter fertility in response to knowledge of HIV status or changes in fertility norms resulting from awareness of increased mortality.

Our assumptions about patterns of initiation of sexual activity, onset of secondary sterility and condom use need more detailed explanation. Women who have never been sexually active are, by definition, uninfected. Age at first sex and the build-up of sexual activity are thus only defined for the uninfected, who are then assumed to be at risk of acquiring the infection. As those who start sexual activity earlier face a higher lifetime risk of becoming infected, retrospective measures of mean age at sexual debut are lower for HIV positive women. This is a selection effect rather than a determinant of the fertility of infected women.

Women were categorized according to their risks of STI-associated sterility. Since the same pattern of sexual behaviour underlies the risks of STI and HIV infection and each can act as a transmission cofactor for the other, women who acquire HIV infection are concentrated in the group with heightened risk of sterility. The age-patterns (but not the ultimate levels) of onset of secondary sterility and HIV incidence are assumed to be the same.

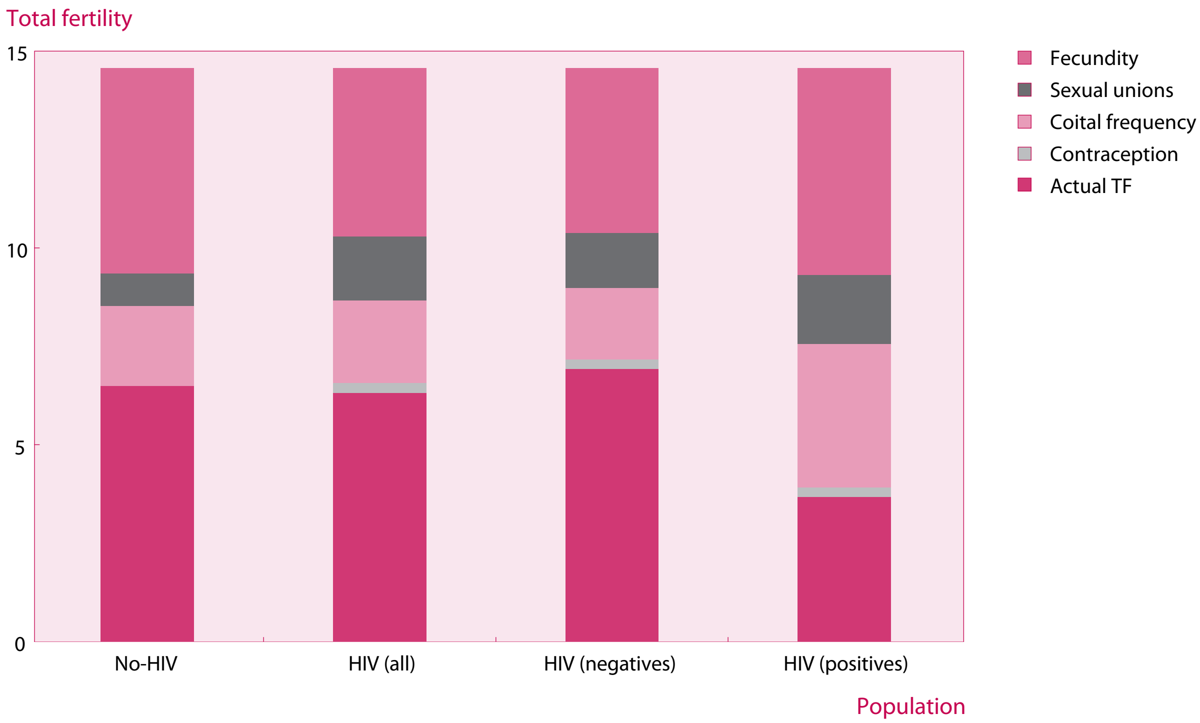
Contraceptive prevalence rates are assumed equal for HIV infected and uninfected women, but where we test the effects of condom use we assume that uninfected women currently using condoms are protected from infection. HIV positive women are thus initially selected as being non-users of condoms at the time of infection but this assumption is subsequently relaxed—after seroconversion, condom use rates are taken as being the same in both subgroups.

Table 6
Bongaarts' indices and total fertility for less and more developed sub-Saharan African countries facing HIV epidemics

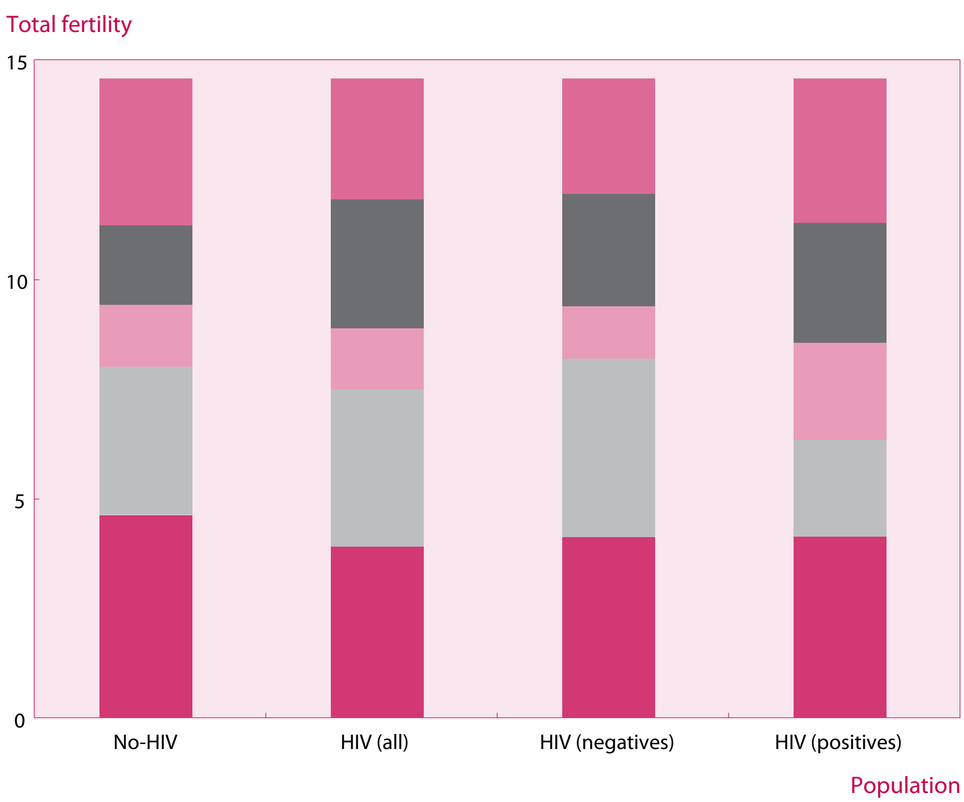
	Less developed country				More developed country			
		During HIV epidemic				During HIV epidemic		
	Before HIV	All	HIV-	HIV+	Before HIV	All	HIV-	HIV+
Fecundity	0.52	0.56	0.60	0.39	0.63	0.67	0.68	0.51
Menarche-menopause	0.85	0.82	0.85	0.67	0.88	0.84	0.87	0.71
Foetal wastage	0.93	0.88	0.92	0.72	0.97	0.92	0.96	0.78
Infertility	0.87	0.90	0.93	0.78	0.93	0.94	0.96	0.87
Lactational amenorrhoea	0.71	0.78	0.77	0.82	0.77	0.86	0.85	0.91
Sexual unions	0.93	0.83	0.87	0.80	0.80	0.65	0.71	0.60
Age at first sex	0.97	0.92	0.92	0.98	0.91	0.86	0.85	0.97
Divorce and separation	0.95	0.92	0.95	0.88	0.90	0.86	0.90	0.78
Widowhood	0.99	0.98	0.98	0.97	1.00	0.98	0.99	0.97
Remarriage rate	1.00	0.96	0.98	0.96	1.00	0.95	0.97	0.88
Coital frequency	0.81	0.78	0.82	0.58	0.84	0.83	0.87	0.67
Post-partum abstinence	0.92	0.94	0.97	0.84	0.95	0.95	0.97	0.90
Terminal abstinence	0.98	0.91	0.93	0.82	0.99	0.96	0.98	0.92
Coital frequency	0.89	0.87	0.90	0.76	0.89	0.87	0.90	0.76
Contraception	1.00	0.97	0.98	0.97	0.62	0.57	0.54	0.67
Contraceptive use: level	1.00	0.97	0.98	0.96	0.68	0.61	0.61	0.63
Contraceptive use: age pattern	1.00	0.97	0.98	0.96	0.62	0.54	0.54	0.57
Condom use	1.00	0.97	0.98	0.97	0.62	0.57	0.54	0.67
Total effect, no interactions	0.39	0.35	0.42	0.18	0.26	0.21	0.23	0.14
Total effect with interactions	0.45	0.43	0.48	0.23	0.32	0.27	0.29	0.26
Total fertility—theoretical maximum	14.6	14.6	14.4	15.9	14.6	14.6	14.4	15.9
Total fertility—actual	6.5	6.3	6.9	3.7	4.6	3.9	4.1	4.1
Fertility reduction: number of children		-0.2				-0.7		
Fertility reduction: %		-3%				-16%		

Figure I
Effect of HIV on the proximate determinants of fertility

a. Less developed country



b. More developed country



The way in which the determinants of fertility in the infected and uninfected subgroups combine to govern population-level fertility is modified by the size of the HIV epidemic and the severity of its mortality consequences. These factors determine the balance between the proportions of the population that are healthy and sick at each age. In both scenarios, mean survival time was set at 11.5 years from infection for adults and 2 years for infants.[4] The per coitus new partner infection risk which resulted in an HIV prevalence of 15 per cent was 0.2 per cent—per coitus infection risks were assumed to decline with union duration, down to a level of 0.02 per cent for unions lasting more than 5 years, to represent a selection effect whereby unions in which partners have little sexual involvement with outsiders are presumed to be more stable.

[4] These mean survival times correspond to median survival times of around 8 and 1.5 years, respectively.

To illustrate the combined effect of possible changes in the different proximate determinants, we used Bongaarts' decomposition model (Bongaarts and Potter, 1983; Gregson, 1994). A summary of the results is given in table 6 and figures Ia and Ib. The overall reduction in total fertility is slight in the less developed scenario (less than 3 per cent overall), but there is a large decline (16 per cent) in fertility levels in the more developed scenario. In the less developed scenario the total fertility of HIV positive women is close to half that of HIV negative women, but this differential is almost absent in the more developed scenario. In both cases, there is a shift in the balance of fertility reduction accounted for by the different proximate determinants. Exposure within sexual unions and contraception become more important while the role of the variables controlling fecundity is diminished. The reason for the latter is partly structural: women with lower risk of secondary sterility form a larger fraction of the total population than previously, as those at high risk have been depleted by high levels of HIV mortality.

Table 6 also shows the potential effect on fertility of each model parameter. Condom use lowers fertility less than other forms of contraception. This is not due to contraceptive inefficiency, which has not been allowed for in this model, but is explained by structural effects. Higher condom use leaves more women free of HIV and other STIs, so they experience higher fertility rates. Higher proportionate use of condoms also reduces the impact of contraception in the HIV infected. This reflects the initial selection of non-condom users into the HIV infected group: the more contraceptors who use condoms, the smaller the proportion of newly infected individuals who use contraception. In both scenarios, age at first sex has a much smaller fertility reducing impact among HIV infected women than among other women. This is because infected women are selected for earlier commencement of sexual activity—even in populations in which sexual activity generally starts late they will be found disproportionately amongst those who become sexually active earliest.

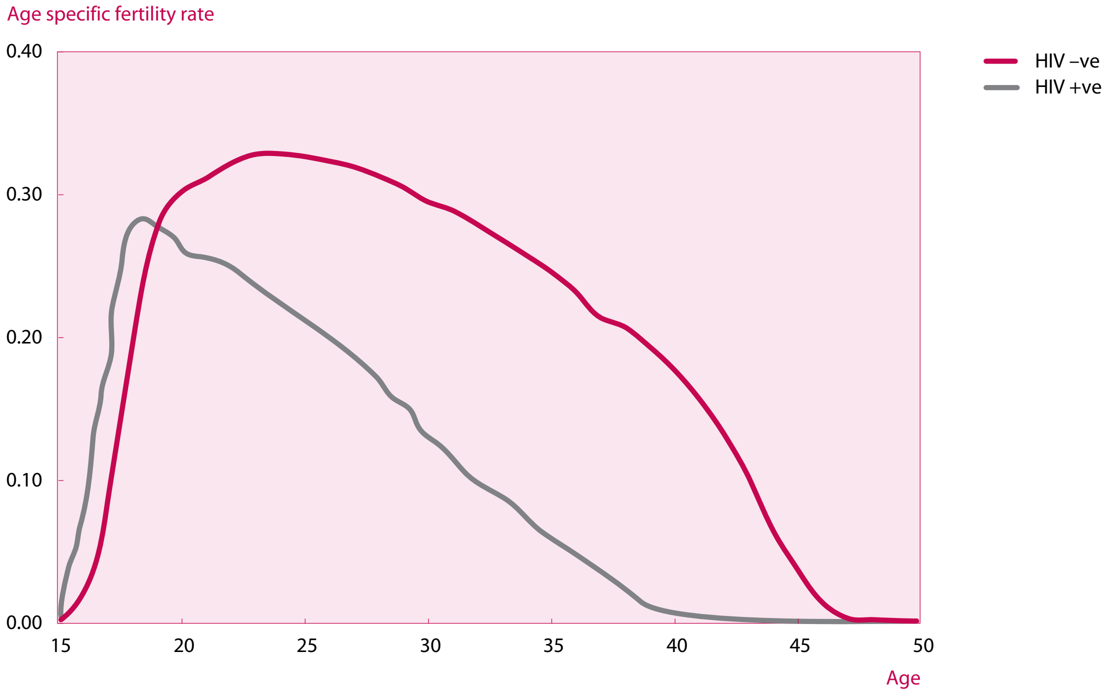
Implications for antenatal surveillance of HIV prevalence

Most national level estimates of HIV prevalence are based on anonymous screening of women attending antenatal clinics, as this procedure is convenient, inexpensive and ethically acceptable (Chin, 1990). Pregnant women are taken as representative of all women, so that these estimates are generally used without adjustment or just standardized for age. However, we have seen that large fertility differentials may arise between infected and uninfected women and that the epidemic itself can affect the fertility of a population.

Figure II shows the patterns of age-specific fertility for HIV infected and uninfected women in the two simulations. In both cases, infected women have higher fertility than their uninfected counterparts up to age 20, but substantially lower fertility thereafter. The selection effect at young ages is more evident in the more developed scenario, as sexual activity is assumed to start later in this population, so those who do become infected at early ages are especially atypical. Differences between the age-specific fertility of infected and uninfected women cause antenatal HIV prevalence estimates to be higher than community levels at ages under 20 but lower above this age (Zaba and Gregson, 1998). The age relationship between antenatal and community prevalence is similar in the two scenarios

Figure II
Age-specific fertility rates by HIV infection status

a. Less developed country



b. More developed country

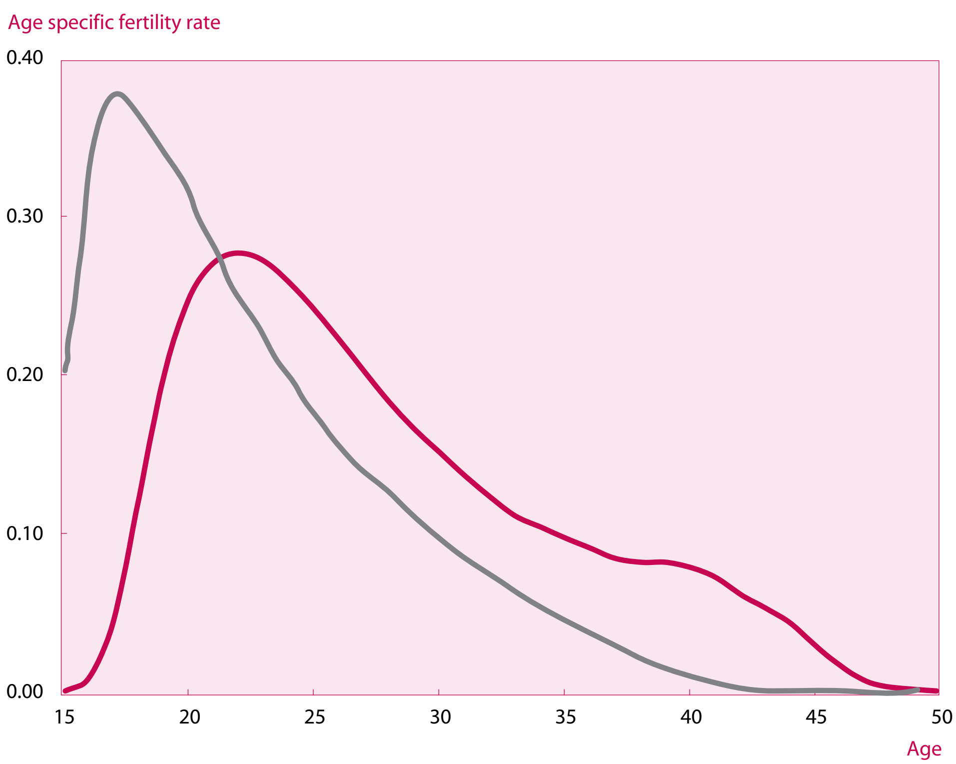
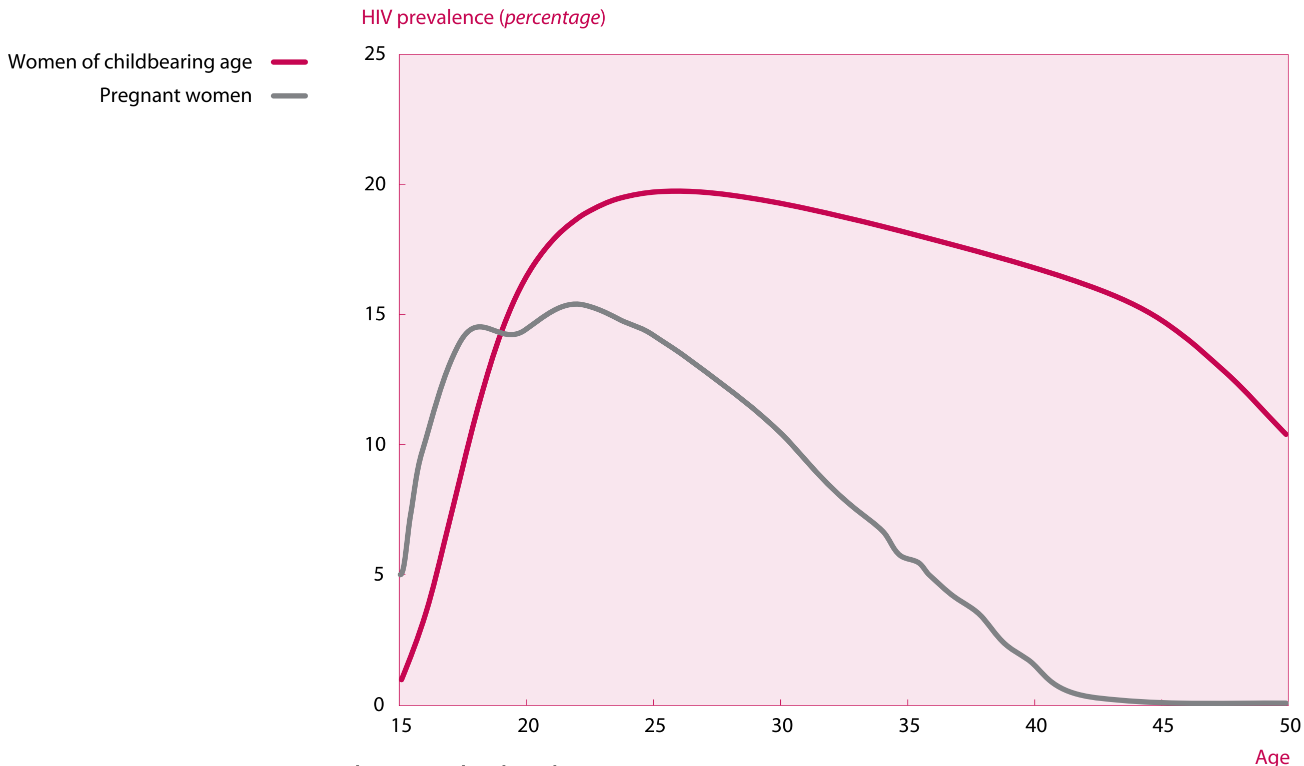
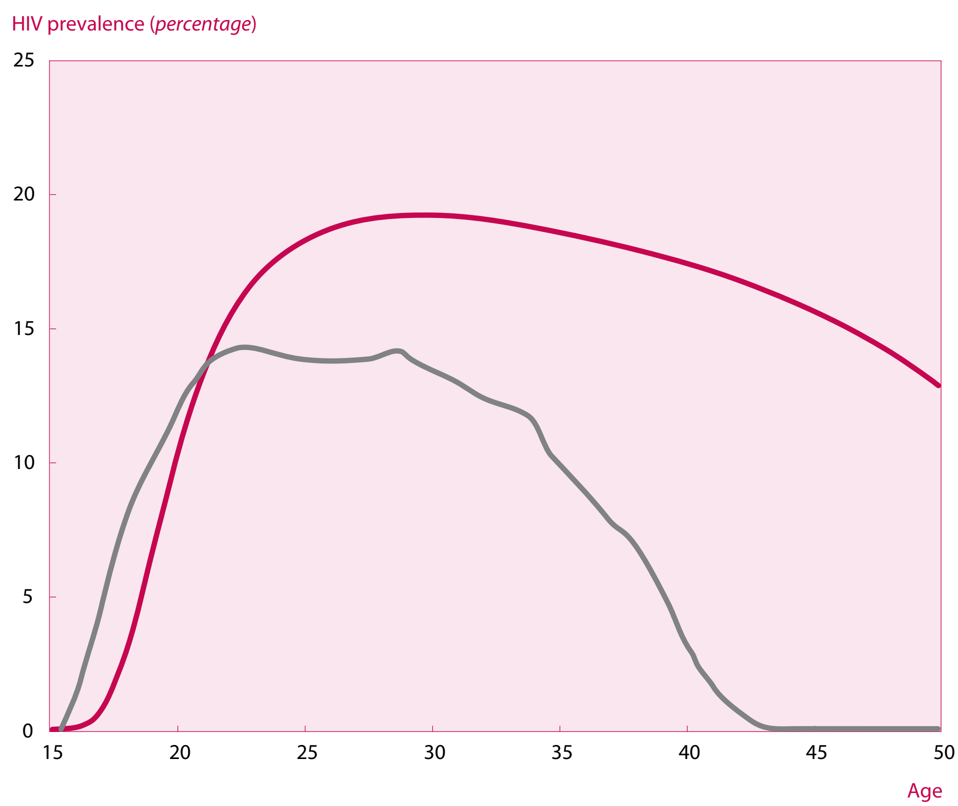


Figure III
HIV prevalence in the general female population and in pregnant women

a. Less developed country



b. More developed country



(figure III) and should therefore be fairly robust to differences in fertility distributions. Comparison of the crude prevalence measures for pregnant women and all women aged 15-49 over a range of simulations (not shown) indicate that the much lower prevalence in pregnant women at older ages far outweighs the opposite bias at younger ages, especially in simulations with fertility patterns characteristic of less developed populations. Therefore, the crude estimate for pregnant women is likely to be an underestimate of prevalence in all women of childbearing age, more so in less developed than more developed populations. Age standardization reduces antenatal estimates further, as it gives more weight to older ages than crude estimates, so unstandardized estimates are generally preferable, contrary to what was thought before the extent of lower fertility in HIV infected women was known (Lessner, 1991; Gregson and others, 1995).

For most of the model populations investigated, the extent of the bias (measured as the percentage point difference between prevalence in pregnant women and all women of reproductive age) increases almost linearly with the true HIV prevalence until the true prevalence reaches about 50 per cent and declines thereafter. This simple relationship holds if HIV prevalence is altered without changing the relative values of the fertility determinants for the HIV positive and negative subgroups. As a proportion of true prevalence, the measurement error declines with increasing HIV prevalence. This is illustrated in figure IVa, which shows the effect of varying levels of per coitus risk of infection in the two populations for which we have developed fertility scenarios. In the less developed scenario, prevalence in pregnant women rises from about 6 per cent to 26 per cent as true prevalence increases from around 8 per cent to 31 per cent. In the more developed scenario, the bias is about 2 per cent lower at the higher levels of prevalence.

The bias in antenatal estimates is very sensitive to the extent of condom use. In figure IVb, we illustrate this by keeping the infection risk per unprotected coitus constant but varying the pattern of condom use. In the "more developed" scenario, this is achieved by fixing overall contraceptive prevalence at 30 per cent but varying the proportion of contraceptors who use condoms between 20 per cent and 100 per cent. In the less developed scenario, we assume that condoms are the only form of contraception used and that usage varies between 1 per cent and 10 per cent. These simulations show that prevalence in pregnant women is more sensitive to the extent of condom use than to changes in community HIV prevalence resulting from condom use. If condoms were used very widely, antenatal HIV prevalence estimates could overstate general population levels.

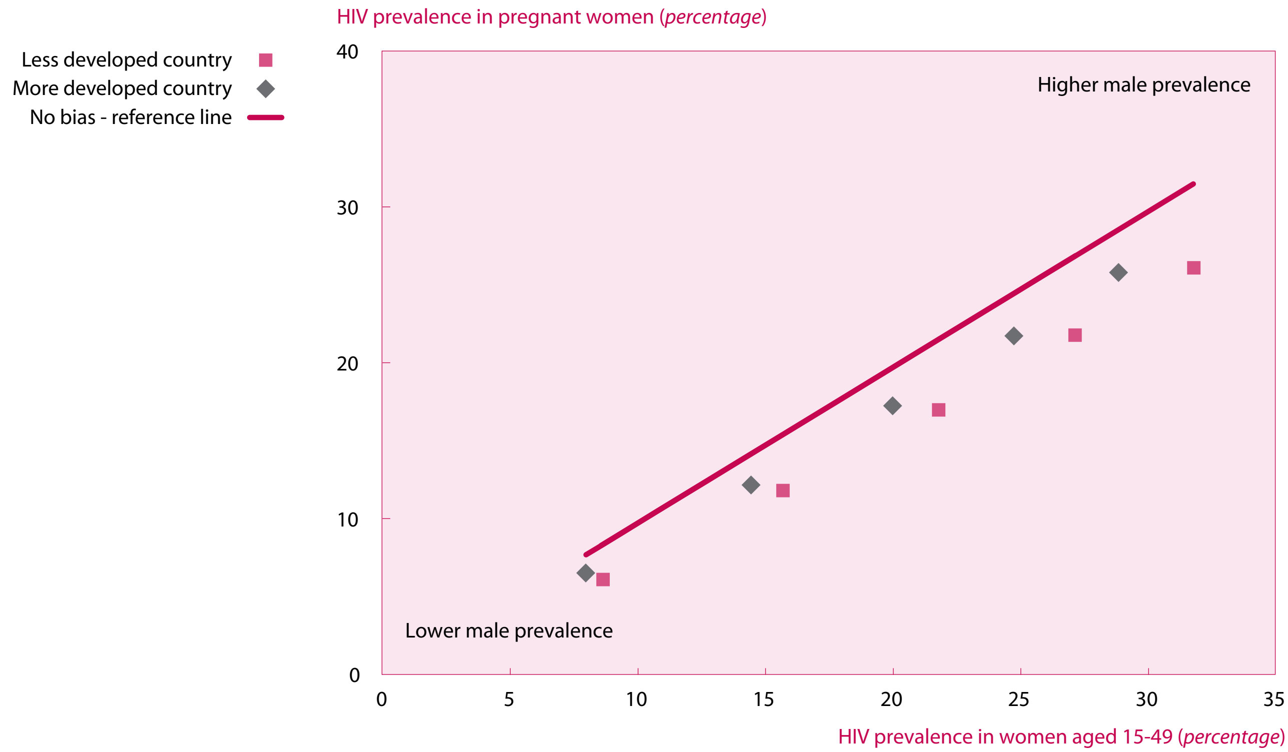
These findings have important implications for the ability of antenatal surveillance systems to capture real trends in HIV prevalence in the general population. Since it is unrealistic to expect condom use rates to rise to the very high rates shown in figure IVb, we would generally expect antenatal surveillance to underestimate community prevalence. In any given setting, there will probably be a slight increase in the undercount as the epidemic matures and HIV prevalence rises, but, if there is no change in contraceptive use, the direction of the prevalence trend should be captured by ANC surveillance. However, if underlying prevalence falls, due to successful condom promotion, antenatal surveillance could fail to capture the full extent of the trend.

Population growth rate and age-structure effects

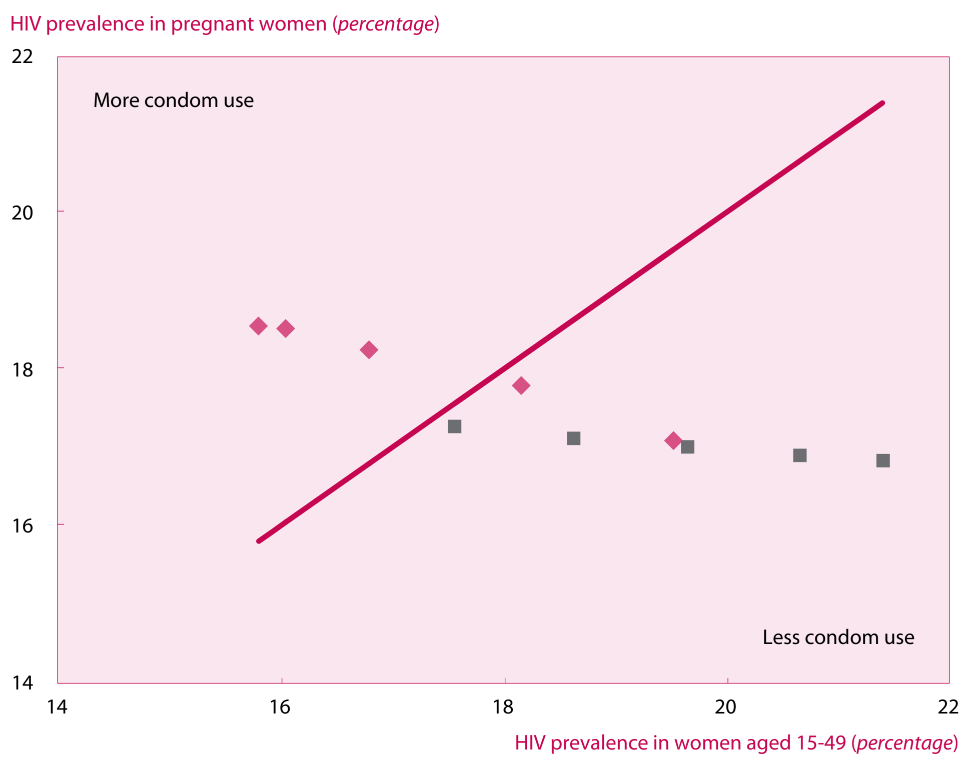
In general, fertility changes have a more marked effect on population growth and age structure than mortality changes. The case of HIV is an exception to this rule. Nonetheless, the fertility effects of HIV epidemics will also be significant in many populations. Figure Va shows the relationship between the intrinsic growth rate and HIV prevalence for our less developed population scenario. The per coitus infection risk is varied to generate alternative levels of HIV prevalence. The measurements of growth presented here would be observed in stable populations in which epidemics have also stabilized. They can thus be interpreted either as the long-term consequences of the epidemic or as

Figure IV
Bias in HIV prevalence estimates based on reports of pregnant women

a. Varying male HIV prevalence



b. Varying extent of condom use



abstractions showing the tendency of change in these measures independent of initial population structure. Mortality effects on growth were measured by calculating only the direct effects of HIV on female survival, ignoring all behavioural, biosocial and structural changes in fertility. In this population, fertility decrease lowers growth by a third as much as is effected by mortality increase; that is, if mortality increase lowers growth by 1.5 percentage points, fertility decrease would lower it by a further 0.5 percentage points. In the more developed scenario, the impact of HIV associated fertility change is even stronger because of the bigger absolute change in total fertility.

Where large-scale HIV epidemics develop, death rates will generally increase and population growth rates will tend to fall. In a number of more developed sub-Saharan African countries, growth rates were falling before any noticeable impact of the epidemic, as fertility declines were outstripping improvements in mortality. In countries such as Zimbabwe and Botswana, the combination of rising death rates due to HIV and continuing declines in birth rates could lead to periods where the rate of natural increase falls slightly below zero (Gregson and others, 1997; U.S. Bureau of the Census, 1997). Whether this will occur will depend significantly on the direction and extent of the impact of HIV epidemics on fertility. At present, it seems most plausible that these epidemics will exert a further downward pressure on fertility, accelerating existing declines in population growth in these countries.

The relationship between population age structure and mortality is fairly complex. Decreased survivorship is associated with a younger age-structure but reduced population growth, also a consequence of increased mortality, limits this tendency. HIV mortality is heavily concentrated at young adult ages so the direct effect is stronger than the indirect effect that acts through the growth rate. The results shown in figure Vb, derived from our "less developed" model with varying per coitus infectivity, illustrate how the mortality effects of high HIV prevalence produce a younger age structure. However, lower birth rates yield older age structures because population growth is reduced. Where an HIV epidemic reduces fertility, this ageing effect could counterbalance the tendency of increased mortality to produce a younger age structure. In this example, the epidemic has little net effect on the mean age of the population.

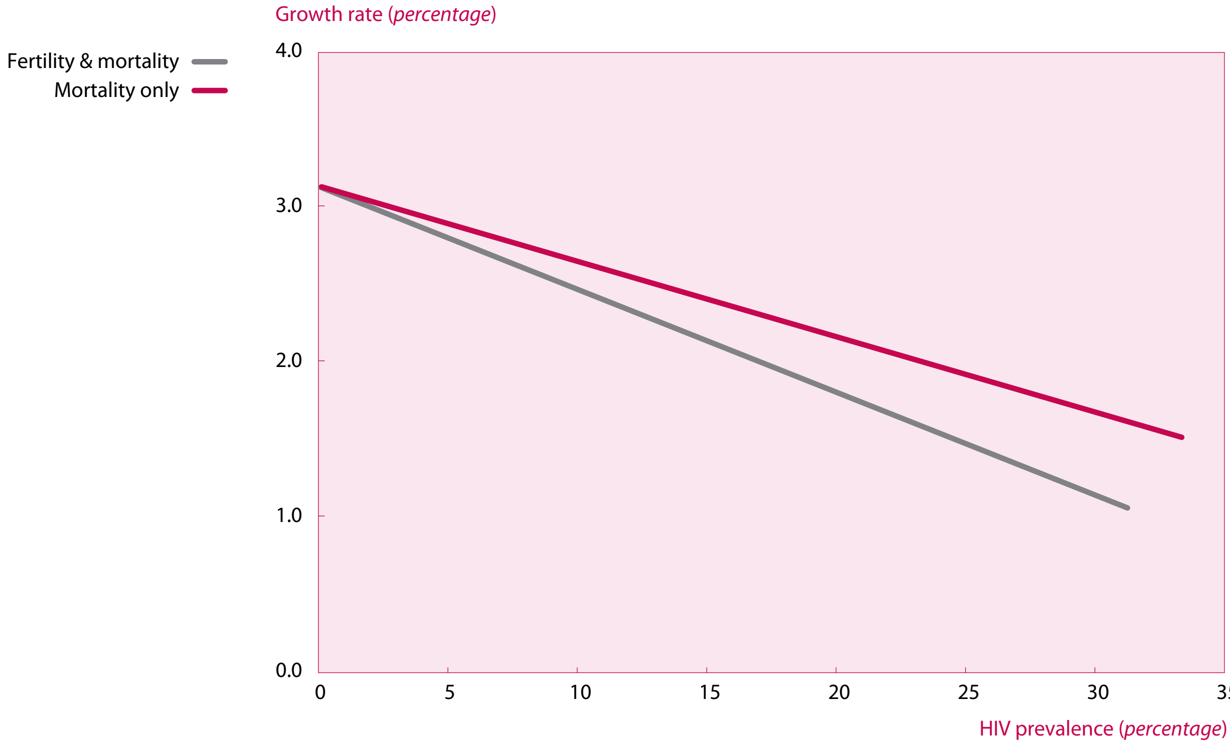
Implications for the broader demographic effects of HIV epidemics

Fertility decline can also influence other demographic effects of HIV, and it is important to take account of fertility differentials between infected and uninfected women. The case of maternal orphanhood is a good example. Declining fertility would tend to increase the proportion of children under 15 who are orphaned, because the child population would have an older age structure, and older children have a higher cumulative risk of parental death. Falling fertility in the context of an HIV epidemic, would thus tend to further increase the proportion orphaned. However, if women with HIV have lower fertility, the overall proportion of orphaned children will increase more slowly. There will also be fewer children who are orphaned at very young ages, particularly if the fertility effect of HIV on infected women is greatest at more advanced stages of infection. Of course, the degree of change in the absolute number of orphans in a population will also depend on the population age structure and growth rate, which, as we have seen, are themselves affected by the fertility impact of an HIV epidemic. These effects are discussed in more detail elsewhere (Gregson and others, 1999b).

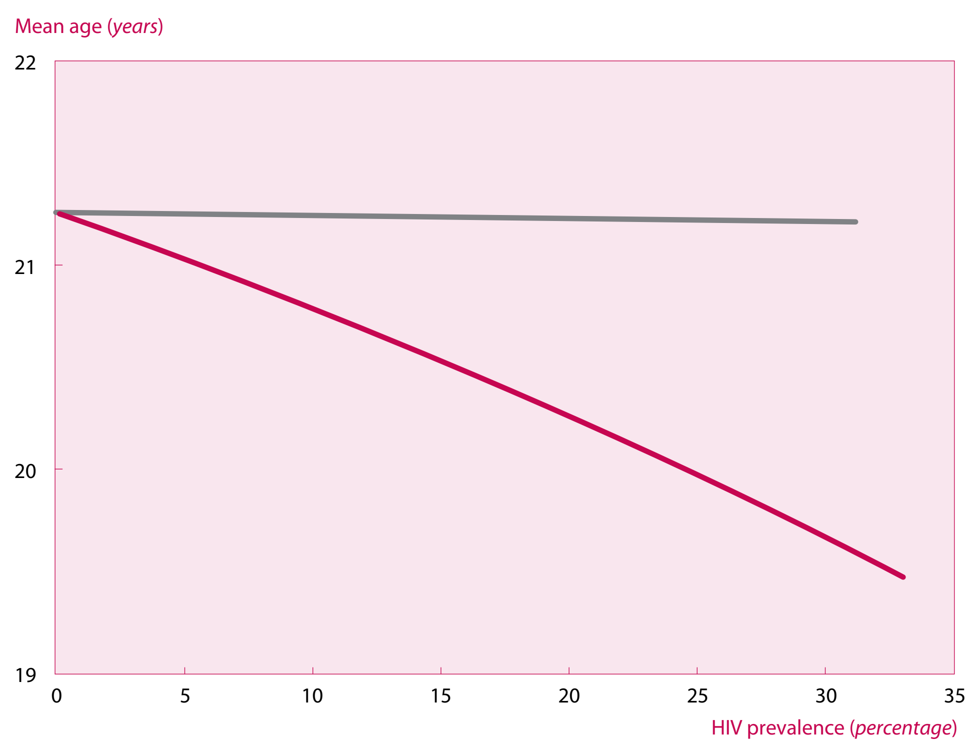
Lower overall birth rates will reduce the numbers of babies infected and dying from HIV related causes, in absolute terms. Lower birth rates in women with HIV will also reduce the impact of epidemics on early childhood mortality rates. Fewer children will be born to infected women so the proportion of all babies who are born with HIV infections will be smaller and the impact of the HIV epidemic on infant and childhood mortality will be less severe than would otherwise be expected. In particular, young orphans are less

Figure V
Demographic effects of HIV associated with fertility and mortality changes

***a. Population growth** (rate of natural increase)*



***b. Age structure** (mean age)*



likely to be infected, so that death rates among orphaned children may not be quite as bad as was first feared. Lower orphan mortality will result in a slight ageing in the orphan population as a whole.

CONCLUSIONS

The relationship between HIV and fertility is bidirectional and highly complex and empirical study of the relationship at the population level probably impossible. Nonetheless, the consequences are profound and, therefore, it is important that an understanding of the intricacies of the relationship is developed. In this paper, we have attempted to advance current understanding by: (*a*) reviewing the areas of overlap between the socio-economic and proximate determinants of HIV epidemics and fertility; (*b*) using this review as a basis for identifying possible mechanisms for interaction between HIV epidemics and fertility; (*c*) examining existing evidence for the effects of these mechanisms; and (*d*) applying a mathematical model to study the population level effects of HIV on fertility and the implications of fertility differentials between infected and uninfected women for HIV surveillance based on data from antenatal clinics.

The review of common determinants highlighted the fact that individual factors and processes of change can have contrasting effects on HIV epidemics and levels of fertility. Some aspects of traditional culture that support high fertility can serve to suppress levels of HIV prevalence. Equally, aspects of socio-economic development generally associated with declining fertility may facilitate the spread of HIV epidemics. Thus, it is not altogether surprising that Southern African populations where levels of socio-economic development are relatively high and fertility is falling are experiencing the most severe HIV epidemics (U. S. Bureau of the Census, 1997).

Population-based data suitable for quantifying the effects of possible mechanisms of interaction between HIV and fertility have been slow to emerge. However, the few studies conducted show that significant changes are taking place in the populations studied. In particular, HIV infection is strongly associated with subfertility and changes in reproductive behaviour have been recorded. Current evidence on conscious fertility decisions taken in response to the epidemic in general or to personal knowledge of infection status is inconclusive. Moves are under way to introduce voluntary counselling and testing services for pregnant women, as a prerequisite for providing anti-retroviral therapy to reduce mother to child transmission of the virus. If these are successful, they should improve fertility outcomes for infected women but may also prompt further changes including reduction in breastfeeding and increase in contraception and induced abortion.

For the purposes of generating the illustrations based on the mathematical model, we assumed that the scale of the HIV epidemic would be the same in more and less developed societies. Under this assumption, HIV reduces total fertility substantially in the more developed scenario but has little net effect in the less developed population. If epidemics are more severe in more developed countries the differential between the effects on fertility will be greater still. The simulation results illustrate how surveillance systems which rely on data from antenatal clinics can fail to capture the true extent of HIV epidemics within the population as a whole and could conceal improvements resulting from increases in condom use. They emphasize the need for a straightforward procedure for adjusting antenatal estimates.

Finally, the model simulations show that a change in fertility caused by an HIV epidemic would significantly affect the overall impact of the epidemic on key demographic indicators including population growth and age structure. In some cases, fertility change tends to re-enforce the impact of increased mortality, but, in others, it can alleviate these effects. Fertility differentials between infected and uninfected women are important in determining the effects of an epidemic on demographic features such as orphanhood and early childhood mortality.

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Fertility levels and trends in countries with intermediate levels of fertility

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ABSTRACT

This paper focuses on fertility trends and associated factors in 74 countries with intermediate levels of fertility, that is, in those countries whose total fertility is estimated to be between 2.1 and 5 children per woman in 1995-2000. For the past three decades, fertility has been declining in all these countries with the pace of decline varying according to their level of fertility. Age at marriage has increased, as has the use of modern methods of contraception. In addition, more women are completing secondary or higher education and these countries have become more urbanized. All those factors are strongly related to fertility levels and trends. A continuation of the trends in age at marriage, contraceptive prevalence, educational attainment and urbanization will ensure continuing fertility declines.

INTRODUCTION

Perhaps the most significant demographic change over the past three decades has been the substantial decline in fertility in all areas of the world. Since 1970-1975 world total fertility has declined by 37 per cent: from 4.5 births per woman to the 1995-2000 level of 2.8. The large decline at the global level reflects different changes in reproductive behaviour especially in populous countries such as Bangladesh, India, Indonesia and Pakistan whose total fertility rates in 1970-1975 were above 5 children per woman.

In 1970-1975, 106 countries or areas representing 43 per cent of the world's population had fertility rates at 5 children or more per woman (table 1). Since 1970-1975, the majority of countries have progressed through the different stages of the fertility transition. Thus, the current (1995-2000) distribution of countries according to the level of fertility has changed considerably. It is estimated that just 49 countries with a total population of 770 million have fertility levels of 5 or more children per woman. An equally striking development is that by 1995-2000 as many as 64 countries had fertility levels at or below replacement level, more than three times the number in 1970-1975. Indeed, the percentage of the world's population living in countries with total fertility at or below replacement is 44 per cent compared with 43 per cent in countries with intermediate levels of fertility and 13 per cent in countries with high fertility (above 5 children per woman). The majority of countries (74) have intermediate levels of total fertility rates that is, less than 5 children and more than 2.1 children per woman. Those include India, Indonesia, Brazil and Bangladesh.

Although there is little consensus regarding the specific conditions for fertility decline, it is possible to discern the commonalities among groups of countries that have begun fertility decline, commonalities that are coherent with the theoretical perspectives on the factors associated with fertility decline. The driving force of fertility decline is socioeconomic development, in particular, decline in mortality, female education and labour force participation, urbanization and family planning programmes. The lack of a single

Table 1
Number of countries, population size and percentage distribution of population by fertility level

Year	Total fertility rate (births per woman): Greater than or equal to 5	Less than 5 and greater than 2.1	Less than or equal to 2.1	Total
Number of countries				
1970	106	61	20	187
1980	80	67	40	187
1990	58	74	55	187
2000	49	74	64	187
Population size (*number in thousands*)				
1970	1 588 865	1 427 507	673 272	3 689 643
1980	806 155	2 606 368	1 015 763	4 428 286
1990	682 908	2 141 955	2 428 283	5 253 146
2000	770 757	2 606 062	2 677 944	6 054 764
Population size (*percentage*)				
1970	43	39	18	100
1980	18	59	23	100
1990	13	41	46	100
2000	13	43	44	100

Source: United Nations, *World Population Prospects, The 2000 Revision,* Volume I: Comprehensive Tables (United Nations publication, Sales No. E.01.XIII.8).

or even a "most important" factor in the explanation of fertility decline, however, renders the task of predicting future fertility trends difficult. What factors should be taken into account when projecting fertility into the future? Does a fast pace of decline in the recent past ensure a continuation of such trends?

The aim of this paper is to describe what is known about fertility trends in the 74 countries with intermediate levels of fertility[1] and their relationship with factors of fertility decline. The first section documents levels and trends of fertility since the 1970s. The second section explores the two most important proximate determinants: marriage and contraceptive use. The third section discusses the relationship of fertility with selected socio-economic factors, namely, education and type of residence.

LEVELS AND TRENDS OF FERTILITY

According to the latest available estimates of fertility from national sources for the period 1990-2000,[2] countries with intermediate levels of fertility are spread quite evenly over the total fertility rate (TFR) range of 2.1 to 5 births per woman. At the high end of the range (rates higher than or equal to 4.5 children per woman) are Botswana, Ghana, Kenya, Lesotho and the Sudan in Africa, Jordan, the Syrian Arab Republic and the United Arab Emirates in Asia and Guatemala, Haiti and Honduras in Latin America and the Caribbean. Whereas in Africa, the countries with the highest fertility rates are from all regions except Northern Africa, in Asia, they are from Western Asia, and in Latin America and the Caribbean, from Central America (table 2).[3] At the lower end (less than 3.0 births per woman) are South Africa and Tunisia in Africa; nine countries in Asia and another nine in Latin America and the Caribbean.

The fact that countries are at the upper or lower end of the intermediate-fertility range does not say much about the stage of the transition they are in or their position relative to the other countries in the region. For example, Ghana, Kenya and Jordan are leaders in the fertility transition in their respective regions but have fertility rates at the upper end of the intermediate-fertility range, whereas Guatemala, Haiti and Honduras

[1] According to the 2000 Revision of Estimates and Projections of Population (United Nations, 2001) there are 74 countries with fertility levels between 5 and 2.1 births per woman. Fifteen countries are in Africa, 25 in Asia, 26 in Latin America and the Caribbean, 7 in Oceania and one, Albania, in Europe. Only the 53 countries with an estimated population of one million or more in 1995 are taken into account in the analyses conducted in this paper.

[2] The TFR estimates may differ from those estimated by United Nations for the period 1995-2000 because they are derived from censuses, surveys and registration data and have not been adjusted.

[3] Table 2 shows estimates of total fertility rates from censuses, surveys and registration data for dates around 1970, 1980, 1990, 1995 and 2000. Recent data, for around 2000, are available for only 19 countries but all countries have at least one estimate in the period 1990-2000.

Table 2
Total fertility rates for countries with population size of 1 million or more and with total fertility between 2.1 and 5.0 births per woman

	Around 1970		Around 1980		Around 1990		Around 1995		Around 2000		Average decline per year, earliest to most recent
	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	
Africa											
Algeria	..	..	1979	7.0	1990	4.5	1995	3.5	..	..	0.22
Botswana	1971	6.5	1981	6.2	1991	5.3	..	..	..	..	0.06
Egypt	..	..	1980	5.3	1990	4.5	1995	3.7	1998	3.5	0.10
Ghana	1970	6.9	1978	6.3	1991	5.5	1996	4.5	..	..	0.09
Kenya	1969	7.6	1984	7.7	1991	5.6	1996	4.7	..	..	0.11
Lesotho	1975	5.8	1986	5.3	..	..	1996	4.9	..	..	0.04
Libyan A. J	1973	7.5	..	..	..	..	1993	4.1	..	..	0.17
Morocco	1973	7.4	1981	5.5	1992	3.3	1995	3.3	1999	3.0	0.17
South Africa	..	..	1986	4.4	..	..	1996	2.9	..	..	0.15
Sudan	1973	7.1	1988	5.0	1992	4.6	..	..	..	..	0.13
Tunisia	1970	6.1	1980	4.5	1990	3.3	1995	2.3	1999	2.1	0.14
Asia											
Bangladesh	1973	6.1	1983	4.9	1990	4.3	1994	3.4	1997	3.4	0.11
India	..	..	1979	4.7	1990	3.8	1995	3.5	1997	3.3	0.08
Indonesia	1973	5.2	1983	4.1	1989	3.1	1996	2.8	..	..	0.10
Iran (Islamic Rep. of)	1975	6.4	1982	6.1	1991	5.0	1996	2.8	..	..	0.17
Israel	1970	4.0	1980	3.1	1990	3.0	1995	2.9	1997	2.9	0.04
Jordan	1974	7.6	1980	7.1	1988	5.9	1995	4.5	..	..	0.15
Kuwait	1970	6.8	1980	5.5	1987	3.7	1996	3.4	..	..	0.13
Kyrgyzstan	1969	4.9	1981	4.1	1992	3.6	1995	3.3	1998	2.8	0.07
Lebanon	..	..	1983	3.8	1988	3.1	1993	2.5	..	..	0.13
Malaysia	1970	4.7	1980	3.9	1990	3.3	1995	3.3	1998	3.3	0.05
Mongolia	1973	7.5	1983	5.5	1990	4.2	1996	3.1	..	..	0.19
Myanmar	1973	5.7	1983	4.7	1988	3.5	1994	2.9	..	..	0.13
Nepal	1974	6.0	1983	5.6	1991	5.1	1994	4.8	2000	4.1	0.07
Philippines	1971	6.0	1981	5.1	1991	4.1	1996	3.8	..	..	0.09
Syrian Arab Republic	1970	7.7	..	..	1991	4.7	..	..	..	..	0.14
Tajikistan	1975	6.3	1980	5.7	1990	5.1	1993	4.2	..	..	0.12
Turkey	1970	5.7	1980	4.4	1990	3.0	1995	2.6	1998	2.4	0.12
Turkmenistan	1970	6.0	1982	4.8	1990	4.2	..	..	..	..	0.09
United Arab Emirates	..	..	1987	5.9	1993	5.0	..	..	..	..	0.15
Uzbekistan	1970	5.7	1982	4.7	1990	4.1	..	..	1999	2.8	0.10
Viet Nam	..	..	1985	4.8	1991	3.2	1996	2.3	..	..	0.23
Latin America and the Caribbean											
Argentina	1970	3.2	1980	3.4	1990	2.9	1995	2.6	1997	2.6	0.02
Bolivia	1973	6.5	..	..	1987	5.1	1992	5.0	1996	4.4	0.09
Brazil	1970	5.8	1980	3.9	..	..	1994	2.6	..	..	0.13
Chile	1970	3.3	1980	2.5	1990	2.5	1995	2.4	..	..	0.04
Colombia	1968	6.0	1980	3.6	1988	2.9	1993	3.0	1998	2.6	0.11
Costa Rica	1970	4.3	1980	3.7	1990	3.2	1995	2.8	1998	2.6	0.06
Dominican Rep	1973	5.7	1983	4.1	1989	3.3	1994	3.2	..	..	0.12
Ecuador	..	..	1982	5.0	1992	3.6	1997	3.3	..	..	0.11
El Salvador	1970	6.6	1979	5.6	1991	3.8	1996	3.6	..	..	0.12
Guatemala	..	..	1978	6.1	..	..	1993	5.1	1997	5.1	0.05
Haiti	1973	5.1	1983	5.9	1992	5.0	..	..	1998	4.7	0.02
Honduras	1972	7.5	1981	6.5	1987	5.6	1994	4.9	..	..	0.12

Table 2
Total fertility rates for countries with population size of 1 million or more and with total fertility between 2.1 and 5.0 births per woman (*continued*)

	Around 1970		Around 1980		Around 1990		Around 1995		Around 2000		Average decline per year, earliest to most recent
	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	Year of estimate	TFR	
Latin America and the Caribbean (*continued*)											
Jamaica	1970	5.5	1982	3.5	1990	3.0	1996	2.9	..	..	0.10
Mexico	1974	6.2	1982	4.3	1989	3.5	1995	3.3	..	..	0.14
Nicaragua	..	..	1978	6.5	1990	4.6	1995	3.9	..	..	0.15
Panama	1970	5.0	1980	3.6	1990	2.8	1995	2.6	..	..	0.10
Paraguay	..	..	1977	5.0	1989	4.8	1997	4.3	..	..	0.04
Peru	1968	6.8	1980	4.7	1990	3.8	1995	3.7	1998	3.0	0.13
Uruguay	1970	3.0	1980	2.7	1990	2.3	1995	2.3	..	..	0.03
Venezuela	1970	5.7	1980	4.4	1990	3.6	1995	3.1	1998	2.9	0.10
Oceania											
Papua New Guinea	..	..	1980	6.0	..	..	1994	4.8	..	..	0.09

Source: United Nations Population Division Database on Fertility, 2001.
Notes: Two dots (..) indicate that data are not available.
Estimates of total fertility rates are from censuses, surveys and registration data for dates around 1970, 1980, 1990, 1995 and 2000. Recent data, for around 2000, are available for only 19 countries but all countries have at least one estimate in the period 1990-2000.

that have similar high levels, can be considered laggards as many other countries in Central America have total fertility rates of below 4 children per woman.

The average annual decline for each country over the period 1970-2000 shows that Algeria and Viet Nam had the fastest decline of more than 2 children per decade (table 2). Other countries with declines above 1.5 children per decade include the Islamic Republic of Iran, the Libyan Arab Jamahiriya, Mongolia and Morocco. Among the countries with a slow pace of decline of half a child per decade or less are Argentina, Chile, Guatemala, Haiti, Israel, Lesotho, Malaysia, Paraguay and Uruguay. All of the fast decline countries, except for Viet Nam, had total fertility rates above 6 children per woman in the 1970s. At the same time, the slow decline countries had total fertility rates below 5 children per woman in the 1970s, except for Guatemala, Lesotho and Paraguay. Indeed, as figure I shows, and is to some extent to be expected, the pace of decline is positively related to the level of fertility in the intermediate-fertility countries. Countries at relatively high levels of fertility experienced a faster pace of decline than those at lower levels.

Of particular interest are fertility trends in Bangladesh, Brazil, India and Indonesia because of their population size. These countries comprise 58 per cent of the population of countries with intermediate-fertility levels. All, except for India, had fertility levels above 5 children per woman in the early 1970s and declined, on average at a rate of about one child per decade. By the 1990s, the total fertility rate in Bangladesh had declined to 3.3 births per woman at which level it remained for the second half of the 1990s, whereas that of Brazil and Indonesia had declined to 2.6 and 2.8 births per woman respectively. India experienced a slightly slower decline in fertility over the past three decades: from 4.7 in 1979 to 3.3 in 1997.

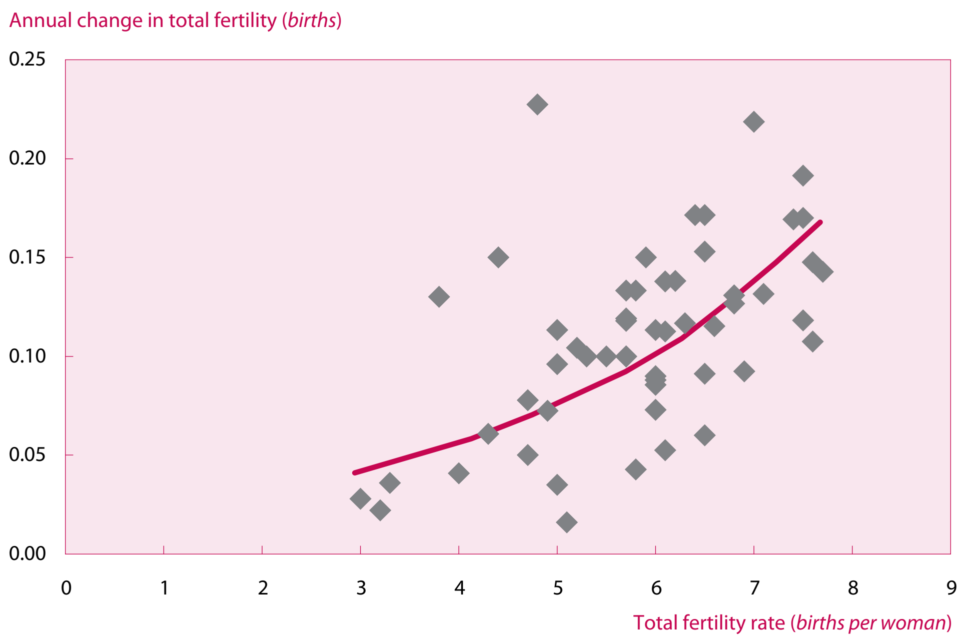
Overall the average pace of decline has slowed in recent decades. The average decline[4] between 1970 and 1980 was 0.11 per year or 1.1 children over the decade. Between 1980 and 1990, the decline had slowed to 0.08 per year, and between 1990 and 1995 to 0.07 per year. This pace held steady over the next five-year period—1995-2000. A comparison of the trend for Nepal and Turkey (figure II) shows that the slowdown is related to lower levels of TFR in Turkey. In Nepal, as the TFR fell from 6.0 in 1974 to 4.1 in

[4] The average pace of declines quoted here are for 13 countries for which estimates are available for all 10-year intervals between 1970 and 2000. These include Morocco and Tunisia in Africa, Bangladesh, Turkey, Nepal, Kyrgzstan, Malaysia and Israel in Asia, and Peru, Colombia, Venezuela, Costa Rica and Argentina in Latin America and the Caribbean

2000, the pace of decline was progressively higher in each decade since the 1970s. In the case of Turkey, TFR fell from 5.7 births per woman in 1970 to just 2.4 in 1998. The pace of decline while high in the 1970-1980 period was much slower in the more recent decades. Thus, in the late 1990s, Nepal had higher fertility and a faster pace of decline than Turkey that had lower fertility and a lower pace of decline.

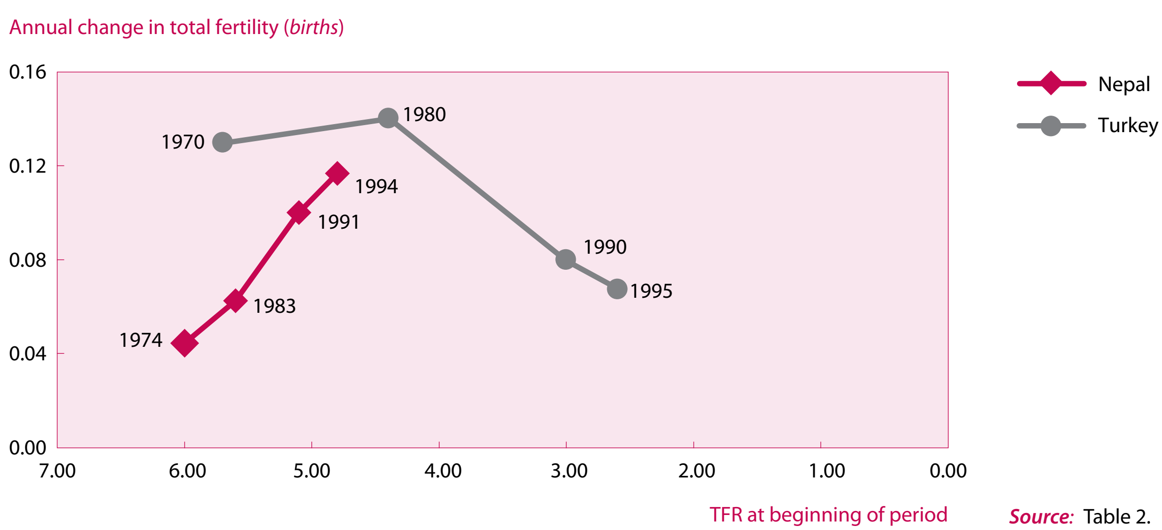
Recently, demographers have been interested in instances where fertility decline appears to have stalled. In particular, the interest stems from two cases, Bangladesh and Egypt, where TFR decline had slowed considerably. In both countries the TFR is still at relatively high levels (around 3.5 births per woman) and both had experienced fast declines in the past. In Bangladesh, the TFR for 1994 was 3.4 births per woman and that for 1997 was also 3.4 births per woman. In Egypt, the TFR in 1995 was 3.7 births per

Figure I
Change in TFR per year according to level at beginning of period (*1970s*)



Source: Table 2.

Figure II
TFR and average annual change in total fertility: Nepal and Turkey



Source: Table 2.

woman, which declined slightly to 3.5 in 1998. In the case of Egypt, although not exactly a stall in fertility decline, the slowdown after years of rapid decline raises concerns about future trends. The stalls in Bangladesh and Egypt are a recent phenomenon but there are a number of countries where fertility has been declining at a very slow pace since the 1970s and from relatively low levels. Those include Argentina, Chile, Israel, Malaysia and Uruguay. In Malaysia, fertility declined by 1.4 children over 28 years to reach 3.3 births per woman in 1998; in Israel by 1.1 children over 27 years to reach 2.9 births per woman in 1997. In Israel and Malaysia, fertility has stalled at 3.3 and 2.9 births per woman, respectively, since 1990. In Chile, fertility declined by 0.9 children over 25 years to 2.4 births per woman in 1995; in Uruguay, a decline of 0.7 children over 25 years to 2.3 births per woman in 1995; and in Argentina by 0.6 children in 27 years reaching a TFR of 2.6 births per woman in 1997.

Age patterns of fertility

During the early stages of fertility decline, fertility often decreases more at older ages than at younger ages resulting in the lowering of the mean age at childbearing. This happened in the developed countries until the 1970s. A similar pattern of change is typical for many developing countries where declines in fertility at the younger ages due to increasing age at marriage are smaller than declines caused by stopping behaviour among high-parity older women. Table 3 shows the percentage of the total fertility rate contributed by those aged 15-24, 25-34 and 35 and over averaged for four groups of countries. In South-Central Asia and South-Eastern Asia, and Latin America and the Caribbean the mean age at childbearing appears to have declined over the past three decades and the most recent estimates show that less than one fifth of total fertility occurs to women over 35 years of age. In the case of sub-Saharan Africa, a similar trend is evident although the proportion of the total fertility at the older ages is still relatively high (24 per cent). In Northern Africa and Western Asia, the change in the age pattern of fertility is more in line with that experienced in developed countries after 1970, that is, an ageing of the fertility schedule. Whereas the proportion of total fertility contributed by the youngest age group declined from 30 per cent to 25 per cent, among older women the proportion increased from 23 to 25 per cent.

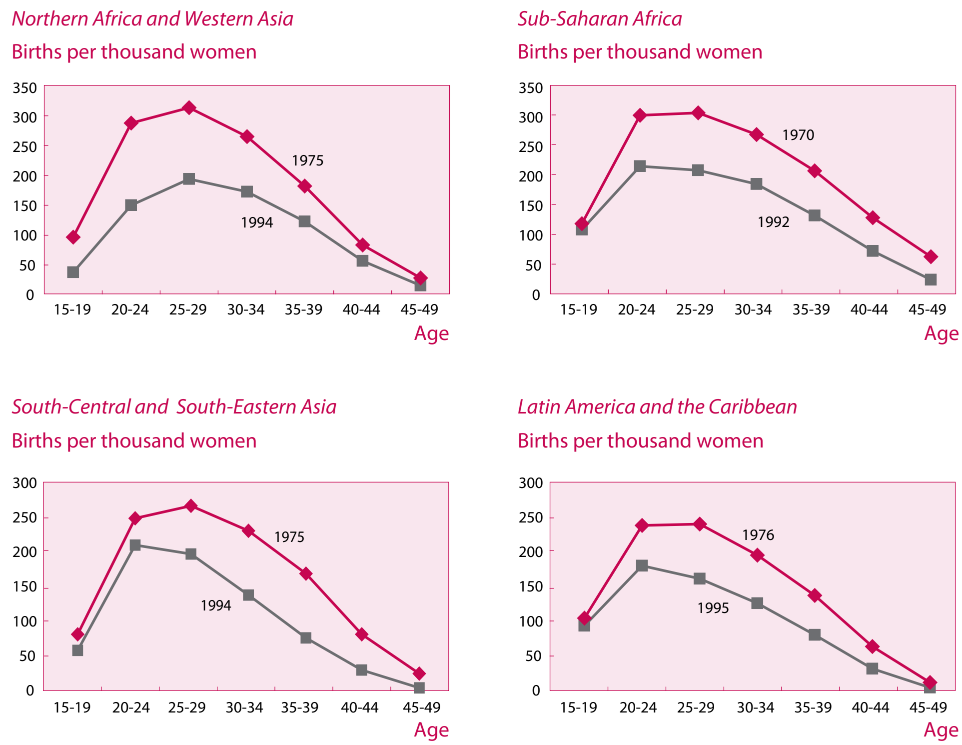
Age-specific fertility rates for the four groups of countries averaged for the earlier period and the most recent period are presented in figure III. Except for Northern Africa and Western Asia, it is striking that very little decline in fertility has occurred among the youngest age groups. In Latin America and the Caribbean, as in sub-Saharan Africa,

Table 3
Percentage of total fertility contributed by ages 15-24, 25-34 and 35 years and over, selected regions

Region	Average date of estimate	Per centage of total fertility contributed by ages		
		15-24	25-34	35+
Northern Africa and Western Asia	1975	30.4	46.3	23.3
	1994	25.5	49.3	25.2
Sub-Saharan Africa	1970	30.1	41.3	28.6
	1992	34.2	41.8	24.0
South-Central and South-Eastern Asia	1975	30.1	45.0	24.8
	1994	37.7	46.8	15.7
Latin America and the Caribbean	1976	35.1	43.7	21.3
	1995	40.8	42.3	17.0

Source: United Nations Population Division Database on Fertility, 2001.

Figure III
Age-specific fertility rates, selected regions



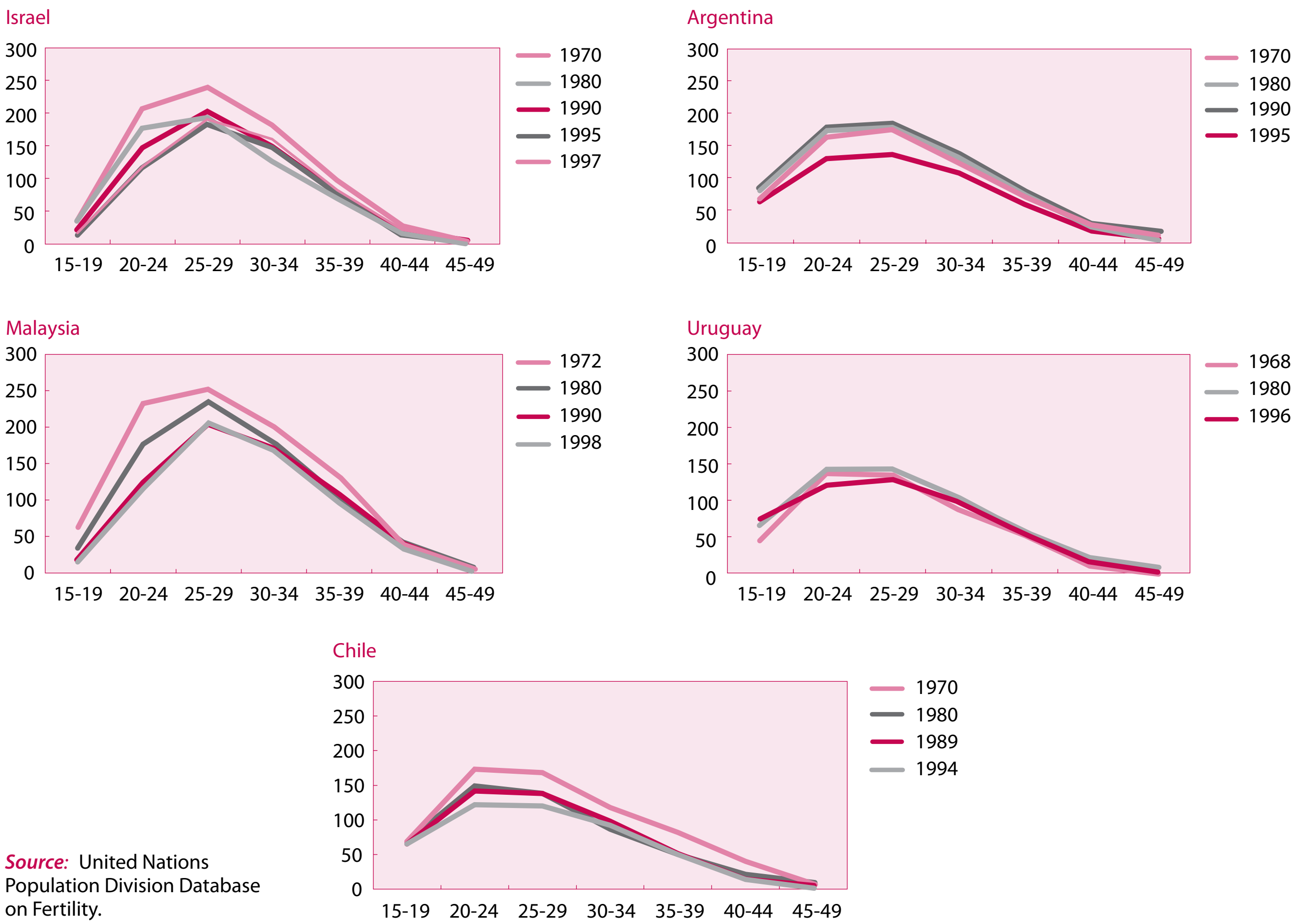
Source: United Nations Population Division Database on Fertility.

there appears to be little or no decline among women 15-19 years. This is true to some extent in South-Central and South-Eastern Asian countries. However, the recent average adolescent fertility rate in the latter regions is much lower at 59 births per 1,000 women compared to 100 births per 1,000 women in the former regions.

In summary, it can be said that while the majority of countries with fertility rates between 5 and 2.1 children experienced fertility declines over the past three decades and can be termed “in transition”, the pace of decline has been uneven. Countries that are at the high end of the intermediate-fertility range appeared to have had a faster pace of decline in the 1990s as compared with those at the lower end. The pace of decline is, to a large extent, related to level of fertility rather than calendar period. The question remains as to how long the current pace of decline will continue and to what level before it stabilizes.

A number of countries have reached fairly low-evels of fertility and are experiencing very slow declines. In Argentina, Chile and Uruguay (figure IV) recent declines have mostly occurred among women in the prime childbearing ages while adolescent fertility remains high and unchanging. The age pattern of fertility in these countries remains young although the most recent estimates show an increase in fertility among women aged 35 and over while fertility declined in the age groups 20-24 and 25-29 (but not 15-19). The rise in fertility at older ages, in conjunction with a fall at the younger ages, may be indicative of a recuperation of the previously postponed births—the phenomenon observed in several European countries. This hypothesis is consistent with the increase of the age at first birth, which appears to be happening in Chile. In Israel and Malaysia, the other countries where fertility has been declining at a slow pace, especially in the recent past, recent age patterns of fertility also show declines in rates among younger women and increases among older ones. It is likely that both postponement and recuperation are also taking place in these two countries. If that is the case, the postponement-recuperation effect is likely to continue and even strengthen

Figure 4
Age-specific fertility rates, 1970s to most recent, for Israel, Argentina, Malaysia, Uruguay and Chile



Source: United Nations Population Division Database on Fertility.

from one cohort to the next. Postponement of births depresses the TFR but the effect of recuperation is to inflate the TFR. The degree to which one or the other occurs determines the level of TFR.

These observations are made only on the basis of the analysis of levels, trends and age patterns of fertility. Other factors are important for the understanding of fertility trends, some of which are reviewed in the sections below.

MARRIAGE AND CONTRACEPTION

This section addresses the two major proximate factors—marriage and contraception—that affect a woman's risk of getting pregnant, and hence, a population's fertility level and patterns.

Marriage

In most countries of the world, especially the less developed ones, the family continues to be the unit in which reproduction takes place. Marriage usually marks the beginning of family formation and as such affects fertility directly through its impact on the duration of a woman's exposure to the risk of pregnancy. Age at marriage is therefore

Table 4
Trends in proportion ever married among women aged 15-19 and 20-24

Region and country	Former year	Ever married (%) among women aged		Later year	Ever married (%) among women aged	
		15-19	20-24		15-19	20-24
Northern Africa and Western Asia						
Algeria	1977	23.6	69.0	1992	5.4	29.6
Egypt	1986	20.7	60.6	1996	14.5	56.1
Israel	1972	8.7	54.3	1983	6.8	49.3
Jordan	1979	20.5	64.4	1997	8.2	38.8
Kuwait	1989	14.4	54.8	1996	5.4	42.0
Libyan Arab Jamahiriya	1984	9.1	49.9	1995	1.0	12.2
Morocco	1982	18.5	59.6	1995	10.5	39.8
Sudan	1983	28.8	69.5	1990	15.9	45.8
Syrian Arab Republic	1970	27.7	70.2	1981	24.9	64.1
Tunisia	1984	6.7	41.0	1994	3.0	27.7
Turkey	1980	21.0	72.7	1998	15.5	60.7
United Arab Emirates	1987	56.5	87.8	1995	8.2	41.7
Sub-Saharan Africa						
Botswana	1981	7.3	31.2	1991	5.4	27.2
Ghana	1979	30.9	84.6	1998/99	16.4	71.0
Kenya	1989	18.8	64.7	1998	16.7	65.1
Lesotho	1976	29.4	79.6	1986	18.1	70.4
South Africa	1980	5.6	35.8	1991	4.5	28.7
South-Central Asia						
Bangladesh	1981	68.7	94.9	1999/00	48.1	81.5
India	1981	44.1	86.0	1998/99	33.6	78.8
Iran (Islamic Republic of)	1986	34.2	74.2	1994	22.4	64.9
Nepal	1981	50.8	86.9	1996	44.0	85.2
Tajikistan	1979	..	79.6	1989	11.6	76.9
Turkmenistan	1979	..	68.3	1989	6.4	53.3
Uzbekistan	1989	15.3	74.1	1996	13.0	77.2
South-Eastern Asia						
Indonesia	1980	30.1	77.7	1997	18.0	63.9
Malaysia	1980	10.3	48.7	1994	7.6	39.8
Myanmar	1983	16.8	57.9	1997	6.6	34.8
Philippines	1980	14.1	54.5	1998	8.5	43.7
Viet Nam	1989	11.4	57.5	1997	7.7	53.1
Caribbean						
Dominican Republic	..	..	..	1996	28.9	66.1
Haiti	..	..	..	2000	19.4	57.3
Jamaica	..	..	..	1997	30.6	70.9
Central America						
Costa Rica	..	..	..	1992/93	17.1	62.2
El Salvador	..	..	..	1998	26.2	60.5
Guatemala	..	..	..	1998/99	26.1	69.5
Honduras	..	..	..	1996	30.4	68.2
Mexico	..	..	..	1990	15.4	54.2
Nicaragua	..	..	..	1998	34.3	75.1
Panama	..	..	..	1990	21.4	55.9

Source: United Nations Population Division Database on Marriage Patterns.

Notes: Two dots (..) indicate that the data are not available.

Table 4
Trends in proportion ever married among women aged 15-19 and 20-24 (*continued*)

South America						
Argentina	..	..	..	1991	12.4	45.2
Bolivia	..	..	..	1998	12.2	53.4
Brazil	..	..	..	1996	16.8	52.6
Chile	..	..	..	1992	11.7	43.8
Colombia	..	..	..	2000	17.6	50.1
Ecuador	..	..	..	1999	19.2	56.2
Paraguay	..	..	..	1996	18.4	62.7
Peru	..	..	..	1996	12.5	52.3
Uruguay	..	..	..	1996	12.8	44.8
Venezuela	..	..	..	1990	17.7	50.6
Oceania						
Papua New Guinea	..	..	..	1996	20.8	75.1

Table 5
Trends in singulate mean age at marriage[a] (*SMAM*) among women

Region and country	Former year	SMAM	Later year	SMAM	Change in SMAM
Eastern Africa					
Kenya	1989	21.7	1998	21.7	0.0
Northern Africa					
Algeria	1980	20.8	1992	25.9	5.1
Egypt	1986	21.6	1996	22.3	0.7
Libyan Arab Jamahiriya	1973	18.7	1984	23.0	4.3
Morocco	1982	22.2	1994	25.3	3.1
Sudan	1983	20.7	1993	22.7	2.0
Tunisia	1984	24.3	1994	26.6	2.3
Southern Africa					
Botswana	1981	26.4	1991	26.9	0.5
Lesotho	1976	20.1	1986	21.3	1.2
South Africa	1980	25.7	1991	26.8	1.1
Western Africa					
Ghana	1979	20.5	1993	22.4	1.9
Eastern Asia					
Mongolia	..	..	1998	22.5	..
South-Central Asia					
Bangladesh	1981	16.7	1989	18.1	1.4
India	1981	18.7	1991	19.3	0.6
Iran (Islamic Republic of)	1986	20.2	1994	21.7	1.5
Kyrgyzstan	1985	..	1997	20.4	..
Nepal	1981	17.9	1991	18.5	0.6
Tajikistan	1979	..	1989	20.9	..
Turkmenistan	1979	..	1989	22.6	..
Uzbekistan	1989	21.0	1996	20.6	-0.4
South-Eastern Asia					
Indonesia	1980	20.0	1990	21.6	1.6
Malaysia (Peninsular)	1984	24.5	1994	24.9	0.4
Myanmar	1991	24.5	1997	26.4	1.9
Philippines	1980	22.4	1995	24.1	1.7
Viet Nam	1989	23.1	1997	22.1	-1.0

Table 5
Trends in singulate mean age at marriage[a] (*SMAM*) among women (*continued*)

Region and country	Former year	SMAM	Later year	SMAM	Change in SMAM
Western Asia					
Israel	1972	22.8	1983	23.5	0.7
Jordan	1979	21.5	1997	25.3	3.8
Kuwait	1989	23.0	1996	25.3	2.3
Lebanon	1970	23.2	..	..	..
Syrian Arab Republic	1970	20.7	1981	21.5	0.8
Turkey	1980	20.7	1990	22.0	1.3
United Arab Emirates	1987	23.1	1995	24.3	1.2
Caribbean					
Dominican Republic	1986	21.5	1996	21.3	-0.2
Haiti	1988	23.8	1994	22.1	-1.7
Central America					
Costa Rica	1973	21.7	1984	22.2	0.5
El Salvador	1992	22.3	1998	21.6	-0.7
Guatemala	1987	..	1998	20.5	..
Honduras	1988	20.9	1996	20.4	-0.5
Mexico	1980	21.6	1990	22.4	0.8
Nicaragua	1992	19.8	1998	20.0	0.2
Panama	1980	21.4	1990	21.9	0.5
South America					
Argentina	1991	23.3	..	..	..
Bolivia	1988	22.8	1998	22.8	0.0
Brazil	1980	22.7	1997	22.8	0.1
Chile	1982	23.6	1992	23.4	-0.2
Colombia	1985	22.7	1993	22.5	-0.2
Ecuador	1982	21.4	1990	22.0	0.6
Paraguay	1982	21.8	1992	21.5	-0.3
Peru	1981	22.8	1996	23.1	0.3
Uruguay	1985	22.9	1996	23.3	0.4
Venezuela	1981	21.3	1990	22.1	0.8
Oceania					
Papua New Guinea	1980	20.6	1996	20.8	0.2

Source: United Nations Population Division Database on Marriage Patterns.

Notes: Two dots (..) indicate that data are not available.

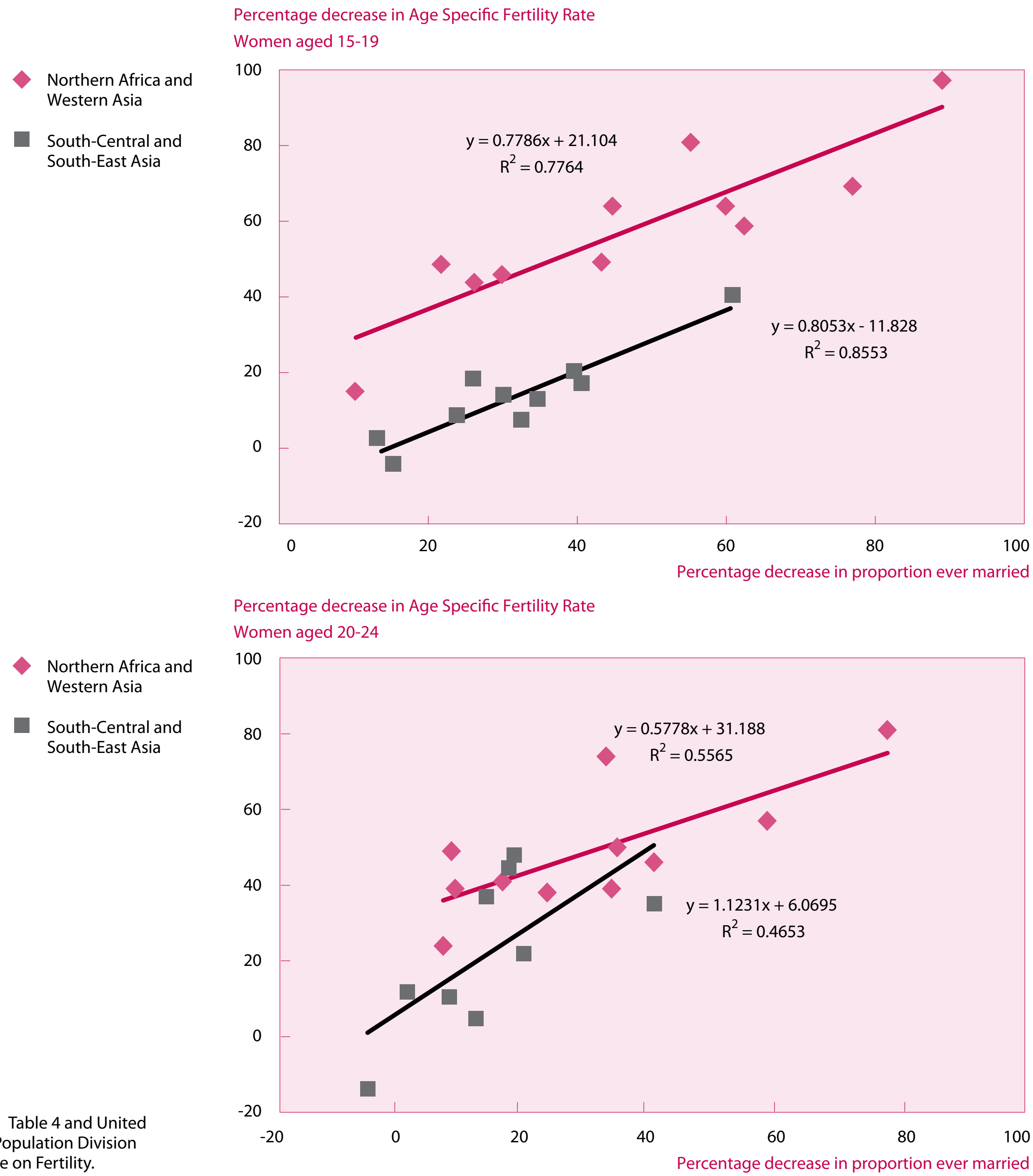
[a] Marriage refers to marital and consensual unions.

a primary indicator of this exposure. The timing of marriage[5] is measured by the proportion of women aged 15-19 and 20-24 who have ever married (table 4) as well as the singulate mean age at marriage (SMAM) (table 5). In the 1990s, the proportion of ever-married women aged 15-19 varies from 1 per cent in the Libyan Arab Jamahiriya to over 40 per cent in Bangladesh and Nepal. Similarly, the proportion of ever-married women aged 20-24 varies from 12 per cent in the Libyan Arab Jamahiriya to over 80 per cent in Bangladesh, Kyrgyzstan and Nepal. At the regional level and on average, the proportion of ever married among women aged 15-19 and 20-24 are lower in Africa (11 per cent and 46 per cent, respectively) than in Asia (16 per cent and 59 per cent, respectively) and Latin America and the Caribbean (20 per cent and 59 per cent, respectively).

The proportions of ever-married women aged 15-19 and 20-24 decreased between the 1980s and the 1990s (table 4), which points to a trend in rising age at marriage. Figure V, which plots the percentage change in the proportion ever married against the percentage change in age-specific fertility rate in Northern Africa and Western Asia and

[5] In this paper, marriage refers to marital and consensual unions.

Figure V
Relationship between change in proportion ever married and change in age-specific fertility rate among women aged 15-19 and 20-24



Sources: Table 4 and United Nation Population Division Database on Fertility.

in South-Central and South-Eastern Asia shows that this decrease in marriage among young age groups has been associated with a decrease in fertility within these age groups. This figure also reveals that the declines in fertility and proportion ever married have been higher in Northern Africa and Western Asia than in South-Central and South-Eastern Asia. In Northern Africa and Western Asia, the fertility depressing effect of the decline in proportion ever married among women aged 15-19 is reflected in the TFR. Almost two thirds of the 11 countries that have experienced the fastest fertility decline (decline in TFR of at least 1.5 children per woman per decade over the period 1970-2000) have less than 10 per cent of their women aged 15-19 who have ever married. On the contrary, the great majority (over 80 per cent) of the 43 countries that have experienced slower fertility declines have more than 10 per cent of their women aged 15-19 who are ever married.

In the 1990s, women who married for the first time by age 50 did so on average at age 24 in Africa, at age 22 in Asia and at age 23 in Latin America and the Caribbean. The lowest SMAMs are that of Bangladesh, India and Nepal (age 18.1 in 1989, age 19.3 in 1991 and age 18.5 in 1991, respectively). In the remaining countries, women marry for the first time in their 20s. Since the 1980s, mean age at marriage has increased in the majority of the countries, particularly in the Northern African countries as well as in Jordan, Kuwait and Myanmar where it has increased by 2 years or more. Worth noting is the case of Algeria where the mean age at marriage increased by 5 years between 1980 and 1992. This substantial delay in marriage, particularly to after 25, has certainly played an important role in the fast TFR decline of over 2 children per decade that Algeria experienced from 1979 to 1995 (table 2). The impact of the increase in age at marriage in Northern African countries on fertility can be seen in the age pattern of fertility for those countries. As noted in the section above, whereas fertility declined most among the oldest age groups in other regions, in Northern Africa and Western Asia, fertility decline occurred mostly because of declines in fertility at the youngest ages.

Contraceptive use

The literature on fertility decline in the developing countries shows that past declines have occurred predominantly from increased contraceptive use. Contraceptive use among women of reproductive age who are in a marital or consensual union has generally reached a medium to high level in the countries with intermediate levels of fertility (table 6). Over the past decade, the percentage using any method of contraception was at least 50 per cent in two thirds of the 50 countries with available data (table 7). In Brazil, Colombia, Costa Rica, the Islamic Republic of Iran and Viet Nam, contraceptive prevalence has even reached 70 per cent or over, a level comparable to that of more developed countries. It is worth noting that these five high prevalence countries all have a TFR below 3 children per woman. On the other hand, over half of the countries with a contraceptive prevalence below 50 per cent belong to the group of countries with the highest TFRs, that is, higher

Table 6
Levels and trends of contraceptive use among women of reproductive age who are in a marital or consensual union; need for family planning

Region and country	Year	Contraceptive use: Latest prevalence (*percentage*) Any method	Contraceptive use: Latest prevalence (*percentage*) Mod. method	Contraceptive use: Trends 1990-2000 (*annual percentage change*) Any method	Contraceptive use: Trends 1990-2000 (*annual percentage change*) Mod. method	Unmet need for family planning: Per cent unmet need	Unmet need for family planning: Per cent met need
Eastern Africa							
Kenya	1998	39.0	31.5	1.3	1.3	23.9	63.1
Northern Africa							
Algeria	1995	56.9	49.4	2.0	2.2	..	..
Egypt	2000	56.1	53.9	1.5	1.4	11.2	83.6
Libyan Arab Jamahiriya	1995	39.7	25.6	..	..	..	..
Morocco	1995	50.3	42.4	2.6	2.1	16.1	76.8
Sudan	1992/93	8.3	6.9	0.0	0.2	26.0[a]	23.5[a]
Tunisia	1994	60.0	51.0	1.7	1.8	..	..

Table 6
Levels and trends of contraceptive use among women of reproductive age who are in a marital or consensual union; need for family planning (*continued*)

Region and country	Year	Contraceptive use: Latest prevalence (*percentage*)		Contraceptive use: Trends 1990-2000 (*annual percentage change*)		Unmet need for family planning	
		Any method	Mod. method	Any method	Mod. method	Per cent unmet need	Per cent met need
Southern Africa							
Botswana	1988	33.0	31.7	..	..	..	..
Lesotho	1991/92	23.2	18.9	..	..	..	..
South Africa	1998	56.3	55.1	0.7	0.7	..	..
Western Africa							
Ghana	1998/99	22.0	13.3	0.6	0.7	23.0	48.9
Eastern Asia							
Mongolia	1998	59.9	45.7	..	..	..	..
South-Central Asia							
Bangladesh	1999/00	53.8	43.4	1.8	1.6	15.3	78.3
India	1998/99	48.2	42.8	1.3	0.1	15.8	75.3
Iran (Islamic Republic of)	1997	72.9	56.0	2.4	3.0	..	..
Kyrgyzstan	1997	59.5	48.9	..	..	11.6	83.7
Nepal	2001	39.3	35.4	1.7	1.4	31.4[b]	47.6[b]
Tajikistan	..	..	..	..	..	..	..
Turkmenistan	2000	61.8	53.1	..	..	..	..
Uzbekistan	1996	55.6	51.3	..	..	13.7	80.2
South-Eastern Asia							
Indonesia	1997	57.4	54.7	1.1	1.1	9.2	86.4
Malaysia	1994	54.5	29.8	1.0	-0.3	..	..
Myanmar	1997	32.7	28.4	3.2	3.0	..	..
Philippines	1998	46.0	28.2	1.2	0.7	19.8	71.5
Viet Nam	1997	75.3	55.8	2.9	3.0	6.9	91.6
Western Asia							
Israel (Jewish population)	1987/88	68.0	52.0	..	..	..	..
Jordan	1997	52.6	37.7	2.5	1.5	14.2	80.1
Kuwait	1996	50.2	40.9	1.0	1.1	..	..
Lebanon	1996	61.0	37.0	..	..	..	..
Syrian Arab Republic	1993	36.1	28.3	..	..	..	..
Turkey	1998	63.9	37.7	0.1	0.7	10.1	86.6
United Arab Emirates	1995	27.5	23.6	..	..	..	..
Caribbean							
Dominican Republic	1996	63.7	59.2	1.4	1.5	12.5	83.9
Haiti	2000	28.1	22.3	1.7	1.2	39.8	41.4
Jamaica	1997	65.9	62.6	1.2	1.3	..	..
Central America							
Costa Rica	1992/93	75.0	64.6	0.8	0.9	..	..

Table 6
Levels and trends of contraceptive use among women of reproductive age who are in a marital or consensual union; need for family planning (*continued*)

		Contraceptive use					
		Latest prevalence (*percentage*)		Trends 1990-2000 (*annual percentage change*)		Unmet need for family planning	
Region and country	**Year**	**Any method**	**Mod. method**	**Any method**	**Mod. method**	**Per cent unmet need**	**Per cent met need**
Central America (*continued*)							
El Salvador	1998	59.7	54.1	1.3	1.1	8.2	..
Guatemala	1998/99	38.2	30.9	1.4	1.0	23.1	62.9
Honduras	1996	50.0	41.0	0.9	1.3	18.0	..
Mexico	1995	66.5	57.5	1.7	1.6	..	..
Nicaragua	1998	60.3	57.4	1.9	2.1	14.7	80.8
Panama	1984	58.2	54.2	..	..	..	..
South America							
Argentina	..	..	..	..	..	..	..
Bolivia	1998	48.3	25.2	1.7	1.6	26.1	64.9
Brazil	1996	76.7	70.3	1.1	1.4	7.3	91.5
Chile	..	..	..	..	..	..	..
Colombia	2000	76.9	64.0	1.1	0.9	6.2	92.8
Ecuador	1999	65.8	51.5	1.4	0.9	10.0	..
Paraguay	1998	57.4	47.7	1.8	1.7	17.3	..
Peru	1996	64.2	41.3	1.5	2.0	12.1	85.1
Uruguay	..	..	..	..	..	..	..
Venezuela	1977	49.3	37.7	..	..	..	..
Oceania							
Papua New Guinea	1996	25.9	19.6	..	..	..	..

Source: United Nations Population Division Database on Contraceptive Use.
Notes: Two dots (..) indicate that data are not available.
[a] Data pertain to the year 1990.
[b] Data pertain to the year 1996.

Table 7
Distribution of countries by contraceptive prevalence,[a] 1990-2000

Contraceptive prevalence						
Less than 10 %	**20 to < 30 %**	**30 to < 40 %**	**40 to < 50 %**	**50 to < 60 %**	**60 to < 70 %**	**70 % or more**
Sudan	Ghana Haiti Lesotho Papua New Guinea United Arab Emirates	Botswana Guatemala Kenya Libyan A. J. Myanmar Nepal Syrian Arab Republic	Bolivia India Philippines Venezuela	Algeria Bangladesh Egypt El Salvador Honduras Indonesia Jordan Kuwait Malaysia Morocco Panama Paraguay South Africa Uzbekistan	Dominican Republic Ecuador Israel Jamaica Kyrgyzstan Lebanon Mexico Mongolia Nicaragua Peru Tunisia Turkey Turkmenistan	Brazil Colombia Costa Rica Iran, Islamic Republic of Viet Nam

Source: Table 3.
[a] Percentage using contraception among women of reproductive age who are in a marital or consensual union.

Table 8
Distribution of countries by annual decrease in total fertility rate and contraceptive prevalence[a]

	Average decrease in TFR over the period 1970-2000 (number of children per decade)			
	2 or more	1.5 to 1.9	1.0 to 1.4	< 1.0
Less than 50 per cent		Libyan Arab Jamahiriya United Arab Emirates	Kenya Myanmar Sudan Syrian Arab Republic	Bolivia Botswana Ghana Guatemala Haiti India Lesotho Nepal Papua New Guinea Philippines
50 per cent or more	Algeria Viet Nam	Iran (Islamic Republic of) Jordan Mongolia Morocco Nicaragua South Africa	Bangladesh Brazil Colombia Dominican Republic Ecuador Egypt El Salvador Honduras Indonesia Jamaica Kuwait Lebanon Mexico Panama Peru Tunisia Turkey Uzbekistan Venezuela	Argentina Chile Costa Rica Israel Kyrgyzstan Malaysia Paraguay Turkmenistan

Sources: Tables 2 and 3.

[a] Percentage using contraception among women of reproductive age who are in a marital or consensual union.

than or equal to 4.5 children per woman. The Sudan, with a prevalence of 8.3 per cent in 1992/93 is at the lowest end of the scale in terms of contraceptive use. In the great majority of the countries considered here, modern methods of contraception account for over 75 per cent of contraceptive use. Only in Bolivia, Malaysia and Turkey do modern methods account for less than 60 per cent of contraceptive use.

The link between fertility decline and contraceptive use is further evidenced by the fact that in general, the higher the contraceptive prevalence reached in the 1990s/2000, the faster the fertility decline that occurred over the period 1970-2000 (table 8). All of the fast decline countries (with an annual TFR decline of 1.5 children per decade) have a contraceptive prevalence above 50 per cent, with the exception of the Libyan Arab Jamahiriya and the United Arab Emirates. On the other hand, over half of the countries with an annual TFR decline of less than 1 child per decade have a contraceptive prevalence below 50 per cent. The exceptions to the latter are countries that already had a TFR of less than 5 children per woman in the early 1970s.

Countries that have reached high prevalence in contraceptive use and had done so within a short interval not surprisingly also recorded the fastest fertility declines (table 9). Out of the 36 countries for which recent trend data on contraceptive use are available, 7 have seen an annual increase in contraceptive use of at least 2 per cent—Algeria, the Islamic Republic of Iran, Jordan, Kyrgyzstan, Myanmar, Morocco and Viet Nam. Among them, only Kyrgyzstan and Myanmar have experienced a rate of fertility decline of less than 1.5 children per decade and this is associated with the fact that these two countries already had a TFR of less than 5 children per woman in the early 1970s. The great majority (90 per cent) of the countries experiencing a recent increase

Table 9
Distribution of countries by annual decrease in total fertility rate and recent trends in contraceptive prevalence[a]

Trends in contraceptive prevalence (annual per cent change, 1990-2000)	Average decrease in TFR over the period 1970-2000 (number of children per decade)			
	2 or more	1.5 to 1.9	1.0 to 1.4	< 1.0
2 per cent or over	Algeria Viet Nam	Iran (Islamic Rep. of) Jordan Morocco	Myanmar	Kyrgyzstan
1.5 to < 2 per cent		Nicaragua	Bangladesh Egypt Mexico Peru Tunisia	Bolivia Haiti Nepal Paraguay
1.0 to < 1.5 per cent			Brazil Colombia Dom. Republic El Salvador Indonesia Jamaica Kenya Kuwait	Guatemala India Malaysia Philippines
Less than 1 per cent		South Africa	Honduras Sudan Turkey	Costa Rica Ghana

Source: Tables 2 and 3.
[a] Percentage using contraception among women of reproductive age who are in a marital or consensual union.

in contraceptive use of less than 2 per cent annually had a relatively slow decline in fertility over the period 1970-2000. With the exception of Costa Rica and Malaysia, these countries had a TFR of at least 5 children per woman in the 1970s. Moreover, the actual fertility level in the majority of these countries is still above 3 children per woman. These results suggest that a further and faster increase in contraceptive use has the potential of lowering fertility further in the majority of the countries with intermediate levels of fertility.

Despite the relatively high contraceptive prevalence in the intermediate-fertility countries, high levels of unmet need for contraception remain. In 28 countries with available data, the percentage of women with an unmet need for family planning[6] varies from less than 10 per cent in Brazil, Colombia, El Salvador, Indonesia and Viet Nam to above 30 per cent in Haiti and Nepal. On the other hand, the percentage of women with met need for family planning[7] varies from less than 50 per cent in Ghana, Haiti, Nepal and the Sudan to over 90 per cent in Brazil, Colombia and Viet Nam. At the regional level, unmet need is highest in Africa (19 per cent) and lowest in Asia (15 per cent), on average. Not surprisingly, the percentage of women whose need for family planning is met is consequently lowest in Africa (around 60 per cent), highest in Asia (around 80 per cent) and around 75 per cent in Latin America and the Caribbean, on average. The countries with the lowest levels of unmet need (and the highest levels of met need) are all countries where contraceptive prevalence has reached very high levels (over 70 per cent). It might be difficult to expect a furthering of fertility decline through an increase in contraceptive use in those countries. However, the majority of the countries still have high levels of unmet need and among them, the countries with the highest levels of unmet need (and the lowest levels of met need) are all countries with a TFR of over 4 children per woman. These results again suggest that there is still room for increasing contraceptive use in the majority of the countries with intermediate levels of fertility, and that this further increase has the potential of decreasing fertility further and faster, particularly in the countries where fertility is still at a rather high level (above 4 children per woman).

[6] Women with an unmet need for family planning are those who would like to postpone or terminate childbearing but are not practicing contraception, that is, who are experiencing a gap between their fertility preferences and their contraceptive practice.

[7] Women with a met need for family planning are the ones using contraception among those who need family planning.

Among the 8 countries that have experienced the fastest fertility decline (a TFR decline of at least 1.5 children per decade)—Algeria, the Islamic Republic of Iran, Jordan, Morocco, Nicaragua, Viet Nam, Zimbabwe and South Africa—women living in urban areas are significantly more likely to use contraception than women living in rural areas. Similarly, more educated women are more likely to use contraception than women who are less educated or not educated at all. These differentials exist for both the use of any method of contraception and that of any modern method of contraception. These results suggest that in these countries, the possibility for increasing contraceptive use still exists (among rural and less educated women), increase which can in turn lead to further fertility decline. In fact, these contraceptive use differentials exist in all the countries with intermediate-fertility levels, except in Costa Rica. The fertility of the latter was already below 5 in the early 1970s.

EDUCATION AND URBANIZATION

Education

Over the past two decades, significant gains in the educational attainment of women have taken place in many countries. In 9 out of 20 countries shown in table 10, more than 50 per cent of women of reproductive age have attained at least secondary schooling. Concomitantly, there are 11 countries where less than 20 per cent of women of reproductive age have no education compared with 7 countries in the earlier period. However, not all countries have shown such gains in female education. In Egypt, Guatemala and Morocco, more than one third of women of reproductive age have no education. In Bangladesh, India, Morocco and Nepal more than half have no education.

Numerous studies have shown convincingly the fertility-reducing impact of advances in female educational attainment, among them a United Nations study of 26 developing countries (United Nations, 1995). That study confirmed the negative relationship between female educational attainment and fertility. It demonstrated that the main paths of influence through which women's education reduces fertility were its association with later age at marriage, desire for smaller families and increased use of contraception. Education-specific trends in fertility were also examined in that study. Analysing data from two different surveys for each country, the study found that in many countries all educational groups participated in the decline of fertility. In many instances because fertility among the less educated declined most, the fertility gap between women with secondary education and those with little or no education narrowed. The findings from the United Nations study are further confirmed by analysis of recent survey data for the 1990s for the countries with intermediate levels of fertility.

Total fertility rates are lower among women who have attained at least secondary education than among those with no education in all 26 countries except in Indonesia and Trinidad and Tobago (table 11). Women with some education have at least one child fewer than women with no education and, in most countries, women with secondary or higher education give birth, on average, to 1 to 4 births fewer than women with no education. In all countries, except Ghana, Guatemala and the Philippines, fertility declined in all education categories (see also figures VI, VII and VIII). In some countries the declines were greater among women with no education and in others, among women with secondary or higher education.

In nine of the 16 countries with data for two points in time (Egypt, Ghana and Kenya in Africa; Brazil, Colombia, the Dominican Republic, Guatemala and Peru in Latin America and the Caribbean) the gap between the TFR of those with secondary or higher education and that of those with no education narrowed over time. Over a 10-15 year period, these nine countries, except for Guatemala, saw a substantial decline in the

Table 10
Percentage distribution of female respondents by educational level, selected countries

Region and country	Year of survey	Highest educational level: No education	Primary	Secondary/ higher	Residence: Urban	Rural
Africa						
Egypt	1988	50.8	31.8	17.4	48.3	51.7
	2000	43.2	29.7	37.0	44.1	55.9
Ghana	1988	39.7	52.8	7.5	33.9	66.1
	1998	29.1	18.0	52.8	35.9	64.1
Kenya	1989	25.1	54.4	20.4	17.3	82.7
	1998	11.5	59.3	29.2	23.2	76.8
Morocco	1987	82.7	10.0	7.1	42.7	57.3
	1992	63.4	16.9	19.8	49.2	50.8
Asia						
Bangladesh	1993/94	58.2	26.8	15.0	11.5	88.5
	1996/97	54.8	27.0	18.2	11.7	88.3
India	1993	61.5	16.3	21.9	26.2	73.8
	1999	53.5	16.9	29.6	26.2	73.8
Indonesia	1987	23.2	60.0	16.8	27.5	72.5
	1997	13.2	58.7	28.1	27.9	72.1
Jordan	1990	23.5	22.5	54.0	73.8	26.2
	1997	9.1	15.3	75.6	83.6	16.4
Nepal	1996	80.0	11.0	9.0	8.4	91.6
	2001	74.0	12.8	13.2	9.6	90.4
Philippines	1993	2.1	31.2	66.6	56.6	43.4
	1998	1.5	26.2	72.2	56.6	43.4
Turkey	1993	27.1	55.4	17.5	64.1	35.9
	1998	16.7	53.0	30.3	66.5	33.5
Latin America and Caribbean						
Bolivia	1989	17.4	41.5	41.1	60.0	40.0
	1998	8.1	34.3	57.5	71.5	28.5
Brazil	1986	7.4	66.5	26.0	75.6	24.4
	1996	5.2	32.9	61.9	82.0	18.0
Colombia	1986	5.7	48.8	45.4	72.0	28.0
	2000	3.3	31.8	64.9	77.4	22.6
Dominican Republic	1986	4.8	61.9	33.3	65.5	34.5
	1996	7.0	49.4	43.6	66.6	33.4
Ecuador	1987	7.8	47.5	44.7	59.2	40.8
	1999	4.1	39.2	56.4	65.2	34.8
Guatemala	1987	38.4	47.1	14.6	37.2	62.8
	1998/99	25.3	49.3	25.4	45.0	55.0
Haiti	1994/95	35.6	41.6	22.8	43.9	56.1
	2000	24.6	47.3	28.1	45.9	54.1
Peru	1986	10.9	38.0	51.0	68.1	31.9
	2000	5.1	28.6	66.3	69.9	30.1

Source: Demographic and Health Surveys.

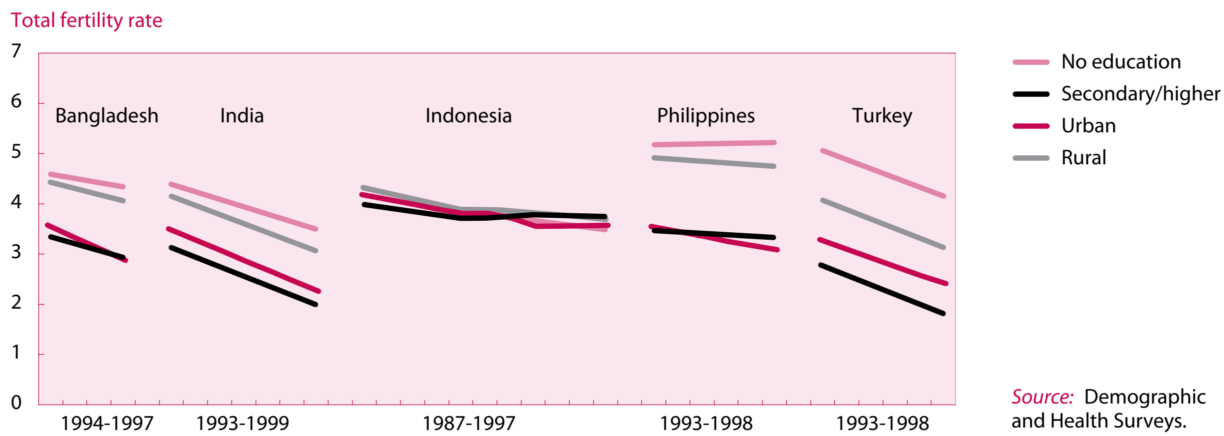
Table 11
Total fertility rates by educational level and place of residence, selected countries

Region and country	Year of survey	Highest educational level: No education	Highest educational level: Primary	Highest educational level: Secondary+	Residence: Urban	Residence: Rural	TFR difference: Primary minus no education	TFR difference: Secondary+ minus no education	TFR difference: Urban minus rural
Africa									
Egypt	1992	6.0	5.4	4.5	4.5	6.2	-0.6	-1.5	-1.6
	1995	5.4	4.8	4.4	4.4	5.4	-0.7	-1.0	-1.0
Ghana	1988	6.9	6.1	3.5	5.2	6.9	-0.8	-3.4	-1.7
	1993	3.5	3.1	1.7	2.3	3.6	-0.4	-1.8	-1.4
	1998	5.8	4.9	3.6	3.0	5.4	-0.9	-2.3	-2.4
Kenya	1989	7.3	7.1	5.0	4.8	7.1	-0.2	-2.2	-2.3
	1993	6.1	5.9	4.1	3.4	6.0	-0.2	-2.0	-2.6
	1998	5.5	5.1	3.5	3.1	5.2	-0.4	-2.0	-2.2
Morocco	1987	6.7	5.2	4.5	5.0	7.4	-1.5	-2.2	-2.4
	1992	5.1	2.6	2.0	2.8	5.7	-2.5	-3.1	-2.9
Sudan	1990	7.1	6.7	5.6	6.2	7.2	-0.4	-1.5	-1.0
Tunisia	1988	7.3	5.7	4.5	5.3	7.9	-1.7	-2.9	-2.5
Asia									
Bangladesh	1993/1994	4.6	4.3	3.3	3.6	4.4	-0.3	-1.2	-0.8
	1996/1997	4.3	3.8	2.9	2.9	4.1	-0.6	-1.4	-1.2
India	1993	3.6	2.9	2.6	2.9	3.4	-0.7	-1.0	-0.5
	1993	4.4	3.5	3.1	3.5	4.2	-0.9	-1.3	-0.7
	1999	3.5	2.6	2.0	2.3	3.1	-0.9	-1.5	-0.8
Indonesia	1987	4.3	4.3	4.0	4.2	4.3	0.0	-0.3	-0.1
	1991	3.9	3.9	3.7	3.8	3.9	0.0	-0.2	-0.1
	1994	3.7	3.8	3.8	3.5	3.8	0.1	0.1	-0.3
	1997	3.5	3.6	3.7	3.6	3.7	0.1	0.3	-0.1
Kyrgyzstan	1997	..	4.3	3.5	2.5	4.0	..	..	-1.6
Nepal	1996	5.5	4.4	3.5	3.7	5.4	-1.0	-2.0	-1.7
Philippines	1993	5.2	5.5	3.5	3.5	4.9	0.3	-1.7	-1.4
	1998	5.2	5.1	3.3	3.1	4.7	-0.1	-1.9	-1.7
Turkey	1993	5.1	3.2	2.8	3.3	4.1	-1.9	-2.3	-0.8
	1998	4.2	2.7	1.8	2.4	3.1	-1.5	-2.3	-0.7
Uzbekistan	1996	1.4	..	3.6	2.9	4.1	..	2.2	-1.1
Latin America and Caribbean									
Bolivia	1989	6.3	6.0	3.3	4.0	6.6	-0.3	-3.0	-2.6
	1998	7.1	5.8	3.0	3.4	6.7	-1.3	-4.1	-3.3
Brazil	1986	6.7	3.9	2.2	3.2	5.4	-2.8	-4.5	-2.2
	1996	4.8	3.4	2.1	2.3	3.6	-1.5	-2.7	-1.3
Colombia	1986	5.4	4.2	2.4	2.8	5.0	-1.2	-3.0	-2.2
	1990	5.0	3.6	2.2	2.5	3.9	-1.4	-2.8	-1.4
	1995	5.2	3.9	2.4	2.5	4.4	-1.3	-2.8	-1.9
	2000	4.1	3.6	2.2	2.3	3.8	-0.5	-1.9	-1.4
Dominican Rep	1986	5.6	4.5	2.7	3.2	5.1	-1.1	-2.9	-1.9
	1991	5.3	3.8	2.7	2.8	4.4	-1.6	-2.6	-1.6
	1996	5.0	3.8	2.6	2.8	4.1	-1.2	-2.4	-1.3
Ecuador	1987	6.5	5.3	2.9	3.5	5.6	-1.2	-3.6	-2.0
Guatemala	1987	7.1	5.2	2.7	4.1	6.6	-1.9	-4.4	-2.5
	1995	7.1	5.1	2.7	3.9	6.2	-1.9	-4.3	-2.3
	1998/1999	7.1	5.2	3.0	4.2	6.0	-1.9	-4.1	-1.8
Haiti	1994/1995	6.3	5.0	2.7	3.5	6.1	-1.3	-3.7	-2.6
Mexico	1987	6.3	4.8	2.5	6.2	4.4	-1.6	-3.8	1.9
Nicaragua	1997/1998	6.1	4.6	2.5	3.1	5.4	-1.5	-3.6	-2.3
Paraguay	1990	6.8	5.6	3.3	3.7	6.3	-1.3	-3.5	-2.6
Peru	1986	7.5	5.4	2.9	3.3	6.9	-2.0	-4.6	-3.6
	1992	7.3	5.4	2.7	3.0	6.5	-1.9	-4.6	-3.6
	1996	6.9	5.2	2.8	3.0	5.8	-1.7	-4.1	-2.8
	2000	5.5	4.4	2.3	2.4	4.7	-1.2	-3.2	-2.3

Source: Demographic and Health Surveys.

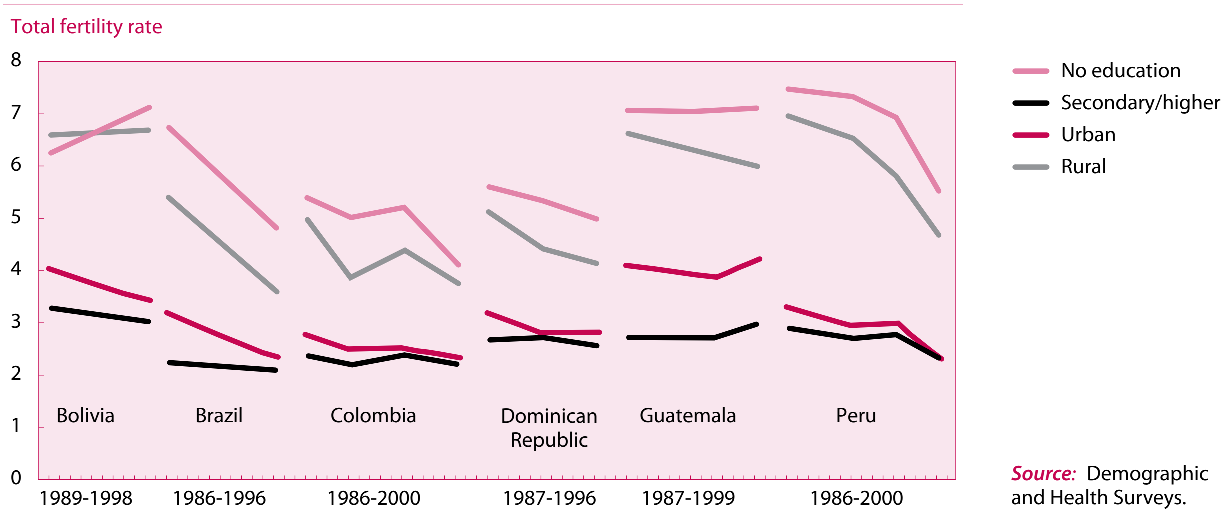
Figure VI
Africa: trends in total fertility rates by background factors

Figure VII
Asia: trends in total fertility rates by background factors



Source: Demographic and Health Surveys.

Figure VIII
Latin America and Caribbean: trends in total fertility rates by background factors



Source: Demographic and Health Surveys.

fertility of women with no education: declines ranging from 6 per cent per annum in the Dominican Republic to 19 per cent per annum in Brazil and Kenya. In five countries (Morocco in Africa; Bangladesh, India and the Philippines in Asia and Bolivia in Latin America and the Caribbean) the gap widened. In these countries the decline in fertility among women with secondary or higher education was larger than that experienced by women with no education. The decline in fertility among women who had attained at least secondary education ranged from 48 per cent per year in Morocco to 2.9 and 2.6 per cent in Bolivia and the Philippines, respectively. It should be noted, however, that in Morocco, the majority of women (63.4 per cent) have no education and only 19.8 per cent have secondary or higher education. In Bolivia and the Philippines, on the other hand, the majority of women have had education at least up to the secondary level. In the two large countries, Bangladesh and India, the TFR declined by 13.6 per cent and 18.9 per cent, respectively, among women with secondary or higher education whereas among women with no education, who constitute more than half of the women surveyed, the decline was just 8.3 per cent per annum.

The analysis of the data presented above points to two trends. One is that in nearly all countries the educational composition of women has changed in a favourable way towards a more educated female population that invariably has lower fertility. The second is that fertility has declined in all education categories and in many countries, declined fastest among women with no education. Both these trends contribute to overall fertility decline and, acting together, make for a rapid decline in total fertility rates. In order to determine the relative contribution to overall fertility decline of either compositional change or changes within education categories, decompositional analysis is usually done. While this is not undertaken in this paper, evidence from an earlier study indicates that between 66 to 82 per cent of change in overall fertility could be attributed to changes in fertility within education groups (United Nations, 1995). Similar findings are reported in the paper on education by Cleland.

Type of place of residence

To the extent that fertility transition is often viewed as a diffusion process that begins from urban areas and spreads to rural areas, compositional differences and changes can result in differences in the timing and pace of fertility decline across societies or countries. Indeed, urban fertility has consistently been found to be lower than rural fertility (United Nations, 1987).

Estimates from the United Nations show a rapid increase of the world's urban population; the process of urbanization is advanced in the developed regions while in the developing regions, it is estimated that 40 per cent of the population lives in urban areas (United Nations, 2001). There is great diversity within the developing regions. Latin America and the Caribbean as a whole is highly urbanized with 75 per cent of its population living in cities in 2000. Asia and Africa are considerably less urbanized, with 37 per cent and 38 per cent, respectively of their populations living in urban areas. The process of urbanization is expected to continue in all regions of the world. Given the large differentials in total fertility according to residence these developments will have an impact on fertility trends.

Data from 19 demographic and health surveys show that except for Egypt, the proportion of women living in urban areas has increased in all countries (table 10). The most rapid increase in urban-resident women occurred in Bolivia, Jordan and Morocco, while the smallest increase was observed in Bangladesh, the Dominican Republic, Ghana, Indonesia and Peru. In only five of the 20 countries (Bangladesh, India, Indonesia, Kenya and Nepal) is the proportion of women living in urban areas less than 30 per cent.

Recent data show total fertility rates that are lower among urban women by at least one child compared to rural women (table 11). The exception is Indonesia, where there is virtually no difference in the average number of births per woman between urban and rural women. The trends in fertility decline by urban and rural residence show that compared to women in rural areas, faster declines in fertility occurred among urban women in Bangladesh, Bolivia, Ghana, Morocco and the Philippines (table 12 and figures VI, VII and VIII). On the other hand, fertility declined faster among rural than urban women in Egypt, Indonesia, Kenya, Turkey and in all Latin American and Caribbean countries, excluding Bolivia but including Guatemala, the only country where fertility increased among urban women.

In Africa, urban-rural fertility differentials have widened over time in Ghana and Morocco, narrowed in Egypt and remained unchanged in Kenya (figure VI). In Asia, the more rapid decline in urban fertility in Bangladesh and the Philippines has widened the gap between urban and rural fertility while the faster fertility decline among rural women in Turkey has narrowed it (figure VII). In Latin America and the Caribbean, the difference between urban and rural fertility has narrowed in all countries with trend data except Bolivia where it increased by more than one child per woman from around the mid-1980s to the mid-1990s, a result of declining urban fertility and unchanged rural fertility (figure VIII). The narrowing gap between rural and urban fertility in Latin America and the Caribbean can be attributed to the faster decline in rural than urban fertility. Nonetheless, some of the widest urban-rural fertility gaps—of at least two children per woman—still persist in Bolivia, Guatemala, Haiti, Nicaragua and Peru in spite of the region's larger proportions of urban residents compared to other developing regions.

The data presented above show that in most countries fertility has declined both among urban and rural women. In some, the fastest decline occurred among urban women, while in others, fertility declined fastest among rural women, even as greater urbanization occurred. This suggests the presence of other factors, in addition to urbanization, in determining the pace of fertility decline within residential strata, factors such as the use of contraception. In countries such as Egypt, Indonesia and Kenya with low proportions of urban women, but where contraceptive use in rural areas is high (36 per

Table 12
Annual percentage decline in total fertility rates by educational level and place of residence, selected countries

	Period of survey		Highest educational level			Residence		
Region and country	Earlier	Later	No education	Primary	Secondary/ higher	Urban	Rural	All women aged 15-49
Africa								
Egypt	1992	1995	-18.0	-19.8	- 3.5	- 4.6	-25.9	-16.3
Ghana	1988	1998	-11.1	-11.7	0.4	-22.0	-14.5	-17.4
Kenya	1989	1998	-19.2	-21.4	-16.6	-19.8	-20.9	-22.3
Morocco	1987	1992	-31.7	-51.9	-48.4	-45.1	-34.2	-42.7
Asia								
Bangladesh	1994	1997	- 8.3	-17.9	-13.6	-23.5	-12.3	-13.6
India	1993	1999	-14.9	-15.5	-18.9	-20.5	-18.0	-18.8
Indonesia	1987	1997	- 8.3	- 7.2	- 2.4	- 6.1	- 6.2	- 6.1
Philippines	1993	1998	0.9	- 7.0	- 2.6	- 9.4	- 3.1	- 6.7
Turkey	1993	1998	-18.1	-10.5	-19.2	-17.5	-18.7	-18.4
Latin America and Caribbean								
Bolivia	1989	1998	9.4	- 2.1	- 2.9	- 6.7	1.1	- 7.6
Brazil	1986	1996	-19.0	- 5.5	- 1.4	- 8.3	-17.9	-11.4
Colombia	1986	2000	- 9.0	- 4.1	- 1.1	- 3.1	- 8.6	- 5.2
Dominican Rep	1986	1996	- 6.2	- 6.8	- 1.1	- 3.7	- 9.7	- 5.9
Guatemala	1995	1999	1.2	1.8	6.7	8.4	- 5.0	- 0.1
Peru	1986	2000	-13.8	- 7.6	- 4.1	- 6.8	-16.2	-10.3

Source: Demographic and Health Surveys.

cent in Kenya and above 50 per cent in Egypt and Indonesia), fertility declined fastest in rural areas. The same is true of countries in Latin American and Caribbean countries that have large proportions of urban populations and high contraceptive usage in rural areas (above 30 per cent in all countries). The effect of compositional change seems to have diminished as was shown in a study of six Latin American and Caribbean countries where only 15 per cent of marital fertility decline was attributable to compositional differences (Rodríguez, 1996).

CONCLUSIONS

This paper focused on 74 countries with intermediate levels of fertility in 1995-2000. For the past three decades, fertility has been declining in all those countries with the pace of decline varying according to their level of fertility. Countries at the upper end of the fertility range generally had a faster pace of decline than those at the lower end. Indeed, in several countries, fertility decline appears to have tapered off. Most of those countries have fertility rates of below 3 children per woman but there are others, such as Bangladesh, Egypt and India, all large countries, with total fertility rates between 3 and 3.5 births per woman, where declines in the recent past have been slow or non-existent. The patterns of change in age-specific fertility rates suggest that older women contributed most to declines in fertility. However, in countries of Northern Africa and Western Asia, postponement of marriage appeared to be a major contributor to fertility decline.

While there are a host of factors that influence fertility outcomes and the pace of fertility decline, this paper focused on a selected few: age at marriage, contraceptive use, education and urbanization. There is strong evidence of rising age at marriage in all countries but the impact of postponement of marriage on total fertility is most evident in the Northern African and Western Asian regions. Contraceptive use has been increasing and has reached a medium to high level in the great majority of countries, with at least 50 per cent of women of reproductive age who are in a union using contraception. Countries that reached high prevalence in contraceptive use during the last decade are also countries that recorded the fastest fertility declines over the period 1970-2000. Despite these high levels, the majority of the countries still have high levels of unmet need for contraception implying a potential for further fertility decline if the need were met.

In the past decades, many countries have become increasingly urbanized and have seen considerable improvements in the educational attainment of women. Both these developments foster and sustain trends towards low fertility. More educated women tend to postpone marriage in order to continue their education and to gain experience in the workplace and therefore also postpone childbearing. They are also more likely, and usually the first group, to use modern methods of contraception. Thus, fertility rates among women with higher levels of education are usually lower than rates among women with no education. To the extent that most family planning programmes better reach urban women, fertility among urban women tends to be lower than that of rural women. In the countries covered in this paper, both education and residence are strongly related to the level of fertility. Women with higher education have fewer children than those with no education and urban women tend to have lower fertility than rural women. Thus, continuing urbanization and increasing educational attainment alone would ensure a continuation of decline in fertility to moderately low levels. The analysis also suggest that declines in fertility facilitated by compositional changes were reinforced by declines in fertility in all education and residence groups, including among women with no education and rural women, as the innovative behaviour of educated and urban women spread. In many countries, total fertility rates among women with no education had a faster pace of decline than that among those with secondary or higher education.

Findings from this study suggest that in countries that have started the demographic transition and are currently experiencing intermediate levels of fertility, fertility is likely to continue to decline and complete the transition, albeit at a slower pace of decline when nearing replacement level. This is predicated on the assumption that the factors affecting fertility levels continue the trends documented above, that is, an increasingly widespread use of contraceptive methods, a further improvement in women's educational attainment, and a continuing shift towards later marriage among women.

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Family structure and fertility trends in intermediate-fertility countries in West Africa

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Sub-Saharan Africa has entered the second phase of the demographic transition, that of a gradual decline in fertility. The decline in mortality began in the early 1930s, and started to pick up speed some 20 years later. It is only since the mid-1980s, however, that the second phase, a decline in fertility, has become evident in some of the countries of sub-Saharan Africa. The decline was first observed in three countries where surveys were conducted under the Demographic and Health Survey (DHS) programme—Botswana, Kenya and Zimbabwe. These initial declines were attributable principally to a change in behaviour on the part of the minority of women living in urban areas who had received several years of schooling. Gradually, however, the decline spread to more countries and into rural areas in some countries. The data compiled by Joseph and Garenne (2001) on the basis of world fertility surveys (WFS) and demographic and health surveys found that most countries in sub-Saharan Africa are seeing a decline in fertility to some degree.

FERTILITY IS DECLINING IN MOST COUNTRIES IN SUB-SAHARAN AFRICA, BUT MORE SLOWLY IN WEST AFRICA

Every new survey has confirmed that sub-Saharan Africa has embarked on a new phase of the demographic transition, although in many countries only the very earliest signs of this change are evident. Table 1 summarizes the trends that have been observed everywhere that two or more sets of results are available from different demographic and health surveys. The overall trend towards a decline in fertility is apparent, although the speed of the decline varies from country to country. It is barely perceptible in the countries of the Sahel, it is pronounced in southern Africa, and it is evident in varying degrees from country to country in East Africa and West Africa. Within countries, all the data show that the decline in fertility varies greatly depending on where a woman lives and her level of schooling.

Of the 17 countries for which reasonably comparable data are available, obtained in separate surveys, only three—Ghana, Kenya and Zimbabwe—have thus far seen their total fertility rate (TFR) fall below 5 children per woman, placing them in the category of intermediate-fertility countries. In addition to these countries where the trend is identifiable, there are also other countries for which only a single recent set of data is available, but which on the basis of that set of data can also be categorized as intermediate-fertility countries. These are South Africa (3.1 children per woman in 1995-1998), Botswana (4.9, in 1988), Comoros (4.6, in 1996) and Gabon (4.5, in 2000). These figures should be viewed with some caution because TFRs in sub-Saharan Africa are nearly always determined on the basis of WFS/DHS surveys which include a random margin of error. The calculation method (based on the last three years or the last five years of observations prior to the survey) can also cause the TFR to vary, and hence alter the list of intermediate-fertility

Table 1
Trends in the total fertility rate (*TFR*)* in those countries of sub-Saharan Africa for which data are available from at least two separate surveys

	WFS (1977-1982)		DHS (1986-1989)		DHS (1990-1994)		DHS (1995-1999)	
Country	Year	TFR	Year	TFR	Year	TFR	Year	TFR
West Africa and Central Africa								
Ghana	1979/1980	6.5	1988	6.4	1993	5.5	1998	4.5
Cameroon	1978	6.3	—	—	1991	5.8	1998	5.2
Nigeria	1981/1982	5.9	—	—	1990	6.0	1999	5.2
Côte d'Ivoire	1980/1981	7.4	—	—	1994	5.7	1998	5.2
Togo	—	—	1988	6.4	—	—	1998	5.4
Guinea	—	—	—	—	1992	5.7	1999	5.5
Senegal	1978	7.1	1986	6.6	1992/1993	6.0	1997	5.7
Benin	1981/1982	7.1	—	—	—	—	1996	6.3
Mali	—	—	1987	6.9	—	—	1995/1996	6.7
Burkina Faso	—	—	—	—	1993	6.9	1998/1999	6.8
Niger	—	—	—	—	1992	7.4	1998	7.5
East Africa and Southern Africa								
Zimbabwe	—	—	1988/1989	5.3	1994	4.3	—	—
Kenya	1977/1978	7.9	1989	6.7	1993	5.4	1998	4.7
United Republic of Tanzania	—	—	—	—	1991/1992	6.5	1996	5.8
Zambia	—	—	—	—	1992	6.5	1996	6.1
Rwanda	1983	8.5	—	—	1992	6.2	—	—

Sources: World fertility surveys (WFS) and Demographic and Health Surveys (DHS).
* Calculation of the TFR is based on a period of 1 to 59 months prior to the survey.

countries. In this paper we have used the TFR figures calculated on the basis of the last five years prior to the survey.

The situation in West Africa varies widely, from Ghana, where the decline since 1988 has been sufficiently pronounced to place the country in the category of intermediate-fertility countries (a drop from 6.4 children per woman in 1988 to 4.5 in 1998), to the Sahelian countries—Mali, the Niger and Burkina Faso—where, apart from urban areas, fertility rates have remained essentially unchanged. However, in addition to Ghana, there are at least three other countries along the coast of the Gulf of Guinea that have seen a sharp decline in fertility in recent years: Cameroon (which, strictly speaking, is considered part of Central Africa), Côte d'Ivoire and Nigeria. In their most recent DHS surveys (conducted in 1998 in Cameroon and Côte d'Ivoire, and in 1999 in Nigeria), these three countries had a TFR of 5.2 children per woman, indicating a decline on the order of one child per woman in Cameroon and Nigeria over the past 20 years, and a decline of nearly two children per woman in Côte d'Ivoire. To these four countries may be added a fifth, Togo, which is not far behind with a TFR of 5.4 children per woman and a decline of about one child per woman during the 10-year period from 1988 to 1998. These are the countries with which this paper will be chiefly concerned.

HOW CAN THE INFLUENCE OF FAMILY STRUCTURE ON FERTILITY BE ANALYSED?

This is a region where the fertility of women and men alike has long been highly valued, as evidenced by social norms expressed in specific family arrangements: a preference for large families, the care of children being the responsibility of all adults in the extended family (through the practice of *confiage*, or placing of children in the care of others), marriage for women at a young age and polygamy (Lesthaeghe, 1989). There can be no doubt that the recurring economic crises affecting these countries and the benefits of the social changes that have nevertheless been achieved since independence are profoundly changing patterns of family life, and hence behaviour relating to fertility.

In Africa, the relationship between family structures and fertility takes many forms, and probably different forms in each society. The same result, a decline in fertility, may come about in response to different combinations of factors, particularly those relating to patterns of family life. The intermediate variables of fertility, marriage, contraception, birth spacing and abortion (Bongaarts, 1978) are dependent on the family norms and values that each society holds dear. There is no automatic correlation between the variables that determine family structure and fertility; the correlation may be strong in one context and negligible in another. There are five areas, however, where the synergy between them is particularly evident (Locoh, 1995):

(*a*) Marriage and the constraints placed upon the marriage partners in contracting marriage. These include the age of partners and conditions of marriage (dowry, contributions of labour, etc.), choice of an acceptable partner, the possibility of divorce and remarriage and the corresponding norms.

(*b*) Rules of residence. These determine, on a day-to-day basis, the control that elders are able to exert over young people, collabour ation by consent or by obligation, and the independence of young people, particularly young couples vis-à-vis the elders. These rules also determine cohabitation arrangements between spouses.

(*c*) Definition of responsibilities in matters of reproduction. This area refers to collabour ation in regard to the rearing of children within a family group (the practice of the *confiage* of children, for example), responsibilities of fathers and mothers in caring for children and, lastly, the intergenerational responsibilities that determine the costs and benefits of having children.

(*d*) The conditions under which individuals gain independence from their families. This relates in particular to women who, in patriarchal societies, were supposed to remain under the control of elders and of their husbands. This area also includes the rights and obligations of each person with respect to the members of their birth family and the members of the family into which they marry.

(*e*) Passing on of values. This area is concerned with the way in which being brought up within a family group has a bearing on the opinions, attitudes and behaviour of the members of that family group, and hence their fertility.

In this paper we shall examine only a few of these questions, having to do with areas on which data are available from the surveys that have been conducted, specifically: marriage arrangements, living arrangements, the sharing of responsibilities in matters of reproduction and the processes by which individuals gain their independence.

There are still only a few countries in West Africa that can be categorized as intermediate-fertility countries, and they have attained this status so recently that it is difficult to take proper stock of the reasons. In our view, it is more important to look at trends in behavioural changes that may lead to a decline in fertility than to examine fertility levels at any given moment. For that reason, we are focusing only on countries for which there have been at least two observations and hence two separate sets of data during the past 15 years and, in order to assess the correlation between family changes and a decline in fertility, we shall compare countries that have a TFR of less than 5.5 with countries in the same region that have a higher TFR.

MARRIAGE ARRANGEMENTS

The example of the swift decline in fertility seen in North Africa is often cited in the context of possible scenarios for Africa's future. Fertility in North Africa was brought under control by delaying marriage, combined with further reinforcement in the form of maintaining very strong social constraints on access to sex. In addition to that constraint, which centred on marriage, family planning programmes were instituted—at different times in different countries of the Maghreb, but very early on in Tunisia—to reduce fertility within marriage by making contraception available to couples. A further factor which bolstered family-planning projects undertaken over the years was the low rate of marriage breakdown (Ben Salem and Locoh, 2001).

In West Africa, all the indicators suggest that fertility is being brought under control in other ways. For now, neither constraints on access to sex and marriage nor accessible methods of contraception are the main factors influencing changes in fertility. It is nevertheless evident that marriage is being somewhat delayed, particularly for women, which reflects a decline in the family's influence over marriage decisions. Other indications (a slight decline in polygamy, an increase in the number of informal unions and an increase in the rate of marriage breakdown) suggest that the West African marriage systems that had hitherto favoured a high level of fertility are being challenged.

Delay of marriage

Data from over 40 years of African statistics (Hertrich, 2001; table 2) have recently revealed that, everywhere in Africa, people, and especially women, are marrying somewhat later. Looking at roughly the same 20-year period, we see that the median age at first marriage rose in Kenya from 19.8 years in 1979 to 20.9 years in 1998, and in Zimbabwe from 19.5 years in 1982 to 20.6 years in 1994. The countries of Southern Africa show a much more spectacular change, reminiscent of the changes seen in the Maghreb. The median age at first marriage in South Africa rose from 25.2 years in 1980 to 28.2 years in 1996, and in Botswana from 26.1 years in 1981 to 28.2 years in 1996. The figures for Swaziland were 31.6 years in 1986, and for Namibia 26.8 years in 1992. In these countries, marriage is no longer the rule and migration is having a profound effect on the formation of unions. If one compares high-fertility countries with intermediate-fertility countries, it is evident that the latter have, by and large, seen the median age of women at their first marriage rise more quickly.

West Africa remains a region where people marry young and women bear children at an early age. According to the latest surveys, the proportion of women who marry before their eighteenth birthday ranges from 30 per cent in Togo to 77 per cent in the Niger. The proportion of women who have borne a child before their eighteenth birthday ranges from 23 per cent in Togo to 50 per cent in Guinea. It is in the intermediate-fertility countries—Cameroon, Togo and Nigeria—that the proportion of women bearing children at an early age has fallen the most during the last 10 years (see table 3). The lowest figure for the subregion (20 per cent) was observed in Ghana in 1998. The median age of women at their first marriage is also beginning to rise: for example, in Ghana from 19.2 years in 1979 to 20.6 years in 1998, and in Cameroon from 17.3 years in 1978 to 19.4 years in 1998. This trend is less evident in the countries of the Sahel, except for Senegal where fertility is only starting to decline even though the age at first marriage has risen sharply (from 17 years in 1978 to 20.6 years in 1997; see table 2).

Narrowing of the age difference between spouses, and initial signs of a decline in polygamy

This rise in the median age of women at marriage is accompanied by a smaller rise in the median age of men at marriage. It is not surprising, then, that the age difference between spouses when they marry is narrowing (see table 2), the age difference being an essential element in the practice of polygamy. Through its impact on the number of marriageable persons available, the narrowing of the age difference at marriage will make the practice of polygamy more difficult over the long term. The initial signs of a reduction in polygamy are already visible in West Africa. This is a new development in the area of marriage relationships, although this recent reduction still leaves the countries of West Africa ahead of the sub-Saharan countries. From DHS surveys, data are available for nine West African countries showing the change in the proportion of wives whose husbands practise polygamy in 1990 and 1998 approximately (table 4). A correlation is apparent between a decline in polygamy and a reduction in fertility: in those countries where the TFR approaches the definition of "intermediate fertility", there is

Table 2
Changes in marriage indicators in countries of North Africa and sub-Saharan Africa (*TFR < 5.5*)

Country	Changes in marriage indicators					TFR circa 1998
	Median age of women at first marriage			Age difference between men and women at first marriage		
	Years in which data collected	1976 -1982	1994 -1999	1976-1982	1994-1999	
North Africa						
Tunisia	1978 and 1995	23.4	25.6	4.3	4.3	2.1 (1999)
Algeria	1977 and 1998	19.4	25.4	5.5	4.6	2.8 (2000*)
Morocco	1979 and 1997	20.9	28.0	4.7	2.0	3.0 (2000*)
Southern Africa and East Africa						
South Africa	1980 and 1996	25.2	28.2	2.1	2.5	3.1 (1995)
Botswana	1981 and 1991	26.8	28.2	4.3	2.7	4.0 (2000*)
Zimbabwe	1982 and 1994	19.9	20.4	5.0	5.0	4.3 (1999)
Kenya	1979 and 1998	19.8	20.9	5.5	4.8	4.7 (1998)
West Africa and Central Africa, TFR < 5.5						
Ghana	1979 and 1998	19.2	20.6	6.9	5.7	4.5 (1998)
Cameroon	1978 and 1998	17.3	19.4	8.8	6.8	5.2 (1998)
Nigeria	1981/1982 and 1999	18.6	19.6	?	7.6	5.2 (1999)
Côte d'Ivoire	1979 and 1994	17.3	20.2	9.3	7.4	5.2 (1998)
Togo	1981 and 1998	18.4	21.0	7.1	5.3	5.4 (1998)

Sources: Hertrich, 2001, and Demographic and Health Surveys (DHS).
* United Nations estimates.

Table 3
Proportion of women aged 20 to 24 years who have married or borne a child before their eighteenth birthday

Country	Year of survey	Women who have borne a child before their 18 birthday		Women who have married before their 18 birthday	
		Before 1993	After 1993	Before 1993	After 1993
West Africa and Central Africa, TFR < 5.5					
Ghana	1988 and 1998	41	35	23	20
Cameroon	1991 and 1998	58	43	46	33
Nigeria	1990 and 1999	52	40	35	28
Togo	1988 and 1998	43	30	30	23
West Africa and Central Africa, TFR ≥ 5.5					
Guinea	1992 and 1999	67	64	49	50
Senegal	1992/1993 and 1997	48	36	34	26
Burkina Faso	1992/1993 and 1998/1999	62	62	31	33
Mali	1987 and 1995/1996	79	70	46	46
Niger	1992 and 1998	83	77	53	46

Source: Demographic and Health Surveys (DHS).

Table 4
Wives whose husbands are polygamous as a percentage of married women, West Africa (*two most recent surveys*)

Country	Years	Wives whose husbands are polygamous (*percentages*) Circa 1990	Circa 1998	TFR Circa 1998
TFR < 5.5				
Ghana	1988 and 1998	28	23	4.5
Cameroon	1991 and 1998	38	33	5.2
Nigeria	1990 and 1999	41	36	5.2
Côte d'Ivoire	1994 and 1999	38	35	5.2
Togo	1988 and 1998	52	43	5.4
TFR ≥ 5.5				
Guinea	1992 and 1999	50	54	5.5
Senegal	1992 and 1997	48	46	5.7
Burkina Faso	1993 and 1999	51	55	6.8
Mali	1987 and 1998	45	44	6.7
Niger	1992 and 1998	36	38	7.5

Source: Demographic and Health Surveys (DHS).

clearly a reduction (in Ghana, Cameroon and Nigeria, and also in Togo). However, one out of three wives in Nigeria and two out of five wives in Togo still have polygamous husbands. In contrast, three countries where fertility has not begun to decline have seen a slight increase in the proportion of wives whose husbands are polygamous (Guinea, Burkina Faso and the Niger).

UNIONS THAT ARE LESS STABLE, INCREASED FREQUENCY OF MARITAL BREAKDOWN

With the crisis that has overtaken Africa's economies, consensual unions of uncertain legal status have grown in number, whether because they represent less of a commitment between partners who are determined to maintain their independence, or because the traditional steps in the marriage process, particularly the paying of a dowry, are too costly. At the same time, more marriages are breaking down and ending in separation or divorce as a result of both the economic crisis and women's growing independence, given that it is usually women who take the initiative in ending a marriage (Locoh, 1994). Other reasons for the increasing frequency of marital breakdowns are situations in which husbands and wives must live apart owing to migration and the fact that informal unions are less robust. It is even becoming less common for widows to be looked after by their husbands' families. The tradition of *lévirat*, in which a man takes the widow of his deceased brother as his wife, is maintained only in those rural societies that have remained true to their traditions. Consequently, there is a tendency for women to be without partners for longer periods, and in the long run this cannot fail to have some effect on fertility. The AIDS epidemic also plays a role in separations. It is more common for women to be widowed at a young age, and separations are more frequent when one partner learns that the other is HIV-positive.

Living arrangements

A reduction in household size is often mentioned as a possible indicator of a change in family patterns, of a trend towards nuclear family units, which would foster a reduction in fertility. To date, no clear trend in this direction has been observed. In North Africa, the reverse is seen in Algeria. The average number of persons per household has held steady, owing to a severe housing shortage, while fertility has declined. Even in West Africa, whether in spite of or because of economic problems, extended households are still common, with several generations living together under the same roof. This arrangement in which different generations look after one another helps older family members maintain control over young couples and on occasion gives rise to conflicts over opinions and values, particularly in the highly sensitive area of fertility choices.

Another type of household structure very common in the countries of the West African coast is one in which women are heads of household. This may reflect a situation in which a polygamous husband does not share the same dwelling with the wife, or one in which the woman is able to provide for herself and her family and is living independently. Those West African countries where fertility has started to decline are also those where women heads of household are commonplace or where the proportion of women heads of household has increased during the interval between two surveys conducted in the early 1990s and late 1990s (except in Togo). In Ghana, no fewer than 35 per cent of households are headed by women, while in Togo the figure is 28 per cent. This serves as an indicator both of women's capacity for independence and of the frequently precarious situation in which they find themselves when they assume their family responsibilities (see table 5). Many women pay dearly for living independently in this way, but they also gain certain advantages in the form of financial autonomy and psychological independence in a world that officially remains highly patriarchal. Women heads of household are mainly to be found in urban areas (unlike the situation in East Africa where they are mainly to be found in rural areas).

SHARING OF RESPONSIBILITIES IN MATTERS OF REPRODUCTION

Care of children by extended families

Until now, responsibility for the care of children has not fallen solely to their biological parents. Members of the extended family, consisting of grandparents, aunts and uncles, and other relatives, have traditionally assisted in rearing children through the practice of *confiage*. For other adults to look after the children of other family members has always been one way for families to cope with health crises and protect children if their parents should die. This is what is happening with the AIDS epidemic. Not only grandparents,

Table 5
Proportion of households headed by women, by place of residence, circa 1990 and circa 1998

Country	Years of surveys	Households in rural areas (*percentage*)		Households in urban areas (*percentage*)	
		Circa 1990	Circa 1998	Circa 1990	Circa 1998
TFR < 5.5					
Ghana	1988 and 1998	30.7	35.4	38.3	34.9
Togo	1988 and 1998	24.8	22.1	28.9	29.9
Cameroun	1991 and 1998	16.8	20.7	25.8	19.9
Nigeria	1990 and 1999	12.9	16.2	18.6	18
TFR ≥ 5.5					
Senegal	1986 and 1997	8.8	13.1	25.7	19.7
Mali	1987 and 1996	14.4	7	11.6	18.4
Niger	1992 and 1998	7.9	12.9	15.3	15.5
Burkina Faso	1993 and 1999	5	5	15.5	12.8

Source: Demographic and Health Surveys (DHS).

but also aunts and uncles, and older brothers and sisters, are taking in children whose parents have died. Moreover, it is not only children who have been orphaned that circulate among relatives' households: this is a fairly widespread practice that helps the child identify with his or her extended family rather than just his or her biological parents. In Senegal, for example, nearly 25 per cent of all children under 15 years of age are placed in the care of a household other than that of their biological parents; for children between 10 and 14 years of age, the figure is 35 per cent. Over one recent 11-year period, the proportion of children under 15 years of age placed in the care of other households in this way remained fairly stable, declining only slightly from 27 per cent in 1986 to 25.5 per cent in 1997 (Vandermeersch, 2000).

While this practice of *confiage* helps the burden of child-rearing to be shared, it does so at the cost of depersonalizing the relationship between biological parents and their children, and hence lessens their comprehension of their responsibility as parents. If people's desire to have a large number of children should wane, it is to be expected that this will be accompanied by a strengthening of the relationship between parents and their children and hence a decline in the practice of placing children in the care of other family members. Even though some households in urban areas are now trying to withdraw from the practice of rearing children born to other relatives, it is a practice that still remains quite common and is proving resistant to change, even where fertility has declined. In Cameroon, for example, the figure stood at approximately 22 per cent both in 1991 and in 1998.

A sharp division between the rights and responsibilities of husband and wife

In West Africa, conjugal life is characterized by a lack of mutual commitment between husband and wife (Fapohunda and Todaro, 1988). This is commonly manifested by a separation of assets, of farming income or of wages, polygamy without co-residence, and informal unions without cohabitation. Moreover, all adults have other mutual commitments to respect in addition to those linking them to the biological families that they themselves have created. Everyone, male and female alike, must throughout his or her lifetime render assistance to his or her elders, and these responsibilities may compete with providing for the welfare of his or her children. The roles of men and women in bearing the costs of child-rearing are quite distinct. Women take care of the essentials of day-to-day life (feeding and clothing their children), while men defray certain major expenses that arise from time to time (ceremonies, school tuition fees and health costs). These demarcation lines between areas of responsibility shift occasionally. In some cases, a man may see his traditional "dominant" role challenged as a result of economic reversals that prevent him from earning a living, such that, against his will, he finds his position within society and within the family undermined. Consequently, the woman's earnings become the household's sole income. In these situations, men and women are forced to review their choices in regard to both earning a living and rearing children, and to adopt strategies that may focus on each of them as an individual or on both of them as a couple, as the case may be; here, decisions regarding fertility are of prime importance. As well, the AIDS epidemic is disrupting the adoption of common strategies by husband and wife. In the case of a couple in which both partners learn that they are HIV-positive, it is very rare for them to be able to move forward and make decisions together (Hassoun, 1997).

Emergence of couples more deeply committed to one another

It is evident that some young adults are adopting a lifestyle that is centred more on affection between husband and wife and joint responsibility in child-rearing. Couples of this sort are to be found among educated young city-dwellers, those that might be considered the emerging middle class. They set specific objectives for their children in terms of health, education and professional success, and consequently, in the present situation of severe economic crisis, they have fewer children. It is within this group that one sees the strongest convergence of opinions and behaviours regarding fertility. They see the need for family planning and are able to make effective use of methods of contraception. They have adopted a new family model based on a small number of children, and they generally have access to methods of contraception which they are able to use appropriately thanks to their level of education. The fertility levels for capital cities in West Africa (2.9 children per woman in Lomé, 3.1 in Yaoundé and Douala, 3.4 in Abidjan and 2.7 in the Greater Accra district) attest to the changes taking place, which are attributable in part to this segment of the population.

The last DHS survey in Ghana highlighted the convergence of husbands' and wives' desires regarding the number of children they have, and a consistency in their responses concerning decisions about contraception (Andro, 2001). This contrasts with the situation in the countries of the Sahel, where there is very little agreement between husbands and wives and where only the husbands' views carry weight in determining whether or not contraception is used (Andro and Hertrich, 2001).

PROCESSES BY WHICH INDIVIDUALS GAIN THEIR INDEPENDENCE

Changes in intergenerational dependency relationships and the erosion of traditional constraints on marriage have been accelerated by migration to the cities. In rural areas, these constraints continue to weigh heavily, but in urban areas, even in situations where several generations live together under the same roof, freedom for young people is starting to become the norm and their ability to get around parental constraints is growing. This is particularly evident in the case of young people who have gone to school and managed to get jobs that give them their own income. Parents continue to be consulted, but any opinions or instructions they give, whether about marriage or how many children a couple should have, are much less likely to be heeded.

In the context of fertility, the issue of independence in making individual choices relates not only to relations between old people and young people but also, and more important, to relations between men and women. The structure of the power relationships between men and women has a direct impact at all levels on how reproduction is dealt with at the social level. In Nigeria, for example, one study showed that the economic independence of women had a positive effect, all else being equal, on their practice of family planning (Kritz et al., 2000). Indeed, the system of gender relations acts as much at the level of each individual in regard to his or her own reproductive strategies as it does at the level of society in general in regard to the reproductive models that society favours. In other words, the gender relations within a society determine, on the one hand, the means for decision-making between a man and a woman in regard to fertility and, on the other hand, the social conditions of the processes that surround procreation (pregnancy, birth, child-rearing). The negotiation between husband and wife as to the number of children they wish to have is closely dependent on the structure of these relations between men and women; and this will be the decisive factor during this period of transition and change in family aspirations (Bankole, 1995; Andro and Hertrich, 2001).

In certain West African countries, women have managed to achieve a remarkable level of independence in regard to labour and productive work, and this has enabled many of them also to maintain great freedom to move about and even to set up house in separate dwellings, which is a situation very different from other societies in the Third World. In the area of fertility, however, the scope of their freedom has been limited, and for many remains limited, to the period following childbirth when they can insist on waiting for a while before resuming sexual relations. They have very little ability to limit the number of children they have owing to family pressures and the lack of contraceptive services. Much remains to be done in this area. This situation explains why, in those countries that were the first to witness a decline in fertility, such as Cameroon and Ghana, it was more often because child spacing increased than because contraceptive methods were used. The fact that a decline in fertility on the order of two children per woman was achieved in Ghana over a period of 20 years despite the fact that only 11 per cent of women were using modern contraceptive methods in 1998 (see table 7) shows clearly that fertility can be brought under control by a wide variety of means, as was the case in Europe where the fertility transition took place well before the existence of modern methods of contraception. It is also to be expected that, as contraception becomes more widely available, this will cause the fertility rate to fall even faster, given that up to now the decline in fertility has been achieved by traditional means, and in urban areas by clandestine abortions which have been increasing rapidly in number (Desgrées du Loû et al., 1999).

WILL WEST AFRICA SEE A RAPID DECLINE IN FERTILITY?

A comparison of Cameroon and Tunisia

Will the sub-Saharan countries, particularly those in West Africa, that have experienced a decline in fertility of one to two children per woman after having TFRs on the order of six to seven children per woman up to 1980 now evolve quickly towards a level of fertility just sufficient to replace the present parental generation? Drawing lessons from other countries' experience may be one way to predict future trends. For instance, it is tempting to compare the countries in West Africa with those in North Africa, which are much farther along in the process of declining fertility and have, each at its own pace, in little more than a single generation moved from a high level of fertility of more than seven children per woman to a strictly controlled level of barely two children per woman in 2000 (Ouadah-Bedidi and Vallin, 2000). In Nigeria, Côte d'Ivoire and Cameroon, the TFR in 1998 was 5.2 children per woman, exactly the same level as in Tunisia 20 years earlier. That is simply a numerical coincidence (particularly in view of the margin of error inherent in TFR calculations based on survey data). But still, looking ahead to 2020 or so, does it suggest that we should expect a fertility level of two children per woman in the countries of West Africa in 20 years' time?

The societies of sub-Saharan Africa ascribe great importance to a series of family patterns and norms that are very different from, if not diametrically opposed to, those which are highly valued by the societies of the Maghreb. Entry into marriage, first sexual experiences, mutual commitment between spouses, the status of women and the workings of family life are all factors that have different effects on fertility trends between the two regions. The norms that govern family ideals are also embodied in social and demographic policy. They serve to widen the gap between the countries of North Africa and those of West Africa. For purposes of comparison, we shall take Tunisia and Cameroon as examples, given that Cameroon had in 1998 the same TFR that Tunisia had in 1978 (see table 6).

Modern-day Cameroon is less urbanized (39 per cent) than Tunisia was in 1978 (52 per cent), and the differences in TFR according to the place of residence are greater. On the other hand, the level of literacy is higher among the female population in Cameroon (65 per cent of females over six years of age, versus 39 per cent in Tunisia in 1978); and yet, in Tunisia 20 years ago, fertility had already declined even among illiterate women, whereas this has not yet happened in Cameroon where illiterate women have, on average, 6.6 children. In Tunisia 20 years ago, the difference in fertility rates between illiterate women (TFR = 5.5) and women with secondary-school education (TFR = 2.9) was smaller than the difference in 1998 in Cameroon. As well, for each level of schooling, the fertility level in Cameroon is on average higher than in Tunisia. If one looks only at these two variables that have traditionally been used to explain fertility, the differences

Table 6
Comparison of Tunisia (1978) and Cameroon (1998)

Rate	Tunisia 1978	Cameroon 1998
Total fertility rate (TFR)		
Overall TFR	5.2	5.2
TFR, urban areas	4.45	3.9
TFR, rural areas	6.06	5.8
TFR, no schooling	5.52	6.6
TFR, primary school	4.16	5.3
TFR, secondary school	2.87	3.6
Mean age at first marriage	**23.9 years**	**20.2 years**
Percentage unmarried		
15 to 19 years of age	94.6	64.2
20 to 24 years of age	56.3	26.4
25 to 29 years of age	19.9	10.9
Percentage of women in conjugal or informal unions who practise modern contraception		
Overall, 15 to 49 years of age	34.0	7.1
Urban areas, 15 to 49 years of age	38.3	13.1
Rural areas, 15 to 49 years of age	15.7	4.9
Overall, 20 to 24 years of age	16.0	5.3
Place of residence and level of education		
Per centage of the population living in rural areas	52	69
Per centage of females over six years of age who are illiterate	61	35

Sources: Tunisian fertility survey, 1978 (ONAPO, 1982), and Demographic and Health Survey, Cameroon, 1998.

in fertility rates in Cameroon today are greater than the corresponding differences were in Tunisia.

But above all, there are two intermediate factors where the difference between the two countries is striking: age at marriage and the use of effective contraception. Women in Cameroon marry at a much younger age: in 1998, 36 per cent of Cameroonian women 15 to 19 years of age were married, whereas in 1978 only 6 per cent of Tunisian women in this age group were married. Similar differences are evident for the 20-to-24-year and 25-to-29-year age groups. Consequently, the mean age at first marriage was three years higher in Tunisia in 1978 (23.9 years) than in Cameroon in 1998 (20.2 years). Marriage practices played a major role in the swift reduction of the fertility rate in Tunisia and throughout the Maghreb, particularly because child-bearing outside marriage carries a stigma and occurs very rarely. In Cameroon, in contrast, women were still marrying at a relatively young age in 1998, although there has recently been a rise in the age at first marriage. Because of the tolerance in Cameroonian society for child-bearing prior to or outside marriage, an increase in the age at marriage has much less impact on reducing fertility in Cameroon than in Tunisia.

There are also clear differences in behaviour between the two countries in regard to the use of modern contraceptive methods. With the same fertility level (5.2 children per woman) in both cases, 34 per cent of married Tunisian women were using contraception in 1978, whereas only 7.1 per cent of married Cameroonian women were doing so in 1998, or barely one fifth as many. For young married women in the 20-to-24-year age group, the proportion of Tunisian women using modern contraceptive methods in 1978 (16 per cent) was three times the proportion of Cameroonian women doing so in 1998 (5.3 per cent). In Tunisia, even as early as 1978, a relatively high proportion of women were using modern contraceptive methods within marriage thanks to a family planning programme that had been in place since the early 1970s and that was strongly supported by the Government (Gueddana, 2001). It is only in the past 10 years that a programme of this kind has received official support in Cameroon (Locoh and Makdessi, 1996). Thus far, it has managed to provide only a few items of equipment and has extended only very tentatively beyond urban areas. The proportion of married women in Cameroon using modern contraceptive methods in 1998 was barely one fifth the proportion of Tunisian women doing so in 1978.

This comparison provides several indications as to how the transition is made from a high-fertility rate to a fertility rate that is held in check. How is it that very limited use of modern contraception, combined with marriage at a young age, even though the age has risen slightly, have nevertheless produced in Cameroon a fertility level identical to the level in Tunisia in 1978? The answer lies in birth spacing, achieved by breastfeeding children for a longer time and abstaining from sexual relations for a longer period following childbirth. A further factor, though probably one with a limited impact, is the fact that abortions have recently become available. Two other points should be borne in mind: on the one hand, girls' level of education is higher in Cameroon, which could result in the fertility rate declining faster in the future; but on the other hand, Cameroon is a less urbanized country, and the health infrastructure in rural areas in particular falls far short of that which existed in Tunisia in 1978; that is something which could significantly impede the spread of modern contraceptive methods.

DISCUSSION AND OUTLOOK

As outlined above, family structures in West Africa have seen rapid change and it is still not clear what the consequences will be for decisions as to how many children people will have and for the control of fertility. For young adults in today's world, having a family that will assure the stability and security of its members is something that will become more and more difficult to achieve. What behaviours will they adopt regarding fertility? Very likely they will want to have fewer children; they may practise contraception, although still only tentatively, and will probably make more frequent use of clandestine abortion; and there will probably be less respect for duties and obligations towards the extended family, which may or may not be superseded by greater respect for mutual commitments between husband and wife. This future for the younger generations is filled with uncertainty. Some will move towards the North African model of tightly controlled fertility, although probably without matching its age at marriage, and involving other methods as well, with contraception being used alongside traditional birth-spacing methods. Others, especially in rural areas, while seeing the sense in having a small family, will find it difficult to do so owing to strong social pressures and the widespread use of traditional birth-spacing methods given that modern contraception is so difficult to obtain.

So far as aspects of marriage are concerned, the fact that people's age at marriage is beginning to rise has only a modest impact on the start of people's reproductive life, given the widespread permissiveness that exists regarding young people's commencement of sexual relations. It is among the better-educated and city-dwellers that the birth of a first child can be most effectively controlled. But beyond its impact on the fertility timetable, the delay of marriage and/or the start of reproductive life that we are beginning to see has a more diffuse effect, although certainly just as important an effect, on young people's (and especially young women's) ability to establish a sense of self, by allowing them a period of life between childhood and adulthood when they can assert their independence. The more time young people have to gain a certain degree of independence, the more likely they are to want to participate in decisions that concern them, particularly decisions concerning marriage and whether to practise contraception within marriage. As marriage evolves in this way, the distance evident in relations between husband and wife in societies where the age gap is large—in which the husband's dominance is reinforced by the fact that he is older—will likely diminish.

Within the context of conjugal life, two contrary movements which are usually manifested in different milieux may both be conducive to a decline in fertility: first, an increase in women's independence, reinforced by the tradition of separation of assets and of earnings, and second, a strengthening of the mutual commitment between husband

and wife. In some milieux, the fact that wives are more independent to the point of living apart may contribute to keeping fertility more closely in check. In other milieux, the emergence of couples who have stronger bonds between them and share common goals and aspirations for their children will result in their deciding to reduce the number of children they have. In the latter case, greater use of methods of contraception may be expected. In Ghana, for example, there has been an increased convergence of attitudes of husbands and wives in favour of contraception.

Overall, the proportion of women utilizing contraceptive methods remains very low, even in the most "advanced" countries (see table 7): 11 per cent in Ghana and just over 8 per cent in Nigeria, Cameroon and Togo. This is very far from the situation in Tunisia in 1978 (34 per cent) used in our illustration. If the fertility rate is declining somewhat in West Africa, it is more as a result of traditional birth-spacing methods, or temporary separations, or marriages in which husband and wife do not live together, all of which are strategies that women know how to use in order to control the number of children they have. Contrary to what has happened elsewhere, the use of contraceptive methods is growing only slowly, and women in particular still have relatively little say in the matter. To be sure, the desire to control fertility is strengthening among educated city-dwellers; but there has been little progress made in rural areas, whether in connection with family and marriage constraints or with facilities and information.

One of the changes likely to come about is a decline in polygamy, partly as a result of the economic and social progress made during the first 20 years after independence, and partly because the economic crisis makes it more difficult to establish and maintain several wives, at least in urban areas. Such a development may reflect a preference on the part of some adults for a monogamous union in which the two partners are committed to one another, and for a growing number of women it certainly reflects their choice to be head of household (possibly with a partner who is not their legal husband) rather than live in a polygamous marriage with other co-wives. It is also likely that women who are widowed or divorced will feel less compelled to remarry.

The impact on fertility of a decline in polygamy will not be clear-cut. At the individual level, the most detailed studies have shown that polygamy has not had a significant effect on a woman's fertility, all else being equal (particularly the woman's status) (Effah, 1999). Where women in polygamous marriages have fewer children, this is the result of selection: there are more infertile women or women of low fertility in such marriages, and there are more women in second or third unions whose husbands may not have such a strong desire for more children. It is at the group level that the impact on fertility of a

Table 7
Present-day utilization of modern contraceptive methods by women 15 to 49 years of age, according to the most recent Demographic and Health Studies

Country	Year of survey	Percentage of women using contraception	TFR	TFR, capital cities or urban areas
TFR < 5.5				
Ghana	1998	10.8	4.5	Greater Accra district (2.7)
Cameroon	1998	8.0	5.2	Douala and Yaoundé (3.1)
Nigeria	1999	8.9	5.2	Urban areas as a whole (4.5)
Côte d'Ivoire	1999	9.8	5.2	Abidjan (3.4)
Togo	1998	7.9	5.4	Lomé (2.9)
TFR ≥ 5.5				
Guinea	1999	4.9	5.5	Conakry (4.0)
Burkina Faso	1999	5.8	6.4	Ouagadougou (4.0)
Senegal	1997	7.0	5.7	Urban areas as a whole (4.3)
Mali	1996	5.0	6.7	Bamako (4.7)
Niger	1999		7.5	Niamey (5.2)

Source: Demographic and Health Surveys (DHS).

decline in polygamy should be felt, in two ways: (*a*) if there is less inclination to be polygamous, this reduces the fluidity of the marriage market and the likelihood that all or nearly all women will be exposed to the risk of conceiving; and (*b*) if there is an increase in polygamous unions without co-residence, which are not recognized by the families or are recognized only to a limited degree, this reduces the families' ability to exert pressure on a wife who possesses limited status to fulfil her "duty" to have children, while at the same time the wives, who may have to support their families entirely on their own, may be more strongly motivated to limit the number of children they have.

The desire to have a great many children is not as widespread today as it was 20 or 30 years ago, but the demographic and health surveys conducted in West Africa have found that, most often, the desired number is four or more children. Of women who have three children alive, only a very small proportion say that they want to have no more, even in countries that we have considered intermediate-fertility countries. From 1988 to 1998, the proportion of such women increased sharply in Ghana, from 13.7 per cent to 36 per cent, and more modestly in Togo. Everywhere else, the proportion of such women has held fairly steady and has remained below 15 per cent (see table 8).

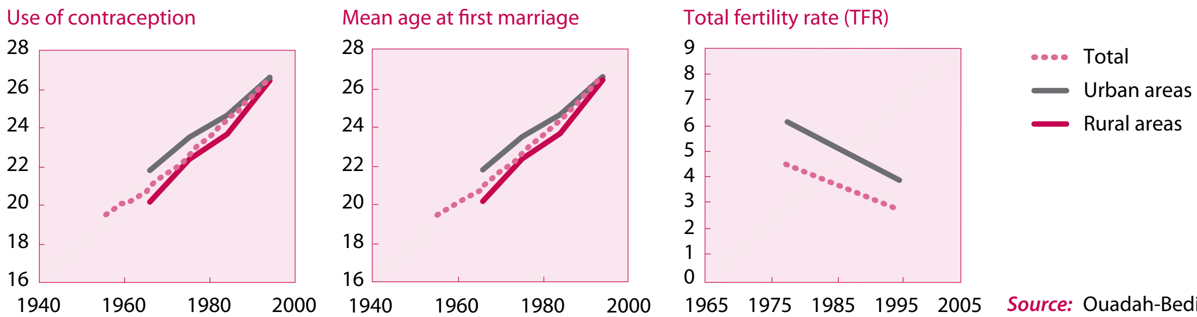
The situation may be expected to evolve differently in urban and rural areas, given that rural areas are routinely left behind when it comes to community facilities, health centres (which are the main locations where family planning advice is dispensed), schools, enterprises that create paying non-agricultural jobs, and so on. The economic crisis is helping to speed up the pace of behavioural change in those milieux which are already inclined to adopt new family-life practices because they are engaged in the modern world; but most of Africa's rural population remains beyond the reach of such changes. Even so, according to surveys conducted in 1998 and 1999, in the three intermediate-fertility countries (Ghana, Cameroon and Nigeria), fertility rates in rural areas are approaching five children per woman. Reducing the disparities between urban and rural areas will be one of the main challenges to achieving a swift reduction in fertility. That is what was accomplished in Tunisia, where the differences between rural and urban areas in regard to age at marriage, use of contraception and especially fertility have been virtually erased (see figure I). As for the capital cities of the countries along the African coast, no data are available for Lagos alone, but the TFR for all of Nigeria's urban areas as a whole is close to 4.5 children per woman. However, in Douala and Yaoundé, Accra, Lomé, and Abidjan, the TFR is very close to the range of two to three children per woman (see table 7). Everything indicates that this decline will become more widespread. The motivation is there, the resources are still severely lacking and, sadly, abortion is do-

Table 8
Women with three children alive, who wish to have no more

Country	Year of surveys	Women with three children alive, who wish to have no more: Circa 1990	Circa 1998	TFR circa 1998
TFR < 5.5				
Ghana	1988 and 1998	13.7	36.1	4.5
Cameroon	1991 and 1998	7.5	9.8	5.2
Nigeria	1990 and 1999	8.8	11	5.2
Togo	1988 and 1998	13.6	22	5.4
TFR ≥ 5.5				
Burkina Faso	1993 and 1999	12	11	6.8
Guinea	1992 and 1999	10.8	12.8	5.5
Niger	1992 and 1999	5.8	4.8	7.5
Senegal	1992 and 1997	9	9.1	5.7
Mali	1987 and 1996	14.6	10.6	6.7

Source: Demographic and Health Surveys (DHS).

Figure I
Historical trends in the use of contraception, mean age at first marriage and total fertility rate (*TFR*), 1970 to 1995



Source: Ouadah-Bedidi, 2002.

ing much harm when instead contraception should be made more widely available. In rural areas, however, the future remains highly uncertain. In a country such as Togo which has suffered total economic and political collapse and where the health-care infrastructure is woefully inadequate, one wonders whether women will be able to keep their fertility under control, even though more and more of them wish to do so, and at what cost to their health.

Ghana seems to be the country that is closest to the end of its cycle of declining fertility. Ghana's fertility remained unchanged until 1985 or so, in spite of an explicit policy to limit demographic growth and in spite of (or perhaps because of) a lengthy period of economic depression. Once the political and economic situation became more favourable, the fertility rate dropped (by an average of two children per woman from 1988 to 1998).

Looking forward, the desire in sub-Saharan Africa to keep fertility in check sits at the nexus of two contrary and upsetting groups of forces: those brought on by growth and the beginnings of what is called development (in particular, a decline in mortality, easier access to education, upgrading of community infrastructure and the emergence of a wage-earning class), on the one hand, and those brought on by the economic collapse of the 1980s (the loss of urban jobs, the increase in financial difficulties affecting day-to-day life, the emigration of skilled young people, deteriorating infrastructure, the end of free education, and so forth (Coussy and Vallin, 1996), on the other. As a result of urbanization and advances in health and education, new relationships have started to develop between old and young, between husbands and wives. Couples of a new sort, and in some cases women heads of household, have come to have new aspirations for their children. Moreover, increasing economic constraints and shortages have driven home the importance of having fewer children. It is at this nexus of the progress achieved during the growth years from 1960 to 1975 and the hardships of the economic crisis, which have only gone from bad to worse, that West Africans have taken to heart the need to keep their families small. Four main factors are converging to convince people that it is worthwhile not to have so many children: (*a*) an erosion of the ideals that centre on having a large family; (*b*) the resulting number of women who are able to run their families and provide for them on their own; (*c*) the advent of young adults who have been educated; and (*d*) the emergence, in some milieux, of couples that are more deeply committed to one another.

A generation from now, will West Africa have adopted as the norm the notion that a family should have only two or three children? It is unlikely for the countries of the Sahel, which are only now at the starting point of their fertility transition. It is quite conceivable in all the capital cities of the countries along the African coast, but much less likely in rural areas and medium-sized cities and towns unless the essential facilities are provided soon in the areas of health (especially reproductive health), education and employment. When a decline in fertility becomes visible in the statistics, it is the result of family changes long at work beneath the surface. This is what happened in Ghana and it is probably what is happening in other countries. This is why, in order to prepare for future developments in fertility, it is important to keep watch on indicators of family structure such as age at marriage, polygamy rates, the proportion of women who are heads of households, the proportion of children who do not live with their biological parents, and the extent to which men and women agree on the use of contraception.

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Education and future fertility trends, with special reference to mid-transitional countries

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INTRODUCTION

Of all the indicators of socio-economic status, schooling has been most widely used by demographers. Education of adults persistently emerges as the single most powerful predictor of their demographic behaviour. Thus, length of schooling is associated with the start of reproductive life (age at marriage and maternity), with childbearing and the use of birth control, and with mortality. Until the late 1970s, the pervasive influence of educational background of individuals and couples on a range of demographic outcomes was thought by many researchers to reflect the close link between extent of formal schooling and material circumstances; schooling was typically taken to be an indicator of socio-economic status, and interest in its association with fertility and mortality was correspondingly diluted. The turning point was the publication of results from a survey in Nigeria that showed the schooling of mothers to be a more powerful predictor of child survival than economic characteristics of the family, such as the father's occupation (Caldwell, 1979) together with an extensive review of the educational-fertility relationships that came to similar conclusions (Cochrane, 1979). Subsequent research has confirmed that the schooling of the mother is generally a more decisive influence on reproduction than characteristics of the father.

Advocacy of better schooling for girls as a means of achieving lower mortality and fertility has become embedded in the ideology of major international organizations such as the World Bank and the United Nations Population Fund. It also emerged as one of the major themes of the 1994 International Conference on Population and Development. Yet empirical support for the view that the enhancement of women's schooling is critical for fertility reduction is neither as strong nor as universal as is often implied, and the links between schooling and fertility are not clearly understood (United Nations, 1987). The relationship between women's schooling and fertility—and particularly the effect of a modest amount of schooling—is highly context-specific, varying by region of the world, level of development and time (Jejeebhoy, 1995). It may also be affected by cultural conditions, particularly by the position women occupy in the traditional kinship structure.

The main purpose of this paper is to identify the implications of past and projected changes in the educational composition of populations for the future course of fertility in countries that have now entered in the mid- and later phases of fertility transition, broadly defined here in terms of total fertility in the range of three to five births per woman. Of critical importance is the speed of future decline and the level at which reproduction will stabilize. The ideal requirements for successful achievement of this purpose are: a theory of fertility transition that specifies the role of schooling as a determinant in the context of other determinants; clear documentation of the statistical associations between schooling at individual and aggregate levels, across space, time and phase of fertility transition; an understanding of the intervening pathways that link schooling to fertility outcomes; and a reasonably accurate forecast of future trends in schooling.

The mere enumeration of these desiderata, together with the abundance of empirical evidence that has been accumulated in the 50 years, dictate a need for this paper to be highly selective both in terms of issues and evidence. The approach will be to attempt to synthesize features and understanding from studies of the recent past and then to apply them, in a necessarily speculative way, to the future. The issues, or desiderata, will be taken in reverse order.

CHANGING EDUCATIONAL COMPOSITION

Two components of educational composition of a population are potentially relevant to fertility: the composition of the school-age population and the composition of the population in the reproductive ages. Considering the first of these, school enrolments may transform intergenerational relationships by raising the direct costs of childbearing, reducing their availability for household production and allowing parents to invest in the quality of offspring at the expense of quantity (Becker, 1991; Caldwell, 1982). The effect of children's schooling on the reproductive aspirations and behaviour of parents has been neglected by researchers. Some of the rather meagre evidence is positive (e.g. Caldwell, Reddy and Caldwell, 1985; Axinn, 1993;) but one cross-national study failed to find any link between primary school enrolment and fertility (Tan and Haines, 1984) and demographic trends in such countries as Bangladesh and Nepal show that high (or even moderate) enrolments are not a necessary precondition for fertility decline.

For the purposes of this paper with its focus on mid- to late transition, consideration of possible effects of primary and secondary school enrolments on the fertility of the parental generation is not a top priority for two reasons. First, mass schooling is already well established in most, though not all, countries that have recorded appreciable fertility decline and it is doubtful that further increases in enrolment would exert any appreciable influence in reproduction. Indeed, fertility transition in sub-Saharan Africa is proceeding in the presence of declining enrolments. Second, most authors have argued that the advent of mass schooling acts primarily as a catalyst for the onset and early phase of fertility transition, a relationship that is largely irrelevant to the countries under consideration here.

Past improvements in literacy and education of the adult population are well documented and will not be discussed here. Future changes in the educational composition of the adult population may well be more relevant to the course of fertility over the next few decades than trends in school enrolment and retention, though, of course, one is merely the longer term consequence of the other. A recent paper by Lutz and Goujon (2001) provides succinct regional projections of educational composition to the year 2030. Two projections are made. The first assumes a continuation of recent enrolment ratios—the constant scenario—together with projections of fertility, mortality and migration trends that follow the IIASA central scenario (Lutz, 2001). The second projection assumes that all regions experience linear improvement in their school enrolments that will bring them to the current levels of North America by 2030. Though not explicitly stated by the authors, this "American" scenario presumably represents the upper bound of possible outcomes while the "constant" scenario perhaps captures a more realistic future. Certainly a comparison of primary and secondary enrolments in the 1980s and 1990s suggests that no major improvements occurred in most low-income regions (United Nations, 1995a). An alternative stance would be to extrapolate past recent rends in enrolments but this exercise is beyond the scope of this paper.

The results of the projections by Lutz and Goujon are summarised in table 1 for the adult female population for the three regions that contain the majority of mid- and late-transition countries: North Africa, Latin America, West Asia and South Asia. One striking point to emerge is the length of the time lags involved. Even under the optimistic 'American' scenarios, the educational composition of the adult female population does not change radically over the next 30 years. The biggest change concerns the percentage of women with tertiary education, which is projected to rise from about 10 per cent in three of the four regions to nearer 20 per cent. However large proportions of women in 2030 will still fall into the no schooling or primary schooling categories: over 60 per cent in South Asia, over 40 per cent in North Africa and West Asia and over 30 per cent in Latin America.

Of course, age-specific projections are required to document in detail the possible implications of changes in educational composition for future fertility. If attention were to be restricted to prime childbearing ages—say 20 to 35 years—larger projected improvements in educational composition would be obtained than for the entire adult population aged 15 or more years. But even such age-specific projections, if based on realistic assumptions about future trends in schooling, would probably fall below the 'American' scenario.

In summary, four key points emerge from this brief discussion. First, the multistate life table methods used by IIASA can be routinely applied to project the educational composition of countries and regions. Second, the assumptions used by IIASA could probably be improved to develop a central or most likely scenario, lying somewhere between the "constant" and "American" scenarios (except in sub-Saharan Africa, perhaps). Third, age-specific projections are needed to spell out possible demographic implications. Fourth, the results of such further refinements are unlikely to challenge the impression given by table 1, namely that adult populations in low-income regions indeed will become more educated but the extent of improvement will be relatively modest, at least over a 30-year perspective.

EDUCATION AND FERTILITY: PATHWAYS OF INFLUENCE

Most of the research on education-fertility relationships has used cross-sectional surveys, in particular WFS and DHS enquiries. As will be shown in the next section, a cross-sectional perspective can be misleading because it often conveys an impression of im-

Table 1
Education composition (*percentage*) of the adult female population (aged 15+ years) for selected regions, 2000 and 2030 (projected)

	Schooling			
	None	Primary	Secondary	Tertiary
North Africa: 2000	55	17	20	8
2030 (constant)	34	21	35	9
2030 ("American")	30	17	36	17
Latin America: 2000	15	39	37	9
2030 (constant)	4	35	50	11
2030 ("American")	4	29	48	19
West Asia: 2000	34	33	23	10
2030 (constant)	25	29	37	9
2030 ("American")	22	24	38	17
South Asia: 2000	66	17	15	2
2030 (constant)	37	44	15	4
2030 ("American")	34	32	25	10

Source: Lutz and Goujon, 2001. The world's changing human capital stock: multi-state population projections by educational attainment. *Population and Development Review*, vol. 27, No. 2.

mutability, or inevitability, to relationships that evolve over time. Nevertheless, cross-sectional surveys provide valuable information on the linkages between the educational background of individuals and couples and reproductive outcomes, that may be of relevance to considerations of the future. In this section, the behavioural links will be taken first. The relationship between schooling and fertility preferences will then be discussed and finally underlying or distal causal mechanisms will be considered.

Behavioural links

No need exists to repeat in any detail the huge body of evidence concerning the effects of education on the major proximate or behavioural determinants of reproduction: sexual behaviour or its commonly used surrogate, marriage; breastfeeding and related post-partum factors; and fertility regulation. The role of postponement of marriage and maternity in fertility transitions varies greatly by region, accounting for an appreciable proportion of overall decline in many Asian and North African countries but for a much smaller proportion in Latin America. Cross-sectional evidence, most recently summarized by United Nations (1995b) and Jejeebhoy (1995) indicates that age at first marriage and first birth among women are strongly related to schooling in nearly all low- and medium-income countries, though a small exposure to schooling often has only a negligible impact. Moreover, the multivariate analyses reviewed by Jejeebhoy suggest that the relationship cannot be attributed to employment or the characteristics of the husband.

In the countries that form the focus of this paper, with total fertility below five births but above replacement level, delayed marriage, while impacting on period fertility, may have little influence on ultimate family size or cohort fertility. An issue of critical importance for fertility projections is whether or not rising marriage ages, particularly among more educated strata, will translate over coming decades into an avoidance of marriage and motherhood altogether, as has happened in many advanced industrialized countries. Thus far, this translation has not occurred. The proportions of all women aged 40 to 49 years who have never married is negligible in nearly all developing countries (Kishor and Neitzel, 1996). When disaggregated by women's education, the dominant impression is that marriage remains the norm. Among women aged 40 to 49 years with 10 or more years of schooling, the proportion never married exceeded 10 per cent in only seven out of twenty two DHSs (United Nations, 1995b). It is also true that Western Europe is unusual in having a long tradition of marriage avoidance, in contrast to most Asian and African societies where there is little evidence of any such tradition of non-marriage. Marriage and motherhood still remain almost universal in such low-fertility Asian countries as the Republic of Korea and Taiwan Province of China, though not in Japan.

The future of marriage, itself strongly influenced by education, in today's medium-fertility countries represents the single biggest uncertainty in future fertility forecasting. The topic has been badly neglected by demographers and research in this area might pay high dividends.

Consideration of the post-partum factors (lactational amenorrhoea and sexual abstinence) can be brief because their role in future fertility trends is negligible. Suffice it to say that the fertility-enhancing effects of shorter and less intense lactation and early resumption of sexual relations following childbirth, both associated strongly with schooling, are typically overshadowed by greater use of fertility regulation. For instance in 10 of 14 Asian, North African and Latin American DHSs, the average length of the interval between first and second birth was found to rise monotonically with increasing women's education (Mboup and Saha, 1998). In sub-Saharan Africa, however, the dominant impression was that birth interval lengths varied little by education, presumably a reflection of lower overall levels of fertility regulation.

The dominant behavioural pathway linking education to fertility is, of course, the use of contraceptives. With few exceptions, contraceptive use rises monotonically and steeply across schooling categories. In most countries the link takes the form of increased resort to effective modern methods, though important exceptions exist. In Bangladesh, China and India, better educated couples are less likely to be sterilized than their less educated counterparts.

In today's medium-fertility countries contraceptive prevalence is already relatively high and is expected to rise further. Thus contraceptive discontinuation, failure and switching, together with abortion, will become progressively more important determinants of fertility among sexually active women. Surprisingly, women's schooling is not a net predictor of the probability of overall discontinuation while still apparently in need of protection, nor of user or method failure (Curtis and Blanc, 1997). This is one of the few instances where schooling fails to lead to benign demographic outcomes. However, schooling is related to one crucially important element of contraceptive behaviour, namely the propensity to switch to another method after abandoning an earlier method. Curtis and Blanc (1997) demonstrate that mother's schooling is a strong net predictor of switching in four of the six DHSs examined. In the remaining two surveys, the net effect of schooling is positive but not significant at the 95 per cent confidence level.

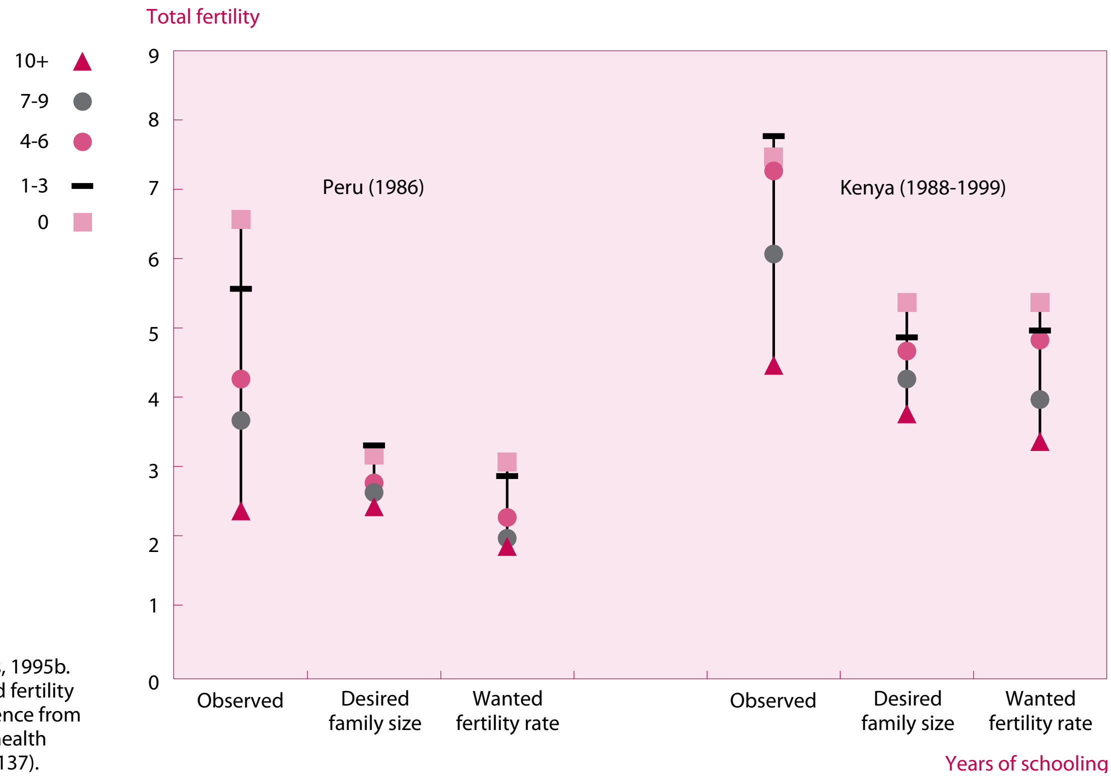
Little is known about schooling-abortion relationships because of lack of reliable data. Ongoing analysis of DHS contraceptive calendar data by Ali and Cleland at the London School of Hygiene and Tropical Medicine supports the expectation that the relationship will be positive. Using pooled data from 18 surveys, they have found that women's schooling is a net predictor of abortion following contraceptive failure. The DHS does not distinguish between induced and spontaneous abortion though it is clear that the majority of abortions following failure are induced. It is also certain that both forms of abortion are severely underreported and thus it remains possible that the educational differential simply reflects reporting error.

Links through demand for children

We turn now to fertility preferences. The dominant characterization of fertility transition is that falling demand for children in response to societal changes, including schooling, is the main driving force of changes (e.g. Pritchett, 1994). Sub-Saharan Africa conforms most closely to this perspective. The very pronatalist attitudes documented by WFS enquiries in the late 1970s and early 1980s have steadily eroded in the past 20 years and falling demand for children has typically preceded widespread uptake of contraception. In other regions, however, family size desires were always much more modest than in Africa and appear to have changed little in the first 10 to 15 years of decline. Thereafter, fertility itself and indicators of desire or demand for children have fallen in parallel. Thus implementation of pre-existing attitudes may have been primarily responsible for initiation of fertility transition in Asia and Latin America. Furthermore one plausible interpretation of the subsequent parallel decline in attitudes and reproductive outcomes is that increased acceptability of, and resort to, modern fertility regulation techniques may have acted to destabilize desired family sizes. In other words, the path of causality may not be a straightforward unidirectional one from demand to contraceptive use, but rather circular with strong feedback effects from behaviour to demand (Robinson and Cleland, 1992).

These considerations serve as a warning that our conceptualization of fertility desires and implementation of desires may be oversimplified. Nevertheless, in so far as a clear-cut distinction can be made, it is clear that implementation has made a more important contribution to fertility reductions of the past 30 years than changing demand. Feyisetan and Casterline (2000) show that changes in fertility preferences, on average, account for only one-fifth of the observed increases in contraceptive prevalence between the 1970s and the 1990s in low-income countries. Not surprisingly, this fraction is appreciably larger in sub-Saharan Africa.

Figure I
Observed fertility and desired fertility: Peru and Kenya



Source: United Nations, 1995b. Women's education and fertility behaviour: recent evidence from the demographic and health surveys (ST/ESA/SER.R/137).

Broadly the same verdict can be reached with regard to schooling differentials in fertility. While the educational background of couples is negatively associated with desired family size, differences are modest (except in sub-Saharan Africa), once appropriate statistical controls are made for age and number of living children (United Nations, 1995b). Conversely, schooling differentials in implementation (i.e., unmet need) are much wider (e.g. Westoff and Moreno, 1992). As a visual illustration, figure I contrasts actual fertility with two indicators of desired fertility for Peru and Kenya. In Peru, the variation in observed fertility by women's education is vastly greater than the variation in desired fertility. In Kenya, the same tendency is apparent, but in a much less pronounced manner.

The greater ability of more educated couples to achieve their fertility preferences should not be exaggerated. In a multivariate analysis of the probability of bearing children who were unwanted at time of conception, Adetunji (1998) found a variety of maternal education effects in 10 DHSs. In two of the three Latin American countries, the expected result was obtained: the probability of unwanted childbearing declined significantly with increasing schooling. However in two of the four African countries, and in Indonesia and Egypt, the opposite effect was found. The results for the African surveys—Ghana and Kenya, both conducted in 1993—can be explained by the fact that these two countries were in a relatively early phase of transition, a time when implementation of preferences is tentative and when unwanted fertility may rise. Moreover, as already shown, schooling is more strongly associated with the desire for smaller families in Africa than elsewhere, leaving educated couples more exposed to the risk of unwanted childbearing. The results for Indonesia (1990) and Egypt (1992) are less easy to explain, because these countries had long and well established fertility declines at the time of the surveys analysed by Adetunji. Measurement error is one possible explanation: post-facto rationalization of the 'wantedness' of recent births may be more common among the less educated.

Distal links

The research literature encompasses a multitude of possible underlying or distal pathways linking the education of individuals and couples to fertility via the proximate factors discussed above. They may be grouped into three broad and overlapping categories: cognitive, socio-psychological and economic.

The most obvious way in which schooling may influence the fertility of couples is by providing them with the means of acquiring and understanding correct information about prevention of pregnancy and childbirth. Literacy, in the narrow sense of ability to read and write, cannot be the only crucially important cognitive skill implicated. Even one to three years of maternal schooling is associated in some countries with an appreciable reduction in childbearing and this modest exposure to primary schooling is rarely sufficient to impart lasting reading and writing skills. However, even a few years at school may improve oral literacy, namely the understanding of decontextualized language (i.e., formal distanced language in which meaning resides in the words and syntax alone rather than in shared contextual understandings). The language of school teachers, health staff and mass media is decontextualized. The work of Levine and associates in Mexico, Nepal and Zambia has demonstrated that unschooled adult women are less capable of understanding radio messages on health in their native language than primary schooled women—a powerful demonstration that oral literacy skills acquired in school persist into later life in ways that might be relevant to health and contraception (Levine et al., 1991). This line of research has the immense appeal of explaining why the effect of schooling is so ubiquitous in low-income countries, despite wide variety in the quality of education and nature of curricula. Exposure to the use of decontextualized language and, at higher grades of primary school, the acquisition of print literacy are universal features of all modern educational systems. Empirical evidence certainly confirms that schooling does lead to better knowledge of contraceptive methods, how they should be used and where they can be obtained. At the same time many studies have demonstrated that lack of knowledge is not a major barrier to adoption and sustained use of contraception. Cognitive factors may be important but are unlikely to be the central pathway.

With regard to socio-psychological, as opposed to cognitive, factors that may mediate the relationship between maternal schooling and the proximate or direct determinants of fertility, the main possibilities discussed in the research literature are listed below:

- Shifts in the valuation of children;
- Greater autonomy of women in domestic decision-making, including reproductive aims and control;
- Closer identification with modern institutions (including the health-care system) and greater confidence and skill in accessing them.

The work of Caldwell in West Africa and South India suggests that schooling transmits new western values of the child-centred nuclear family which results in a greater commitment to their survival and welfare (Caldwell, 1982; Caldwell, Reddy and Caldwell, 1985). Such a transformation in values leads, inevitably, to smaller family sizes but more investment in each child—a process often termed the quantity-quality trade-off. Though immensely plausible, this thesis founders upon the fact that schooling has only a relatively modest impact on indicators of desired family size, once appropriate statistical controls are introduced.

The possibility that educated mothers enjoy greater domestic decision-making power than uneducated ones has attracted substantial research attention, particularly in the gender-stratified societies of South Asia. As women typically have the responsibility for contraception, enhanced autonomy in this regard might pay high dividends in terms of ability to control the number and spacing of children. Most ethnographic studies agree that educated mothers are accorded considerable respect and esteem but there is little agreement on the extent to which this enhanced status translates into increased decision-making power (Caldwell, Reddy and Caldwell, 1985; Jeffery and Jeffery, 1996; Zeitlyn and Islam, 1997). The potentially empowering effect of schooling may wither in the face of structural weakness—the lack of control over property or income. Furthermore, some authors have adduced evidence that a modest exposure to schooling may reinforce mainstream values of modesty and deference rather than encourage women to challenge the traditional authority of the husband and older family members.

Another set of socio-psychological mechanisms linking maternal schooling to reproductive behaviour concerns identification with modern institutions and confidence in interacting with them. Once again, the potential relevance of these factors to health-care seeking behaviour in general, and uptake of contraceptives in particular, are obvious, because it is well documented that skill and determination is often required to access adequate services in many low-income settings. The main body of evidence comes from large-scale surveys and is overwhelmingly positive. Not only are better educated couples more likely to translate the desire to postpone or limit childbearing into contraceptive practice, they are also more likely to use allopathic health services for a range of needs including ante- and natal-care, child immunization and curative care. The evidence from micro-studies is also generally positive. In West Africa, Nepal and rural South India, it has been found that educated mothers make more demands on health-care providers and receive a better quality of service.

The final possible distal pathway of influence refers to enhanced opportunity that educated mothers may have to seek paid employment, thus raising the opportunity costs of marriage and motherhood (Becker, 1991). The balance of evidence, from both cross-national and localized studies, is negative. Employment of women does not appear to be a strong predictor of reproductive behaviour in low and medium in some countries, nor can the education-fertility link be attributed to employment opportunities (United Nations, 1987).

CONCLUSIONS

Agreement can be reached on the proximate mechanisms that account for the negative schooling-fertility association that has been so widely documented in cross-sectional studies. Postponement of marriage and maternity, coupled with an enhanced propensity to translate reproductive preferences into appropriate protective behaviour, are the major pathways. The desire for smaller families represents an additional pathway, but its contribution is relatively minor, except in sub-Saharan Africa.

With regard to the underlying cognitive, socio-psychological or economic factors, agreement may never be reached, because the required research is exceedingly complex and the answers may be context-specific. The available evidence, however, suggests that the crucially important link may be the ability of an exposure to schooling to confer a closer identification with modern institutions, including the health system, and greater confidence in interacting with these institutions. This interpretative emphasis, if correct, carries important implications. It implies, for instance, that reproductive differences between better and less well-educated couples have a relatively shallow and mutable origin. As the social modernization of societies proceeds and as modern contraception and associated services evolve from something perceived as alien, unnatural and rather frightening into a normal humdrum part of everyday life, the initial "advantage" conferred by schooling will dissipate. To explore this process further, the changing relationship over time needs to be examined.

EDUCATION-FERTILITY RELATIONSHIPS OVER THE COURSE OF FERTILITY TRANSITION

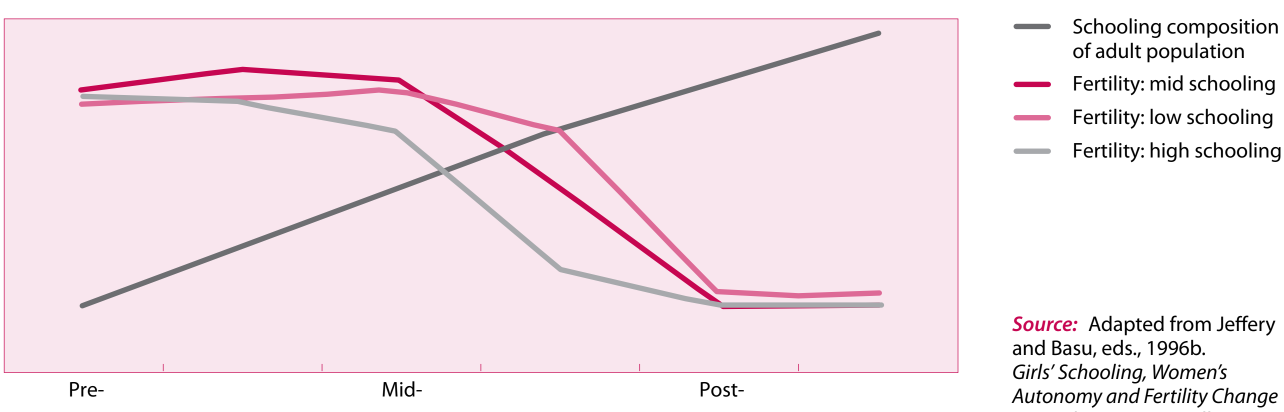
The relationship between schooling and fertility over the course of the fertility transition is depicted in figure II. Prior to the onset of decline, schooling enrolments and the educational composition typically improve. However, there is no threshold. In some countries—Bangladesh and Nepal, for instance—fertility started to decline when most of the adult population were illiterate. In others—the Philippines and Jordan, for example—the reverse was true: the majority of the population had received schooling prior to the onset of decline. As fertility transition progresses over a period of some 50 years, the educational attainment of population typically improves though again no inviolate rule applies. Fertility in some countries of East and Southern Africa continues to fall in a context of declining enrolments.

In pre-transitional societies, the link between education and fertility is weak and varied. Usually the bulk of the population has received no formal schooling, a moderate proportion has had primary schooling and a tiny elite higher levels of schooling. This latter group may record lower fertility but the fertility of the primary schooled group is often no different or even higher than that of unschooled couples. This scenario was typical of most sub-Saharan countries and the less developed states of South Asia in the 1970s and early 1980s.

As reproductive decline likes root, fertility differentials by schooling initially tend to widen, because of the staggered process of change. Childbearing declines first among the best educated and last amongst the least well educated. In the later phase of fertility transition, these differential begin to narrow until convergence is reached at the end of transition. Thus the pronounced links between schooling and fertility are a transient phenomenon, arising and then disappearing over the course of a few decades.

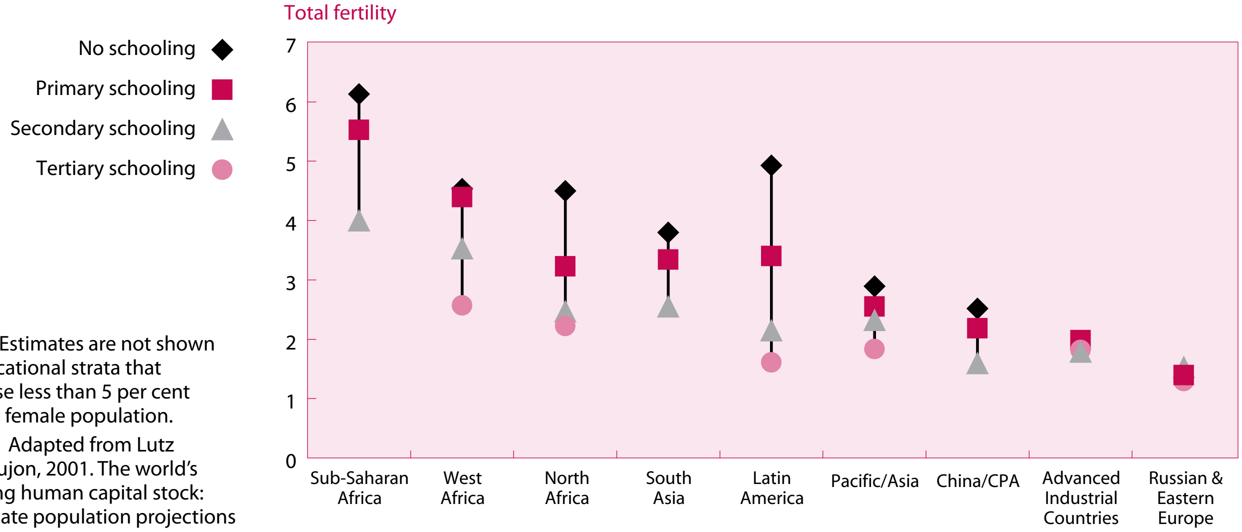
Abundant evidence supports this temporal model. Consider figure III, which shows differentials by women's schooling for selected regions, running from early and mid-transitional ones on the left to post-transitional ones on the right. The link between schooling and fertility has entirely disappeared in the two lowest fertility regions—the advanced industrialised countries of Western Europe, North America and Japan and the former Soviet block countries. Conversely, differentials are still wide in the highest fertility regions of sub-Saharan Africa, West Asia and North Africa. Latin America is the only

Figure II
An illustration of the role of schooling in fertility transition



Source: Adapted from Jeffery and Basu, eds., 1996b. *Girls' Schooling, Women's Autonomy and Fertility Change in South Asia*, New Delhi: Sage.

Figure III
Differentials in total fertility by women's education, circa 2000, for selected regions



Notes: Estimates are not shown for educational strata that comprise less than 5 per cent of adult female population.

Source: Adapted from Lutz and Goujon, 2001. The world's changing human capital stock: multi-state population projections by educational attainment. *Population and Development Review*, vol. 27, No. 2, pp. 323-339.

region that departs appreciably from the overall impression that divergences in fertility between educational strata attenuate in the later phase of transition. However, this region is not a true exception. Rodriguez (1996) demonstrated that, in the 1980s, reconvergence had already started: in this decade, marital fertility decline was smallest among couples where the wife had received secondary schooling, and largest in the group with incomplete primary schooling. Documentation of fertility trends by education in Chile between 1950 and 1980 offers convincing further support for the analysis by Rodriguez (Chackiel and Schkolnik, 1996). Latin America is unusual among regions in exhibiting exceptionally large educational differentials in fertility in the early phases of transition but these are now narrowing in accordance with the model in figure II.

Figure II suggests that improvements in the schooling of the adult population may be a relatively modest force behind fertility decline, particularly in the later phase of transition when downward trends in fertility may be more pronounced in the lower than in the higher educational strata. Table 2 shows the contribution of changing educational composition to overall decline between the 1970s and 1990s for a selection of countries. The table shows the observed total fertility rates for the 1970s, as estimated by WFS

Table 2
Total fertility trends between the 1970s and 1990s: observed and standardized by educational composition of women

	WFS		DHS			Per centage decline attributable to composition
	Date	Observed TFR	Date	Observed TFR	Standardised TFR	
Kenya	1975	8.25	1997	4.70	5.00	8
Jordan	1974	7.64	1989	5.57	6.01	21
Morocco	1978	5.90	1991	4.04	4.37	18
Turkey	1976	4.50	1992	2.51	3.02	26
Bangladesh	1973	6.08	1998	3.31	3.86	20
Philippines	1976	5.24	1992	4.09	4.78	60
Colombia	1974	4.69	1994	2.96	3.63	39
Peru	1975	5.57	1995	3.48	4.73	60

enquiries, the observed rates in the 1990s, as recorded by the DHS, and the DHS rates, standardized by the educational composition of women in the WFS. Remarkable variation in the percentage contribution to decline of changing composition is apparent. In Peru and the Philippines, 60 per cent of decline is attributable to composition, suggesting that reproductive levels within educational strata have changed rather little in those two countries. More typically, however, composition accounts for only about 20 per cent of fertility decline, clearly indicating that within-strata declines have been the dominant force of change. These results are consistent with those obtained in an earlier study which found large effects of composition in five Latin American countries but much smaller effects in two African countries (United Nations, 1995b).

CONCLUSION

The temporal perspective outlined in the preceding section offers for greater insights into the possible role of schooling in future fertility declines than the more common cross-sectional perspective. The reproductive behaviour of the best-educated elite probably does provide a sound guide for the future behaviour of the rest of the population. As so often stated, well-schooled couples represent the vanguard of change. Others will inevitably follow. Historical evidence strongly suggests that convergence between educational strata will come about as the era of fertility transition ends. There is probably no better guide to fertility forecasting at the national level than to assume that less privileged strata will follow the path of the most privileged. However, the speed with which they will follow will vary greatly between countries.

The second lesson from the temporal perspective is that detailed consideration of probably future trends in school enrolments and educational composition of the adult population and their possible impact on fertility may be a poor investment of time and resources.

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Female labour-force participation

*Lin Lean Lim**

TRENDS IN FEMALE LABOUR FORCE PARTICIPATION AND FERTILITY

One of the most striking phenomena of recent times has been the extent to which women have increased their share of the labour force; the increasing participation of women in paid work has been driving employment trends and the gender gaps in labour force participation rates have been shrinking. Especially in the 1980s and early 1990s, labour force growth was substantially higher for women than for men for every region of the world except Africa. In the developed industrialized countries, increasing female labour force participation has been linked to the completion of the fertility transition. In many developing countries, however, fertility decline has been slow or stalled.

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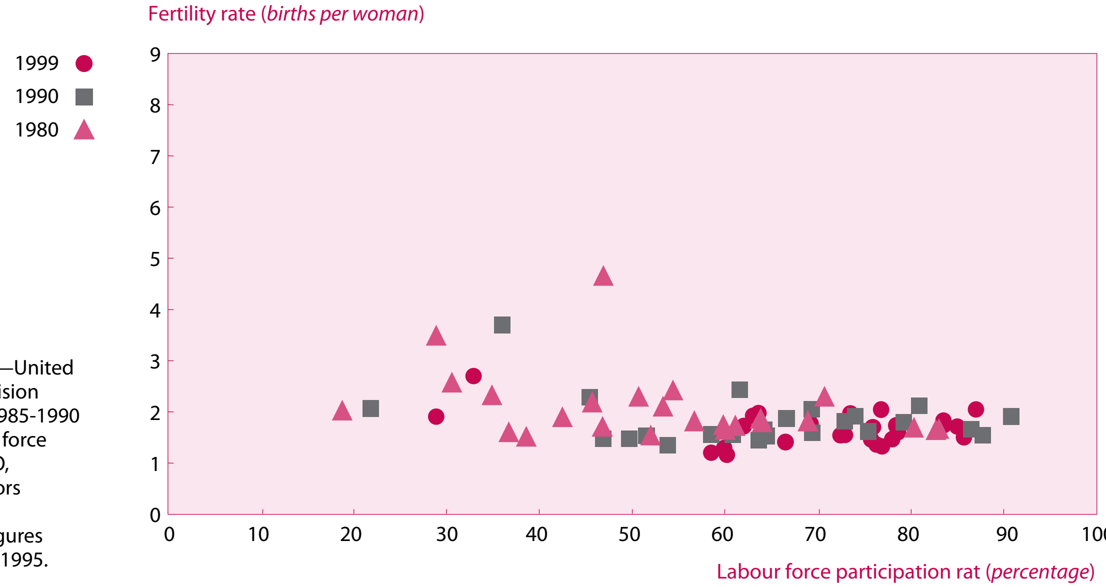
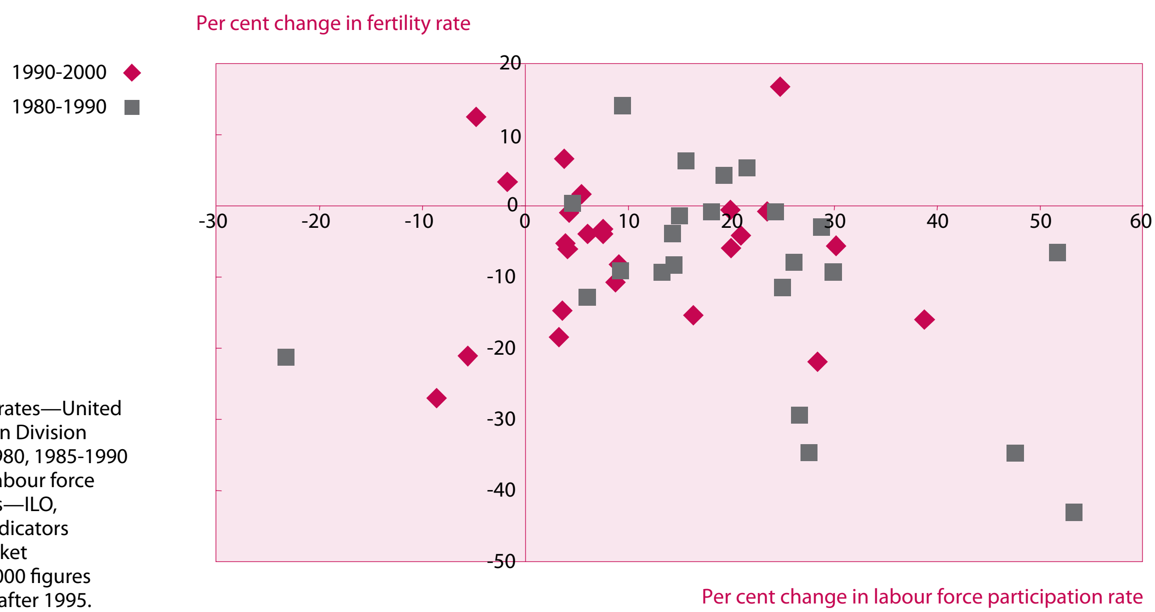
Figure Ia shows that by 1980, fertility levels in most of the developed industrialized countries were already close to or below the replacement rate of 2.1 children per woman. Labour force participation rates of women in the prime ages of 25-54 years continued to rise in the 1990s to between 60 to 85 per cent and by the turn of the century fertility was well below replacement. Figure Ib shows that the developed countries that experienced the largest increases in female labour force participation rates (FLFPRs) in the 1980s also tended to have the largest declines in total fertility rates (TFRs). By the 1990s, changes in both FLRPRs and TFRs had slowed down. In several of the transition economies in figures IIa and IIb, the economic participation of women has actually been falling, especially in the 1980s but there has been a clear decline in fertility rates especially in the 1990s, most to below replacement. In figure IIIa for the Asia-Pacific countries, there is no clear pattern between women's employment and total fertility rates. There are almost as many countries with high FLFPRs and high levels of fertility (for example, Nepal, Papua New Guinea) and as there are countries with similar high FLFPRs and total fertility rates around replacement level (for example, Democratic People's Republic of Korea and Thailand) and yet another group of countries where fertility had dropped below replacement but FLFPRs are only around 60 per cent (Hong Kong and Singapore). Figure IIIb also does not show a clear relationship between changing FLFPRs and fertility decline; Asia-Pacific countries with little increase in female participation showed sharper falls in TFRs than many of the countries with large increases in female participation. In Latin America and the Caribbean, figure IVa shows increasing FLFPR and declining fertility since 1980. Changes in both rates in figure IVb have generally been larger in the 1980s than in the 1990s. Women in the North African and Middle Eastern countries continue to have the lowest levels of labour force participation in the world but there has been a distinct fall in total fertility rates, albeit none to below replacement levels (figure Va). What is striking in figure Vb is that FLFPRs fell or changed very little in most North African and Middle Eastern countries in the 1990s but fertility continued to drop sharply. In contrast, women in sub-Saharan Africa, in figure VIa, have very high rates of female labour force participa-

Figure Ia
Developed (*industrialized*) economies, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

Figure Ib
Developed (*industrialized*) economies, females aged 25-54 years

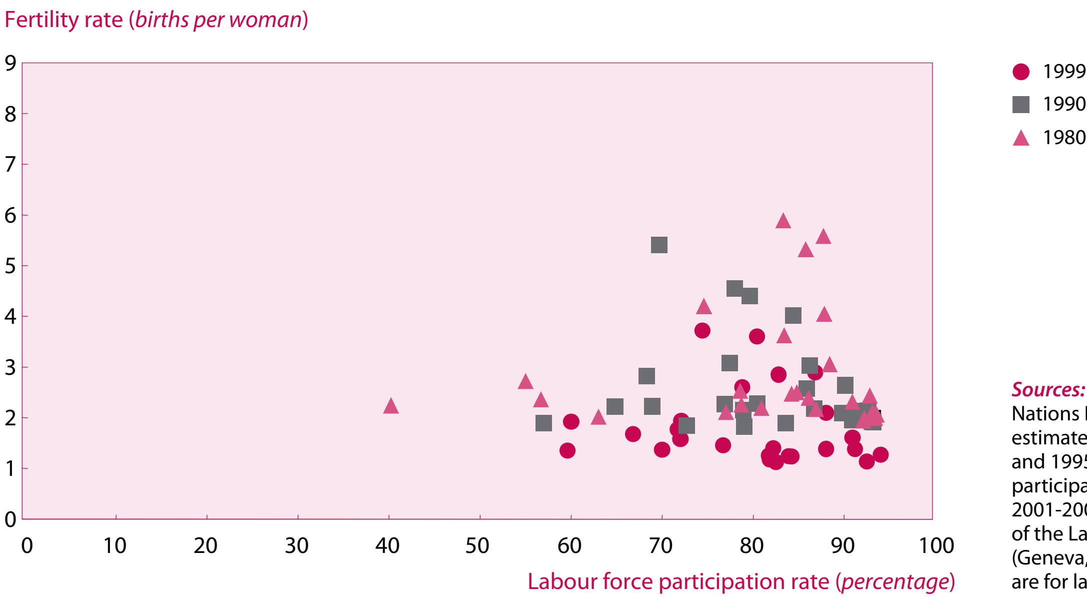


Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

tion and their fertility rates have remained high and even in the late 1990s total fertility rates were between 4 to 7 children per woman. Figure VIb shows that there has been very little percentage change in FLFPRs especially in the 1990s and the declines in TFRs have been small.

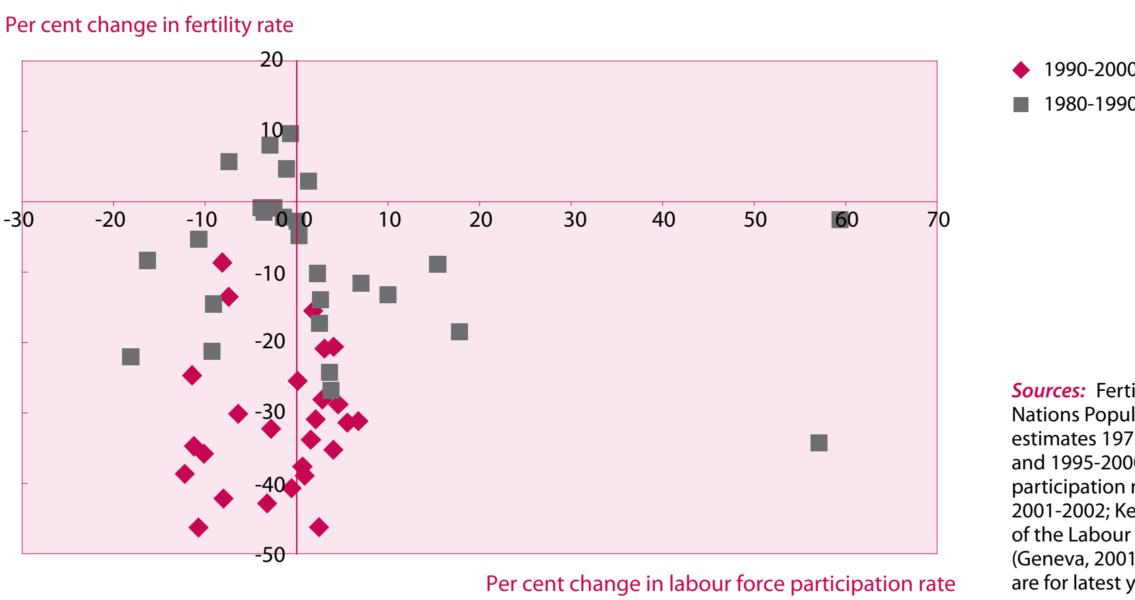
The paper examines the elusive or ambiguous relationship between fertility and women's labour force participation in those developing countries with intermediate levels of fertility (with TFRs above replacement and below 5 children per woman). Focussing on recent trends and patterns, it essentially argues that increases in labour force participation have not been matched by improvements in job quality and that the kinds

Figure IIa
Transition economies, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

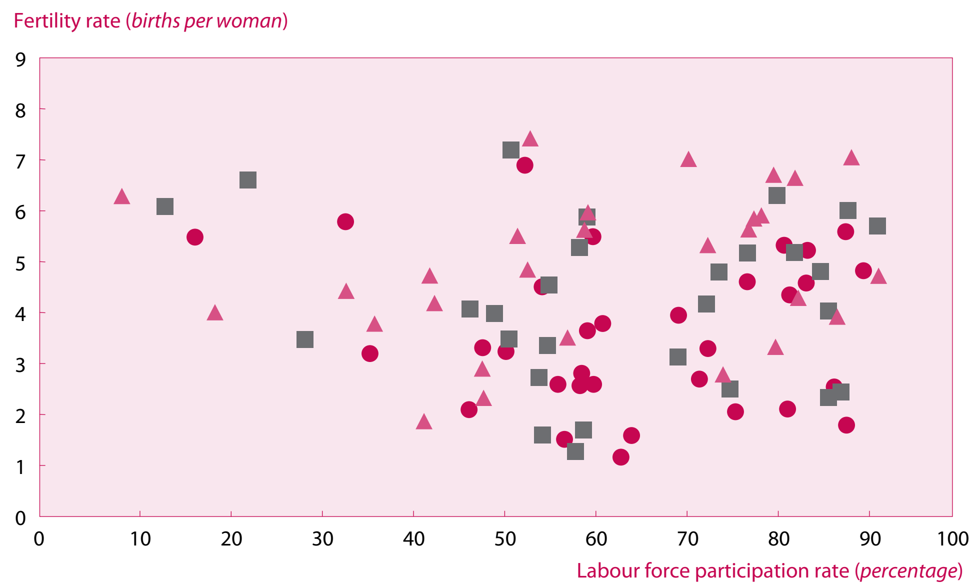
Figure IIb
Transition economies, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

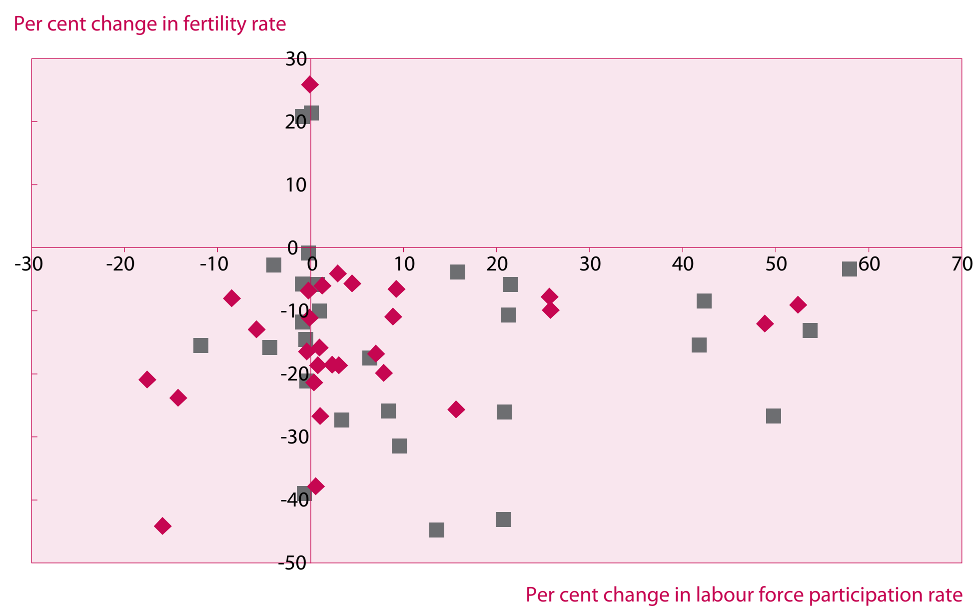
of jobs women are engaged in and their working conditions have not led to their true socio-economic empowerment, have not provided adequately satisfying alternatives to childbearing or have not involved serious incompatibility between paid and unpaid work. Other factors affecting the relationship between women's employment and fertility, such as the socio-cultural and macro-economic contexts in specific countries, are also identified. The last section attempts to address the following questions: What are the indicators of women's labour force participation and working conditions that could be useful predictors of future fertility in these countries and is their correlation likely to be strong or weak? What other contextual factors should be considered in formulating plausible assumptions

Figure IIIa
Asia and the Pacific, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

Figure IIIb
Asia and the Pacific, females aged 25-54 years



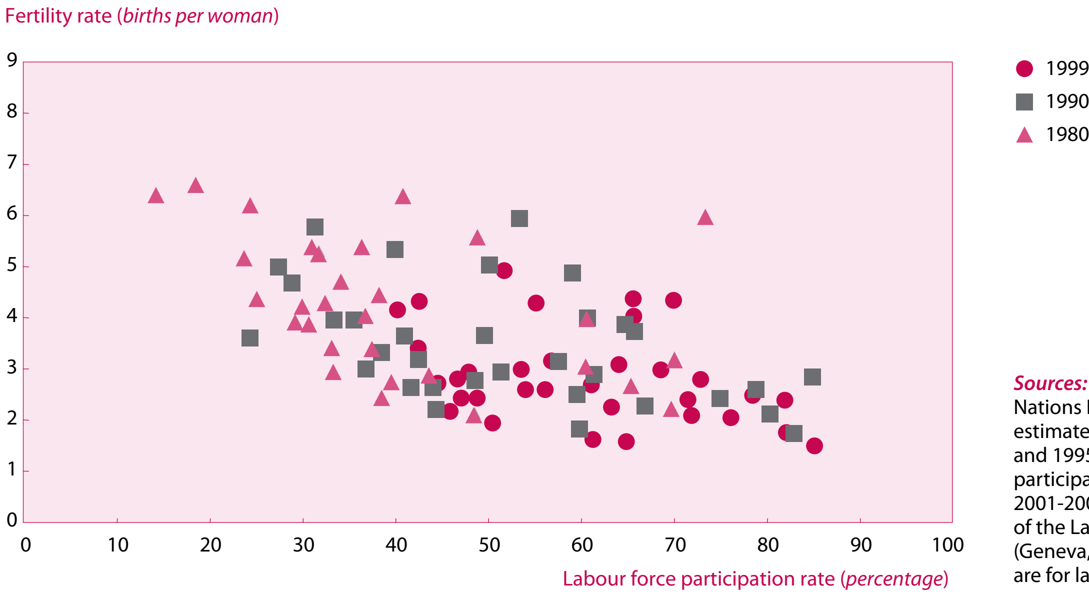
Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

on future fertility for these countries? On the basis of these suggested predictors, the paper does not foresee fertility falling to below replacement in most of these countries.

When is the relationship inverse

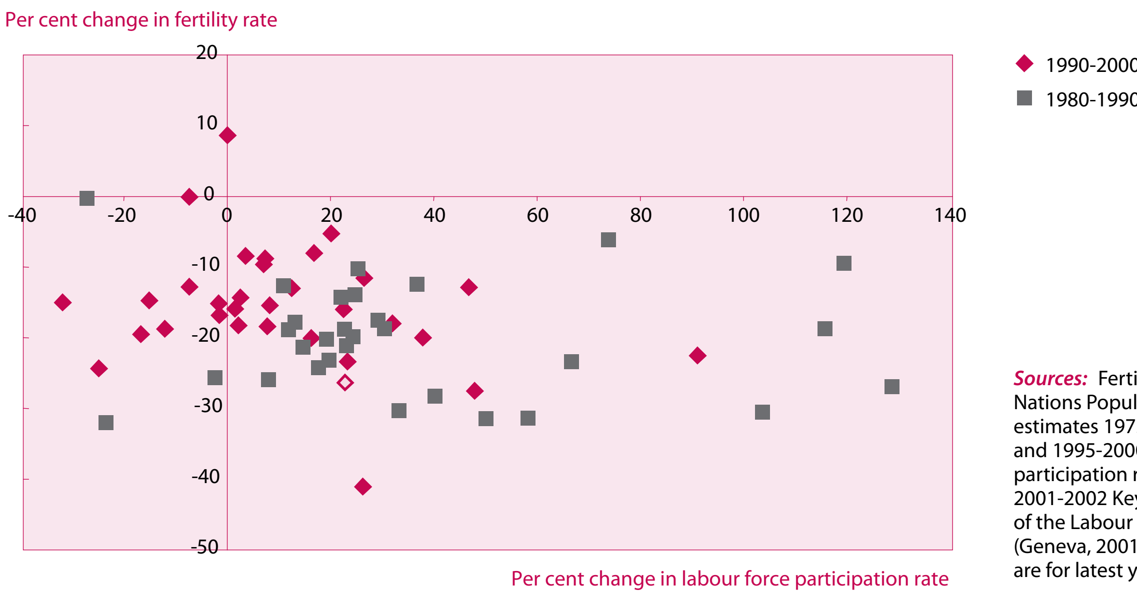
It may be useful to start by recalling some main hypotheses linking increasing female labour force participation with declining fertility and considering the nature of women's employment underlying these hypotheses. Drawing from the experience of developed industrialized countries, women's employment is likely to lead to sustained declines in fertility when:

Figure IVa
Latin America and the Caribbean, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002 Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

Figure IVb
Latin America and the Caribbean, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002 Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

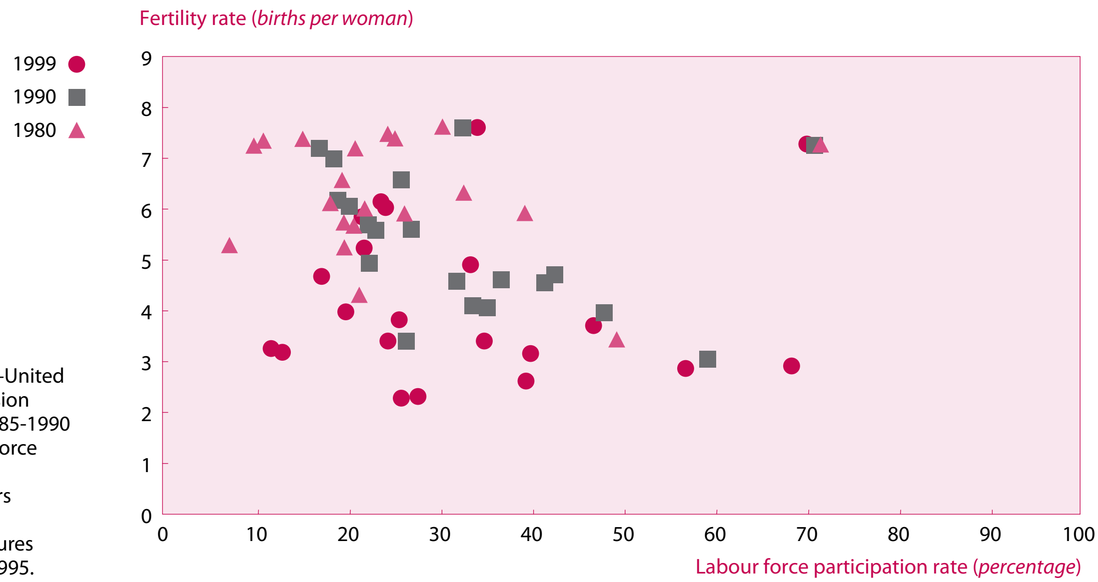
(*a*) Women's employment is empowering or "status enhancing", so that they have control over income and resources and a greater say in family decision-making, including in fertility decisions;

(*b*) The conflict between women's productive and reproductive roles significantly raises the opportunity cost of having children;

(*c*) Childcare arrangements are not easily available and the time intensity and quality of childcare desired seriously constrain women's economic activities;

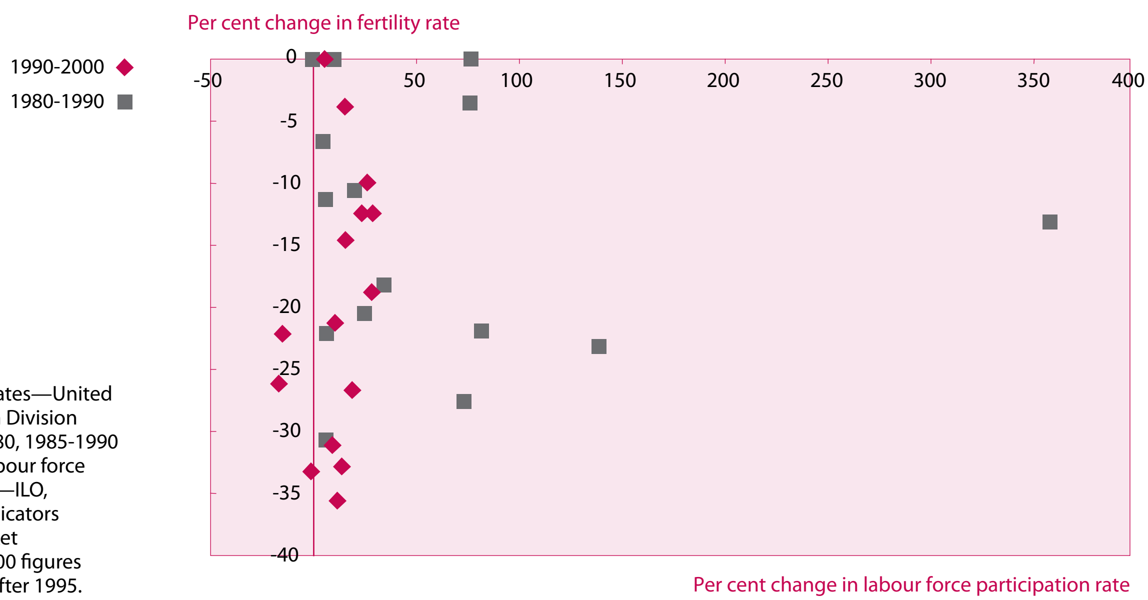
(*d*) The interruption effects (of a period of labour force withdrawal to bear and raise young children) involve heavy costs;

Figure Va
North Africa and the Middle East, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

Figure Vb
North Africa and the Middle East, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

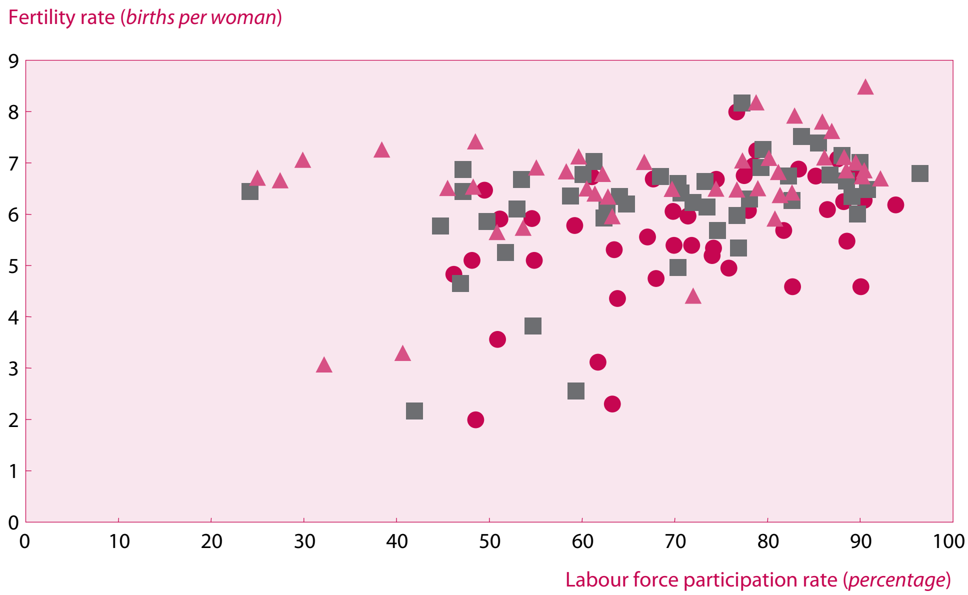
(*e*) The returns and satisfactions women derive from participation in economic activities are substantially higher than the returns and satisfactions of having additional children;

(*f*) Women's employment and income-earning capacity enhances their economic or financial independence and reduces the need to have children as a form of security for old age or against adverse economic conditions;

(*g*) Women's economic role and contribution to family welfare lead to reduced sex preference for children and changing attitudes toward the value of daughters;

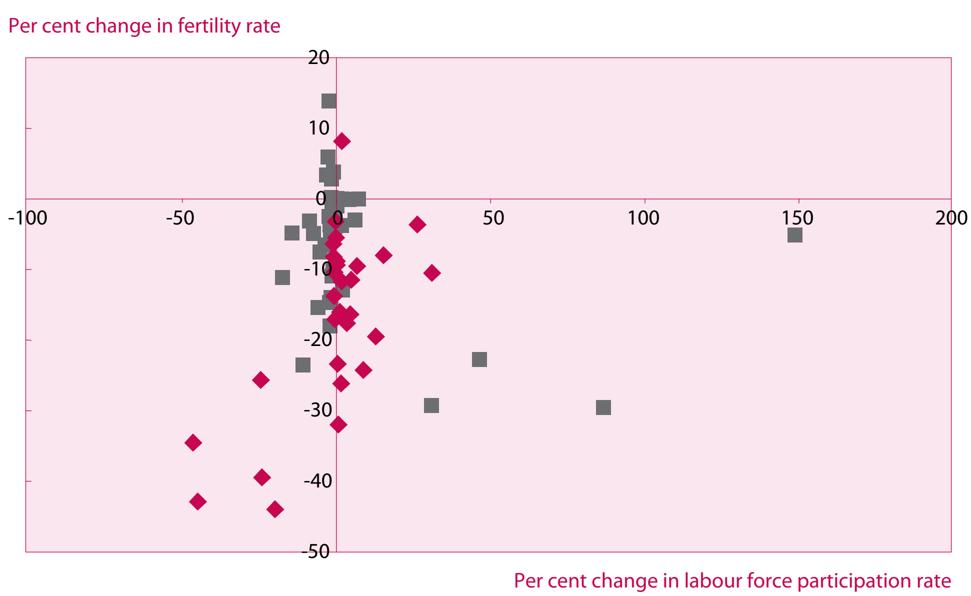
(*h*) Women's increasing participation in the labour force is linked to increasing investments in girls' education, and age at first marriage and age at first pregnancy go up; and

Figure VIa
Sub-Saharan Africa, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 1999 figures are for latest year after 1995.

Figure VIb
Sub-Saharan Africa, females aged 25-54 years



Sources: Fertility rates—United Nations Population Division estimates 1975-1980, 1985-1990 and 1995-2000; Labour force participation rates—ILO, 2001-2002; Key Indicators of the Labour Market (Geneva, 2001), 2000 figures are for latest year after 1995.

(*i*) Women work and build up careers before marriage, and age at first marriage and age at first pregnancy go up.

The nature of women's employment or the kinds of jobs and working conditions for women that are likely to empower women, exacerbate role incompatibility, enhance their status and decision-making within their families, increase their economic or financial independence, constrain domesticity or motherhood or provide alternative returns and satisfactions to having children can be identified as:

(*a*) Wage employment away from the home—particularly in non-familial enterprises;

(*b*) Productive and remunerative jobs in the formal rather than in the informal economy;

(*c*) Regular, full-time jobs that are permanent and secure;

(*d*) Regular or fixed working hours;

(*e*) Quality jobs with clear career prospects that require and generate commitment and offer alternative interests and achievements to domesticity or motherhood;

(*f*) Jobs that are progressive rather than static and offer opportunities for occupational or geographical mobility;

(*g*) Non-discrimination in the labour market and labour markets that are not strongly sex segregated;

(*h*) Jobs that allow women to organize and increase their representation and voice at the workplace, community and society;

(*i*) Jobs that provide workers with social security, such as pension schemes; and

(*j*) Jobs that do not open up opportunities for the use of child labour.

There is growing evidence confirming that it is not entry into the labour force per se but true economic empowerment that is linked to reproductive decision-making:

> "There is mounting evidence that women's ability to fully enjoy human rights—indeed, even to demand such rights—is integrally linked to their economic empowerment. A study of the circumstances in which women in poor communities feel entitled to make decisions about marriage and childbearing, contraception and sexuality was carried out by the International Reproductive Rights Research Action Group in seven countries: Brazil, Egypt, Malaysia, Mexico, Nigeria, the Philippines and the United States. Among its conclusions is that the ability to take such decisions requires a sense of personal autonomy, which develops in tandem with the knowledge that women can provide for themselves and their children. Their sense of personhood is sparked by motherhood and nurtured by participation in organized groups, but fundamentally depends on having incomes of their own.

For most of these women, livelihoods remain uncertain, and autonomy provisional, subject to factors outside their control, including the rising costs and care burdens they experience as a result of cuts in Government spending and the privatization of social services. But for a few, those with a paid job or a small business and money they can call their own, economic empowerment conveys the right to imagine a different future. With it comes the courage to stand up against husbands and partners, parents and in-laws, to assert their rights to decide whether and when to have sex, or bear children, to resist violence, to make household decisions." (UNIFEM, 2000).

Of the countries listed in the quotation above, six are intermediate-fertility countries, Nigeria's total fertility rate is above 5 and only the United States has below replacement fertility.

WOMEN'S EMPLOYMENT IN THE INTERMEDIATE-FERTILITY COUNTRIES

In the intermediate-fertility countries, the trend in labour force participation since 1980 has generally been one of rising rates for women and reduced rates for men, so that the sex differential has narrowed. The largest increase over the last two decades took place in Latin America and the Caribbean. Women's participation also increased in those countries where it has historically been low; in the Middle East and North Africa, FLFPRs increased in the 1980s but fell in several countries in the 1990s. What is striking in table 1 and figures Ib to VIb is that increases in labour force participation rates of women distinctly slowed down in the 1990s as compared to the 1980s.

Women have been entering the labour force increasingly to contribute to family survival. Structural adjustment processes, financial crises, prolonged economic downturns, the "feminization of poverty" have all forced more and more women to take up

Table 1
Intermediate-fertility countries: total fertility rates and female labour force participation rates

Region and country	Total fertility rate 1980-1985	Total fertility rate 1995-2000	FLFPR 25-54 1980	FLFPR 25-54 1990	FLFPR 25-54 latest year 1990s
North Africa and Middle East					
Algeria	6.4	3.3	20.6	22.0	11.8
Bahrain	4.6	2.6	19.4	35.1	39.1
Egypt	5.1	3.4	6.9	31.6	24.0
Iran (Islamic Republic of)	6.5	3.2	21.7	22.6	12.5
Israel	3.1	2.9	49.1	59.0	68.0
Jordan	6.8	4.7	15.0	19.9	16.9
Kuwait	4.9	2.9	26.5	47.7	56.6
Lebanon	3.8	2.3	21.1	26.1	25.8
Libyan Arab Jamahiriya	7.2	3.8	25.0	22.3	25.3
Morocco	5.4	3.4	39.1	41.4	34.5
Qatar	5.5	3.7	17.8	42.3	46.5
Sudan	6.0	4.9	32.3	26.6	33.1
Syrian Arab Republic	7.4	4.0	24.1	25.6	19.5
Tunisia	4.9	2.3	19.4	33.6	27.0
United Arab Emirates	5.2	3.2	20.4	36.4	39.7
Sub-Saharan Africa					
Botswana	6.0	4.4	81.6	76.6	63.8
Cape Verde	6.3	3.6	33.0	46.7	50.9
Ghana	6.7	4.6	88.5	89.8	90.0
Kenya	7.5	4.6	83.0	82.1	82.6
Lesotho	5.6	4.8	53.7	51.9	68.0
Reunion	2.9	2.3	40.6	59.3	63.3
South Africa	4.6	3.1	48.4	54.7	61.7
Swaziland	6.0	4.8	45.5	44.8	46.4
Asia and the Pacific					
Bangladesh	5.3	3.8	76.8	73.5	60.6
Brunei Darussalam	3.8	2.8	32.7	54.6	58.4
East Timor	5.4	4.4	82.3	81.6	81.3
India	4.5	3.3	52.5	46.3	47.7
Indonesia	4.1	2.6	50.7	50.5	58.5
Malaysia	4.2	3.3	45.5	49.0	50.2
Mongolia	5.7	2.7	81.8	84.7	71.3
Myanmar	4.7	3.3	72.4	72.1	72.3
Nepal	5.5	4.8	58.8	58.5	89.2
Philippines	5.0	3.6	51.5	54.7	59.0
Turkey	4.2	2.7	47.0	36.0	32.9
Viet Nam	4.5	2.5	78.1	85.7	86.2
Oceania					
Fiji	3.8	3.2	18.4	28.1	35.3
Guam	3.1	4.0		69.0	
Papua New Guinea	5.4	4.6		76.7	76.6
Latin America and the Caribbean					
Argentina	3.2	2.6	34.6	36.8	54.0
Bahamas	3.2	2.4	70.2	78.8	81.8
Belize	5.4	3.4	23.6	28.8	42.5
Bolivia	5.3	4.4	42.0	27.3	69.8

Table 1
Intermediate-fertility countries: total fertility rates and female labour force participation rates (*continued*)

Region and country	Total fertility rate 1980-1985	Total fertility rate 1995-2000	FLFPR 25-54 1980	FLFPR 25-54 1990	FLFPR 25-54 latest year 1990s
Brazil	3.6	2.3	36.5	51.1	63.2
Chile	2.7	2.4	33.3	41.7	48.8
Colombia	3.7	2.8	24.7	57.4	72.7
Costa Rica	3.5	2.8	31.0	38.2	46.9
Dominican Republic	4.2	2.9	34.2	41.0	47.6
Ecuador	4.7	3.1	23.9	33.5	64.0
El Salvador	4.5	3.2	48.8	65.1	57.2
French Guiana	3.6	4.1		65.5	
Guatemala	6.3	4.9	29.5	31.2	51.6
Guyana	3.3	2.5	29.3	43.9	47.1
Haiti	6.2	4.4	70.0	53.3	65.5
Honduras	6.0	4.3	35.1	40.0	55.0
Jamaica	3.6	2.5	60.5	84.8	78.5
Mexico	4.2	2.8	31.6	34.5	44.8
Nicaragua	6.2	4.3	40.9	50.1	42.5
Panama	3.5	2.6	44.4	42.3	55.9
Paraguay	5.3	4.2	35.8	58.9	40.1
Peru	4.6	3.0	28.2	35.6	68.5
Suriname	3.7	2.2	35.8	41.2	45.9
Uruguay	2.6	2.4	43.5	59.5	71.5
Venezuela	4.0	3.0	38.3	49.7	53.5
Transition Economies					
Albania	3.4	2.6	74.7	77.4	78.8
Kyrgyzstan	4.1	2.9	87.9	84.5	86.8
Tajikistan	5.5	3.7	83.3	69.8	74.4
Turkmenistan	4.8	3.6	85.8	78.1	80.4
Uzbekistan	4.7	2.9	87.8	79.6	82.8

Source: Total Fertility Rates: United Nations Population Division estimates Female; Labour Force Participation Rates: ILO, 2001a.

economic activities outside the home. The generally quoted figure is that women account for 70 per cent of the absolute poor and that the percentage may be rising. What is also important to consider is that work done out of economic necessity is less likely to have a negative impact on fertility than work done out of choice or intrinsic interest.

Women are not only entering the labour force in much greater numbers, they are also remaining in the labour force throughout their child bearing and child-rearing years. They are no longer a reserve or secondary labour force. In the past and particularly in developed countries, a "double peak" pattern was prevalent—most women entered the labour force in their twenties, left after a few years to bear and raise children and re-entered the labour force towards the end of their childbearing years. Nowadays, labour force participation rates are high for women in their twenties, rise through their thirties and forties and decline only after age 50. "Recent age patterns indicate that women are finding ways to combine family responsibilities with market work" (United Nations, 2000a). Of course, it could also be that with unemployment and under-employment growing, the competition for jobs is becoming so intense and the costs of interrupted participation are so high that women do not dare withdraw from the labour force even when they have children—and especially if they have large families to support.

Role incompatibility is likely to be greater for women in wage employment, less so for those in self-employment and least so for contributing family workers who are unpaid. Except in sub-Saharan Africa (excluding Southern Africa) and Southern Asia, the majority of women workers are employees working for others for wages or salaries. Many of the intermediate-fertility countries do not have a consistent statistical series on employment status broken down by sex, but where available, the information suggests a declining trend in the proportion of employees and a consequent increase in other employment statuses where the conflict with childbearing and child-rearing is likely to be less. In Latin America and the Caribbean, for example, the share of wage and salary workers among the female workforce dropped from 76 per cent to 71 per cent in Belize between 1993-1999, from 69 to 65 per cent in the Dominican Republic between 1991-1997, from 48 to 43 per cent in Bolivia between 1990-1996, from 84 per cent to 77 per cent in Panama between 1992-1999 (ILO, 2001a). This trend is expected to continue in most parts of the world as more and more women are unable to find paid employment in the formal economy and have to go into the informal economy as own-account or unpaid family workers.

Even among the wage and salary workers, more and more are likely to be in non-regular or atypical jobs. Whereas men are more likely to be hired in core or regular and better remunerated positions, women are increasingly being hired in peripheral, insecure, less valued jobs as home-based workers, causal workers and temporary workers. In the context of globalization and flexible specialization in production and employment relationships, more and more women are being employed under sub-contracting arrangements in putting out systems as industrial out-workers who are often home-based. Another important and growing source of employment for women is related to the rapid advances in telecommuting that have made it possible to relocate data entry, keyboarding, clerical, answering service jobs from developed to developing countries. In countries an-dregions such as India, South Africa, the Caribbean, more and more women are working in these offshore "back offices" and call centres, which are often their own homes.

These various forms of non-regular or atypical work are normally characterized by very low pay, irregular incomes, little or no job or income security and lack of social protection, and cannot be expected to provide a satisfying alternative to childbearing. Very importantly, the available evidence suggests that home-based work (which could be as employees or own-account) is an important and expanding source of employment worldwide, especially for women, and that women who are engaged in home-based work are not only better able to combine work and family responsibilities but also are more likely to use child labour. Especially where they are involved in subcontracting with piece rate payment or tight delivery deadlines, women are likely to use child labour. In India, for example, of the estimated 5 million workers in the beedi (tobacco rolling) industry, 90 per cent are home-based women workers who are paid very poorly on a piece rate—they have to roll 1,000 beedis a day to earn roughly US$1—and who use children, especially girls, to help out in beedi rolling.

If the intermediate-fertility countries follow the trend in developed industrialized countries, then the trend will also be one of increasing part-time employment. In the United States and the United Kingdom where standard working hours have been reduced and there has been a sharp increase in part-time jobs, the inverse relationship between FLFPRs and fertility has weakened (Standing, 1983). Part-time work is very much a female domain; in the countries for which data are available, well over half, if not over two thirds, of all part-time workers are women. Furthermore, part-time work for women is increasingly involuntary, growing numbers are working shorter hours than they want. Both the role incompatibility hypothesis and the economic empowerment hypothesis would then be less relevant.

A significant trend has been growing self-employment among women (and men), especially among those who have failed to secure paid jobs. For example, the proportion of self-employed among non-agricultural women workers doubled in sub-Saharan Africa (excluding Southern Africa) from 44 per cent in 1970 to 90 per cent in 1990. The proportion also increased in Northern Africa, South America, Southern Asia and Eastern and

Southern Europe (United Nations, 2000a). Many of the self-employed women are in micro and small enterprises, rather than large companies. Among the self-employed, women are much more likely than men to be own-account workers rather than employers and to be in the informal rather than formal economy. The available evidence suggests that own-account work is more out of need than choice, and that those who work from economic necessity have higher fertility than those who work because they want to do so.

In some of the countries, women are still concentrated in the category of unpaid family work. According to the latest year figures available, contributing family workers among economically active women is over 77 per cent in Bangladesh, 44 per cent in Indonesia, 56 per cent in Kenya and 23 per cent in Egypt. For these women, unpaid family work would involve both economic activities and care work looking after children (ILO, 2001a).

Related to increasing self-employment of women is the growth of the informal economy, and it is this feature that is likely to have important implications for the trend in fertility decline. Where data are available, they indicate that the informal economy has been growing not only in developing but also in transition and developed countries. In India and Indonesia, the informal economy accounts for nine out of every ten women working outside of agriculture, in Kenya for 83 per cent, 40 per cent in Tunisia, 30 per cent in South Africa, 74 per cent in Bolivia, 67 per cent in Brazil, 44 per cent in Chile and also in Colombia, 48 per cent in Costa Rica, 69 per cent in El Salvador, 65 per cent in Honduras, 55 per cent in Mexico, 41 per cent in Panama and 47 per cent in Venezuela (United Nations, 2000a). Most women (and men) have been going into the informal economy because they cannot find jobs or are unable to start businesses in the formal economy and cannot afford to be openly unemployed. But work in the informal economy, being outside legal and regulatory frameworks, is normally characterized by a high degree of vulnerability. Workers have little or no legal or social protection and they are excluded from or have limited access to public infrastructure and benefits. Informal economy workers are rarely organized for effective representation and have little or no voice either at the workplace or in the socio-political arena. Informal employment is normally unstable and insecure—consisting of very long hours and peak pressure to finish contract orders by a short deadline, followed by "inactive" periods waiting for orders and therefore providing only unstable and insecure incomes. A much higher percentage of people working in the informal, relative to the formal economy, are poor and women working in the informal economy are more likely than men to be poor. Where there is child labour, it is in the informal economy.

Other aspects that may explain why women's recent labour force participation in these countries is not likely to be status enhancing or empowering for them and therefore not likely to have a significant impact on reducing fertility include labour market segmentation, occupational segregation by sex and labour market discrimination. Information at the 1-digit sector level shows that women are still concentrated in those sectors that are traditionally associated with their gender roles, especially in community, social and personal services whereas men dominate the better-paying sector jobs in financial services, real estate and business services. In the industrial sector, women are almost exclusively in manufacturing whereas men are in construction and the utilities industries (ILO, 2001a). Occupational segregation by sex has generally declined over the past two decades but is still very extensive all over the world and has remained virtually unchanged in most Middle Eastern and North African countries (Anker, 1998). "Occupational segregation is more detrimental to women than to men, especially given the characteristics of the typically female occupations. Female occupations are 'relatively low paid, have relatively little employment security and have relatively little authority or career opportunities' and are also undervalued in terms of social status" (United Nations, 2000a). Where labour market segmentation remains strong and women are excluded from career jobs or have little job occupational mobility and are not able to satisfy their status aspirations, they may seek to enhance their self-esteem and status in motherhood. On the other hand, in highly segmented labour markets, women may have fewer opportunities to meet potential marriage partners and age at marriage may therefore go up.

That gender discrimination remains strong in the labour market can also be seen in other ways: "many women with comparable skills and experience are confronted with a gender wage gap and lag behind men in income and career mobility in the formal sector. Equal pay for women and men for equal work or work of equal value, has not yet been fully realized. Gender discrimination in hiring and promotion and related to pregnancy, including through pregnancy testing, and sexual harassment in the workplace persist. In some countries, women's full and equal rights to own land and other property, including through the right to inheritance, is not recognized yet in national legislation. Progression in the professions, in most cases is still more difficult for women" (United Nations, 2000b).

OTHER FACTORS INFLUENCING THE RELATIONSHIP BETWEEN WOMEN'S EMPLOYMENT AND FERTILITY

This section briefly considers the impact that other major factors, including ethnicity and religion, government policies, socio-cultural norms and migration, are likely to have either directly or indirectly on women's employment and fertility in the future. Examples are drawn mainly from three countries in different regions of the world—Malaysia, Nicaragua and the United Republic of Tanzania. In Malaysia, the confounding of race, religion, politics and economics by affirmative action government policies along ethnic lines has been a major explanation of the fertility transition. The Malaysian case also suggests that rising religious fundamentalism may be an important "predictor" of future fertility levels. Nicaragua illustrates the impact of autonomous international migration of women on fertility levels. Other countries sending large numbers of women overseas for employment mainly in domestic service include Indonesia, the Philippines and Bangladesh. Although the United Republic of Tanzania is actually not in the list of intermediate-fertility countries (its current TFR is 5.5), it is included to illustrate the point that where strong socio-cultural norms persist, as in much of sub-Saharan Africa, women's labour force participation tends to have little impact on high-fertility levels.

The Malaysian case is interesting because despite extraordinarily rapid socio-economic development and increase in female labour force participation rates, the fertility transition has slowed and hovered at above 3.3 children per woman. Various studies have shown that even after controlling for socio-economic, demographic and residential characteristics, fertility differentials persist among the three main ethnic groups in the country and that ethnicity appears to be an important determinant of fertility differentials. Fertility decline has been most rapid for the Chinese, followed by the Indians but Malay fertility decline "bottomed out" in the early 1980s (about the same time as the Islamic fundamentalist revival movement took off) and even showed signs of increasing since. Linear extrapolation of fertility trends of the 1980s led to the prediction that the Chinese would attain replacement level fertility about 1995 and the Indians about 2000, that fertility for these two groups would continue to fall below replacement, and that Malay fertility decline would be at a much slower pace so that the ethnic fertility differentials would widen (Lim, Jones and Hirschman, 1987). However, recent data from the Population Census of 2000 indicate that both Chinese and Indian fertility levels have not yet reached replacement (being respectively at 2.57 and 2.55) and that Malay fertility is still at 3.62 (Malaysia, 2001). Since the Malays now account for 66 per cent of total Malaysian population (up from just over half in the 1970s), what happens to Malay fertility will increasingly determine the overall rate for the country as a whole.

Even after controlling for socio-economic, demographic and residential characteristics, fertility differentials persist among the Malays, Chinese and Indians and "ethnicity" appears to be an important determinant. The ethnic factor in Malaysia has been clearly influenced by the Malaysian Government's New Economic Policy (NEP) which came into force in 1970 and which favoured the educational advancement, geographical and occupational mobility and income earning opportunities of the Malays vis-à-vis the other ethnic groups and directly influenced the relative costs and values of children. By ensuring educational and job opportunities for Malay children through a quota system, scholarships and other financial subsidies, the NEP reduced the costs and raised the value of children to Malay parents. These policies had the opposite effect on Chinese and Indian parents. The NEP has been replaced by an active policy to develop a Bumiputra Commercial and Industrial Community, which still favours the restructuring of employment in Malaysia to increase the number of Malay professionals, managers and skilled workers in various occupations and sectors. This affirmative action policy of the Government will continue to influence the way in which the different ethnic communities view the costs and benefits of children.

Religion and religious orthodoxy also represent an important aspect of ethnicity and since the Malays are all Muslims, the influence of the Islamic religion in particular can be examined. While the implementation of the NEP served to improve the position of Malay women relative to the other ethnic groups, the religious fundamentalist movement appears to have worked in the opposite direction to lower their status relative to their own menfolk. One study (Lim, 1990) based on data from a number of surveys conducted in the mid-1980s showed that the percentage of Malay women working outside the home was not greatly different from that of the non-Muslim groups of Chinese and Indians and did not indicate restriction of Malay women from the employment sectors that entail contact with men. But relative to the other ethnic groups, Malay women faced the greatest objections from their husbands and were most restricted in their efforts to assume economic roles outside the home. They were also least likely to feel confident that they would be able to support themselves financially, much less their children, in spite of having higher mean income from employment than the Chinese or Indian women. The censure of spinsterhood and the emphasis Islam places on safeguarding against a woman's sexual misconduct or suspicion thereof by marrying her off early was evident in the comparatively younger age at marriage, even though educational levels have been going up. Other than increasing pressure among Muslims to be more observant of their religion, incursions of religion into politics, the setting up of communes that attempt to emulate the order of Islam and moves in some States to introduce "syariah" as the basis of all laws in the country, the "dakwah" movement has also resulted in increasing numbers of Malay women who have adopted traditional costumes and covered their heads. There was also evidence of high-fertility norms persisting among Malay women and a distinct drop in contraceptive use by the end of the 1980s. Whether religious fundamentalism will continue in the changed global context since 11 September and its implications for Malay women and their fertility behaviour remains to be seen, but for Malaysia completion of the fertility transition does not seem to be on the horizon.

Nicaragua is an example of a country where autonomous international migration of women for employment has been an important contributory factor in the decline in fertility. The estimates are that close to one million Nicaraguans or roughly 20 per cent of the nation's total population are migrating to other countries. Women account for about 49 per cent of the total emigrants and the majority go to Costa Rica to work as domestic helpers or in commercial activities. A recent survey (ILO, 2001d) found that female emigration is much more likely than male emigration to be linked to the disintegration of marriages and that female migrants who are still married have lower desired family size than non-migrant women. It is also worth noting that migrant women claimed that the most important reason for having children is to fulfil their emotional needs and to realize themselves as women—reasons related to having help in the home and support in old age came second. In countries such as Nicaragua, including the Philippines, Indonesia and Bangladesh, where women are increasingly engaged in contract labour migration, it can be expected that fertility would continue to fall at least to replacement.

The United Republic of Tanzania is an example of a country where socio-cultural norms support high fertility and where these norms are not likely to change rapidly especially in a context where productive and reproductive roles go together and where women's labour force participation generally has not been empowering. "Women in Tanzania, like women elsewhere in sub-Saharan Africa, are oriented towards motherhood. Traditionally a woman is expected to marry early and give birth to many children. Girls are socialized early in their lives into key roles as mothers, housekeepers and producers. A women's status is measured largely by her capacity to reproduce and maintain children. Young girls learn early in life to look after their siblings and to trade and farm like their mothers, sisters, aunts and grandmothers" (ILO, 2001e). The trend in female labour force participation in the United Republic of Tanzania has been one of rising unemployment since 1985, concentration in the agricultural sector where women outnumber men, and in the informal economy where they are engaged mainly in survival type activities and where their low income earnings force many women to enlist their children to supplement family income. Women work because it is a matter of survival and continue to want large families. The ideal number of children is still cited as six. Girls are precious in fetching dowry and assisting in domestic chores while boys are counted on for support in old age and to carry on the family name. A recent survey conducted among working women in the United Republic of Tanzania confirmed that support in old age is the most important reason for high fertility—"I need many children so that some can take care of me when I am old" (ILO, 2001e). The value of children is also confirmed in the belief that a child who has died should be replaced.

COMPLETING THE FERTILITY TRANSITION: WHAT INDICATORS OF WOMEN'S EMPLOYMENT MAY BE IMPORTANT PREDICTORS

Female labour force participation rates per se are increasingly less likely to be meaningfully linked to total fertility rates in the intermediate-fertility countries in the future. The assumption that in the process of socio-economic development women go increasingly into modern sector, permanent, full-time wage employment does not hold. To predict what is likely to happen to fertility in these countries, it would be more useful to have specific indicators of the quality of women's employment and their working conditions. Listed below are some indicators and some speculation about how they are likely to affect future fertility:

(*a*) *Status in employment:* The proportion in wage and salary employment is not likely to go up significantly. In many of the countries, the significant jump in employee status for women was linked to the establishment of export-processing zones and labour-intensive manufacturing industries in the 1970s and 1980s. But over time, with changing skill requirements in many of the zones, men rather than women are being hired and the proportion of female employees tends to drop (in the maquiladoras in Mexico, for example). More importantly, with intensifying global competition and flexible specialization, women in poor countries are more likely to be hired in subcontracting for global commodity and value chains and to be in the category of self-employed or own-account work. Compared to employee status, self-employment and own-account work is less likely to have a strong inverse relationship with fertility.

(*b*) *Open unemployment rates:* An important feature is that women's jobs and income earning capacity tend to be increasingly insecure. Women generally have higher rates of unemployment and especially of under-employment and disguised unemployment than men and find it harder to re-enter employment once they lose their jobs. For example, at the end of the 1990s, the open unemployment rates for women and men respectively were 5.1 per cent and 3.3 per cent in Indonesia, 9.7 per cent and 6.0 per cent in the Bahamas, 14.3 per cent and 11.9 per cent in Argentina, 11.6 per cent and 7.2 per cent in Brazil, 23.3 per cent and 17.2 per cent in Colombia, and 14.5 per cent and

8.8 per cent in Nicaragua. Between 1990 and 1997, the unemployment rate for women increased by 2 and 5 percentage points in Northern Africa, Central and South America and Eastern and Western Europe. Young women in particular have very high rates of open unemployment. For example, in the Philippines in 1998, the rate was 19.3 per cent for women aged 15-24 years as compared to 13.6 per cent for men in the same age group and 5.3 per cent for women aged 25-54 years. If one reason for women to have children is to ensure their security either in old age or under difficult economic circumstances, then it could be speculated that this motive would be increasingly important under conditions of growing unemployment and income insecurity.

(*c*) *Work in the formal or informal economy:* The informal economy has been responsible for the bulk of new jobs in most if not all these countries and the situation is not likely to change in the near future. The relationship between informal employment and fertility is mutually dependent (women in the informal economy are likely to have higher fertility than women in the formal economy and women with high fertility may be forced to work in the informal rather than formal economy). At both national and international levels there have been growing efforts to improve legal and social protection and organization and representation of workers in the informal economy (for example, the General Discussion at this year's International Labour Conference will be on Decent Work and the Informal Economy). The success of these effects may have some impact on fertility decisions, but given the problems and the size of the informal economy in most of these countries, the impact would most likely not show up for a very long time.

(*d*) *Sector of employment:* The inverse relationship between labour force participation and fertility tends to be most obvious among those employed in the industrial sector and to be less so or even to be absent among those employed in agriculture or services. In fact, several studies have suggested a positive relationship between women's work in agriculture and fertility. In those countries with large agricultural sectors, women's employment share remains very high; women have even taken over from men in agriculture in several areas. The trends indicate only slow decline in the share of agriculture in total employment and increases in the services sector rather than in the industrial sector.

(*e*) *Location of employment:* Home-based work is becoming increasingly common—because of subcontracting and industrial outputting systems and the spread of information and communications technology. The trend has been one of increasing relocation of jobs from industrialized to developing countries, especially "back office" staff located in call centres or engaged in data entry and processing. The jobs are dominated by women, but while they can benefit from the new independence of work location, "isolation and exclusion from career choices can also occur" and "in the best, a new, more informal and more appealing work culture may be apparent; but, in the worst circumstances, call centres have been called the 'sweatshops of the digital era'" (ILO, 2000b). Female homeworkers may be better able to balance work and family responsibilities but may also desire children to compensate for the low status and isolation of their work. The isolation of home-based work or work in micro or small enterprises (discussed below) may also mean that women are less likely to have the support of group norms to change their fertility behaviour.

(*f*) *Occupational segregation:* The sex segregation of occupations is changing but only slowly and therefore not likely to have any significant impact on reducing fertility. In fact, occupational segregation not only reinforces typical female stereotypes, such as the caring, docile and home-based woman worker, but may also perpetuate them into the next generation because restricted and inferior labour market opportunities for women "cause many families—and many women—to underinvest in women's education, training and experience" (Anker, 2001).

(*g*) *Size of enterprise:* More new jobs have been created in micro and small enterprises than in large enterprises. For example, in Latin America in the 1990s, only one-third of net job gains in private sector urban employment was in enterprises with more than 20 workers and most of these jobs were in the least productive, lowest earning activities (ILO, 2001c). In India, there has been increasing feminized employment in small-scale production units, which are actually ancillaries of large companies. An inverse relationship between female employment and fertility is more likely in large companies, especially multinational companies. In micro and small enterprises, the relationship is not clear or may be absent.

(*h*) *Child labour:* The contribution of children to the family workforce and especially to family income has always been an important reason for high fertility. One estimate is that the number of child workers in the world has fallen from about 250 million to about 211 million and can be expected to continue to fall significantly. The global campaign against child labour is having an impact, at least on the number of children going to school instead of being in hazardous forms of work. A Timebound Programme for the Elimination of Child Labour has been launched in El Salvador, Nepal and the United Republic of Tanzania and is being extended to a number of other countries, including the Philippines. The Timebound Programme, which has the commitment of national governments, includes a component for providing viable alternative livelihood for parents in return for sending children to school. In these countries, the value of children as child workers would fall.

(*i*) *Migration for employment:* Women are increasingly engaged in autonomous migration, both internal and international, for employment. The opportunities for male contract labour migration have shrunk, but there are still many opportunities for international female labour migrants, especially as domestic helpers, "entertainers", sales persons, hotel and restaurant workers and assembly line workers. However, statistics are hard to come by and where available are probably underestimated because much of it is undocumented. Whether within countries or internationally, women involved in autonomous migration for economic reasons are likely to get married at a later age than those remaining in their place of origin. The autonomous migration experience and exposure to work and living conditions in urban areas or other countries tends to influence the attitude of young women toward delayed marriage and family formation. For those already married, the kinds of work that women migrants are mainly going into do not provide for having children with them. Importantly, marriage breakups are much more likely to occur when it is the man rather than the woman remaining behind in a migration move.

(*j*) *Other "predictors":* It is also important to take into account the fact that more and more governments and employers' and workers' organizations are instituting various measures to enable women (and men) to better harmonize work and family responsibilities. Legislation and regulations in the labour code increasingly provide for maternity protection, leave and benefits for women workers, parental leave (with appropriate job guarantees) to allow both women and men to take time off work to care for children, to have flexible working time arrangements, child care services and facilities, etc. It is a legal obligation in countries as diverse as Bangladesh, Bolivia, Colombia, Ecuador, Egypt, the Islamic Republic of Iran, the Philippines and the Syrian Arab Republic for employers to provide childcare support services or facilities in enterprises employing above a specified number of workers (ILO, 1994). Even in rural areas, labour laws provide for crèches for children of workers in the formal agricultural sector. In the informal economy in both rural and urban areas, there are growing initiatives by grassroots women's groups, NGOs, community/civil society groups to set up social support services to promote the harmonization of work and family responsibilities. Under such circumstances, it can also be expected that the role incompatibility hypothesis will increasingly have less relevance.

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Views and policies concerning population growth and fertility among Governments in intermediate-fertility countries

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INTRODUCTION

This paper discusses Government views and policies concerning population growth and fertility level, as well as their determinants, in intermediate-fertility countries; i.e., countries with a total fertility rate under 5 children per woman but above replacement level. The information for this paper is derived from a variety of sources: official replies of Governments to the United Nations Population Inquiries, national reports, official statements at population conferences, and material provided by government agencies as well as the world press. The data analysed cover the period of a quarter of a century, from 1976 to 2001, roughly paralleling the period from adoption by Governments of the World Population Plan of Action in Bucharest in 1974, to the adoption at the special session of the General Assembly in 1999 of key actions for further implementation of the Programme of Action of the International Conference on Population and Development.

Some general trends in Government views and policies are discussed for the whole world and the less developed regions. However, the focus of the paper is on the 67 intermediate-fertility countries where 43 per cent of the world population currently lives. This group includes the most populous countries and the largest birth contributors: Bangladesh, Brazil, Egypt, India, Indonesia, the Islamic Republic of Iran, Mexico, the Philippines, South Africa, Turkey and Viet Nam, as well as some rather small countries in the Caribbean and Oceania. Several of the intermediate-fertility countries have experienced a rapid decline in fertility (for example, Algeria, Bahrain, Brazil, Indonesia, the Islamic Republic of Iran, Kuwait, Lebanon, Mexico, Mongolia, Suriname, Tunisia, Uzbekistan and Viet Nam), while others have had a more gradual decrease (for example, Argentina, Bolivia, Botswana, Fiji, Ghana, Guatemala, Haiti, Israel, Lesotho, Nepal, Papua New Guinea, Paraguay, Samoa, the Sudan, Swaziland, Uruguay and Vanuatu). In many of these countries, there was strong political commitment to population policy development and family planning for decades. In others, the Government did not play such a major role and did not have an explicit population policy. This paper considers some common features and peculiarities of national policies related to fertility.

GOVERNMENT VIEWS

Population growth

As a result of progress in medicine coupled with public health measures and the consequent dramatic reduction in death rates after the Second World War, population growth rates, particularly in the less developed regions, reached unprecedented levels in the second half

Table 1
Government views and policies on population growth

Country	View on population growth			
	1976	1986	1996	2001
Africa				
Eastern Africa				
Kenya	Too high	Too high	Too high	Too high
Northern Africa				
Algeria	Satisfactory	Too high	Too high	Too high
E gypt	Too high	Too high	Too high	Too high
Libyan Arab Jamahiriya	Too low	Satisfactory	Satisfactory	Satisfactory
Morocco	Too high	Too high	Too high	Too high
Sudan	Satisfactory	Satisfactory	Too high	Too high
Tunisia	Too high	Too high	Satisfactory	Satisfactory
Southern Africa				
Botsvana	Too high	Too high	Too high	Too high
Lethoto	Too high	Too high	Too high	Too high
South Africa	Too high	Too high	Too high	Too high
Swaziland	Too high	Too high	Too high	Too high
Western Africa				
Cape Verde	Satisfactory	Satisfactory	Too high	Too high
Ghana	Too high	Too high	Too high	Too high
Asia				
Eastern Asia				
Mongolia	Too low	Too low	Satisfactory	Satisfactory
South-Central Asia				
Bangladesh	Too high	Too high	Too high	Too high
India	Too high	Too high	Too high	Too high
Iran (Islamic Republic of)	Too high	Satisfactory	Too high	Too high
Kyrgyzstan	..	..	Satisfactory	Satisfactory
Nepal	Too high	Too high	Too high	Too high
Tajikistan	..	..	Satisfactory	Too high
Turkmenistan	..	..	Satisfactory	Satisfactory
Uzbekistan	..	..	Too high	Satisfactory
South-Eastern Asia				
Brunei Darussalam	..	Satisfactory	Satisfactory	Satisfactory
Indonesia	Too high	Too high	Too high	Too high
Malaysia	Too high	Satisfactory	Too high	Satisfactory
Myanmat	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Philippines	Too high	Too high	Too high	Too high
Viet Nam	Too high	Too high	Too high	Too high
Western Asia				
Bahrain	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Israel	Too low	Too low	Too low	Too low
Jordan	Satisfactory	Satisfactory	Too high	Too high
Kuwait	Too low	Too low	Satisfactory	Satisfactory
Lebonon	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Qatar	Too low	Too low	Too low	Satisfactory
Syrian Arab Republic	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Turkey	Too high	Too high	Too high	Too high
United Arab Emirates	Too low	Satisfactory	Too high	Too high

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

Policy to population growth				
1976	1986	1996	2001	Country
				Africa
				Eastern Africa
Lower	Lower	Lower	Lower	Kenya
				Northern Africa
No intervention	Lower	Lower	Lower	Algeria
Lower	Lower	Lower	Lower	Egypt
Raise	No intervention	No intervention	No intervention	Libyan Arab Jamahiriya
Lower	Lower	Lower	Lower	Morocco
No intervention	No intervention	Lower	Lower	Sudan
Lower	Lower	Lower	Lower	Tunisia
				Southern Africa
Lower	Lower	Lower	Lower	Botswana
Lower	Lower	Lower	Lower	Lesotho
Lower	Lower	Lower	Lower	South Africa
Lower	No intervention	Lower	Lower	Swaziland
				Western Africa
No intervention	No intervention	Lower	Lower	Cape Verde
Lower	Lower	Lower	Lower	Ghana
				Asia
				Eastern Asia
Raise	Raise	Maintain	Maintain	Mongolia
				South-Central Asia
Lower	Lower	Lower	Lower	Bangladesh
Lower	Lower	Lower	Lower	India
Lower	No intervention	Lower	Lower	Iran (Islamic Republic of)
..	..	No intervention	No intervention	Kyrgyzstan
Lower	Lower	Lower	Lower	Nepal
..	..	No intervention	No intervention	Tajikistan
..	..	No intervention	No intervention	Turkmenistan
..	..	Lower	Maintain	Uzbekistan
				South-Eastern Asia
..	No intervention	No intervention	No intervention	Brunei Darussalam
Lower	Lower	Lower	Lower	Indonesia
Lower	Maintain	Lower	No intervention	Malaysia
No intervention	No intervention	No intervention	No intervention	Myanmar
Lower	Lower	Lower	Lower	Philippines
Lower	Lower	Lower	Lower	Viet Nam
				Western Asia
No intervention	No intervention	No intervention	No intervention	Bahrain
Raise	Raise	Raise	Raise	Israel
No intervention	No intervention	Lower	Lower	Jordan
No intervention	Raise	Maintain	Maintain	Kuwait
No intervention	No intervention	No intervention	Maintain	Lebanon
Raise	Raise	Raise	Maintain	Qatar
No intervention	No intervention	No intervention	No intervention	Syrian Arab Republic
Lower	Lower	Lower	Lower	Turkey
Raise	Raise	No intervention	No intervention	United Arab Emirates

Table 1
Government views and policies on population growth (*continued*)

Country	View on population growth 1976	1986	1996	2001
Europe				
Southern Europe				
Albania	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Latin America and the Caribbean				
Caribbean				
Bahamas	Too low	Satisfactory	Satisfactory	Satisfactory
Dominican Republic	Too high	Too high	Too high	Too high
Haiti	Too high	Too high	Too high	Too high
Jamaica	Too high	Too high	Too high	Too high
Saint Lucia	..	Too high	Too high	Too high
Central America				
Belize	..	Satisfactory	Too low	Satisfactory
Costa Rica	Too high	Satisfactory	Too high	Satisfactory
El Salvador	Too high	Too high	Too high	Too high
Guatemala	Too high	Too high	Satisfactory	Too high
Honduras	Satisfactory	Too high	Satisfactory	Satisfactory
Mexico	Too high	Too high	Too high	Too high
Nicaragua	Too high	Satisfactory	Too high	Too high
Panama	Satisfactory	Satisfactory	Satisfactory	Satisfactory
South America				
Argentina	Too low	Satisfactory	Satisfactory	Satisfactory
Bolivia	Satisfactory	Too low	Satisfactory	Satisfactory
Brazil	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Chile	Satisfactory	Too low	Satisfactory	Satisfactory
Colombia	Too high	Satisfactory	Satisfactory	Satisfactory
Ecuador	Too high	Satisfactory	Satisfactory	Satisfactory
Guyana	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Paraguay	Too low	Satisfactory	Satisfactory	Too high
Peru	Satisfactory	Too high	Too high	Too high
Suriname	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Uruguay	Too low	Too low	Too low	Too low
Venezuela	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Oceania				
Melanesia				
Fiji	Too high	Too high	Satisfactory	Satisfactory
Papua New Guinea	Too high	Too high	Too high	Too high
Vanuatu	..	Satisfactory	Satisfactory	Satisfactory
Polynesia				
Samoa	Too high	Too high	Too high	Too high

of the twentieth century. Among the first countries that expressed concern that rapid rates of population growth were undercutting their prospects for achieving socio-economic objectives were India, Pakistan and the Republic of Korea in Asia, and Egypt in Africa. Some of these countries already had high population density: the Republic of Korea with 206 persons per square kilometre and India with 109 in 1950. Although Egypt's land was vast, and population density was only 22 persons per square kilometre, almost all of the population (over 90 per cent) was squeezed into the Nile Valley and its fertile delta, and along the Mediterranean coast.

Policy to population growth 1976	1986	1996	2001	Country
				Europe
				Southern Europe
No intervention	Maintain	Maintain	Maintain	Albania
				Latin America and the Caribbean
				Caribbean
Raise	No intervention	No intervention	No intervention	Bahamas
Lower	Lower	Lower	Lower	Dominican Republic
Lower	Lower	Lower	Lower	Haiti
Lower	Lower	Lower	Lower	Jamaica
..	Lower	Lower	Lower	Saint Lucia
				Central America
..	No intervention	No intervention	No intervention	Belize
No intervention	No intervention	Lower	No intervention	Costa Rica
Lower	Lower	Lower	Lower	El Salvador
No intervention	No intervention	No intervention	Lower	Guatemala
No intervention	Lower	No intervention	No intervention	Honduras
Lower	Lower	Lower	Lower	Mexico
No intervention	No intervention	Lower	Lower	Nicaragua
No intervention	No intervention	No intervention	Maintain	Panama
				South America
Raise	No intervention	No intervention	No intervention	Argentina
No intervention	No intervention	No intervention	No intervention	Bolivia
No intervention	No intervention	No intervention	No intervention	Brazil
No intervention	No intervention	No intervention	No intervention	Chile
Lower	No intervention	No intervention	No intervention	Colombia
No intervention	No intervention	No intervention	No intervention	Ecuador
No intervention	No intervention	No intervention	No intervention	Guyana
No intervention	No intervention	No intervention	Lower	Paraguay
No intervention	Lower	Lower	Lower	Peru
No intervention	No intervention	No intervention	No intervention	Suriname
Raise	No intervention	Raise	Raise	Uruguay
No intervention	No intervention	No intervention	No intervention	Venezuela
				Oceania
				Melanesia
Lower	Lower	Maintain	Maintain	Fiji
Lower	Lower	Lower	Lower	Papua New Guinea
..	No intervention	No intervention	No intervention	Vanuatu
				Polynesia
Lower	Lower	Lower	Lower	Samoa

In 1976, two years after adoption of the World Population Plan of Action, over one third of Governments in the world and 41 per cent in the less developed regions perceived their growth rate to be too high. This proportion was particularly high among the countries of Latin America and the Caribbean (48 per cent). By 2001, continued high rates of population growth have remained an issue of policy concern for many countries of the developing world. The proportion of Governments in the less developed regions perceiving their growth rate to be too high steadily increased to 54 per cent in 2001.

Table 2
Change in Government views on population growth in intermediate-fertility countries, 1976-2001, by current level of fertility and by major area (*percentage of countries*)

Region	1976				2001			
	Too high	Satisfactory	Too low	Total	Too high	Satisfactory	Too low	Total
Total	**53**	**30**	**17**	**100**	**51**	**46**	**3**	**100**
According to total fertility rate								
TFR 3.5-5	59	27	14	100	72	28	0	100
TFR 2.1-3.5	49	32	19	100	38	57	5	100
According to major area*								
Africa	69	23	8	100	85	15	0	100
Asia and Oceania	54	23	23	100	46	50	4	100
Latin America and the Caribbean	44	39	17	100	40	56	4	100

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.
* Albania (Europe) is not included in the regional distribution.

Among the intermediate-fertility countries, 53 per cent of Governments in 1976 perceived their population growth rate to be too high. This percentage fell to 46 per cent in 1986, before rising back again to 51 per cent in 2001 (see tables 1 and 2). Among the 42 countries with a total fertility rate between 2.1 and 3.5 children per woman, 38 per cent in 2001 considered their rate of population growth to be too high. In contrast, in the 25 countries with a total fertility rate between 3.5 and 5, this proportion was 72 per cent (see table 2).

While in Asia and Oceania the proportion of Governments perceiving their population growth to be too high decreased between 1976 and 2001, in Latin America and the Caribbean it remained practically at the same level. In contrast, in African countries, it steadily rose from 1976 to 1996 and then remained at the same level. Only two countries in Africa consider their population growth rates satisfactory: Libyan Arab Jamahiriya and Tunisia. Currently, countries with intermediate fertility that view population growth as too high encompass almost all those in Africa (85 per cent), 46 per cent in Asia and Oceania, and 40 per cent in Latin America and the Caribbean.

The majority of countries in Asia and Oceania considered their population growth rates to be too high throughout the quarter century from 1976-2001. In the 1990s, Jordan and Tajikistan also shifted to this view. In contrast, first Fiji, Kuwait and Mongolia shifted to a view of their population growth as being satisfactory, then later Malaysia, Qatar and Uzbekistan. Of the nine intermediate-fertility countries of Western Asia, five consider their population growth rate to be satisfactory and Israel considers it to be unsatisfactory because it is too low. The main goal of population policy in Israel is to increase the size of the population. Higher population growth rates are encouraged through measures aimed at increasing fertility as well as immigration. Kuwait considered its population growth rate to be satisfactory in the early 1990s, but expressed a mixed view of its growth rate in the late 1990s. The Government viewed the growth rate of Kuwaiti nationals as satisfactory and that of non-nationals as too high.

Fertility level

In the intermediate-fertility countries, the proportion of Governments that viewed their fertility as too high decreased from 61 per cent in 1976 to 44 per cent in 1986, then after rising back to 60 per cent in 1996, leveled off at 57 per cent in 2001 (see tables 3 and 4). In the group of 42 countries with TFR between 2.1 and 3.5 children per woman, 45 per cent considered fertility as too high in 2001. In contrast, among the 25 countries with TFR between 3.5 and 5 children per woman, 76 per cent said that fertility was too high (see table 4).

Since 1976, the proportion of Governments that viewed their fertility as too high has declined among the intermediate-fertility countries of Asia and Oceania and of Latin America and the Caribbean. Some countries have shifted their view of fertility from too high to satisfactory—two countries in Asia and Oceania (Bahrain and Fiji) did so, as did four countries in Latin America and the Caribbean (Chile, Colombia, Costa Rica and Panama). In contrast, the proportion that viewed fertility as too high has increased in Africa since 1976. Three African countries have shifted their view of fertility level from satisfactory to too high—Algeria, Cape Verde and the Sudan. In 2001, the proportion of Governments that viewed their fertility as too high was 46 per cent in Asia and Oceania and 52 per cent in Latin America and the Caribbean and 92 per cent in Africa. Currently, the Libyan Arab Jamahiriya is the only intermediate-fertility African country that considers its fertility level to be satisfactory.

The proportion of the intermediate-fertility countries currently viewing their fertility as satisfactory is high in Western Asia (56 per cent), where only two countries, Jordan and Turkey, consider their fertility to be too high. In contrast, Israel has steadily considered its fertility as too low. The United Arab Emirates has also recently shifted to such a view. The Government of the United Arab Emirates has expressed concern with the demographic imbalance in the country, particularly related to the low-fertility rate of national women. In his address to a 2001 Women's Association Conference on enhancing childbearing among UAE national families and encouraging them to have more children, Sheikh Humaid characterized the existing demographic imbalance as society's most prominent challenge, which bears economic, cultural, social and security consequences. He called on all institutions of society to work out effective plans to curb this imbalance.

Two thirds of the intermediate-fertility countries in South America consider the level of fertility as satisfactory, and Uruguay even considers it as too low. Only Ecuador, Paraguay and Peru consider it as too high.

Family planning and reproductive health

The views of Governments with respect to family planning over the last three decades have transformed considerably. Since the adoption of the World Population Plan of Action at the 1974 Bucharest Conference, an increasing number of Governments have accepted the idea that Government actions could slow population growth. At the subsequent international conferences in 1984 and 1994, most Governments have reaffirmed the need for effective family planning programmes to slow population growth and promote health.

The Governments of India and many other countries have increasingly considered it important to integrate family planning with maternal and child health programmes. The public health approach to family planning programmes has been reinforced in the international arena in the 1990s. The Governments of the Islamic Republic of Iran and some other countries expressed that the family planning programme should allow couples to decide for themselves how many children they desired, rather than serve as a vehicle for population reduction. These Governments further suggested that the programmes should offer services and remedies not only to couples who wish to limit their family size but also to those who experience difficulty conceiving.

The ICPD Programme of Action defined reproductive health for the first time in an international document, stating that: "reproductive health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system . . ." It also said that reproductive health care should enhance individual rights, including the right to decide freely and responsibly "the number and spacing of one's children".

Table 3
Government views and policies on fertility

Country	View on fertility level 1976	1986	1996	2001
Africa				
Eastern Africa				
Kenya	Too high	Too high	Too high	Too high
Northern Africa				
Algeria	Satisfactory	Too high	Too high	Too high
Egypt	Too high	Too high	Too high	Too high
Libyan Arab Jamahiriya	Too low	Satisfactory	Satisfactory	Satisfactory
Morocco	Too high	Too high	Too high	Too high
Sudan	Satisfactory	Satisfactory	Too high	Too high
Tunisia	Too high	Too high	Too high	Too high
Southern Africa				
Botswana	Too high	Too high	Too high	Too high
Lesotho	Too high	Too high	Too high	Too high
South Africa	Too high	Too high	Too high	Too high
Swaziland	Too high	Too high	Too high	Too high
Western Africa				
Cape Verde	Satisfactory	Satisfactory	Too high	Too high
Ghana	Too high	Too high	Too high	Too high
Asia				
Eastern Asia				
Mongolia	Satisfactory	Too low	Satisfactory	Satisfactory
South-Central Asia				
Bangladesh	Too high	Too high	Too high	Too high
India	Too high	Too high	Too high	Too high
Iran (Islamic Republic of)	Too high	Satisfactory	Too high	Too high
Kyrgyzstan	..	..	Satisfactory	Satisfactory
Nepal	Too high	Too high	Too high	Too high
Tajikistan	..	..	Too high	Too high
Turkmenistan	..	..	Satisfactory	Satisfactory
Uzbekistan	..	..	Satisfactory	Satisfactory
South-Eastern Asia				
Brunei Darussalam	..	Satisfactory	Satisfactory	Satisfactory
Indonesia	Too high	Too high	Too high	Too high
Malaysia	Too high	Satisfactory	Too high	Too high
Myanmar	Satisfactory	Satisfactory	Too high	Satisfactory
Philippines	Too high	Too high	Too high	Too high
Viet Nam	Too high	Too high	Too high	Too high
Western Asia				
Bahrain	Too high	Satisfactory	Satisfactory	Satisfactory
Israel	Too low	Too low	Too low	Too low
Jordan	Too high	Satisfactory	Too high	Too high
Kuwait	Satisfactory	Too low	Satisfactory	Satisfactory
Lebanon	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Qatar	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Syrian Arab Republic	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Turkey	Too high	Too high	Too high	Too high
United Arab Emirates	Satisfactory	Satisfactory	Satisfactory	Too low

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

Policy to modify fertility				
1976	1986	1996	2001	Country
				Africa
				Eastern Africa
Lower	Lower	Lower	Lower	Kenya
				Northern Africa
No intervention	Lower	Lower	Lower	Algeria
Lower	Lower	Lower	Lower	Egypt
Raise	No intervention	No intervention	No intervention	Libyan Arab Jamahiriya
Lower	Lower	Lower	Lower	Morocco
No intervention	No intervention	Lower	Lower	Sudan
Lower	Lower	Lower	Lower	Tunisia
				Southern Africa
Lower	Lower	Lower	Lower	Botswana
Lower	Lower	Lower	Lower	Lesotho
Lower	Lower	Lower	Lower	South Africa
Lower	Lower	Lower	Lower	Swaziland
				Western Africa
No intervention	No intervention	Lower	Lower	Cape Verde
Lower	Lower	Lower	Lower	Ghana
				Asia
				Eastern Asia
Maintain	Raise	Maintain	No intervention	Mongolia
				South-Central Asia
Lower	Lower	Lower	Lower	Bangladesh
Lower	Lower	Lower	Lower	India
Lower	No intervention	Lower	Lower	Iran (Islamic Republic of)
..	..	No intervention	No intervention	Kyrgyzstan
Lower	Lower	Lower	Lower	Nepal
..	..	Lower	No intervention	Tajikistan
..	..	No intervention	No intervention	Turkmenistan
..	..	Maintain	Maintain	Uzbekistan
				South-Eastern Asia
..	No intervention	No intervention	No intervention	Brunei Darussalam
Lower	Lower	Lower	Lower	Indonesia
Lower	Maintain	Lower	Lower	Malaysia
No intervention	No intervention	No intervention	Maintain	Myanmar
Lower	Lower	Lower	Lower	Philippines
Lower	Lower	Lower	Lower	Viet Nam
				Western Asia
No intervention	No intervention	Lower	Lower	Bahrain
Raise	Raise	Raise	Raise	Israel
No intervention	No intervention	Lower	Lower	Jordan
Maintain	Raise	Maintain	No intervention	Kuwait
No intervention	No intervention	No intervention	Lower	Lebanon
Maintain	Maintain	Maintain	Maintain	Qatar
No intervention	No intervention	No intervention	No intervention	Syrian Arab Republic
Lower	Lower	Lower	Lower	Turkey
Maintain	Raise	No intervention	Raise	United Arab Emirates

Table 3
Government views and policies on fertility (*continued*)

Country	View on fertility level			
	1976	1986	1996	2001
Europe				
Southern Europe				
Albania	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Latin America and the Caribbean				
Caribbean				
Bahamas	Satisfactory	Satisfactory	Satisfactory	Too high
Dominican Republic	Too high	Too high	Too high	Too high
Haiti	Too high	Too high	Too high	Too high
Jamaica	Too high	Too high	Too high	Too high
Saint Lucia	..	Too high	Too high	Too high
Central America				
Belize	..	Satisfactory	Too high	Satisfactory
Costa Rica	Too high	Satisfactory	Too high	Satisfactory
El Salvador	Too high	Too high	Too high	Too high
Guatemala	Too high	Satisfactory	Too high	Too high
Honduras	Too high	Too high	Too high	Too high
Mexico	Too high	Too high	Too high	Too high
Nicaragua	Too high	Satisfactory	Too high	Too high
Panama	Too high	Satisfactory	Satisfactory	Satisfactory
South America				
Argentina	Too low	Satisfactory	Satisfactory	Satisfactory
Bolivia	Satisfactory	Too low	Satisfactory	Satisfactory
Brazil	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Chile	Too high	Too low	Satisfactory	Satisfactory
Colombia	Too high	Satisfactory	Satisfactory	Satisfactory
Ecuador	Too high	Satisfactory	Too high	Too high
Guyana	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Paraguay	Satisfactory	Satisfactory	Satisfactory	Too high
Peru	Satisfactory	Too high	Too high	Too high
Suriname	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Uruguay	Too low	Too low	Too low	Too low
Venezuela	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Oceania				
Melanesia				
Fiji	Too high	Too high	Too high	Satisfactory
Papua New Guinea	Too high	Too high	Too high	Too high
Vanuatu	..	Satisfactory	Satisfactory	Satisfactory
Polynesia				
Samoa	Too high	Too high	Too high	Too high

Reproductive health encompasses many elements, including contraceptive information and services, prenatal care, safe childbirth and postnatal care, prevention and treatment of STIs, including HIV/AIDS, prevention and treatment of infertility, elimination of harmful practices, and violence against women. The Programme of Action calls for all countries to provide these services, mainly through the primary health care system, by 2015. Governments have adopted a life-cycle approach to reproductive health that is based on the understanding that the situation of women during pregnancy and childbirth depends on their experience in childhood and adolescence.

Policy to modify fertility				
1976	1986	1996	2001	Country
				Europe
				Southern Europe
Maintain	Maintain	Maintain	Maintain	Albania
				Latin America and the Caribbean
				Caribbean
No intervention	No intervention	No intervention	Lower	Bahamas
Lower	Lower	Lower	Lower	Dominican Republic
Lower	Lower	Lower	Lower	Haiti
Lower	Lower	Lower	Lower	Jamaica
..	Lower	Lower	Lower	Saint Lucia
				Central America
..	No intervention	No intervention	No intervention	Belize
No intervention	No intervention	Lower	Lower	Costa Rica
Lower	Lower	Lower	Lower	El Salvador
No intervention	No intervention	Lower	Lower	Guatemala
Lower	Lower	Lower	Lower	Honduras
Lower	Lower	Lower	Lower	Mexico
No intervention	No intervention	Lower	Lower	Nicaragua
No intervention	No intervention	No intervention	Maintain	Panama
				South America
Raise	No intervention	No intervention	No intervention	Argentina
No intervention	No intervention	No intervention	No intervention	Bolivia
No intervention	No intervention	No intervention	No intervention	Brazil
No intervention	No intervention	No intervention	No intervention	Chile
Lower	No intervention	No intervention	Lower	Colombia
No intervention	No intervention	Lower	Lower	Ecuador
No intervention	No intervention	No intervention	No intervention	Guyana
No intervention	No intervention	No intervention	Lower	Paraguay
No intervention	Lower	Lower	Lower	Peru
No intervention	No intervention	No intervention	No intervention	Suriname
Raise	No intervention	Raise	Raise	Uruguay
No intervention	No intervention	Lower	Lower	Venezuela
				Oceania
				Melanesia
Lower	Lower	Lower	Lower	Fiji
Lower	No intervention	Lower	Lower	Papua New Guinea
..	No intervention	No intervention	No intervention	Vanuatu
				Polynesia
Lower	Lower	Lower	Lower	Samoa

Child mortality

Addressing population growth concerns in the World Population Plan of Action and the ICPD Programme of Action, Governments had recognized the interrelationship between fertility and mortality levels. Reducing infant, child and maternal mortality is seen to lessen the need for high fertility and reduce the occurrence of high-risk births. In 2001, some 83 per cent of countries in less developed regions considered the level of under-five mortality to be unacceptable. In intermediate-fertility countries, this proportion was

Table 4
Change in Government views on fertility in intermediate-fertility countries, 1976-2001, by current level of fertility and by major area
(*percentage of countries*)

	1976				2001			
Region	Too high	Satisfactory	Too low	Total	Too high	Satisfactory	Too low	Total
Total	**61**	**32**	**7**	**100**	**57**	**39**	**4**	**100**
According to total fertility rate								
TFR 3.5-5	68	27	5	100	76	24	0	100
TFR 2.1-3.5	57	35	8	100	45	48	7	100
According to major area*								
Africa	69	23	8	100	92	8	0	100
Asia and Oceania	64	32	4	100	46	46	7	100
Latin America and the Caribbean	56	35	9	100	52	44	4	100

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.
* Albania (Europe) is not included in the regional distribution.

79 per cent. Every country in Africa considered its under-five mortality to be too high, as did 84 per cent in Latin America and the Caribbean and 64 per cent in Asia and Oceania (see table 5). The region of Western Asia is notable in that two thirds of Governments consider child mortality acceptable.

Maternal mortality

Maternal mortality is another serious concern for Governments. In 2001, only one fifth of Governments in the intermediate-fertility countries found their level of maternal mortality to be acceptable (see table 6). These included eight countries in Asia and Oceania (Brunei Darussalam, Fiji, Israel, Kuwait, Lebanon, Qatar, Syrian Arab Republic and United Arab Emirates) and five countries in Latin America and the Caribbean (Argentina, Bahamas, Chile, Costa Rica and Jamaica).

The maternal mortality ratio in the intermediate-fertility countries varies from 8 maternal deaths per 100,000 live births in Israel to 1,300 maternal deaths in Kenya and 1,500 in the Sudan. About 60 per cent of births in less developed countries occur outside health facilities. Births attended by trained health personnel in Bangladesh, for example, accounted for only 8 per cent in 1990-1997 (UNICEF, 1999). This affects health and mortality of both mothers and children. And even deliveries in health facilities can still be risky because of poor medical care. The Programme of Action called on Governments to aim for maternal mortality ratios below 60 deaths per 100,000 live births in all countries. At the General Assembly's review of the implementation of ICPD Programme of Action, a new benchmark called for high-mortality countries to ensure that at least 60 per cent of births are assisted by trained health personnel.

Abortion

According to WHO estimates, 13 per cent of maternal deaths result from complications from abortion. These complications particularly arise from unsafe procedures, which usually occur where abortions are illegal or inaccessible. Abortion is one of the most divisive health issues that Governments face. The international consensus hammered out at the Cairo Conference is that unsafe abortion should be addressed to reduce its adverse health impacts. In the Programme of Action, Governments declared that "in no case should abortion be promoted as a method of family planning" (United Nations, 1995).

Table 5
Trends and Government acceptability of under-five mortality

Country	1975	2000	Annual percentage change, 1970-1975 to 1995-2000	Acceptability of under-five mortality 2001
Africa				
Eastern Africa				
Kenya	169	109	-1.8	Unacceptable
Northern Africa				
Algeria	159	56	-4.2	Unacceptable
Egypt	210	64	-4.8	Unacceptable
Libyan Arab Jamahiriya	140	31	-6.0	Unacceptable
Morocco	179	68	-3.9	Unacceptable
Sudan	233	137	-2.1	Unacceptable
Tunisia	156	37	-5.8	Unacceptable
Southern Africa				
Botswana	152	135	-0.5	Unacceptable
Lesotho	221	159	-1.3	Unacceptable
South Africa	109	83	-1.1	Unacceptable
Swaziland	226	143	-1.8	Unacceptable
Western Africa				
Cape Verde	108	64	-2.1	Unacceptable
Ghana	177	112	-1.8	Unacceptable
Asia				
Eastern Asia				
Mongolia	152	99	-1.7	Unacceptable
South-Central Asia				
Bangladesh	225	111	-2.8	Unacceptable
India	192	99	-2.6	Unacceptable
Iran (Islamic Republic of)	166	53	-4.6	Unacceptable
Kyrgyzstan	74	54	-1.3	Unacceptable
Nepal	241	117	-2.9	Unacceptable
Tajikistan	109	80	-1.2	Unacceptable
Turkmenistan	113	77	-1.5	Unacceptable
Uzbekistan	109	58	-2.5	Unacceptable
South-Eastern Asia				
Brunei Darussalam	59	11	-6.7	Acceptable
Indonesia	185	63	-4.3	Unacceptable
Malaysia	57	15	-5.3	Acceptable
Myanmar	198	142	-1.3	Unacceptable
Philippines	112	42	-3.9	Unacceptable
Viet Nam	174	56	-4.5	Acceptable
Western Asia				
Bahrain	76	22	-5.0	Unacceptable
Israel	53	10	-6.7	Acceptable
Jordan	106	33	-4.7	Unacceptable
Kuwait	59	15	-5.5	Acceptable
Lebanon	60	23	-3.8	Acceptable
Qatar	64	16	-5.5	Acceptable
Syrian Arab Republic	118	32	-5.2	Acceptable
Turkey	194	60	-4.7	Unacceptable
United Arab Emirates	85	16	-6.7	Acceptable

Table 5
Trends and Government acceptability of under-five mortality (*continued*)

Country	1975	2000	Annual percentage change, 1970-1975 to 1995-2000	Acceptability of under-five mortality 2001
Europe				
Southern Europe				
Albania	92	40	-3.3	Unacceptable
Latin America and the Caribbean				
Caribbean				
Bahamas	46	25	-2.4	Unacceptable
Dominican Republic	135	58	-3.4	Unacceptable
Haiti	194	115	-2.1	Unacceptable
Jamaica	56	27	-2.9	Acceptable
Saint Lucia	53	18	-4.3	Unacceptable
Central America				
Belize	70	42	-2.0	Unacceptable
Costa Rica	64	15	-5.8	Acceptable
El Salvador	152	41	-5.2	Unacceptable
Guatemala	165	61	-4.0	Unacceptable
Honduras	163	55	-4.3	Unacceptable
Mexico	100	38	-3.9	Unacceptable
Nicaragua	152	50	-4.4	Unacceptable
Panama	68	28	-3.5	Unacceptable
South America				
Argentina	58	25	-3.4	Acceptable
Bolivia	245	88	-4.1	Unacceptable
Brazil	126	49	-3.8	Unacceptable
Chile	81	15	-6.7	Acceptable
Colombia	101	39	-3.8	Unacceptable
Ecuador	137	60	-3.3	Unacceptable
Guyana	106	75	-1.4	Unacceptable
Paraguay	72	48	-1.6	Unacceptable
Peru	169	65	-3.8	Unacceptable
Suriname	58	33	-2.3	Unacceptable
Uruguay	52	20	-3.8	Unacceptable
Venezuela	67	25	-3.9	Unacceptable
Oceania				
Melanesia				
Fiji	66	24	-4.0	Acceptable
Papua New Guinea	161	96	-2.1	Unacceptable
Vanuatu	133	40	-4.8	Unacceptable
Polynesia				
Samoa	89	37	-3.5	Unacceptable

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

Replies to the Seventh and Eighth United Nations Inquiries among Governments on Population and Development show that abortion is a matter of growing concern for Governments. Of 50 Governments in the intermediate-fertility countries that responded to the question on abortion, 32 (64 per cent) considered it a matter of concern (see table 7). Seven countries expressed no concern on the issue (Morocco, Tunisia and the Sudan in Africa; Israel, Islamic Republic of Iran, Jordan, Tajikistan and Turkey in Asia). Four countries (Bangladesh, Ghana, India and Indonesia) did not have an official position in the Seventh Inquiry, but in the Eighth Inquiry reported their concern.

Table 6
Maternal mortality ratios and Government acceptability of maternal mortality

Country	Maternal mortality ratio (per 100,000 births), 1995	Acceptability of maternal mortality, 2001
Africa		
Eastern Africa		
Kenya	1 300	Unacceptable
Northern Africa		
Algeria	150	Unacceptable
Egypt	170	Unacceptable
Libyan Arab Jamahiriya	120	Unacceptable
Morocco	390	Unacceptable
Sudan	1 500	Unacceptable
Tunisia	70	Unacceptable
Southern Africa		
Botswana	480	Unacceptable
Lesotho	530	Unacceptable
South Africa	340	Unacceptable
Swaziland	370	Unacceptable
Western Africa		
Cape Verde	190	..
Ghana	590	Unacceptable
Asia		
Eastern Asia		
Mongolia	65	Unacceptable
South-Central Asia		
Bangladesh	600	Unacceptable
India	440	Unacceptable
Iran (Islamic Republic of)	130	Unacceptable
Kyrgyzstan	80	Unacceptable
Nepal	830	Unacceptable
Tajikistan	120	Unacceptable
Turkmenistan	65	Unacceptable
Uzbekistan	60	Unacceptable
South-Eastern Asia		
Brunei Darussalam	22	Acceptable
Indonesia	470	Unacceptable
Malaysia	39	Unacceptable
Myanmar	170	Unacceptable
Philippines	240	Unacceptable
Viet Nam	95	Unacceptable
Western Asia		
Bahrain	38	Unacceptable
Israel	8	Acceptable
Jordan	41	Unacceptable
Kuwait	25	Acceptable
Lebanon	130	Acceptable
Qatar	41	Acceptable
Syrian Arab Republic	200	Acceptable
Turkey	55	Unacceptable
United Arab Emirates	30	Acceptable

Table 6
Maternal mortality ratios and Government acceptability of maternal mortality (*continued*)

Country	Maternal mortality ratio (per 100,000 births), 1995	Acceptability of maternal mortality, 2001
Europe		
Southern Europe		
Albania	31	Unacceptable
Latin America and the Caribbean		
Caribbean		
Bahamas	10	Acceptable
Dominican Republic	110	Unacceptable
Haiti	1 100	Unacceptable
Jamaica	120	Acceptable
Saint Lucia	..	..
Central America		
Belize	140	Unacceptable
Costa Rica	35	Acceptable
El Salvador	180	Unacceptable
Guatemala	270	Unacceptable
Honduras	220	Unacceptable
Mexico	65	Unacceptable
Nicaragua	250	Unacceptable
Panama	100	Unacceptable
South America		
Argentina	85	Acceptable
Bolivia	550	Unacceptable
Brazil	260	Unacceptable
Chile	33	Acceptable
Colombia	120	Unacceptable
Ecuador	210	Unacceptable
Guyana	150	Unacceptable
Paraguay	170	Unacceptable
Peru	240	Unacceptable
Suriname	230	..
Uruguay	50	Unacceptable
Venezuela	43	Unacceptable
Oceania		
Melanesia		
Fiji	20	Acceptable
Papua New Guinea	390	Unacceptable
Vanuatu	32	Unacceptable
Polynesia		
Samoa	15	..

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

Adolescent fertility

Adolescent fertility is a growing concern for Governments, particularly in less developed regions. It is related to the fact that young people constitute a high proportion of the population in the less developed countries. The recent increase in sexual activity among adolescents in some countries is frequently accompanied by an increase in teen-age pregnancies, and the spread of AIDS. Young people are more vulnerable than adults to un-

Table 7
Abortion rates and Governments views and policies on abortion

Country	Abortion rate (per 1,000 women aged 15-44)	Is induced abortion viewed as a matter of concern by the Government	Grounds on which abortion is permitted						
			To save the woman's life	To preserve physical health	To preserve mental health	Rape or incest	Foetal impairment	Economic or social reasons	On request
Africa									
Eastern Africa									
Kenya	..	Yes	x	x	x	-	-	-	-
Northern Africa									
Algeria	..	No official position	x	x	x	-	-	-	-
Egypt	..	No official position	x	-	-	-	-	-	-
Libyan Arab Jamahiriya	..	..	x	-	-	-	-	-	-
Morocco	..	No	x	x	x	-	-	-	-
Sudan	..	No	x	-	-	x	-	-	-
Tunisia	9 (*1996*)	No	x	x	x	x	x	x	x
Southern Africa									
Botswana	..	Yes	x	x	x	x	x	-	-
Lesotho	..	..	x	-	-	-	-	-	-
South Africa	3 (*1997*)	No official position	x	x	x	x	x	x	x
Swaziland	..	..	x	-	-	-	-	-	-
Western Africa									
Cape Verde	..	..	x	x	x	x	x	x	x
Ghana	..	Yes	x	x	x	x	x	-	-
Asia									
Eastern Asia									
Mongolia	26 (*1996*)	Yes	x	x	x	x	x	x	x
South-Central Asia									
Bangladesh	28 (*1997*)[a]	Yes	x	-	-	-	-	-	-
India	..	Yes	x	x	x	x	x	x	-
Iran (Islamic Republic of)	..	No	x	-	-	-	-	-	-
Kyrgyzstan	16 (*1999*)	..	x	x	x	x	x	x	x
Nepal	..	No official position	x	-	-	-	-	-	-
Tajikistan	15 (*1999*)	No	x	x	x	x	x	x	x
Turkmenistan	32 (*1997*)	..	x	x	x	x	x	x	x
Uzbekistan	10 (*1999*)	..	x	x	x	x	x	x	x
South-Eastern Asia									
Brunei Darussalam	..	..	x	-	-	-	-	-	-
Indonesia	..	Yes	x	-	-	-	-	-	-
Malaysia	..	No official position	x	x	x	-	-	-	-
Myanmar	..	Yes	x	-	-	-	-	-	-
Philippines	..	Yes	x	-	-	-	-	-	-
Viet Nam	63 (*1999*)	Yes	x	x	x	x	x	x	x
Western Asia									
Bahrain	..	..	x	x	x	x	x	x	x
Israel	15 (*1999*)	No	x	x	x	x	x	-	-
Jordan	..	No	x	x	x	-	-	-	-
Kuwait	..	Yes	x	x	x	-	x	-	-
Lebanon	..	..	x	-	-	-	-	-	-
Qatar	..	..	x	x	x	-	x	-	-
Syrian Arab Republic	..	..	x	-	-	-	-	-	-
Turkey	25 (*1993*)	No	x	x	x	x	x	x	x
United Arab Emirates	..	..	x	-	-	-	-	-	-

Table 7
Abortion rates and Governments views and policies on abortion (*continued*)

Country	Abortion rate (per 1,000 women aged 15-44)	Is induced abortion viewed as a matter of concern by the Government	Grounds on which abortion is permitted: To save the woman's life	To preserve physical health	To preserve mental health	Rape or incest	Foetal impairment	Economic or social reasons	On request
Europe									
Southern Europe									
Albania	22 (*1999*)	..	x	x	x	x	x	x	x
Latin America and the Caribbean									
Caribbean									
Bahamas	..	No official position	x	x	x	-	-	-	-
Dominican Republic	47 (*1989/1991*)b	No official position	x	-	-	-	-	-	-
Haiti	..	..	x	-	-	-	-	-	-
Jamaica	..	No official position	x	x	x	-	-	-	-
Saint Lucia	..	No official position	x	x	x	-	-	-	-
Central America									
Belize	..	Yes	x	x	x	-	x	x	-
Costa Rica	..	Yes	x	x	x	-	-	-	-
El Salvador	..	No official position	-	-	-	-	-	-	-
Guatemala	..	..	x	-	-	-	-	-	-
Honduras	..	No official position	x	-	-	-	-	-	-
Mexico	25 (*1989/1991*)[b]	Yes	x	-	-	x	-	-	-
Nicaragua	..	Yes	x	-	-	-	-	-	-
Panama	..	Yes	x	-	x	x	-	-	-
South America									
Argentina	..	Yes	x	x	x	x	-	-	-
Bolivia	..	Yes	x	x	x	x	-	-	-
Brazil	41 (*1989/1991*)[b]	Yes	x	-	-	x	-	-	-
Chile	50 (*1989/1991*)[b]	Yes	-	-	-	-	-	-	-
Colombia	36 (*1989/1991*)[b]	Yes	x	-	-	-	-	-	-
Ecuador	..	Yes	x	x	x	x	-	-	-
Guyana	..	..	x	x	x	x	x	x	x
Paraguay	..	Yes	x	-	-	-	-	-	-
Peru	56 (*1989/1991*)[b]	Yes	x	x	x	-	-	-	-
Suriname	..	..	x	-	-	-	-	-	-
Uruguay	..	..	x	x	x	x	-	-	-
Venezuela	..	Yes	x	-	-	-	-	-	-
Oceania									
Melanesia									
Fiji	..	Yes	x	x	x	-	-	x	-
Papua New Guinea	..	Yes	x	x	x	-	-	-	-
Vanuatu	..	..	x	x	x	-	-	-	-
Polynesia									
Samoa	..	..	x	x	x	-	-	-	-

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

[a] Susheela Singh, Josefina V. Cabigon, Altaf Hossain, Haidary Kamal and Aurora E. Perez (1997). Estimating the level of abortion in the Philippines and Bangladesh. *International Family Planning Perspectivies* (New York), vol. 23, No. 3 (September).

[b] Stanley Henshaw, Susheela Singh and Taylor Haas (1999b). Recent trends in abortion rate worldwide. *International Family Planning Perspectives* (New York), vol. 25, No. 1 (June).

Table 8
Teenage fertility rate, percentage of births to woman under age 20 and Governmental views and policies on adolescent fertility

Country	Teenage fertility rate (per 1,000 women aged 15-19)	Per centage of births to women under age 20	Is adolescent fertility viewed as a matter of concern by the Government	Policies and programmes addressing adolescent fertility
Africa				
Eastern Africa				
Kenya	98	17	Major concern	Information, education and communication; youth centres and youth-friendly clinics.
Northern Africa				
Algeria	22	5	Minor concern	No
Egypt	52	10	Major concern	Yes
Libyan Arab Jamahiriya	19	4	..	..
Morocco	34	7	Minor concern	No
Sudan	64	9	Not a concern	No
Tunisia	12	3	Minor concern	Yes
Southern Africa				
Botswana	77	14	Major concern	Introducing friendlier health and family-planning facilities; use of peer educators to promote family planning.
Lesotho	74	11	Major concern	Yes
South Africa	81	17	Major concern	Yes
Swaziland	84	13	Not a concern	..
Western Africa				
Cape Verde	78	14	..	No
Ghana	91	15	Major concern	Family life education for in-school and out-of-school youth; peer counselling programmes.
Asia				
Eastern Asia				
Mongolia	57	13	Minor concern	National reproductive health programme.
South-Central Asia				
Bangladesh	140	23	Major concern	Health and population programmes for married adolescents; information for adolescents on nutrition, hygiene, puberty, safer sex bahaviour, and risks of STD/HIV/AIDS.
India	51	9	Major concern	Discouraging below legal age marriages; promotion of contraception and counselling, making abortion safer, care during pregnancy.
Iran (Islamic Republic of)	38	9	Major concern	Yes
Kyrgyzstan	36	8	Not a concern	Yes
Nepal	136	19	Minor concern	Yes
Tajikistan	31	6	Not a concern	No
Turkmenistan	20	4	..	Yes
Uzbekistan	63	13	..	Yes
South-Eastern Asia				
Brunei Darussalam	35	7	Not a concern	No
Indonesia	59	13	Major concern	Family life education.
Malaysia	17	3	Major concern	National study on adolescent reproductive health and sexuality; provision of appropriate services for adolescents.
Myanmar	30	6	Major concern	Adolescent Reproductive Health Programme; ife skills training for youth.
Philippines	45	8	Major concern	Population education for in-school youth; adolescent health and youth development programme.

Table 8
Teenage fertility rate, percentage of births to woman under age 20 and Governmental views and policies on adolescent fertility (*continued*)

Country	Teenage fertility rate (per 1,000 women aged 15-19)	Per centage of births to women under age 20	Is adolescent fertility viewed as a matter of concern by the Government	Policies and programmes addressing adolescent fertility
South-Eastern Asia (*continued*)				
Viet Nam	25	6	Minor concern	Adolescent health programmes; reproductive health services; population education for in-school youth.
Western Asia				
Bahrain	20	4	Not a concern	No
Israel	18	4	Minor concern	Family and sex education in schools.
Jordan	41	7	Not a concern	No
Kuwait	34	12	Not a concern	No
Lebanon	27	6	..	No
Qatar	26	4	..	No
Syrian Arab Republic	44	8	..	..
Turkey	64	14	Major concern	Adolescent Reproductive Health Programme.
United Arab Emirates	70	15	..	..
Europe				
Southern Europe				
Albania	16	3	..	No
Latin America and the Caribbean				
Caribbean				
Bahamas	63	14	Major concern	National adolescent health programme; family life education.
Dominican Republic	97	20	Major concern	National programme of comprehensive assistance to adolescents; reproductive health educational programmes in and out of schools; education in print media.
Haiti	70	13	..	..
Jamaica	63	15	Major concern	Yes
Saint Lucia	73	17	Major concern	Yes
Central America				
Belize	94	19	Major concern	No
Costa Rica	85	18	Major concern	National programme of comprehensive assistance to adolescents, including social and communication activities.
El Salvador	95	19	Minor concern	No
Guatemala	119	18	Minor concern	Yes
Honduras	115	19	Minor concern	Health care programme for women; prevention of adolescent pregnancies.
Mexico	70	15	Major concern	Family planning programme; information, education and communication.
Nicaragua	157	25	Major concern	Yes
Panama	82	17	Major concern	Adolescent and women's health project; national programme of general health for schoolchildren and adolescents.
South America				
Argentina	65	15	Major concern	Information, education and communication; counselling and reproductive health services.
Bolivia	79	12	Minor concern	Yes
Brazil	72	18	Major concern	National programme of adolescent health assistance.
Chile	49	10	Major concern	Information, education and communication.

Table 8
Teenage fertility rate, percentage of births to woman under age 20 and Governmental views and policies on adolescent fertility (*continued*)

Country	Teenage fertility rate (per 1,000 women aged 15-19)	Per centage of births to women under age 20	Is adolescent fertility viewed as a matter of concern by the Government	Policies and programmes addressing adolescent fertility
South America (*continued*)				
Colombia	88	18	Major concern	Sexual education plan; medical consultants for adolescents in local centres; information programmes on adolescents pregnancy and prevention of pregnancy complications.
Ecuador	72	15	Major concern	Yes
Guyana	74	17	..	..
Paraguay	76	13	Minor concern	Information, education and communication on reproductive health; national plan for general health for adolescents.
Peru	58	12	Minor concern	Information, education and communication for youth and adolescents; sexual and family education, reproductive health and family-planning programme, school and adolescent health programme.
Suriname	21	6	Major concern	No
Uruguay	70	16	..	..
Venezuela	98	20	..	..
Oceania				
Melanesia				
Fiji	53	11	Minor concern	Creation of advocacy unit for adolescent health; introduction of emergency contraceptives.
Papua New Guinea	89	13	Minor concern	Free access to information; peer education programme.
Vanuatu	62	9	..	..
Polynesia				
Samoa	49	10	..	..

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

planned pregnancies and to HIV and other STIs. Since adolescence is the period of formation, transition from childhood to adulthood, the experience of people in adolescence impacts their entire lives. Their decisions about marriage, sexual activity and childbearing have major implications for societies.

In 2001, of the 53 intermediate-fertility countries, for which information was available, 30 (57 per cent) viewed adolescent fertility as a major concern (see table 8). The level of concern varied among regions. It was 40 per cent among the countries of Asia and Oceania, 55 per cent in Africa, and 73 per cent in Latin America and the Caribbean. Some countries that expressed no concern in the Seventh Inquiry, changed their view in the Eighth Inquiry to expressing high concern (Colombia, Myanmar and Turkey) or minor concern (Algeria and Tunisia). Other countries shifted from minor to major concern (Bahamas, Bangladesh and Malaysia). However, a number of countries like Nepal in Asia, and Bolivia and Guatemala in Latin America, which exhibit high teenage fertility rates (between 116 and 136 children per 1,000 women aged 15-19) express only minor concern regarding adolescent fertility. Only eight countries express no concern with this issue (the Sudan and Swaziland in Africa; and Bahrain, Brunei Darussalam, Jordan, Kuwait, Kyrgyzstan and Tajikistan in Asia).

Table 9
Change in Government policies on population growth in intermediate-fertility countries, 1976-2001, by current level of fertility and by major area (*percentage of countries*)

	1976					2001				
Region	Lower	Maintain	Raise	No intervention	Total	Lower	Maintain	Raise	No intervention	Total
Total	**46**	**0**	**13**	**41**	**100**	**49**	**12**	**3**	**36**	**100**
According to total fertility rate										
TFR 3.5-5	50	0	9	41	100	68	4	0	28	100
TFR 2.1-3.5	43	0	16	41	100	38	17	5	40	100
According to major area*										
Africa	69	0	8	23	100	92	0	0	8	100
Asia and Oceania	55	0	18	27	100	39	21	4	36	100
Latin America and the Caribbean	26	0	13	61	100	40	4	4	52	100

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

* Albania (Europe) is not included in the regional distribution.

Table 10
Change in Government policies on fertility in intermediate-fertility countries, 1976-2001, by current level of fertility and by major area (*percentage of countries*)

	1976					2001				
Region	Lower	Maintain	Raise	No intervention	Total	Lower	Maintain	Raise	No intervention	Total
Total	47	9	7	37	100	63	7	5	25	100
According to total fertility rate										
TFR 3.5-5	54	5	5	36	100	68	4	0	28	100
TFR 2.1-3.5	43	11	8	38	100	59	10	8	24	100
According to major area*										
Africa	69	0	8	23	100	92	0	0	8	100
Asia and Oceania	54	18	5	23	100	54	11	7	28	100
Latin America and the Caribbean	30	0	9	61	100	60	4	4	32	100

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

* Albania (Europe) is not included in the regional distribution.

POLICY INTERVENTIONS

Policy objectives with respect to population growth

In 2001, some 33 of 67 intermediate-fertility countries (49 per cent) had policies aimed at lowering population growth, while 8 (12 per cent) had policies aimed at maintaining it and only 2 countries, Israel and Uruguay, had policies to raise it. Some 24 Governments (36 per cent) had a policy of non-intervention (see tables 1 and 9). While in countries with total fertility between 2.1 and 3.5, the proportion of those with a policy to lower population growth was 38 per cent, in countries with TFR between 3.5 and 5 children per woman, it was much higher—68 per cent (see table 9).

Throughout the quarter century since 1976, many intermediate-fertility countries steadily maintained their commitment to reduce population growth: two thirds of countries in Africa (Botswana, Egypt, Ghana, Lesotho, Morocco, South Africa and Tunisia), one fourth of those in Asia and Oceania (Bangladesh, India, Indonesia, Nepal, Papua New

Guinea, the Philippines, Samoa, Turkey and Viet Nam); and almost one fourth in Latin America and the Caribbean (Dominican Republic, El Salvador, Haiti, Jamaica, Mexico and Saint Lucia). Some countries shifted to a policy of reducing population growth during these decades. In the 1990s, such a change in policies was made by the Islamic Republic of Iran and Jordan in Asia and Oceania; Cape Verde, the Sudan and Swaziland in Africa; and Guatemala and Nicaragua in Latin America and the Caribbean.

In contrast, Malaysia has changed its policy from one of lowering the population growth rate and no longer intervenes to reduce it. This corresponds to the steady decline of its population growth rate that has resulted mainly from the decline in overall fertility. Costa Rica and Honduras have also shifted from a policy of lowering the population growth rate to one of non-intervention. The Government of Kuwait has adopted a policy to maintain the present rate of growth for Kuwaitis and to reduce the rate of growth for non-Kuwaitis.

Since the concern with population growth issues arose, several Governments identified quantitative targets in their development plans to reduce the population growth rate, for example, Ghana, India, Indonesia, the Islamic Republic of Iran, the Philippines and Turkey. India has needed to delay its targets for the growth rate and fertility level. For example, the targets of achieving the net reproduction rate of 1 and the birth rate of 21 have moved from the year 2000 to the period 2011-2016. In contrast, Indonesia achieved its targets ahead of schedule. In general, however, particularly since the 1990s, national programmes are shifting their emphasis from quantitative to qualitative issues, with the focus being on satisfying unmet needs and on a "people- and family-centred" approach.

Policy objectives with respect to fertility

In 2001, all the countries that have taken action to reduce their rate of population growth pursued that objective through programmes aimed at lowering their fertility level. In addition, six countries in 2001 indicated a policy of non-intervention in regard to their population growth rate while continuing a policy to lower fertility (Bahamas, Bahrain, Costa Rica, Honduras and Malaysia).

The proportion of Governments with a policy to lower fertility rose from 47 per cent in 1976 to 63 per cent in 2001. While in 1976, nine countries viewing fertility as too high did not have any policy to modify it, in 2001, there were only two such countries (see tables 2 and 10). Countries with TFR between 3.5 and 5 children per woman are more likely to have a policy to lower fertility (68 per cent) than those with TFR between 2.1 and 3.5 children per woman (59 per cent) (see table 10).

Many countries have steadily had a policy to lower fertility throughout the entire post-Bucharest period: 9 of 13 countries in Africa (70 per cent), and one third of countries in Asia and Oceania and in Latin America and the Caribbean. In the 1990s, 14 countries shifted from a policy of non-intervention to one aimed at lowering fertility: Cape Verde and the Sudan in Africa; Bahrain, the Islamic Republic of Iran, Jordan, Lebanon and Papua New Guinea in Asia and Oceania; and Bahamas, Colombia, Costa Rica, Ecuador, Guatemala, Nicaragua and Venezuela in Latin America and the Caribbean. Malaysia also shifted to this policy from one of maintaining fertility.

As a result, by 2001, all intermediate-fertility countries in Africa, except Libyan Arab Jamahiriya, 54 per cent of those in Asia and Oceania, and 60 per cent in Latin America and the Caribbean had policies to reduce fertility.

The situation is particularly diverse in Latin America and the Caribbean. In the Caribbean and Central America, all countries (with the exception of Belize and Panama) have a policy to reduce fertility, but in South America only 40 per cent of countries do (Colombia, Ecuador, Paraguay, Peru and Venezuela), and Uruguay has a policy to raise it. Half of the countries in South America have steadily had a policy of non-intervention: Bolivia, Brazil, Chile, Guyana and Suriname. In addition, Argentina has had a policy of non-intervention since the 1980s.

The Governments of Israel and Uruguay have a policy to raise fertility. And the Government of the United Arab Emirates, after shifting to a policy of non-intervention in the 1990s, has recently returned to one of raising fertility, providing incentives for childbearing for national women.

Many countries have reported that they had adopted quantitative targets with regard to fertility levels. Botswana, for example, seeks to reduce TFR from 4 children per woman in 1996 to 3.4 in 2011. Ghana has a target to reduce TFR to 4 children per woman by 2010 and 3 children by 2020. Kenya set targets to reduce TFR to 3.5 children by 2005 and 2.5 by 2010. Bangladesh seeks to reduce TFR to 2.6 in 2002 and 2.2 in 2005. Indonesia wishes to reach replacement level fertility in 2005-2010, and India aims to do it by 2010.

In the 1990s, of all Governments with intermediate fertility who responded to the Inquiry, all in Africa and almost all in Asia (with exception of Israel and Tajikistan) reported that their policies in regard to fertility were adopted both to modify population growth and to improve family well-being. In contrast, eight Governments in Latin America and the Caribbean (Bahamas, Bolivia, Brazil, Costa Rica, Honduras, Nicaragua, Panama and Peru) and two in Asia and Oceania (Fiji and Tajikistan) pointed out that the chief objective in modifying the fertility level was to improve family well-being, and not to modify the rate of population growth.

Family planning and its integration with reproductive health programmes

Family planning has long been a core element of population policies and programmes and is a central component of reproductive health. Since the World Population Conference at Bucharest in 1974, Government policies have shifted in the direction of increased support for services providing modern, effective contraceptive methods. At the 1994 International Conference on Population and Development in Cairo, Governments have particularly reaffirmed the right of couples and individuals to choose the number and timing of children and to have access to the information and means to do so. Many Governments support family planning as part of basic reproductive health services.

Government support for policies and programmes that affect fertility has steadily increased in the intermediate-fertility countries as well. In 2001, 94 per cent of those countries provided either direct (through governmental outlets) or indirect support (non-governmental sources) for family planning programmes and contraceptives (see table 11). The proportion of intermediate-fertility countries providing direct support through State agencies was 87 per cent, slightly higher than in the less developed regions on a whole (84 per cent). The Government of Mongolia since 1988 has removed all restrictions with regard to the use, distribution and importation of contraceptives and began to widely provide modern contraception and educational programmes for women at risk. The Government of Albania since 1990s has also removed limitations on the scale and distribution of contraceptives and established a national family planning programme. Some countries previously providing no support for family planning have started to provide direct support (Qatar) or indirect support (Argentina, Belize and Kuwait). And eight countries (Bahamas, Bolivia, Colombia, Islamic Republic of Iran, Jordan, Myanmar, Nicaragua and Paraguay) have recently shifted from indirect to direct support for family planning.

In contrast, Israel has shifted from direct to indirect support, joining the Government of Lebanon, which has been steadily providing only indirect support for family planning. In 2001, only four of the Governments from intermediate-fertility countries still provide no support for family planning (Brunei Darussalam, Libyan Arab Jamahiriya, Turkmenistan and United Arab Emirates).

A number of Governments have identified national quantitative targets relative to contraceptive use. Botswana seeks to increase contraceptive prevalence from 42.5 per cent in 1996 to 65 per cent in 2011. Ghana aims to achieve the level of 28 per cent for modern methods by 2010 and 50 per cent by 2020. Bangladesh seeks to attain the contraceptive prevalence of 68 per cent by 2005 and 72 per cent by 2010. And Indonesia aims to reach 70 per cent of eligible couples by 2005.

To modify their fertility levels, Governments have used both direct and indirect measures. In earlier family planning programmes, some Governments emphasized direct measures, establishing norms on the number of children and the spacing between them, using incentives and disincentives, and targets for particular contraceptive methods. The leading type of incentive among countries seeking to lower the growth rate has been provision of free or subsidized contraceptives or services. Sterilization, IUDs, pills, condoms, and other methods are provided free of cost.

In some countries, cash incentives have been given to acceptors of sterilization operations, IUD acceptors and to motivators (referral agents). Many Governments have introduced a variety of disincentives, with measures such as imposition of an extra tax, limiting paid maternity leave, or adjusting priority in housing or employment.

The Government of Viet Nam, promoting a family of 1-2 children, used incentives and disincentives to encourage lower fertility. Among the incentives were provision of land and free contraception. Among disincentives were fines or job penalties. In 1988, the Government issued a Decision (Decree) concerning a number of population and family planning policies. It included the permitted numbers of children for different categories of population, and policies and regulations encouraging family planning. One of the standards to be considered in the allocation of land for the construction of a house and the distribution of housing was that the family should have two or fewer children. Families that had more than a certain number had to pay a housing or land rent calculated at a high price for the extra space they requested. They also had to contribute social support funds. People with three or more children were not permitted to move into the urban centres of municipalities, cities and industrial zones. Moreover, when examining the results of the implementation of their plan, State agencies as well as production and business units were to give consideration to meeting the norms on population and family planning. The National Assembly passed the Health Law in 1989, which emphasized that couples are free to choose any available method of family planning and reiterated the voluntary nature of the population programme.

Currently, the Government of India offers retirement benefits for families having a limited number of children. A disincentive has been proposed to limit maternity leave to pregnant women with no more than two children. The Government of the Islamic Republic of Iran passed a national family law in 1993 that encouraged couples to have fewer children by restricting maternity leave benefits after three children. In the Philippines, maternity leave is granted only for the first four children. In Nepal, tax exemptions are based on the number of children. Indonesia has adopted tax disincentives and income-generating activities for acceptors of family planning.

Sterilization has become the method most often subject to legal and administrative restrictions. Many countries in less developed regions once prohibited sterilization for contraceptive purposes. Recently, there has been a trend among countries to reduce or remove restrictions on voluntary sterilization. However, some Governments set age, parity and other restrictions on those who may obtain voluntary sterilization. Governments impose restrictions on women more frequently than on men.

Targets were an integral part of the family planning programme in many countries for decades. Annual targets for different methods, imposed from the top down, were set for family planning workers at all levels, and their performance was judged in terms of the fulfillment of the targets.

The ICPD Programme of Action emphasized that all countries should, over the next several years, assess the extent of the national unmet need for quality family-planning services and their integration into the reproductive health context, paying particular attention to the most vulnerable and underserved groups in the population. Many

Table 11
Trends in percentage of married women using contraception, and Government policies on providing access to contraceptive methods

Country	Percentage of women using contraception			Trends (1990-2000) Annual increase in percentage using	
	Year	Any method	Modern methods	Any method	Modern methods
Africa					
Eastern Africa					
Kenya	2000	39	32	1.3	1.3
Northern Africa					
Algeria	1995	52	49	2.0	2.2
Egypt	2000	56	54	1.5	1.4
Libyan Arab Jamahiriya	1995	40	26		
Morocco	1995	50	42	2.6	2.1
Sudan	1995	8	7		
Tunisia	1995	60	51	1.7	1.8
Southern Africa					
Botswana	1988	33	32		
Lesotho	1995	23	19		
South Africa	2000	56	55	0.7	0.7
Swaziland	1988	20	17		
Western Africa					
Cape Verde	2000	53	46		
Ghana	2000	22	13	0.6	0.7
Asia					
Eastern Asia					
Mongolia	2000	60	46		
South-Central Asia					
Bangladesh	2000	54	43	1.8	1.6
India	2000	48	43	1.3	0.1
Iran (Islamic Republic of)	2000	73	56	2.4	3.0
Kyrgyzstan	2000	60	49		
Nepal	2000	29	26	1.2	0.9
Tajikistan					
Turkmenistan	2000	62	53		
Uzbekistan	2000	56	51		
South-Eastern Asia					
Brunei Darussalam					
Indonesia	2000	57	55	1.1	1.1
Malaysia	1995	55	30	1.0	-0.3
Myanmar	2000	33	28	3.2	3.0
Philippines	2000	47	28	1.2	0.7
Viet Nam	2000	75	56	2.9	3.0
Western Asia					
Bahrain	1995	62	31	1.4	0.1
Israel					
Jordan	2000	53	38	2.5	1.5
Kuwait	2000	50	41	1.0	1.1
Lebanon	2000	61	37		
Qatar	2000	43	32	1.0	0.3
Syrian Arab Republic	1995	36	28		
Turkey	2000	64	38	0.1	0.7
United Arab Emirates	1995	28	24		

Policy to modify fertility				
1976	1986	1996	2001	Country
				Africa
				Eastern Africa
Lower	Lower	Lower	Lower	Kenya
				Northern Africa
No intervention	Lower	Lower	Lower	Algeria
Lower	Lower	Lower	Lower	Egypt
Raise	No intervention	No intervention	No intervention	Libyan Arab Jamahiriya
Lower	Lower	Lower	Lower	Morocco
No intervention	No intervention	Lower	Lower	Sudan
Lower	Lower	Lower	Lower	Tunisia
				Southern Africa
Lower	Lower	Lower	Lower	Botswana
Lower	Lower	Lower	Lower	Lesotho
Lower	Lower	Lower	Lower	South Africa
Lower	Lower	Lower	Lower	Swaziland
				Western Africa
No intervention	No intervention	Lower	Lower	Cape Verde
Lower	Lower	Lower	Lower	Ghana
				Asia
				Eastern Asia
Maintain	Raise	Maintain	No intervention	Mongolia
				South-Central Asia
Lower	Lower	Lower	Lower	Bangladesh
Lower	Lower	Lower	Lower	India
Lower	No intervention	Lower	Lower	Iran (Islamic Republic of)
..	..	No intervention	No intervention	Kyrgyzstan
Lower	Lower	Lower	Lower	Nepal
..	..	Lower	No intervention	Tajikistan
..	..	No intervention	No intervention	Turkmenistan
..	..	Maintain	Maintain	Uzbekistan
				South-Eastern Asia
..	No intervention	No intervention	No intervention	Brunei Darussalam
Lower	Lower	Lower	Lower	Indonesia
Lower	Maintain	Lower	Lower	Malaysia
No intervention	No intervention	No intervention	Maintain	Myanmar
Lower	Lower	Lower	Lower	Philippines
Lower	Lower	Lower	Lower	Viet Nam
				Western Asia
No intervention	No intervention	Lower	Lower	Bahrain
Raise	Raise	Raise	Raise	Israel
No intervention	No intervention	Lower	Lower	Jordan
Maintain	Raise	Maintain	No intervention	Kuwait
No intervention	No intervention	No intervention	Lower	Lebanon
Maintain	Maintain	Maintain	Maintain	Qatar
No intervention	No intervention	No intervention	No intervention	Syrian Arab Republic
Lower	Lower	Lower	Lower	Turkey
Maintain	Raise	No intervention	Raise	United Arab Emirates

Table 11
Trends in percentage of married women using contraception, and Government policies on providing access to contraceptive methods (*continued*)

Country	Percentage of women using contraception: Year	Any method	Modern methods	Trends (1990-2000) Annual increase in percentage using: Any method	Modern methods
Europe					
Southern Europe					
Albania					
Latin America and the Caribbean					
Caribbean					
Bahamas	1988	62	60		
Dominican Republic	2000	64	59	1.4	1.5
Haiti	2000	28	22	1.7	1.2
Jamaica	2000	66	63	1.2	1.3
Saint Lucia	1988	47	46		
Central America					
Belize	1995	47	42		
Costa Rica	1995	75	65	0.8	0.9
El Salvador	2000	60	54	1.3	1.1
Guatemala	2000	38	31	1.4	1.0
Honduras	2000	50	41	0.9	1.3
Mexico	1995	67	58	1.7	1.6
Nicaragua	2000	60	57	1.9	2.1
Panama	1985	58	54		
South America					
Argentina					
Bolivia	2000	48	25	1.7	1.6
Brazil	2000	77	70	1.1	1.4
Chile					
Colombia	2000	77	64	1.1	0.9
Ecuador	2000	66	50	1.4	0.9
Guyana	1975	31	28		
Paraguay	2000	57	48	1.8	1.7
Peru	2000	64	41	1.5	2.0
Suriname					
Uruguay					
Venezuela	1977	49	38		
Oceania					
Melanesia					
Fiji	1975	41	35		
Papua New Guinea	2000	26	20		
Vanuatu					
Polynesia					
Samoa					

Source: The Population Policy Databank maintained by the Population Division of the United Nations Secretariat.

countries, particularly in Africa and Asia, reported in the Eighth Inquiry that they had attempted to assess unmet needs for family planning among the most vulnerable groups.

Following the Cairo Conference, many Governments have drafted new laws and strategy documents, have taken concrete policy actions toward the goal of providing universal access to reproductive health care. In some countries, these actions included developing comprehensive national reproductive health policies. In others, Governments redesigned aspects of national family planning or health programmes to address reproductive

Policy to modify fertility				
1976	1986	1996	2001	Country
				Europe
				Southern Europe
Maintain	Maintain	Maintain	Maintain	Albania
				Latin America and the Caribbean
				Caribbean
No intervention	No intervention	No intervention	Lower	Bahamas
Lower	Lower	Lower	Lower	Dominican Republic
Lower	Lower	Lower	Lower	Haiti
Lower	Lower	Lower	Lower	Jamaica
..	Lower	Lower	Lower	Saint Lucia
				Central America
..	No intervention	No intervention	No intervention	Belize
No intervention	No intervention	Lower	Lower	Costa Rica
Lower	Lower	Lower	Lower	El Salvador
No intervention	No intervention	Lower	Lower	Guatemala
Lower	Lower	Lower	Lower	Honduras
Lower	Lower	Lower	Lower	Mexico
No intervention	No intervention	Lower	Lower	Nicaragua
No intervention	No intervention	No intervention	Maintain	Panama
				South America
Raise	No intervention	No intervention	No intervention	Argentina
No intervention	No intervention	No intervention	No intervention	Bolivia
No intervention	No intervention	No intervention	No intervention	Brazil
No intervention	No intervention	No intervention	No intervention	Chile
Lower	No intervention	No intervention	Lower	Colombia
No intervention	No intervention	Lower	Lower	Ecuador
No intervention	No intervention	No intervention	No intervention	Guyana
No intervention	No intervention	No intervention	Lower	Paraguay
No intervention	Lower	Lower	Lower	Peru
No intervention	No intervention	No intervention	No intervention	Suriname
Raise	No intervention	Raise	Raise	Uruguay
No intervention	No intervention	Lower	Lower	Venezuela
				Oceania
				Melanesia
Lower	Lower	Lower	Lower	Fiji
Lower	No intervention	Lower	Lower	Papua New Guinea
..	No intervention	No intervention	No intervention	Vanuatu
				Polynesia
Lower	Lower	Lower	Lower	Samoa

health. In the 1990s, new national population policies and programmes were adopted in many intermediate-fertility countries such as Viet Nam (1993); Bangladesh, Ghana, Malaysia, Turkey (1994); El Salvador and Nicaragua (1997); and India (2000). Their main objectives were to ensure the achievement of sustainable growth and development. For this purpose, many national policies are aimed at reducing the population growth rate. Following the adoption of the ICPD Programme of Action, many Governments have been revising their national population policies, and health policies in particular. They have also been integrating family planning with comprehensive reproductive health care within general health policies.

The maternal and child health (MCH) approach has been the key policy initiative of India since the 1960s, although in 1996, the requisite coordination for integrating maternal and child health and family planning was still considered a goal to be achieved in the country. India's 2000 national population policy also calls for integrated service delivery of basic reproductive and child health care. The still continuing high rate of mortality under age 5 in India (99 per 1,000 births in 1995-2000) is an important factor of a slowing fertility transition.

The Government of India in 1996 decided to re-orient its Family Welfare Programme and to replace it with the new Reproductive and Child Health (RCH) Programme. The Programme's objective is to improve the quality, coverage, effectiveness and access to services. The target approach has also been changed and the health workers do not have to meet pre-determined targets. Instead, they are to be a part of the planning process to plan their own workload for service provision. The practice of setting centrally determined contraceptive method–related performance targets was ended and replaced by a system of community needs assessment to drive the Programme. Guidelines for sterilization and contraceptive administration have been revised. Sterilizations are available only to married and cohabiting persons, preferably with at least one child aged more than one year. While IUDs are encouraged only for women with children, pills and condoms are freely available. The reproductive and child health programme provides for a substantial step up in investment of resources in infrastructure, services and information in the public sector, for delivery free of cost. The RCH Programme contains special measures for tribal areas and urban slums, including infrastructure improvement.

Malaysia also no longer follows a target-oriented approach in the provision of family planning services. In Bangladesh, the Government policy involves prevention of unsafe abortion, training for the relevant service providers, and promotion of effective contraceptive methods, and decrease in unwanted pregnancies. Community clinics are being established to deliver essential services packages. In South Africa, a new 1996 Constitution included universal rights to reproductive choice and reproductive care, to be implemented in a reorganized health system that provides free primary health care for women and for children under age 6.

Strategies for improving the quality of care have been the focus of the Government of Ghana. Health service providers are being trained in pre-service and in-service programmes to acquire the requisite knowledge and skills in reproductive health to help improve and expand services at all levels of service delivery. The roles of the mid-wife and other partners in both private and public sectors are being expanded on a more regular basis. Midwives and other providers are being trained in life-saving skills.

The Government of Kenya has formulated a national population policy for sustainable development. A National Reproductive Health Strategy (1997-2010) has also been developed. The Government promotes cooperation and collabour ation at all levels of programme implementation. Provincial and district health management teams have been established. Training for the service providers is being organized. Male-only clinics have been opened. In responses to the Eighth Inquiry, the Government of Kenya noted that the implementation of its Programme of Action had encountered obstacles related to illiteracy, poverty, and cultural and religious factors. Moreover, the allocated resources for the programme are considered to be inadequate.

The Government of Nepal has adopted policies on fertility and reproductive health. They include raising a large-scale demand for small families by creating the social and economic environment favourable to families with two children; implementing family planning programmes in an integrated manner with other health activities. The Government strategy includes the expansion of health and hospital services and of out-reach service delivery; and promotion of non-government and private organizations which can improve the delivery of family planning services. To reduce child mortality, the Government has set targets to offer different kinds of immunization to many millions of children.

One of the most serious issues of reproductive health is abortion. In some countries, abortion rates have reached high levels (see table 7). In Viet Nam, they were over 80 per 1,000 women aged 15-44 in mid- 1990s and though decreasing they still were reported over 60 in 1999. In Turkmenistan, abortion rates were in the range of 30 to 40 per 1,000 in the 1990s. However, the Government of Turkmenistan provides no support for family planning programmes and contraceptives. Obviously, in such countries, women rely heavily on abortion to limit their fertility. For example, in Viet Nam, at least 4 pregnancies in 10 are aborted. In India, where abortion is permitted on health grounds as well as for contraceptive failure on the part of a married woman or her husband, it is believed that many legal abortions are not reported and that a large number of illegal and unsafe abortions are performed. According to official statistics, the number of legal abortions was 566,000 in 1995-1996, although the actual numbers are thought to be several times this figure.

Only a handful of recent estimates of the number of abortions are available in countries where abortion is highly restricted or illegal. The most recent estimates of abortion rates for Latin America and Caribbean countries are for 1989-1991 and are quite high in some countries: Brazil (41 per 1,000), Colombia (36 per 1,000), Dominican Republic (47 per 1,000) and Peru (56 per 1,000). In Mexico, the abortion rate was lower and stood at 25 per 1,000 women aged 15-44 (Henshaw and others, 1999; Singh and Wulf, 1994).

Information on induced abortions in sub-Saharan Africa is extremely fragmentary. Survey data suggest that in Africa, the majority of women having abortions are unmarried. In contrast, in countries of the former Soviet Union and Eastern Europe, most women having abortions are married, for example, over 95 per cent in Albania, Kyrgyzstan and Uzbekistan. All Asian and Latin American countries for which data are available display a similar pattern, with the exception of Brazil, where the majority of women having abortions are unmarried. Where the large majority of women having abortions are married, it appears that people rely upon abortion as a method—sometimes as the primary method—of fertility regulation.

In the 1990s, some intermediate-fertility countries modified their laws and regulations concerning abortion and the performance of abortion. Botswana (1991) and South Africa (1996) significantly amended their existing legislation or enacted new abortion laws along a more liberal line. The Sudan (1991) modified its Penal Code to allow abortion to be performed in case of rape, or if the unborn child has died in the mother's womb. In El Salvador, the new Penal Code, adopted in 1997, removed all exceptions to the prohibition against abortion that previously existed and prohibited abortions completely.

In Asia, recent developments include the enactment of abortion legislation that conforms to Islamic Law, for example in the Islamic Republic of Iran (1991 Criminal Code). Both Indonesia (1992) and Malaysia (1989) amended their legislation to allow abortion to be performed on medical grounds. Also in 1989, Mongolia amended its Health Law to provide that becoming a mother was a matter of a woman's own decision and therefore she could obtain an abortion on request during the three first months of pregnancy. Between 1989 and 1991, the Government of Viet Nam approved a number of laws that regulated abortion in various ways including the Law on the Protection of Public Health which provided that "women shall be entitled to have an abortion if they so desire", as well as various decrees making birth control devices and public-health services for abortions free of charge to large segments of the population.

Abortion laws and policies are significantly more restrictive in the developing world than in the developed world. Only one in seven developing countries (21 countries) allows abortion upon request and only one in six countries allows abortion for economic or social reasons. Among the intermediate-fertility countries, abortion is permitted on request in only three countries of Africa: Cape Verde, South Africa and Tunisia, in eight countries of Asia and Oceania: Bahrain, Kyrgyzstan, Mongolia, Turkey, Turkmenistan, Uzbekistan and Viet Nam, only in Guyana in Latin America and the Caribbean as well as in Albania in Europe (see table 5). In India, with high rates of abortion, abortion is permitted on health grounds as well as for the reason of contraceptive failure on the part of a married woman or her husband. It is believed that many legal abortions are not reported and that a large number of illegal and unsafe abortions are also performed.

Special programmes for adolescents

During the 1990s, increased concern with teenage pregnancy and abortion led to shifting the policy emphasis to reaching out beyond the married population—the primary and often the only target of family planning programmes. In 2001, of the 57 intermediate-fertility countries for which information was available 42 (74 per cent) reported having adopted measures to address adolescent fertility, and some had adopted integrated programmes. In Africa, only four countries (Algeria, Cape Verde, Morocco and the Sudan) and, in Latin America and the Caribbean, three countries (Belize, El Salvador and Suriname) did not report any special measures. In contrast, in Western Asia, only two countries have adopted such measures (Israel and Turkey).

Among the measures, most of the emphasis was put on information, education and communication. Education on reproductive health and family life is part of curriculas of public schools of many countries. Some Governments take initiatives to reach out-of-school youth. The Government of Bangladesh has established an information programme for adolescents on nutrition, hygiene, puberty, safer sex behaviour, and risks of STD/HIV/AIDS. Youth centres and youth-friendly clinics have been established in Kenya.

In Ghana, an adolescent Health Desk has been set up in the Ministry of Health. Male motivational and innovative activities in family planning are being developed and pursued. Draft Policy on Adolescent Reproductive Health has been developed and widely disseminated. "Teen" clinics and youth centres in schools are being set up. Studies on adolescent sexuality of different dimensions are carried out and their results influence programme planning. Family life education programmes for in school and out-of-school youth are being promoted by both governmental and non-governmental organizations. Peer counseling programmes are also being pursued.

In Viet Nam, family planning information and services targeted mainly married women. Therefore, the Government has recently commenced adolescent health programmes (in general) and reproductive health services in particular. In addition, it has integrated population education into the public school curricula and currently is further strengthening and expanding it.

Young people often encounter barriers in standard health-care facilities. Also, contraceptives are not permitted to adolescents regardless of their marital status in many developing countries, including Chile, Dominican Republic, Indonesia, Kenya, Malaysia, Myanmar and Papua New Guinea. In Bangladesh, there is a special programme for married adolescents and access to services is permitted to them, though there are no restrictions when it comes to purchasing contraceptives from the private sector. In Papua New Guinea, access to services for adolescents varies from province to province and from one cultural group to another. The early marriage of girls, especially those with little or no education, poses a great challenge for the Government. Formal education of girls ends with their marriage; thus, there is scope for information and education campaigns directed at both parents and young people. Although teenage pregnancy rates are high in Vanuatu, chiefs and families in villages often do not support the notion of making contraception available to unmarried couples or multi-sex partners because such behaviour is against cultural norms and values. As a result, a considerable number of unwanted pregnancies occur. One of the areas under serious consideration by Governments in some countries is sex education in the schools.

Information, advocacy and public participation in family planning and reproductive health programmes

Many Governments are increasingly realizing the importance of raising people's awareness with respect to family planning and reproductive health issues and promoting their active participation in programmes.

In Indonesia, with about 90 per cent of the population adhering to the Islamic faith, the Government, before launching the family planning programme, tried to create a conducive atmosphere among the public for supporting the general concept and policy on curbing the population growth rate. The Government managed through mutual discussions and consultations with Islamic leaders, ulamas, to make them its allies who started to actively support the programme. Their support was essential for convincing the public of the need for a family planning and for the widespread use of different forms of contraception. Another feature of the family planning programme there has been the high level of community participation. There are millions of volunteers who devote time and energy to voluntary family planning and health work (Singh, 1994). The total fertility rate steadily decreased from over 5 children per woman in the 1970s to 2.6 children in 1995-2000.

In the Islamic Republic of Iran, since 1989 the Government has reversed its policy to one of slow population growth and established a national family planning programme. Its major goal is the prevention of unwanted pregnancies in order for families to improve their physical and social health (Hoodfar, Homa and Samad Assadpour, 2000). The Government has incorporated information on population, family planning, and mother and child health care in curriculum materials and entrusted the media with broadcasting such information and raising awareness of population issues and family planning programmes. Religious leaders have become involved with promotion of smaller families, citing them as a social responsibility in their weekly sermons. They have issued fatwas, religious edicts that permit and encourage the use of all types of contraception, including permanent male and female sterilization. The Government has actively involved men in family planning and introduced mandatory premarital contraceptive counseling for couples before receiving a marriage license (Larsen, 2001). The 1993 national quantitative targets were for TFR of 4 children per woman and for the population growth rate of 2.3 per cent to be achieved within 20 years. However, TFR fell sharply from 5.5 in 1988 to below 2.8 in 1996, a 50 per cent decline in 6 years. The actual population growth rate also went down much faster—from 3.7 per cent in 1985-1990 to 2 per cent in 1990-1995 and 1.2 per cent in 2001, one of the fastest drops ever recorded.

In Viet Nam, though the population and family planning programme has existed since 1963, its activities were promoted with little success. The Government set a target to reduce the population growth rate to 2 per cent by 1980, but it was not achieved. A revised target was set to reduce the rate of population growth to 1.7 per cent by 1985. It was not achieved again and the Government was compelled to shift the target to the end of 1990s. In 1992, along with the adoption of a new Constitution and series of laws with regard to marriage and family, health care and protection the Government approved a strategy for education regarding population and family planning. Its general objectives were to promote the acceptance of a small, healthy, happy and prosperous family as the social norm by adequately providing information on population, development and family planning methods, and by mobilizing every member of the community to participate in the population and family planning programme voluntarily with a view to achieving the general population objectives of the country.

Population education has become a compulsory subject in all education levels, grades and faculties in Viet Nam. It has also been included in various forms of informal education such as elimination of illiteracy, complementary education, vocational training. The existing infrastructure of separate organizations for women, youth, peasants and workers as well as organizations of volunteers, such as the Red Cross, has been a good opportunity to infuse family planning throughout the country. The Fatherland Front—an umbrella organization that embraces all mass organizations and patriotic organizations as well as sectors representing the various religions—has also been involved in population activities. It has critical access to the various religions and has played an important role in mobilizing their support for the population and family planning programme. While the Government had targets to reach the total fertility rate of 3.1 children per woman by 2000 and 2.2 children by 2010, the fertility decline has occurred much faster, ahead of the Government's targets; it went down to 2.3 children per woman in the mid-1990s. The rate of population growth also went sharply down to 1.4 per cent in 1995-2000.

The Governments in many intermediate-fertility countries have recently made a particular emphasis on the attraction of public participation and support in national population programmes. They have adopted measures to promote greater community participation in family planning and reproductive health services, to decentralize their management. NGOs and citizen activists, religious and community leaders and the private sector have increasingly become active partners with Governments in deliberations on new policies and programmes as well as their implementation. And this has appeared as an important factor in the progress of their implementation.

In Mexico, the National Forum of Women and Population Policy, a network including over 70 women's organizations works closely with the Government and with the states to ensure that policies and services reflect the ICPD mandate (McDonald, 1999). In Morocco, the Government regularly consults with over 70 NGOs that work on issues related to women and development. In Brazil and South Africa, NGOs working on women's rights have played a prominent role in reshaping the national health agenda. In addition, in the conditions of increasing decentralization in many countries, NGOs and the private sector often fill gaps in Government-supported services. In Bangladesh, decentralization has been one of the major reorganization issues in the country's new health and population-sector strategy. Botswana has established multidisciplinary committees that include communities, NGOs and the private sector. In Ghana, district and subdistrict institutions are being given more autonomy in terms of resource allocation. The Government has set up a desk for coordinating private-sector collabour ative activities in the Ministry of Health.

SOCIAL POLICIES AND FERTILITY

Many other social policies that Governments adopt can also have demographic effects. Among the examples are those related to education, employment and women's status.

Women's education and lower fertility rates are closely related (United Nations, 1995). Educated women have more access to paid work, marry later, want fewer children and have fewer unwanted children. They are also more likely to know about contraception, start using it earlier and rely on modern as opposed to traditional methods. Most countries under consideration have developed and implemented national comprehensive education strategies. Many Governments, for example Argentina and Indonesia, have set up a legal framework to ensure equal access to free and compulsory primary and secondary education for all children. Of particular interest is the schooling of girls and adolescent women. Many of the countries in Latin America illustrate cases of fully developed and integrated plans with clear implementation targets and mechanisms. In Brazil, education is a constitutional right and significant amounts of the public budget are allocated to education. A 10-year plan for Education for All was elabour ated in 1993, and legislation in 1996 instituted the Decade for Education (UNESCO, 2001). Argentina has taken legal action to ensure equal access to free and compulsory education for periods up to 10 years. In Peru, laws were passed on women's right to education including the prohibition of expelling pregnant students. Also African countries have undertaken various efforts to improve education. Algeria and Tunisia are enforcing policies to improve educational attainment by favouring the opening of schools in rural and isolated areas. In addition, the Government of Algeria has been implementing policies providing support for students from poorer families to cover transport and school fees (United Nations, 2000). In order to increase the educational level in the whole country, India has set up a National Committee of Education Ministers to plan and implement universal elementary education. In South-Eastern Asia, the Government of Indonesia is undertaking ambitious efforts to provide free primary and secondary education and to enforce school attendance more forcefully.

Government support for advanced education and increased participation in the formal labour market (see table 12) has brought more and more economic independence for women. Therefore, following similar patterns as women in the developed world, an increasing number of young women in developing countries, especially in urban areas, are delaying marriage. Over the past two decades, with increasing educational attainments, the global labour force has gradually evolved from a largely agricultural to an industrial and services oriented workforce. Urban life's greater employment and educational opportunities are more conducive to smaller families.

Several countries have adopted measures to protect working women and to improve working conditions for mothers. Particularly, since the Fourth World Conference on Women (Beijing, 1995), some countries have taken steps to bring their laws and policies into accord with international conventions. Examples include Algeria, Chile, Dominican Republic, Ghana and Indonesia. Chile for example modified its Labour Code in 1998 to prohibit employers from discriminating against women, based on women's reproductive role, in their access to employment and promotion (United Nations, 2000). Some countries have adopted additional legislation to enforce international labour conventions. For example the right of a mother to maternity leave from her employment after childbirth, and a guarantee that she can return has been recognized internationally since the ILO-Maternity Convention was adopted in 1952 (United Nations, 2000). This Convention guarantees a standard maternity leave of at least 12-weeks' duration. However, how such maternity leave is implemented, whether granting is optional or compulsory for the employer, and the percentage of wage paid, can vary profoundly. In general, conditions are the least favourable in African countries and most advanced in Latin America. Some countries have adopted additional legislation to enforce international labour conventions.

CONCLUSION

This paper reviews the views and policies of Governments related to population growth and fertility for the currently intermediate-fertility countries of the world. It also provides some information on social policies and social variables that can affect fertility levels as well as policies concerning family planning and contraceptive use.

The major points of this paper are:

- The majority of the intermediate-fertility countries have had policies to reduce fertility during the past quarter century. Countries with higher fertility are more likely to have such a policy.
- The percentage of the intermediate-fertility countries providing direct support for family planning has increased during the past 25 years.
- However, there is great diversity among the major areas of the world. Nearly all intermediate-fertility countries in Africa, 54 per cent of those in Asia and Oceania, and 60 per cent in Latin America and the Caribbean have policies to reduce fertility.
- Some Governments have been using national quantitative targets for the population growth rate and for the total fertility rate, as well as national quantitative

Table 12
Female labour force participation (*percentage*)

Country	1980	1990	1995	2000
Africa	**40**	**39.9**	**40.2**	**40.5**
Eastern Africa	46	45.8	45.6	45.6
Kenya	46	45.9	46.1	46.1
Northern Africa	27.2	27.5	29	30.4
Algeria	21.4	21.1	24.4	27.6
Egypt	26.5	27	28.7	30.4
Libyan Arab Jamahiriya	18.6	18.3	20.7	23.1
Morocco	33.5	34.6	34.6	34.7
Sudan	26.9	27	28.4	29.6
Tunisia	28.9	29.1	30.5	31.8
Southern Africa	35.9	37.5	38.1	38.5
Botswana	50.1	46.8	46	45.4
Lesotho	37.9	36.5	36.8	37
South Africa	35.1	37.1	37.7	38.3
Swaziland	33.7	37.1	37.4	37.6
Western Africa	40.2	39.8	40.1	40.4
Cape Verde	34.4	39.3	39.5	39.5
Ghana	51	50.8	50.6	50.4
Asia	**39.1**	**39.5**	**39.8**	**40.1**
Eastern Asia	42.6	44.3	44.6	44.8
Mongolia	45.7	46.3	46.7	47
South-Central Asia	34	32.1	32.9	33.6
Bangladesh	42.3	41.7	42.2	42.5
India	33.7	31.2	31.7	32.3
Iran (Islamic Republic of)	20.4	21.3	24.3	27.1
Kazakhstan	47.6	46.3	46.3	47
Kyrgyzstan	47.6	46.2	46.6	47.3
Nepal	38.8	40.4	40.5	40.5
Tajikistan	46.9	42.2	43.5	44.9
Turkmenistan	47	44.7	45.3	45.9
Uzbekistan	48	45.6	46.2	46.9
South-Eastern Asia	40.6	42.2	42.6	43
Brunei Darussalam	23.4	32.3	34.1	35.7
Indonesia	35.2	38.5	39.7	40.8
Malaysia	33.7	35.5	36.6	37.7
Myanmar	43.7	43.6	43.5	43.5
Philippines	35	36.6	37.1	37.8
Viet Nam	48.1	49.7	49.3	49
Western Asia	31.5	29.8	31	32.2
Bahrain	11	17	19	20.9
Israel	33.7	37.9	39.8	41.3
Jordan	14.6	17.4	21.0	24.4
Kuwait	13	22.7	31.2	31.3
Lebanon	22.6	26.6	28.2	29.5
Qatar	6.4	11.2	12.6	15.2
Syrian Arab Republic	23.5	24.4	25.7	27
Turkey	35.5	34.6	36.1	37.6
United Arab Emirates	5	11.6	13.1	14.8

Source: International Labour Organization (ILO), 1997.

Table 12
Female labour force participation (*percentage*) (*continued*)

Country	1980	1990	1995	2000
Europe	**42.6**	**43.9**	**44.3**	**44.9**
Southern Europe	33	37.5	38.4	39.3
Albania	38.7	40.2	40.8	41.3
Latin America and the Caribbean	**27.9**	**32.6**	**33.8**	**34.8**
Caribbean	34.9	36.7	37.9	38.9
Bahamas	43.4	46	46.6	47.1
Dominican Republic	24.7	27	29	30.8
Haiti	44.6	43.1	43	42.9
Jamaica	46.3	47	46.9	46.8
Saint Lucia				
Central America	26.4	29.5	31.3	33.1
Belize	21.1	21.4	22.6	23.9
Costa Rica	20.8	28.1	29.6	31.1
El Salvador	26.3	31.5	34.1	36.5
Guatemala	22.4	23.4	26.2	28.9
Honduras	25.2	27.7	29.8	31.8
Mexico	26.9	30	31.7	33.2
Nicaragua	27.5	31.9	34	36.1
Panama	29.9	32.4	33.9	35.3
South America	27.5	33.1	34.2	35
Argentina	27.6	28.5	30.9	33.2
Bolivia	33.3	36.9	37.3	37.8
Brazil	28.4	34.8	35.2	35.5
Chile	26.3	30	31.8	33.6
Colombia	26.2	36	37.6	38.9
Ecuador	20.1	24.7	26.4	28
Guyana	25.1	31.2	32.8	34
Paraguay	26.7	27.9	29	30
Peru	23.9	27.5	29.6	31.3
Suriname	27	29.7	31.9	33.7
Uruguay	30.8	39.2	40.7	42
Venezuela	26.7	31.3	33.1	34.8
Oceania	**36.8**	**41.1**	**42.3**	**43.3**
Fiji	17.2	23.4	27.2	30.6
Papua New Guinea	41.8	41.2	41.7	42.2
Vanuatu				
Samoa				

targets relative to contraceptive use. However, these Governments are increasingly shifting from the target approach to a community needs assessment approach with an emphasis on clients' needs and improving the quality of care.

- Many Governments have been using incentives and disincentives to influence fertility levels. They include restrictions on maternity leaves; child and retirement benefits; tax exemptions based on the number of children; tax disincentives, and income-generating activities for acceptors of family planning.
- Following the adoption of the Programme of Action of the International Conference on Population and Development, many Governments have been revising their national population policies, and health policies in particular. They

have also been integrating family planning with comprehensive reproductive health care and within general health policies.

- In some intermediate-fertility countries, women rely on abortion to limit their fertility. To address this issue, Governments are promoting reproductive health and expansion of contraceptive choice.
- Adolescent fertility is a growing concern for many Governments in intermediate-fertility countries, particularly in Latin America and Caribbean, and in Africa. Consequently, Government programmes are reaching out beyond the married population.
- Many Governments are increasingly realizing the importance of raising people's awareness with respect to family planning and reproductive health issues and of active participation of civil society in the implementation of programmes. They have been adopting measures to promote greater community participation in family planning and reproductive health services and decentralize their management.
- Policies in the areas of employment, education, health, particularly child health, gender relations, and the advancement of women can affect the fertility level. Most of the intermediate-fertility countries have been developing these policies, however, with varied intensity, prioritization and coverage.

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Effort measures for family planning action programmes: past trends and future prospects

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The Population Division for at least 25 years has been interested in national family planning programmes as a fertility determinant, and quite early sponsored a number of investigations into both methods and findings concerning it (United Nations, 1978a, 1978b, 1981). Over that same period, indices of the strength, or effort, of these programmes have been measured, intended to serve as independently established inputs, to which the outputs of contraceptive use and fertility could be related. The indices took form in 1972 (Lapham and Mauldin, 1972) and were repeated in 1982, 1989, 1994 and 1999. The focus here is on the national family planning programmes, past and present, with speculations as to their future, and upon their general relationships to increases in contraceptive use and declines in fertility rates.

DATA

The Family Planning Effort (FPE) indices were gathered on 88 countries in 1999, all with populations over 1 million in 2000, and 47 of these countries are included among the intermediate-fertility countries listed for this paper. In addition, six other countries in the intermediate-fertility group with populations over 1 million are included, for a total of 53 countries (see table 1).

The FPE scores are available for most countries in the earlier rounds for 1982, 1989, 1994 and 1999. The questionnaires have been sent to a small number of expert observers for each country; they contain about 120 questions that are reduced to 30 programme features (described in detail in Ross and Stover, 2001). The 30 scores are organized under four components, for policies, services, evaluation/monitoring and method availability, and are converted to the per cent of maximum (100) for easier comparisons (table 2).

Data on contraceptive prevalence are drawn from DHS and other surveys listed in United Nations (2000a) and other sources; total fertility rates are taken from United Nations (2000b).

These 53 countries contain three-fifths (61 per cent) of the developing world's population outside of China. Five of the eight largest developing countries are included (India, Indonesia, Bangladesh, Mexico and Brazil), which alone contain 46 per cent. Twenty-one countries are in Latin America, 9 in Asia, 12 in North Africa/Middle East, and four in the Central Asian Republics. Finally, the sharpest selectivity is in sub-Saharan Africa since the group of intermediate-fertility countries (TFR cut-off of 2.1-4.9) includes only 7 of the nearly 50 countries in the region, all in the Anglophone group.

Table 1
Fifty-three developing countries with total fertility rates between 2.1 and 4.9 and population sizes over one million

Listed by TFR			Listed by population size			Listed alphabetically		
Country	TFR 2000	Population 2000	Country	TFR 2000	Population 2000	Country	TFR 2000	Population 2000
Tunisia	2.21	9 459	India	3.15	1 008 937	Algeria	3.02	30 291
Brazil	2.21	170 406	Indonesia	2.43	212 092	Argentina	2.53	37 032
Lebanon	2.23	3 496	Brazil	2.21	170 406	Bangladesh	3.68	137 439
Uruguay	2.35	3 337	Bangladesh	3.68	137 439	Bolivia	4.14	8 329
Viet Nam	2.38	78 137	Mexico	2.62	98 872	Botswana	4.15	1 541
Chile	2.40	15 211	Viet Nam	2.38	78 137	Brazil	2.21	170 406
Indonesia	2.43	212 092	Philippines	3.44	75 653	Chile	2.40	15 211
Jamaica	2.44	2 576	Iran (Islamic Republic of)	2.98	70 330	Colombia	2.71	42 105
Turkey	2.50	66 668	Egypt	3.14	67 884	Costa Rica	2.75	4 024
Mongolia	2.51	2 533	Turkey	2.50	66 668	Dominican Republic	2.80	8 373
Panama	2.52	2 856	Myanmar	3.05	47 749	Ecuador	2.93	12 646
Argentina	2.53	37 032	South Africa	2.98	43 309	Egypt	3.14	67 884
Uzbekistan	2.57	24 881	Colombia	2.71	42 105	El Salvador	3.03	6 278
Kyrgyzstan	2.61	4 921	Argentina	2.53	37 032	Ghana	4.41	19 306
Mexico	2.62	98 872	Sudan	4.69	31 095	Guatemala	4.67	11 385
Colombia	2.71	42 105	Kenya	4.38	30 669	Haiti	4.18	8 142
Costa Rica	2.75	4 024	Algeria	3.02	30 291	Honduras	4.01	6 417
Kuwait	2.78	1 914	Morocco	3.22	29 878	India	3.15	1 008 937
Dominican Rep.	2.80	8 373	Peru	2.81	25 662	Indonesia	2.43	212 092
Peru	2.81	25 662	Uzbekistan	2.57	24 881	Iran (Islamic Republic of)	2.98	70 330
Venezuela	2.85	24 170	Venezuela	2.85	24 170	Jamaica	2.44	2 576
Ecuador	2.93	12 646	Nepal	4.65	23 043	Jordan	4.50	4 913
South Africa	2.98	43 309	Malaysia	3.08	22 218	Kenya	4.38	30 669
Iran (Islamic Republic of)	2.98	70 330	Ghana	4.41	19 306	Kuwait	2.78	1 914
United Arab Emirates	3.02	2 606	Syrian Arab Republic	3.83	16 189	Kyrgyzstan	2.61	4 921
Algeria	3.02	30 291	Chile	2.40	15 211	Lebanon	2.23	3 496
El Salvador	3.03	6 278	Ecuador	2.93	12 646	Lesotho	4.60	2 035
Myanmar	3.05	47 749	Guatemala	4.67	11 385	Libyan Arab Jamahiriya	3.56	5 290
Malaysia	3.08	22 218	Tunisia	2.21	9 459	Malaysia	3.08	22 218
Egypt	3.14	67 884	Dominican Republic	2.80	8 373	Mexico	2.62	98 872
India	3.15	1 008 937	Bolivia	4.14	8 329	Mongolia	2.51	2 533
Morocco	3.22	29 878	Haiti	4.18	8 142	Morocco	3.22	29 878
Tajikistan	3.29	6 087	Honduras	4.01	6 417	Myanmar	3.05	47 749
Turkmenistan	3.39	4 737	El Salvador	3.03	6 278	Nepal	4.65	23 043
Philippines	3.44	75 653	Tajikistan	3.29	6 087	Nicaragua	4.07	5 071
Libyan Arab Jamahiriya	3.56	5 290	Paraguay	4.00	5 496	Panama	2.52	2 856
Bangladesh	3.68	137 439	Libyan Arab Jamahiriya	3.56	5 290	Papua New Guinea	4.46	4 809
Syria	3.83	16 189	Nicaragua	4.07	5 071	Paraguay	4.00	5 496
Paraguay	4.00	5 496	Kyrgyzstan	2.61	4 921	Peru	2.81	25 662
Honduras	4.01	6 417	Jordan	4.50	4 913	Philippines	3.44	75 653
Nicaragua	4.07	5 071	Papua New Guinea	4.46	4 809	South Africa	2.98	43 309
Bolivia	4.14	8 329	Turkmenistan	3.39	4 737	Sudan	4.69	31 095
Botswana	4.15	1 541	Costa Rica	2.75	4 024	Swaziland	4.62	925
Haiti	4.18	8 142	Lebanon	2.23	3 496	Syrian Arab Republic	3.83	16 189
Kenya	4.38	30 669	Uruguay	2.35	3 337	Tajikistan	3.29	6 087
Ghana	4.41	19 306	Panama	2.52	2 856	Tunisia	2.21	9 459
Papua New Guinea	4.46	4 809	United Arab Emirates	3.02	2 606	Turkey	2.50	66 668
Jordan	4.50	4 913	Jamaica	2.44	2 576	Turkmenistan	3.39	4 737
Lesotho	4.60	2 035	Mongolia	2.51	2 533	United Arab Emirates	3.02	2 606
Swaziland	4.62	925	Lesotho	4.60	2 035	Uruguay	2.35	3 337
Nepal	4.65	23 043	Kuwait	2.78	1 914	Uzbekistan	2.57	24 881
Guatemala	4.67	11 385	Botswana	4.15	1 541	Venezuela	2.85	24 170
Sudan	4.69	31 095	Swaziland	4.62	925	Viet Nam	2.38	78 137

Table 2
Family planning effort scores, 1999 for 47 intermediate-fertility countries

		Four Components			
	Total Score	Policy	Service	Evaluation	Availability
Latin America and the Caribbean					
Argentina	29.5	32.8	21.3	35.8	39.6
Bolivia	48.5	46.3	43.6	45.4	63.7
Brazil	59.4	50.0	46.5	59.2	100.0
Chile	60.8	50.2	56.0	60.0	85.5
Colombia	64.2	43.9	66.2	77.6	80.1
Costa Rica	32.3	38.0	20.7	18.5	56.8
Dominican Republic	50.0	43.3	51.7	43.8	58.5
Ecuador	46.0	47.3	43.3	47.1	49.5
El Salvador	45.9	48.8	45.1	40.9	46.2
Guatemala	36.7	34.8	31.8	34.6	51.0
Haiti	51.4	58.9	49.7	39.2	51.0
Honduras	43.8	43.1	41.3	39.6	52.3
Jamaica	62.5	71.1	59.0	63.3	58.2
Mexico	74.6	79.0	62.5	84.2	90.4
Nicaragua	49.5	35.3	53.2	60.0	54.9
Panama	49.4	61.4	34.4	59.9	60.7
Paraguay	55.7	56.3	42.9	59.4	80.6
Peru	58.6	65.0	41.9	60.1	85.4
Uruguay	33.9	22.3	30.2	54.2	47.0
Venezuela	29.0	31.9	11.7	13.3	70.8
Mean	49.1	48.0	42.6	49.8	64.1
Asia					
Bangladesh	74.5	70.3	74.9	71.6	80.6
India	65.0	72.0	58.4	60.1	72.3
Indonesia	82.2	83.6	86.1	80.9	72.4
Malaysia	68.7	71.9	61.4	85.8	71.7
Mongolia	37.6	30.6	35.1	25.8	58.5
Myanmar	36.6	33.7	37.5	58.9	27.4
Nepal	57.0	61.1	56.0	66.9	48.9
Philippines	56.5	56.3	49.8	66.4	66.7
Viet Nam	76.0	81.6	73.6	65.5	79.0
Mean	61.6	62.3	59.2	64.7	64.2
Sub-Saharan Africa					
Ghana	63.5	68.0	61.4	71.5	58.0
Kenya	62.3	55.4	64.4	62.8	66.7
Lesotho	61.5	62.3	57.8	76.9	60.8
South Africa	53.9	61.9	45.4	46.0	65.5
Sudan	34.7	40.6	40.3	39.4	12.0
Mean	55.2	57.7	53.9	59.3	52.6
North Africa/Middle East					
Algeria	64.2	80.9	55.1	65.0	60.4
Egypt	57.3	63.3	58.3	59.8	45.7
Iran (Islamic Republic of)	71.3	70.3	62.3	67.9	94.0
Jordan	46.8	47.2	44.6	52.8	48.0
Lebanon	60.0	49.1	62.8	74.2	61.2
Morocco	57.1	56.7	51.4	75.8	60.6

Table 2
Family planning effort scores, 1999 for 47 intermediate-fertility countries (*continued*)

		Four Components			
	Total Score	Policy	Service	Evaluation	Availability
North Africa/Middle East (*continued*)					
Syrian Arab Republic	66.2	52.5	74.4	88.1	56.1
Tunisia	71.2	80.0	70.8	87.5	52.4
Turkey	58.9	70.6	43.6	60.9	75.5
Mean	61.4	63.4	58.1	70.2	61.5
Central Asia Rep.					
Kyrgyzstan	48.6	44.5	42.9	53.8	63.9
Tajikistan	54.2	58.1	48.4	68.3	54.6
Turkmenistan	58.5	48.6	58.6	65.3	68.3
Uzbekistan	55.4	69.4	47.8	41.0	60.2
Mean	54.2	55.2	49.4	57.1	61.7
Overall mean	**54.9**	**55.3**	**50.6**	**58.2**	**62.2**

PAST PROJECTIONS

An extensive literature exists on the impact of action programmes on contraceptive prevalence and fertility, but very few exercises have specifically projected programme effects into the future. Three of these are now described.

A first projection

Bernard Berelson (1978) used 12 demographic and social indicators and the FPE scores to determine the prospects for 29 developing countries or areas to reach a crude birth rate of 20 by the year 2000. He divided these countries or areas, containing 85 per cent of the developing world, into four groups:

- *The Certain*: the Republic of Korea, Taiwan Province of China, Chile
- *The Probable*: China, Brazil, Mexico, the Philippines, Thailand, Turkey, Colombia, Sri Lanka, Venezuela, Malaysia.
- *The Possible*: India, Indonesia, Egypt, Peru
- *The Unlikely*: Bangladesh, Pakistan, Nigeria, the Islamic Republic of Iran, Zaire, Afghanistan, the Sudan, Morocco, Algeria, the United Republic of Tanzania, Kenya, Nepal.

He also projected past fertility declines to 2000 for each group, showing that the four groups, in order, should come to much different CBRs (population weighted). These followed two assumptions: that the future would follow the declines of the previous 20 years (1955-1975), or that the future would follow double the decline of the previous ten years (1965-1975), during which declines were perhaps faster and action programmes had come into play.

At that time, the United Nations Medium Variant projections for CBRs in 2000, for the same groups of countries, are shown in the last column. The agreement with the second projection is good overall, and is close for two groups.

A second projection

A partial update of Berelson's work assessed the likelihood that each of 37 developing countries would reach replacement fertility by 2015 (Mauldin and Ross, 1994). These countries, having populations of 15 million or more in 1990, contained 91 per cent of

Expected CBR values by 2000 under two assumptions

Category	CBR 1975	Decline = 1955-1975	Decline = double 1965-1975	UN 2000 Projection
The Certain	24	15	15	19.6
The Probable	29	24	19	21.5
The Possible	37	31	26	26.6
The Unlikely	48	47	46	36.8
Total	**34**	**30**	**26**	**25.6**

(No country projection was taken below CBR 15; and three countries with slight increases in the 1955-1965-1975 data were considered as no change.)

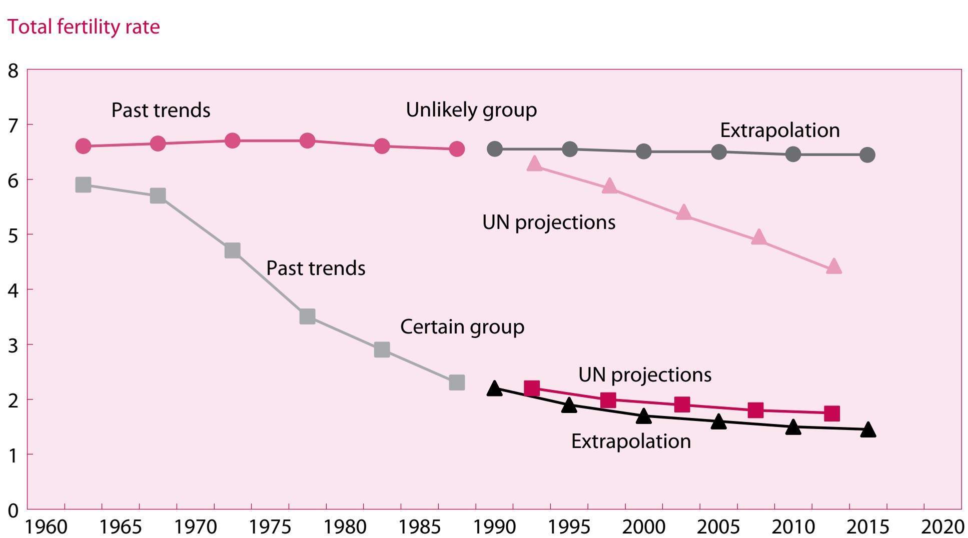
the developing world and were divided into the same four groups, defined by quartiles on a composite index based on five indicators including contraceptive prevalence in 1990 and the FPE from the 1989 round, as well as an indicator for the socio-economic setting that in turn was made up of seven demographic and social items.

When the past TFR trend was projected to 2015 for each of the four groups it was found to agree closely with the United Nations Medium Variant projections only for the Certain and Probable groups. The agreement was not close for the other two groups. Figure I contrasts the agreement for the Unlikely group and the Certain group: The high and constant level of fertility for the Unlikely group when projected by the composite index remained high and flat, whereas the UN then showed a considerable decline. Since this analysis was done, three of the 11 countries in the Unlikely group (table 3) have reached TFRs (1995-2000) below 5 and are included in the group for this paper, as are all five countries in the Possible category. Exercises like this can be repeated at intervals and could be applied now to the intermediate-fertility group with current data.

A third projection

A third projection concerns only the programme effort indices, not fertility, and it is only for the five years from the 1999 FPE round to 2004 (based upon Ross and Stover, 2000). However experience with methods used for the short range may help to clarify how best to extrapolate to longer periods.

Figure I
Projected average total fertility rates for 19 developing countries, Unlikely and Certain prospect groups, according to extrapolation of past trends and United Nations projections



Source: Mauldin and Ross, 1994.

Table 3
Indicators for 37 countries according to prospect categories for fertility decline

Prospect group/country	Total fertility rate 1985-1990	Total fertility rate decline between 1960-1965 and 1985-1990	Contraception prevalence level, 1990 (per cent)	Programme effort score (per cent of maximum), 1989	Socio-economic indicator, 1985	Composite index
Certain						
Taiwan Province of China	1.76	3.69	80.0	81	81	85
Korea, Republic of	1.73	3.67	79.3	81	79	84
China	2.38	3.55	80.0	87	55	78
Thailand	2.57	3.85	72.8	80	57	77
Colombia	2.90	3.86	66.1	62	72	74
Korea (Dem. People's Republic of)	2.50	3.25	69.4	54	72	72
Sri Lanka	2.67	2.49	65.7	80	62	71
Mexico	3.60	3.15	57.2	77	74	70
Mean	2.51	3.44	71.3	75	69	76
Weighted mean	2.40	3.50	78.1	85	58	78
Probable						
Brazil	3.20	2.95	69.8	32	71	64
Malaysia	4.00	2.72	54.2	66	68	63
Venezuela	3.45	3.01	57.2	54	81	63
Indonesia	3.48	1.94	48.6	80	54	61
Peru	4.00	2.85	56.7	51	68	60
Turkey	3.79	2.32	65.0	46	63	60
Vietnam	4.22	1.83	55.0	68	54	57
South Africa	4.38	2.13	58.4	62	57	56
Philippines	4.30	2.31	37.7	49	64	54
Egypt	4.53	2.54	44.7	66	53	54
Argentina	2.96	0.13	63.1	21	84	53
India	4.20	1.61	46.6	72	42	52
Morocco	4.82	2.33	38.8	57	50	50
Mean	3.95	2.21	53.5	56	62	57
Weighted mean	4.00	1.91	50.1	65	51	55
Possible						
Algeria	5.43	1.95	48.9	46	61	47
Bangladesh	5.10	1.58	37.2	72	29	43
Myanmar	4.50	1.50	42.4	12	46	39
Iran (Islamic Republic of)	6.50	0.76	40.5	57	61	37
Kenya	6.80	1.32	28.8	58	46	35
Mean	5.67	1.42	39.6	49	49	40
Weighted mean	5.50	1.40	38.1	55	43	41
Unlikely						
Ghana	6.39	0.51	14.4	52	45	28
Nepal	5.95	-0.91	20.5	59	27	27
Iraq	6.15	1.03	19.7	1	68	25
Pakistan	6.75	0.25	11.9	48	36	24
Nigeria	6.90	-0.03	6.0	43	42	21
Zaire	6.70	-0.70	8.7	28	47	19
Tanzania (United Republic of)	6.80	0.00	8.6	42	34	18
Sudan	6.44	0.23	8.8	20	31	16
Afghanistan	6.90	0.11	5.9	36	20	14
Ethiopia	7.00	-0.30	4.3	32	27	13
Uganda	7.30	-0.40	4.3	33	29	13
Mean	6.66	0.06	10.3	36	37	20
Weighted mean	6.75	0.02	9.2	39	37	20

Five projections were made; the first four used the 1994 to 1999 changes as the basis for estimating the changes to come. The fifth projection used all past rounds from 1982 onward. For this exercise the countries were divided into four groups according to the total score (per cent of maximum):

Strong	>67
Moderate	46-66
Weak	21-45
Very Weak/None	0-24

For Projections A, B, and C, the top two groups were combined as "Stronger" and the bottom two groups were combined as "Weaker". In Projection D the top two groups were treated separately and compared to the combination of the bottom two groups. Projection E treated each country separately.

- *Projection A*: Let each Weaker programme improve on each of the 30 FPE scores as much as it did in the last 5 years. Keep all Stronger programme scores constant. Result: Large gaps persist between the new Weaker programme scores and the 1999 Stronger programme scores. Also, the all-country score changes little, partly because the Weaker programmes are not numerous.
- *Projection B*: Let each Weaker programme move half-way on each of the 30 scores toward the average 1999 level of the Stronger programmes. Keep all Stronger programme scores constant. The result is better than in Projection A: the total score improves more and there are improvements in all four score components. However the relatively small number of Weaker programmes means that the all-country score changes little.
- *Projection C*: Same as Projection B, but the upward movement of each Weaker programme occurs only on 21 of the 30 scores, those where the Stronger average was quite high and there was ample room for an increase by most Weaker programmes. (It is not reasonable to expect Weaker programmes to improve appreciably on the 9 scores where even the Stronger programmes have performed poorly, i.e., below 50, half of maximum.) Result: A lesser improvement than in Projection B due to omission of 9 scores, both overall and for three of the four components.
- *Projection D*: Break the Stronger group into its two parts (the "Moderate" and "Strong" groups). Let the Weaker programmes move halfway toward the 1999 level of the Moderate programmes, and let the Moderate programmes move halfway toward the 1999 level of the Strong programmes. This produces a much better gain, larger than in Projections A-C, both overall and for each of the four components. The gain in the all-country score is due primarily to the Moderate programmes, which improve considerably and are also especially numerous. The Weaker programmes improve about as much, and the two groups together offset the assumed zero change by the Strong group, yielding the overall gain.
- *Projection E*: A different option is to use a regression method to predict the 2004 scores from the 1999 scores, based upon all past relationships of initial to subsequent scores. Change data (for the total score only) were used from 1982 to 1989, from 1989 to 1994 and from 1994 to 1999. Casting all these changes into one framework, and predicting each later score from the previous one, gives an equation that was applied to all 1999 scores to estimate the 2004 scores. (The final equation used was simply linear; earlier trials showed a squared term to be insignificant. Also, results were similar when the equation was based upon any one past period rather than upon all three periods.) Result: this exercise produced a small decline in the total score for both the Strong and Moderate programmes, but a larger increase for the Weaker programmes, sufficient to give a small increase in the all-country score.

Figure II
Four projections of component scores to 2004, compared to 1999

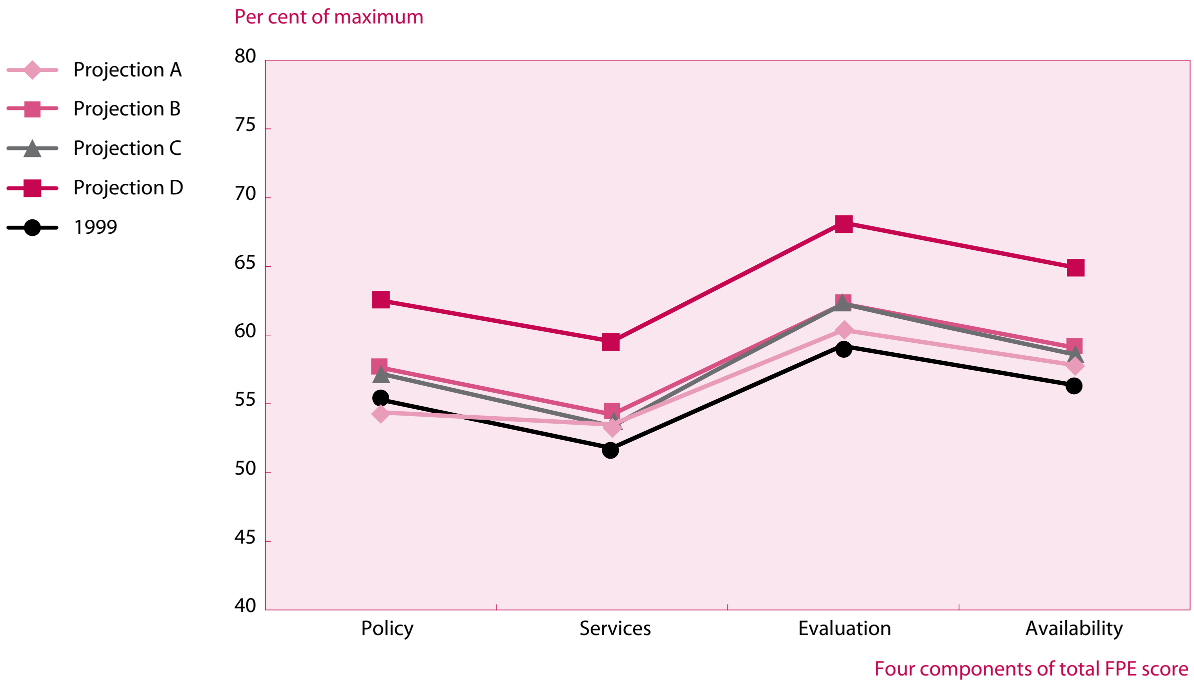


Figure II depicts the effects of projections A-D for the four components, showing the advantage of Projection D for all four.

The net result of these trials is that the Weaker programmes are not numerous enough to make a large difference in the all-country scores unless they are permitted to improve considerably. That is, Projections A-C placed limits on the possible changes, and only when the more numerous Moderate programmes were broken out in Projection D did the all-country score change much. However the regressions in Projection E reflected the pace of earlier changes by the Weaker programmes, and it has been the Weaker programmes that have improved the most over the last few decades.

PAST TRENDS OF CONTRACEPTIVE USE AND FAMILY PLANNING EFFORT

Other papers in this note are concerned with the future course of fertility; here we concentrate on the FPE materials and the closely allied information on changes in contraceptive prevalence, which the programmes chiefly focus upon. The increases in contraceptive use in most countries are well known, so the only trends included here are for Intermediate-fertility countries that were surveyed in all four FPE rounds from 1982 through 1999 (figures IIIa–IIId).

The principal observations to be made about these prevalence trends are:

- The remarkable evenness of upward movement;
- The lack of any plateauing so far;
- The large spread of levels among countries within each of the four large regions;
- The close similarity of the central tendencies in Asia, Latin America, and North Africa/Middle East (less so in sub-Saharan Africa).

Most countries surveyed have experienced continuous increases in contraceptive use, which is consistent with their fertility declines into the intermediate group, but they still vary across a wide range of levels, and the ranges within each region are more prominent than any overriding differences in the regional averages, except that the sub-Saharan African regional average is lower.

Figure IIIa
Contraceptive prevalence for countries in Asia region, 1980-2001

Figure IIIb
Contraceptive prevalence for countries in Latin America region, 1980-2001

Programme effort measures have also been upward on average but with less regularity than seen in the prevalence trends (figures IVa–IVd). *In general*, the Weaker programmes have improved most in their effort levels, so the dispersion of scores in 1999 is less than before. Figure V shows the upward movement of the weakest cohort of programmes starting in 1972, closing the gap to the stronger programmes.

The highest scoring countries in 1999 tend to have been high in one or two previous rounds. However, the patterns vary considerably by region, as follows:

- In Asia, Myanmar has improved sharply from nearly zero in 1982, while the top performers of Indonesia, Bangladesh and Viet Nam have been high and level. India's score declined in 1999.

Figure IIIc
Contraceptive prevalence for countries in Middle East/North Africa region, 1980-2001

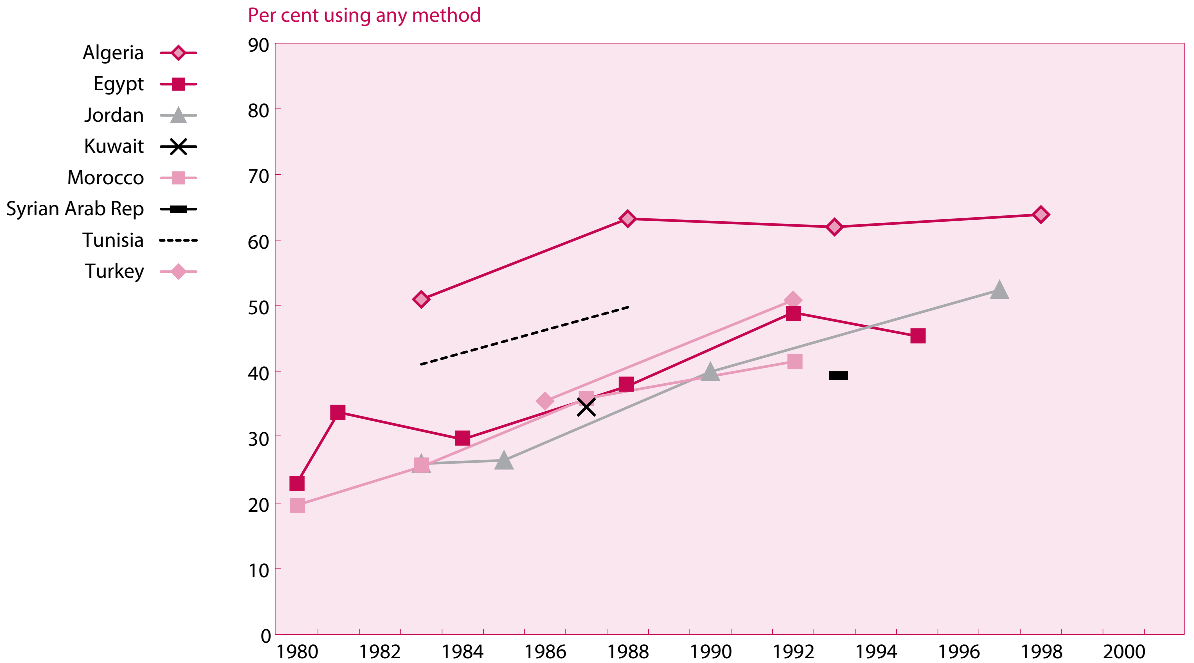
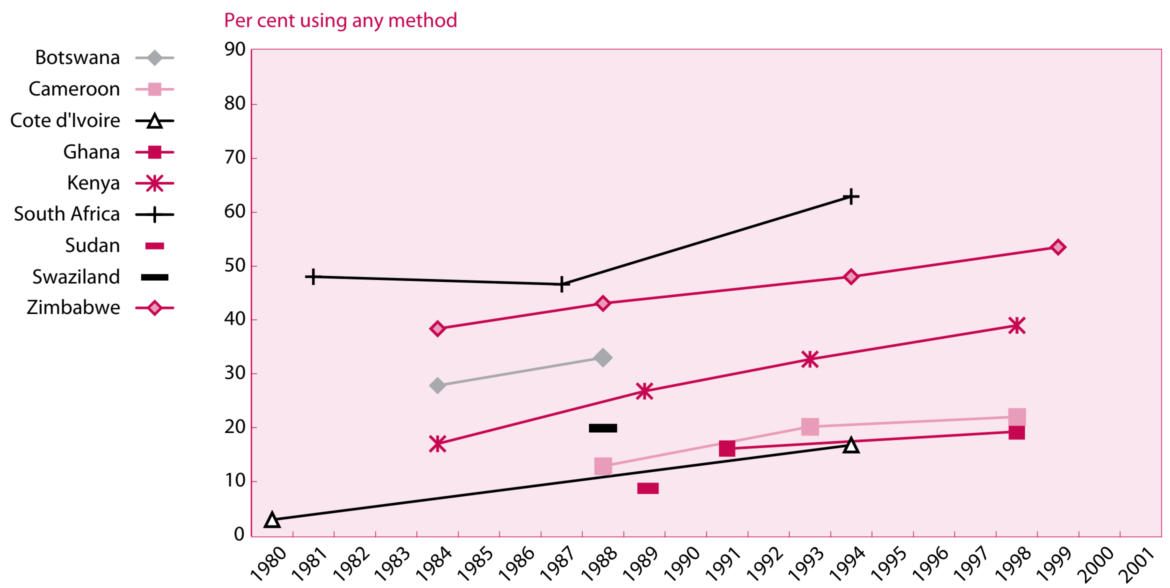


Figure IIId
Contraceptive prevalence for countries in sub-Saharan Africa region, 1980-2001



- The Latin American countries show many ups and downs, with no overriding pattern. Nearly every country experienced a definite rise in the seven years from 1982 to 1989, but in the next two periods declines nearly matched rises. Mexico's line at the top has been consistent, but most of the others have not, due perhaps partly to measurement errors as well as to real programme changes, some of them reflecting shifts in the relative roles of the public and private sectors. A country-by-country examination would help to clarify the changes, by examination of the 30 detailed scores and by using local information.
- In the North Africa/Middle East region the scores have been generally up, and the patterns are more even than in Latin America. Only the Lebanon score

Figure IVa
Total programme effort score for countries in Asia region, 1982-1999

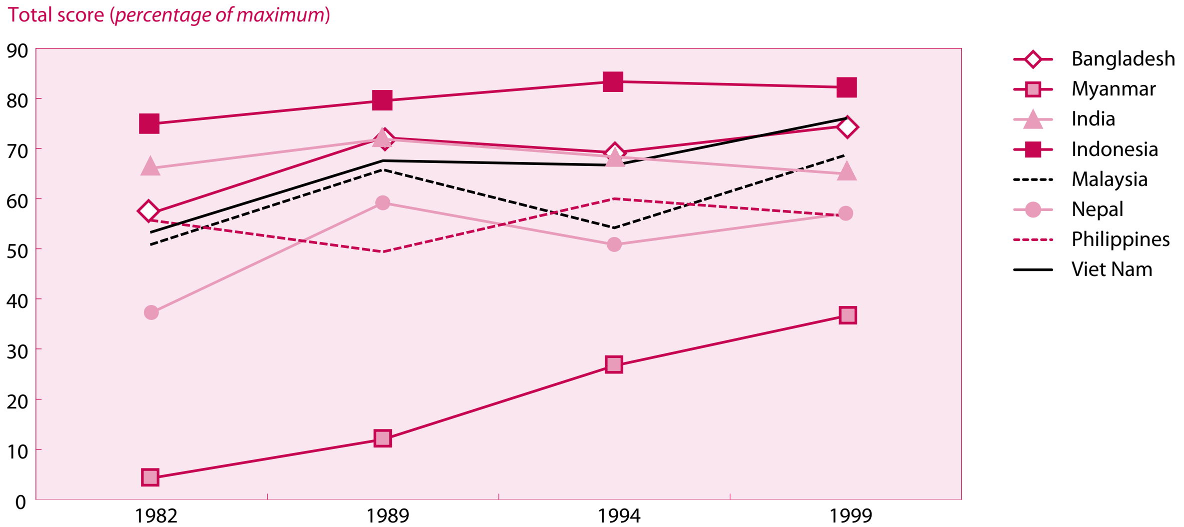
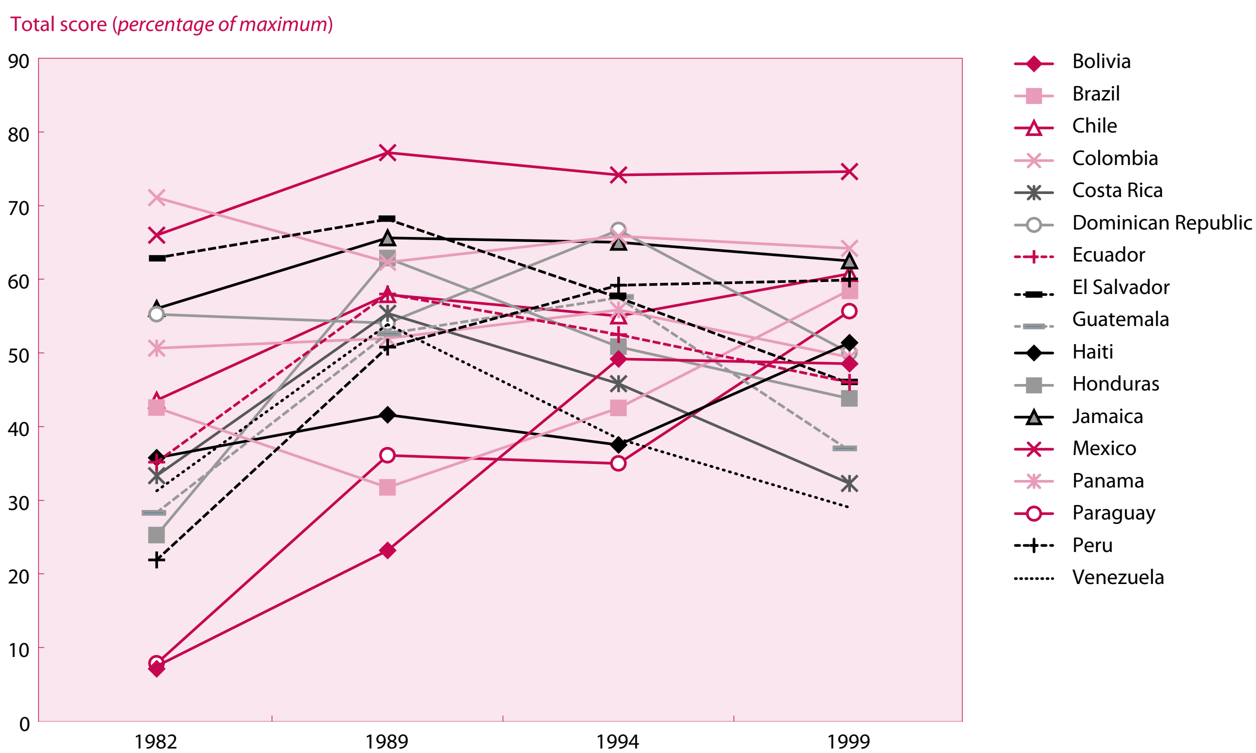


Figure IVb
Total programme effort score for countries in Latin America region, 1982-1999



underwent a large reversal. By 1999 the countries showed less dispersion than before, centred on 60 per cent of the maximum score.

- In sub-Saharan Africa all four trends are up, even including the Sudan's. The other three are nearly the same, also at about 60 per cent.
- For the Central Asia Republics no trend lines are available.

Programme effort interacts with the social setting in its impact on contraceptive prevalence and fertility, as documented first by Berelson (1974), who classified coun-

Figure IVc
Total programme effort score for countries in Middle East/North Africa region, 1982-1999

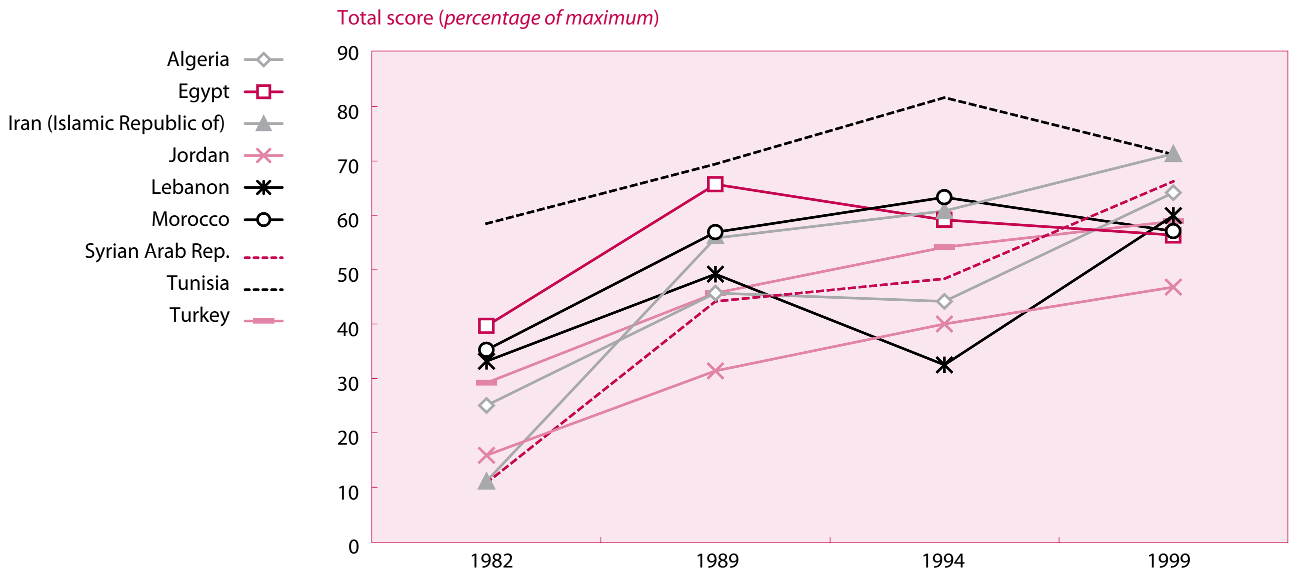
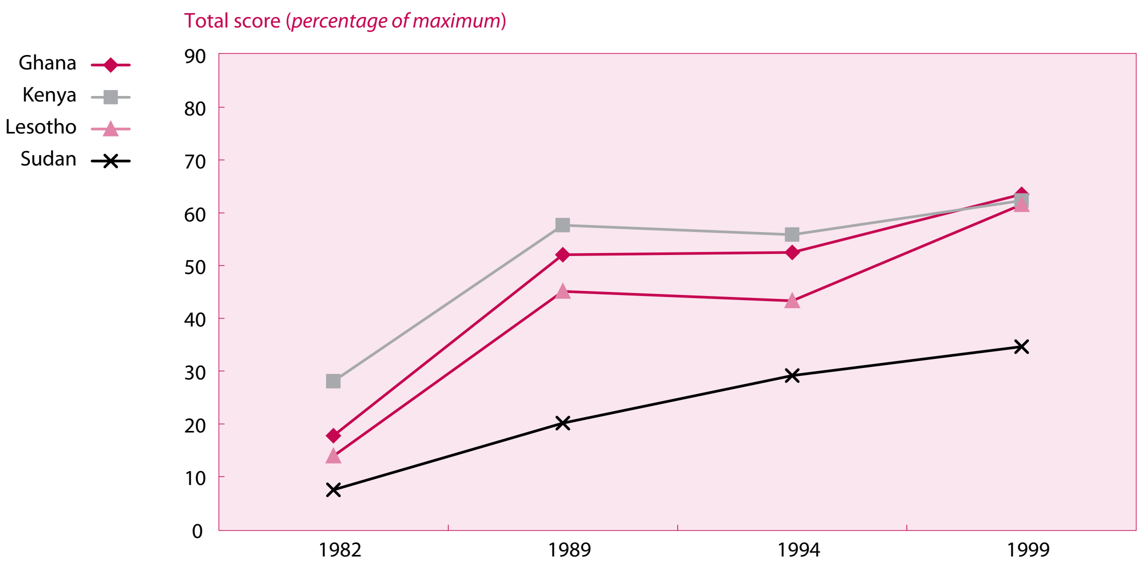
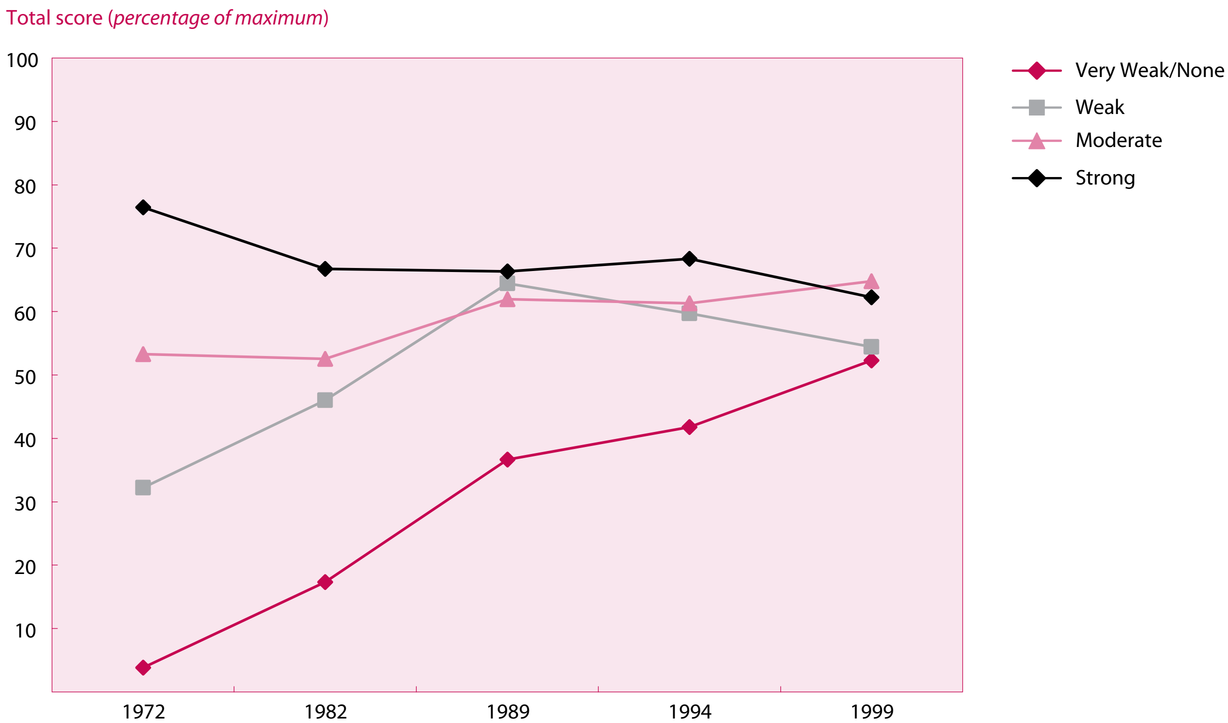


Figure IVd
Total programme effort for countries in sub-Saharan Africa region, 1982-1999



tries simultaneously by programme effort and social setting, with values in the cells for contraceptive adopters, contraceptive users and fertility decline. This was repeated with more countries by Freedman and Berelson (1976), by Mauldin and Berelson (1978), and by others in various ways since. The 2 by 2 summary given below indicates how this synergy persists among the intermediate-fertility countries, within their narrower TFR range. Prevalence of use varies across social setting, and separately across programme effort, but especially so along the diagonal for both. Each cell gives the mean prevalence of contraceptive use for the countries involved. The average for all countries is 52 per cent using, varying from 28 per cent to 61 per cent (country detail is in table 4).

Figure V
Increases in effort over time by 1972 effort cohorts



CEILING LEVELS FOR PREVALENCE AND PROGRAMME EFFORT

How high might prevalence and programme effort values go? A ceiling level for contraceptive use is 80 per cent to 85 per cent, as registered in surveys in the Chinese examples of (83 per cent), Hong Kong Special Administrative Region of China (86 per cent), and Taiwan Province of China (82 per cent). Others have been in the high 70s, or approaching it, as in the Republic of Korea (77 per cent), Thailand (73 per cent), Viet Nam (75 per cent), Brazil (77 per cent), Colombia (73 per cent), Costa Rica (75 per cent), Puerto Rico (78 per cent), and Mauritius (75 per cent). The closest example in the Middle East is the Islamic Republic of Iran (70 per cent). The highest figures have occurred where sterilization is a major component, except in Viet Nam and Mauritius. Prevalence of contraception in the 75 per cent to 85 per cent range is quite consistent with replacement fertility, and usually it is accompanied by later marriage and some abortion use.

Interestingly, a similar ceiling exists for the total FPE score. The strongest programmes have leveled off at about 80 per cent to 85 per cent of the maximum of 100. Asian programmes are again notable, with China (86 per cent) and Taiwan Province of China (79 per cent), also Indonesia (82 per cent). Others fall into the 70s: Thailand (75 per cent), and Viet Nam (76 per cent) in Asia, Islamic Republic of Iran (71 per cent) and Tunisia (71 per cent) in the Middle East, Mauritius again (71 per cent), and Mexico (75 per cent) in Latin America. These high figures only occur where the FPE component

	Total programme effort score		
Social setting	High and upper middle	Lower middle and low	Mean
High and upper middle	61	58	60
Lower, middle and low	44	28	38
Mean	55	45	**52**

Table 4
Contraceptive prevalence by family planning effort and social setting, for countries with intermediate TFR levels (*2.1–4.9*)

	Total programme effort score (1999)				
Social setting	High and upper middle		Lower middle and low		Mean
High and upper middle	Algeria	47	Costa Rica	75	
	Brazil	77	Ecuador	57	
	Columbia	72	Honduras	50	
	Dominican Republic	64	Jordan	53	
	Egypt	55	Kyrgyzstan	60	
	El Salvador	60	Mongolia	57	
	Iran (Islamic Republic of)	73	Paraguay	51	
	Jamaica	66			
	Mexico	65			
	Nicaragua	60			
	Panama	58			
	Peru	64			
	Philippines	46			
	South Africa	53			
	Syrian Arab Republic	40			
	Tunisia	60			
	Turkey	64			
	Uzbekistan	68			
	Mean	61	Mean	58	60
Lower middle and low	Bangladesh	49	Bolivia	48	
	Ghana	20	Guatemala	31	
	India	41	Haiti	18	
	Indonesia	57	Myanmar	33	
	Kenya	39	Sudan	10	
	Lesotho	23			
	Morocco	59			
	Nepal	29			
	Viet Nam	75			
	Mean	44	Mean	28	38
Mean		**55**		**45**	**52**

Source: Adapted from Ross and Stover, 2001.

score for method availability is high (referring to the proportion of the entire population for whom methods are easily available, including male and female sterilization, the IUD, the pill or injectable, the condom, and safe abortion).

In the past a prevalence increase of 2 points a year (e.g. 50 per cent to 52 per cent of couples using a method) has been a working upper limit, although the Republic of Korea rose at 2.5 points a year from about 20 per cent to about 75 per cent and a very few other countries have risen at that pace. At 2 points a year prevalence in a country can rise from 40 per cent to 75 per cent in about 17 years. However a tabulation (taken from United Nations, 2000a) giving the pace for 34 intermediate-fertility countries with repeat surveys shows the patterns in table 5. As the means on the right show, there is no apparent relation between the pace of increase and the starting level, perhaps partly because the precise starting dates and time intervals vary (unlike table 6). Most countries fall into the middle column, for a pace of about 1.5 per cent per year. At that rate it takes 23 years for prevalence to rise from about 40 per cent to 75 per cent, during which time a good deal of additional population growth will have been built into the age structures. For absolute numbers India will dominate these developments.

Table 5
Distribution of countries by pace of prevalence increase and starting level

	Annual percentage point increase in contraceptive prevalence			
Earlier prevalence	**<1,0**	**1.0-1.9**	**2.0 or more**	**Mean**
Below 15 per cent	Ghana Sudan	Haiti Lesotho Nepal		0.96
15-34 per cent	Guatemala India Jordan	Bolivia Egypt Honduras Kenya Malaysia Nicaragua Philippines Syrian Arab Republic	Bangladesh Morocco	1.35
35-49 per cent		Algeria Dominican Rep. Ecuador Indonesia Paraguay Peru South Africa Tunisia	Iran (Islamic Republic of)	1.41
50-64 per cent	Colombia Panama	Mexico Turkey Viet Nam		1.24
65 per cent plus	Costa Rica	Brazil		0.95
Overall Mean				**1.27**

The means show no trend, and combining categories does not change the lack of pattern.

Source: United Nations, 2000, table 5.

Table 6
Distribution of countries by pace of increase in total effort score, by starting level

	Annual percentage point increase in total effort scores, 1982-1999			
1982 score	**<1.0**	**1.0-1.9**	**2.0 or more**	**Mean**
Below 15 per cent		Myanmar Sudan	Bolivia Iran (Islamic Republic of) Lesotho Paraguay Syria	2.62
15-34 per cent	Costa Rica Guatemala Venezuela	Honduras Jordan Lebanon Turkey	Algeria Ghana Kenya Peru	1.43
35-49 per cent	Brazil Ecuador Haiti	Chile Egypt Morocco Nepal		1.01
50-64 per cent	Dominican Republic El Salvador Jamaica Panama Philippines Tunisia	Bangladesh Malaysia Viet Nam		0.36
65 per cent plus	Colombia India Indonesia Mexico			0.12
Overall Mean				**1.18**

Source: Programme effort files.

Whether countries will increase prevalence at a steady rate over a long period is not clear. In the past a few may have stalled for a while around the mid-fifties, and there are reasons why that might be so (below).

The parallel for FPE scores, using the same cell boundaries, shows a pace of 1.18 points per year for the 38 countries that were studied in all rounds of the study (table 6). The pattern according to the initial level is quite different from that for contraceptive prevalence, since the average annual increase is closely related to the starting level. The means descend from 2.62 to 1.43 to 1.01 to 0.36 and 0.12 as the starting level rises, and the distribution of countries clearly lies along the diagonal.

This reflects the greater room for improvement when the starting level is low, but it also confirms the observation above that it is the weaker programmes that have increased the most over the years. That augurs well for a continued rise in the average.

LOOKING TOWARD THE FUTURE

We can list two sets of considerations, one for the negatives and one for the positives as they may impinge upon future trends of programme effort and its effects.

The negatives are several. First, these programmes can only do so much. Short of the draconian approach used in China, they are largely limited by individual preferences. In every country there is a subgroup of individuals and couples who wish to avoid pregnancy, who are willing to use contraception and who will do so at higher rates with the assistance of an organized programme. The size of that subgroup sets an upper limit, which fundamentally reflects deeper conditions related to the timing of cohabitation, to spacing customs and to desired family size. Those in turn are imbedded in social and economic conditions. How fast those factors may change requires a different calculus than that discussed here.

Second, programme strength depends partly upon outside factors. Programmes have had their greatest impact in interaction with favourable social settings, and where those are weak the infrastructures necessary to large efforts in health, education, agriculture or other interventions are not very helpful. What Berelson called the "Fourth Cell" still appertains—very few countries fall into the table cell for a weak social setting but a strong programme. Bangladesh has been a prominent exception to the rule.

Other limitations act in the chain from programme activities to fertility: the strongest programmes have plateaued at about 85 per cent of the maximum scores; they may in some instances simply substitute for private contraception (while however stimulating it in others); some of the contraceptive use they produce suffers from failures and irregular use, applies to only one part of the birth interval, is used partly for inefficient spacing of births, and sometimes replaces breastfeeding. All these limitations weaken any one-to-one correlation between programme strength and fertility. However there is evidence of a firm link between programme strength and the reduction of *unwanted* fertility (Bongaarts, 1994).

Where the TFR has fallen to replacement some national leaders have become concerned about too-low fertility, with its own deleterious consequences. In that sense the very success of programmes can bring about their demise. The Republic of Korea is a major example of this; upon reaching a low TFR it essentially dismantled the national programme by deep reductions in budget and allocated staff.

Donors too can become fatigued with supporting the same programmes year after year. A chronic turbulence exists in the financial resources of such major agencies as USAID, the UNFPA, the World Bank, and some European donors, which has helped restrict planning in some country programmes to a short-term basis. There are also ideological shifts both internationally and within countries that, while they may be overdue and unavoidable as in the 1996 Indian policy reversal, still illustrate the uncertain paths of programme effort. Severe outer shocks to the programmes can unexpectedly undermine efforts; national chaos can render useful activity nearly impossible, as in Somalia, the Democratic Republic of the Congo, Rwanda or Afghanistan.

Discontinuation rates of resupply methods limit programme effects. In practice, all methods but sterilization have relatively high discontinuation rates. Most persons who start on a resupply method interrupt or cease its use, not due to a loss of interest but rather to health side effects, fear, inconvenience, cost or poor access. Only a relatively small subgroup finds each method satisfactory for a longer period of 5-15 years. All resupply methods, as necessary and useful as they are, have relatively brief continuation rates. As generalizations, among women starting on the pill or injectable, half or more discontinue within a year, and condom discontinuations are worse. The IUD and implant are used on average about 3.5 years in developing countries.

The state of contraceptive technology is unsatisfactory. Given any level of public motivation for pregnancy control, defects of the technology reduce the net effect upon fertility, in particular upon unwanted fertility. One study of 15 countries (Blanc, Curtis and Croft, 2002) concluded that the fertility rate (TFR) would be between 4 and 29 per cent lower in the absence of contraceptive failures, and without other kinds of discontinuations the TFR would be reduced by between 20 per cent and 48 per cent. Effects were greater on the total unwanted fertility rate; more than half of recent unwanted fertility was due to births preceded either by a contraceptive failure or a contraceptive discontinuation in all countries but one. Further, quality-related discontinuations were inversely associated with measures of programme effort.

Discontinuations produce a programmatic limit. If as many as 15 per cent of all women start on a method during any one year and use a resupply method for even 3.5 years, prevalence stabilizes at 53 per cent, far below the replacement fertility equivalent. To maintain that level there must be compensating movements in and out of the using pool, a churning process that is wasteful for the couples and burdensome and costly for the programme. This remains true in general, notwithstanding the portion of useful terminations that reflect the sorting out process as couples seek the best method for their own situation, and change methods as they move from one life stage to another.

Large proportions of women in the developing world have completed their desired family size by age 30, and face a fifteen-year period during which they need protection from unwanted abortions and births. The movement into the final stage, one of permanent protection, needs the option of male or female sterilization, with its near-zero failure rate and automatic long-term continuation. Without that it is difficult to attain high prevalence (among these countries the correlation between total prevalence and sterilization prevalence gives an R2 of 0.24). The absence of sterilization in the contraceptive offerings is a serious limitation, and it will be easier for these countries to move toward replacement fertility if they manage to offer it more widely.

Yet it is not likely that some of them will do so. Sterilization has won favour in very few Muslim countries, which largely prefer the IUD and other methods. Apart from Tunisia, in no Middle East Muslim country has sterilization prevalence risen above 5 per cent of couples, and in most, as in Algeria, Egypt, Iraq, the Syrian Arab Republic and Turkey, it is a mere 2-3 per cent. It is higher in the Islamic Republic of Iran, where 12 per cent of couples were using the method in the 1994 survey. In Indonesia only 3 per cent use the method, and, in Bangladesh, which has stressed the method nationally over the years, only 8 per cent use it. These low figures are due partly to cultural factors including fundamentalist objections, partly to negative attitudes among the medical elites, and partly to the failure of the programmes quietly to make the method more available to the general population. Of all these countries, only the Islamic Republic of Iran has achieved high overall prevalence of use.

Positive influences counterbalance the negatives. They are found primarily in the record of the overall increases in programme effort in each inter-survey period since 1972. Individual country scores show considerable fluctuations but globally the programmes have been making greater efforts. This applies in particular to extending the sheer access of people to contraceptive methods.

For the future there is always the possibility of breakthroughs in contraceptive technology that would make both the adoption and continuation of reliable contraception easier for the user and easier for programme implementation. Private-sector activity would be augmented by such developments, which programmes could stimulate and reinforce.

The sheer institutionalization of these programmes in Ministries of Health and Finance, and in the supportive international and national assistance agencies, must be counted as an important positive factor. These have their own momentum, and despite the exigencies of annual budget and staffing struggles, they will surely be part of the scene for the indefinite future.

There is in addition the drumbeat of research and analysis that continues to dramatize the inevitable growth of numbers on the planet and the kinds of burdens they represent. It was data and its analysis that led to the historic decisions in China, India, Bangladesh, Indonesia, Mexico and others to establish a response to extraordinary population growth rates and their consequences. The impetus created by demographic knowledge has been reinforced by analyses concerned with other reasons for making humane contraception available to whole populations. The information base has sustained the rationale for large-scale organized programmes at the national level, and may be expected to continue to do so.

A final influence that tends to tilt the scale in favour of continued programme effects is the net movement of young populations of working age to urban areas, where services can be more concentrated and efficient, to deal with the burgeoning numbers of users that come from both population growth and rising prevalence of use. Clinical medical services are more prevalent in cities for offerings of the IUD, injectable, implant and sterilization. Rising educational levels, where they occur, will reinforce the public uptake of these in both public and private sectors. Finally, to the extent that infrastructures improve, programmes will find it easier to operate.

The role of HIV/AIDS is probably a neutral factor for these particular intermediate-fertility countries, although that remains to be seen over the long run. The high-HIV countries in sub-Saharan Africa are excluded from the group, so among the 53 countries considered here, the 12 countries with HIV prevalence above 1 per cent of adults contain only 6 per cent of the aggregate population. The other 41 countries, with low HIV prevalence, contain the other 94 per cent of the total.

In sum, there is a set of positive features that will help programme contributions in the future and counterbalance some of the negative ones. The net effect will depend on the country; a few of these countries, like Indonesia, Bangladesh, Mexico, Viet Nam and the Islamic Republic of Iran already have high effort scores, with less room for increases. Nevertheless most other programmes have ample room for improvement, and the past record is encouraging. The literature since the mid-1970s at least, including the United Nations–sponsored work and the other analyses cited above, finds overall fertility effects. For the developing world as a whole through 1990, the programmes were estimated to have produced a population reduction of about 412 million persons, and were projected to add considerably to that figure (Bongaarts, Mauldin and Phillips, 1990). By 1990 organized programmes were credited for about half of the recorded fertility decline since the 1950s, or an average net impact in the developing world in the late 1980s of about 1.4 births per woman (Bongaarts, 1997).

In the years since those analyses were done some countries have moved closer to replacement, implying a slowing of further decline; moreover some timing effects are present that may later attenuate or reverse declines at low levels. However countries differ greatly; for some the recent rates of decline would not produce replacement for some time, and in that interval programmes will have a substantial compass within which to continue their effects, and to improve. Even the strongest programmes are selective among the 30 programme effort scores; none maximize effort on all 30. They differ not just in overall strength but in their selectivity of features. Policymakers who seek to optimize future programme effects, on a voluntary basis, will approximate the features of a high-effort programme. Judging from the FPE indices over the years, such a programme:

- Provides supplies and quality services to the whole population, close to home;
- Includes a wide range of contraceptive methods;
- Includes pregnancy termination methods where legal and safe;
- Uses the media fully to inform the public;
- Legitimizes child spacing and the programme itself in frequent statements by high officials and by prominent figures in the private sector;
- Enlivens the private medical sector and pharmacies, e.g. through social marketing programmes;
- Eliminates custom duties and taxes on contraceptives, and eases regulatory barriers; permits advertising of contraceptive products and services;
- Establishes specialized subprogrammes such as community-based distribution, home visiting, post-partum and post abortion offerings;
- Reaches out to adolescents through the schools, military and other channels;
- Takes steps to enforce a minimum marriage age for both sexes; and
- Uses its good offices to seek the cooperation of potentially hostile institutions in the society, or at least their acquiescence.

These core items can operate through various contexts and with various rationales, whether through the health ministry for health reasons, or through various ministries for a blend of demographic, health, gender-related and human rights reasons. Some programmes will go further, widening out to foster female employment, cottage industries or income generation activities.

How far will such a programme go to reduce fertility? Basically, it encourages, and helps to implement, the "later, longer, fewer" fertility behaviour that was urged in China, but on a voluntary basis with personal choice preserved. It makes it easy for every couple to implement their own objectives, and it reduces births in the country down to the limit, or floor, that reflects what couples definitely want, minus those precluded by infecundity.

The floor will still include births that are only "semi-wanted". Even with attractive contraceptive services ready at hand in both public and private channels, some people will not use them due to religious objections, conflicting pressures within couples or families, or personal ambivalence. What are removed however are those pregnancies and births that are frankly not wanted, including most pregnancies that would otherwise end in abortions.

With social change this floor, of the births that are actively wanted, tends to descend, and births undergo a shift according to order. First and second births continue, while third and fourth (and higher) births diminish. In time, fewer second births occur. The marriage age may rise; pre-marital adolescent births may diminish; and birth spacing if it occurs will tend to reduce period fertility rates. There is no sign yet of a fall-off in the remarkable increases in contraceptive use in this group of countries, and their average programme effort score has risen in every survey so far. Both trends however are linked to future social setting changes that are not entirely assured.

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The end of the fertility transition in the developing world

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Over the past four decades reproductive behaviour has changed rapidly in much of the developing world. The average total fertility rate (TFR) has fallen by half from the traditional six or more to near three today, and contraceptive use—once rare—is now widespread. Between the early 1960s and the late 1990s the largest fertility declines occurred in Asia (-52 per cent) and Latin America (-55 per cent) and the smallest in sub-Saharan Africa (-15 per cent) (United Nations, 2001). Differences among countries are even larger, with some completing the transition to replacement fertility in record time (e.g., China, Hong Kong Special Administrative Region of China, Singapore, the Republic of Korea), while others (mostly in sub-Saharan Africa) have seen little change in reproductive behaviour.

These recent fertility declines have been more rapid and pervasive than had been expected. For example, although the medium variant projections prepared by the United Nations Population Division in the 1970s and 1980s correctly predicted widespread fertility declines by the 1990s, the actual levels in the 1990s were even lower than these projections indicated for some world regions. The substantial declines that took place in a few poor and largely agricultural countries such as Bangladesh were particularly unexpected. Demographers and social scientists have proposed a variety of explanations for why these fertility transitions have been so rapid, but there is no consensus and a sometimes contentious debate among competing theories continues in the demographic literature (see Bulatao and Casterline, 2001, for a recent review).

With the spread of fertility decline through much of the developing world, the focus of the debate about future fertility trends is shifting from the early to the later phases of the transition. Until recently, only limited attention was given to understanding the determinants of reproductive behaviour in developing countries with relatively low fertility. Conventional theories have little to say about the pace of fertility decline or the level at which fertility will stabilize at the end of the transition. However, it is often assumed that ongoing declines will continue and that fertility near the replacement level of about two births per woman will prevail in the long run (for various perspectives see Caldwell, 1982; Demeny, 1997; National Research Council, 2000). On this issue the United Nations has long incorporated the views of the demographic community in its projections. According to the medium variant of the most recent United Nations projections, virtually all subregions of the developing world will have ended their transitions by 2025-2030 with TFRs at or below 2.2. The only exceptions are expected to be sub-Saharan Africa and West Asia, where the TFR is projected still to be at 3.5 and 2.8 respectively (United Nations, 2001). These assumptions about continued future fertility declines are critical to future trends in population size. Population growth over the next few decades will exceed current projections substantially if fertility declines are less rapid than now projected or if fertility at the end of the transition remains above the replacement level (Casterline, 2001a; United Nations, 2001).

This study examines recent trends and patterns in fertility in the developing world with particular emphasis on the later stages of the transition. The main objective is to identify regularities in the past record that may provide clues to future trends. Key issues examined include (1) the pace of fertility decline and changes in this pace over the course of the transition, and (2) the determinants of the fertility level at the end of the transition. The record of fertility change in the developing world over the past half-century is examined first. Next, to help explain observed transitions, the relationship between the TFR and socio-economic indicators is discussed. A concluding section summarizes the implications for future trends in fertility.

PATTERNS OF CONTEMPORARY FERTILITY TRANSITION

Data

This analysis of past fertility trends in the developing world relies on the most recent available United Nations estimates of total fertility rates for 143 "less developed countries" (United Nations, 2001). This data set provides estimates as five-year averages from 1950-1955 to 1995-2000 and it includes all countries in Africa, Asia and Latin America and the Caribbean, (except Japan, Australia and New Zealand). For the present study single-year estimates of the TFR were derived from these five-year averages with standard interpolation procedures. The onset of the transition is assumed to be the year in which the TFR drops to 5 per cent below the maximum observed level between 1950 and 2000. This threshold for entry into the transition was chosen instead of the more common 10 per cent decline used in many previous studies, to address a criticism of past practice by Casterline (2001). He correctly notes that a transition may be underway for a number of years before a country reaches a 10 per cent decline. The 5 per cent decline threshold used here minimizes this problem.[1]

Fertility levels in 1995-2000

In 1995-2000 the (weighted) average of the TFR for the developing world as a whole is estimated at 3.1. This average is heavily influenced by the relatively low fertility of very large countries, in particular China with a TFR of 1.8. As a result, the unweighted average, which gives each country the same weight, is substantially higher at 4.1. The TFRs of individual countries vary widely from a low of 1.2 in Macao to a high of 8 in Niger. In the analysis below, the country is the unit of analysis and unweighted averages of the TFR and other demographic and socio-economic indicators will be used (unless otherwise noted), because the focus is on understanding and predicting future fertility trends for countries.

Since the large majority of developing countries have not yet reached the end of their transitions, it is not possible to describe comprehensively the patterns that characterize entire transitions in the developing world. There are of course some developing countries or areas—about one in seven (21/143)—that have already reached a TFR of 2.1 or lower, including China, Hong Kong Special Administrative Region of China, Singapore, the Republic of Korea and several Caribbean islands. Unfortunately, the experience of this selected set of countries or areas is not representative of the developing world as a whole and it therefore cannot be used to draw reliable conclusions about future transition patterns that will occur in other countries or areas (more on this below).

Fertility patterns in countries with transitions starting in the 1960s

Despite these limitations, valuable insights can be gained from partial transitions observed to date. For example, the record of countries that started their transitions in the 1960s provides a useful starting point for the discussion because these transitions have

[1] In some countries fertility fluctuated so that the TFR fell below the 5 per cent threshold initially but rebounded, before subsequently dropping again below this threshold. For this study the most recent observed year of reaching the 5 per cent threshold is used as the transition year.

been underway for at least three decades. The fertility trends in this set of 38 countries are plotted in figure I. Three key features of these transitions are evident: (1) fertility is high until the transition begins; (2) once the transition gets underway fertility declines fairly rapidly and tends to continue doing so; (3) the pace of decline decelerates as countries reach the later stages of the transition. In this set of countries the annual decline in the TFR averaged 0.15 in the early 1970s and only 0.06 in the 1990s.

Despite these broad similarities, countries starting transitions in the 1960s diverge substantially in the level and pace of fertility at all stages of the transition. Particularly notable is the wide range in fertility in 1995-2000 from a high of 4.9 in Guatemala to 1.5 in the Republic of Korea. After three decades in transition only eight of these 39 countries have a TFR at or below 2.1. Rapid declines to below replacement are the exception rather than the rule.

Pace of fertility decline

The question as to whether the pace of decline slows later in the transition can also be examined with more recent cross-sectional data from all countries. For each country the pace is measured as the annual change in the total fertility between one quinquennium and the next. For example, the TFR for the developing world as a whole dropped by 0.43 births between 1985-1990 and 1990-1995 (from 3.80 to 3.37). The annual pace of decline for the quinquennium starting in 1985-1990 is therefore 0.086 (i.e., 0.43/5). Figure II plots the average pace for groups of countries with different levels of fertility. All observations after a country entered the transition are included. The relationship between the level of the TFR and its pace is plotted separately for the pre- and post- 1975 periods.[2]

The main finding is that the pace of fertility change is positively associated with the level of fertility: the lower the TFR, the slower the pace of change. For example, before 1975 the average annual pace was 0.15 for countries with a TFR between 4 and 6, but the pace was then only 0.04 for countries with a TFR between 2.0 and 2.5.

A comparison of this relationship between the pre- and post- 1975 periods shows a significantly more rapid pace before than after 1975 for countries in earlier stages of the transition.[3] For example, transitional countries with TFRs between 4 and 6 before 1975 experienced more rapid declines than countries with TFRs between 4 and 6 after 1975.[4] In contrast, this difference between the pre- and post- 1975 pace did not exist for countries with lower levels of fertility. Possible explanations are discussed below.

This cross-sectional evidence is consistent with the longitudinal pattern observed in the group of countries whose transitions began in the 1960s (see figure I). Both indicate substantial declines in the pace as the transition proceeds.

The 1990s

In the preceding analysis fertility trends were calculated from United Nations estimates for the past half-century. Unfortunately, estimates for the late 1990s in many countries are based on very limited direct information. Only a small number of developing countries have accurate vital statistics, and in a limited number of additional countries surveys are available after 1995. Information from the 2000 round of censuses was not yet available when the estimates published by the United Nations (2001) were made. In many countries the estimates for 1995-2000 are therefore obtained indirectly or are projections from earlier periods.

In the past few years results from a number of very recent DHS surveys have become available. These new data provide useful information on fertility trends during the 1990s. For present purposes a subset of DHS countries were selected in which two surveys were implemented during the 1990s and in which the TFR was below 4 in the early 1990s.[5] Nine countries met these criteria and the two successive estimates of their TFRs are presented in the first two columns of table 1. At the time of the first survey in the early 1990s the TFR ranged from 3.9 in Egypt to 2.5 in Turkey. At the time of the

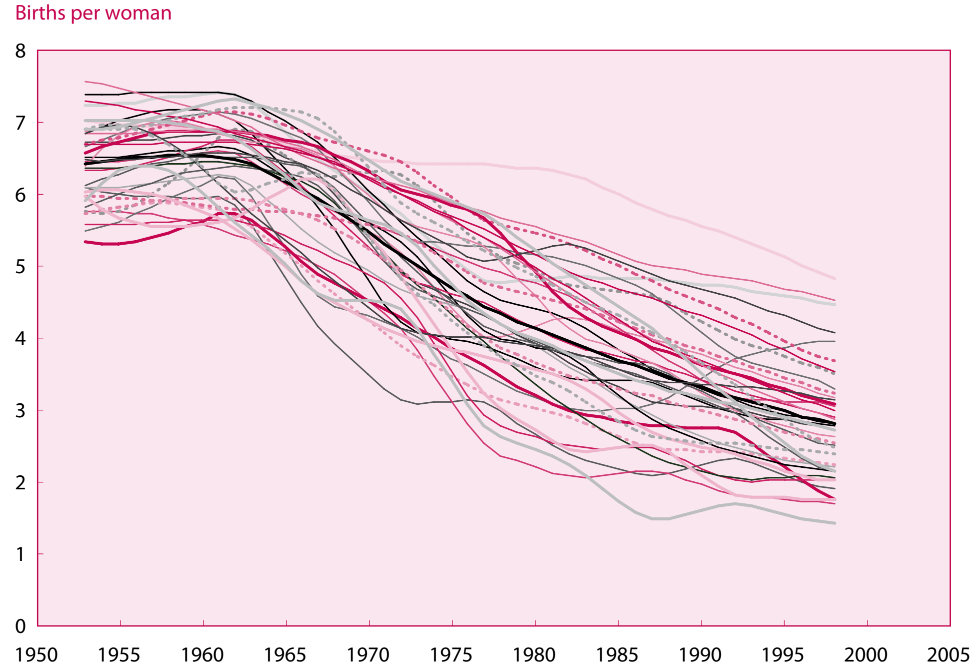
[2] For example, for the post-1975 period, a country in transition in 1975 contributes four observations with TFRs for 1975-1980, 1980-1985, 1985-1990, and 1990-1995 and corresponding pace estimates from 1975-1980 to 1980-1985, from 1980-1985 to 1985-1990, from 1985-1990 to 1990-1995, and from 1990-1995 to 1995-2000. The fact that some countries contribute more observations than others could lead to a bias, but this bias is minimized by controlling for the level of the TFR in figure II.

[3] This finding is consistent with Casterline (2001a), who reported that national fertility declines in the first 10 years of the transition proceeded more rapidly in the 1960s than in later decades.

[4] Further analysis shows no significant trend since 1975.

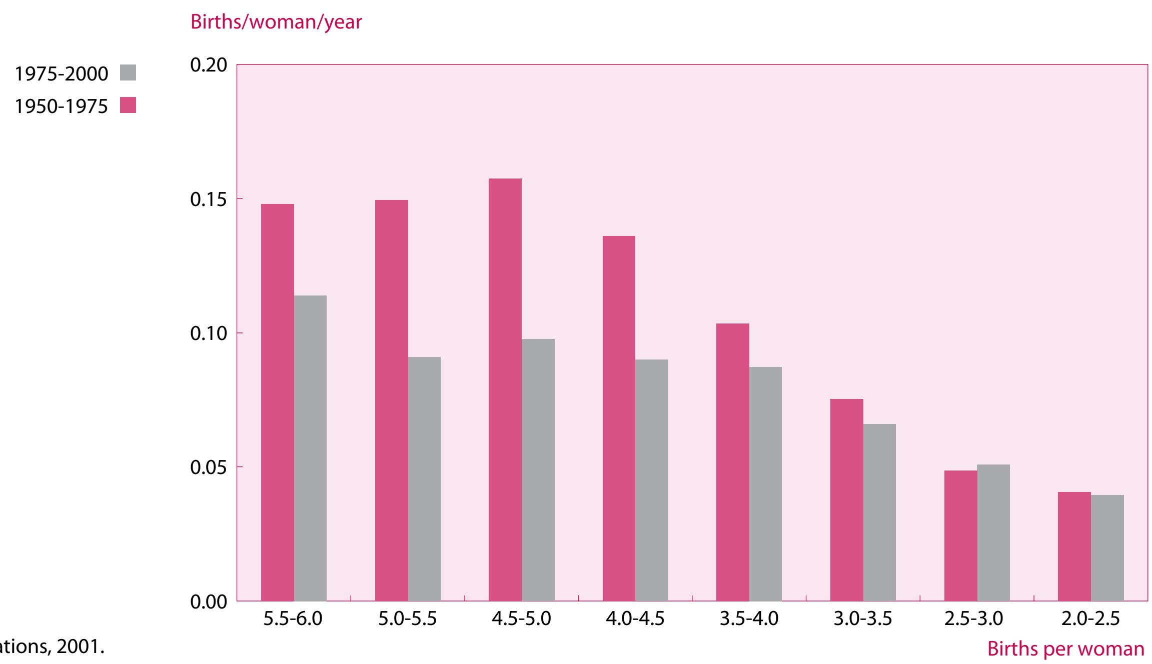
[5] In countries with more than two surveys in the 1990s, the first and last were used.

Figure I
TFR from 1953 to 1998 for countries with transition onsets in the 1960s



Source: United Nations, 2001.

Figure II
Annual pace of decline in TFR by level of TFR in transitional countries



Source: United Nations, 2001.

second survey in the late 1990s or 2000 the TFR had declined in most cases except in Turkey where a slight rise was measured. The lowest TFR at the time of the second survey was 2.1 in Kazakhstan and the highest was 3.5 in Egypt.

The pace of decline between the two surveys averaged 0.048 births per woman per year. Notably, in five of the countries the pace was 0.3 or less, which is well below the pace observed in the 1980s. The transitions in these countries have slowed dramatically in the 1990s, or are close to stalling.

The last column of table 1 indicates the pace of fertility decline as estimated by the United Nations for the period between the two DHS surveys in the 1990s. The average pace in the United Nations estimates for this set of countries is 0.074, which is substantially higher than the 0.048 estimated from the DHS surveys. The cause of this difference is not clear and could be errors in one or both DHS estimates. However, it is also possible that the United Nations has overestimated the pace of declines in some of these countries.

The three pieces of evidence reviewed here—trends in countries entering transitions in the 1960s, cross-sectional pace at different levels of fertility and recent trends from DHS surveys—point to two conclusions. First, the pace of fertility decline usually decelerates as countries progress through their transitions. This is not a particularly surprising or controversial finding, but the cause of this trend is not obvious. Furthermore, the reduction over time in the pace in early transitional countries is unexpected and calls for an explanation. Second, on the end point of the transition, the evidence is less clear-cut, but convergence to 2.1 seems unlikely in the next quarter-century even for countries that are already in transition. It would be more plausible to assume considerable variation in levels of fertility at the end of transition in the next few decades, with some countries dropping below replacement and others stalling at higher levels.

RELATIONSHIP BETWEEN FERTILITY AND DEVELOPMENT INDICATORS

To obtain a better understanding of contemporary patterns of fertility transition, it is useful to examine the relationship between fertility and socio-economic indicators. The following five conventional indicators will be used for this purpose: life expectancy at birth, per cent literate among adults, real GDP per capita (log) adjusted for purchasing power, per cent of population in urban areas, and per cent of labour force in agriculture (United Nations, 2001; World Bank, 2000; Heston et al., 1995). Data for most of these variables are available from 1960 to the early 1990s and the analysis below is therefore confined to this period.[6] All countries for which these variables are available are included in the analysis except the major oil exporters (Brunei, the Libyan Arab Jamahiriya, Oman, Saudi Arabia, and the United Arab Emirates) whose highly unusual development experience will not be examined. In addition, crisis years defined by very large and sudden changes in life expectancy are excluded (e.g., Cambodia in the 1970s).[7]

[6] The per cent literate among adults was available only for the period 1970-1998. Since this variable changes only slowly over time, estimates were made for the 1960s by logistic backward extrapolation.

[7] Crisis periods are defined as quinquennia during which the change in life expectancy was more than three standard deviations from the average pace of change in life expectancy for all countries and periods.

Table 1
Estimates of total fertility rate and annual pace of TFR decline for countries with two DHS surveys between 1990 and 2000 and with TFR<4 at the time of the first survey

	Observed TFR from DHS surveys		Pace of decline	
	Early 1990s	Late 1990s	DHS estimates	United Nations estimates
Bangladesh (1993/2000)	3.4	3.3	0.01	0.09
Colombia (1990/2000)	2.8	2.6	0.02	0.04
Dominican Rep. (1991/1996)	3.3	3.2	0.02	0.07
Egypt (1992/2000)	3.9	3.5	0.05	0.09
India (1993/1998)	3.4	2.8	0.11	0.08
Indonesia (1991/1997)	3.0	2.8	0.03	0.09
Kazakhstan (1995/1999)	2.5	2.1	0.11	0.06
Peru (1992/2000)	3.5	2.8	0.09	0.09
Turkey (1993/1998)	2.5	2.6	-0.02	0.07
Average	**3.1**	**2.9**	**0.048**	**0.073**

Source: DHS first country reports and interpolation from United Nations, 2001.

Figure III plots the relationship between TFR and life expectancy and includes all observations (137 countries, with multiple observations per country from 1960-1965 to 1990-1995). The simple correlation between these variables is a highly significant—0.79. Correlations between the TFR and the other four development indicators are also highly significant and in the expected direction although somewhat smaller in size: per cent literate, -0.73; GDP per capita, -0.68; per cent urban, -0.63; and per cent of labour force in agriculture, 0.69.

The data in figure III also demonstrate that the relationship between TFR and life expectancy is nonlinear. At the lowest levels of life expectancy the TFR is high and there is no significant correlation between the two. In contrast, at high levels of life expectancy the TFR is strongly and inversely associated with life expectancy. Similar nonlinear patterns of association exist for the other development indicators. To shed light on this changing relationship it is necessary to examine in greater detail the successive phases of the transition. Three phases are distinguished below: (1) pretransition, covering all observations before the TFR reaches the 5 per cent decline threshold, (2) transition onset and early transition, covering the first decade after the year in which the threshold is reached, and (3) mid and late transition, the remaining period with more than 10 years after transition onset.

Pretransition

In 1960-1965 the large majority of developing countries had not yet entered the transition. The average TFR in these pretransitional countries in the early 1960s was 6.7 with a standard deviation of 0.6. Regional averages were similar for Asia (6.5), Latin America (6.6), and sub-Saharan Africa (6.7), but slightly higher in the Middle East/North Africa (7.1). Regression analysis indicates no significant effects on fertility of development indicators in countries with the lowest levels of development.[8] Although countries vary in their level of pretransitional fertility, there is usually little trend up or down before the

[8] Results are based on fixed-effects regressions with observations limited to years with the lowest levels of each development indicator (life expectancy <45, per cent literate <25, log of GDP/capita <2.7, per cent urban <10, and per cent of labour force in agriculture >90).

Figure III
Relationship between TFR and life expectancy for 137 developing countries with observations from 1960-1965 to 1990-1995

Source: United Nations, 2001.

Table 2
Average levels of development indicators in year of onset of transition by decade in which transition occurred

	Decade in which year of transition onset occurred				
	1960s	1970s	1980s	1990s	All
Life expectancy (years)	57.7	54.1	51.1	48.7	54.7
Literacy (per cent)	61.6	52.2	44.9	41.3	52.8
GDP per capita (log $)	3.21	3.19	3.03	[a]	3.14
Urban population (per cent)	37.2	34.3	25.2	27.0	32.8
Labour force in agriculture (per cent)	50.3	57.1	68.2	[a]	57.5

Source: See text.
[a] Fewer than 5 observations.

transition starts. The TFR can therefore be considered largely unresponsive to changes in development until the transition begins. This pattern of fertility is consistent with the existence of natural fertility, defined as the fertility that prevails when couples do not consciously limit the size of their families (Cleland, 2001; Henry, 1961; Knodel and van de Walle, 1979). Fertility surveys in pretransitional countries have confirmed that only a very small proportion of couples practice contraception (Curtis and Neitzel, 1996), and differences in fertility are caused primarily by differences in proximate determinants other than contraception (Bongaarts and Potter, 1983). This issue will not be discussed further because this study focuses on the later phases of the transition.

Transition onset

The transition has begun in 123 of the 137 developing countries included in this analysis. The year of onset varied widely: 23 countries entered their transition before 1960, 38 in the 1960s, 32 in the 1970s, 23 in the 1980s and 7 in the 1990s. The remaining 14 countries will presumably also enter the transition eventually. As shown in figure I, the onset of a transition typically represents a break from the past with the pace of fertility decline sharply higher after than before the onset. In countries for which time series of contraceptive use are available, a rise in contraceptive use from very low levels coincides with the onset of the transition (Bongaarts and Johansson, 2002; United Nations, 1999).

The transition onset occurs after a country's level of development has risen for some time. On average in the year of onset, life expectancy was 54.7 years, per cent literate 52.8, GDP per capita (log) 3.14, per cent urban 32.8, and per cent of labour force in agriculture 57.5 (see last column of table 2). There is, however, no well-defined threshold of development that signals the start of a transition. In fact, levels of development at time of onset vary considerably historically in Europe and in contemporary developing countries. One cause of this variation is that the level of development at the time of onset appears to have declined over time (Bongaarts and Watkins, 1996). This trend is also evident in table 2, which presents averages for development indicators in the year of transition onset for groups of countries entering the transition in different decades from the 1960s to the 1990s. For example, the average life expectancy in the year transitions started was 57.7 years in the 1960s, but it declined to 54.1 in the 1970s, 51.1 in the 1980s and 48.7 in the 1990s. Similarly, this average declined over time for per cent literate, GDP per capita, and per cent urban and rose for per cent of labour force in agriculture. These effects are statistically significant for life expectancy, per cent literate, and GDP per capita.[9] Apparently, the later in time a transition starts, the lower the average development level at transition onset becomes. It is unclear whether this trend will continue into the future.

[9] Based on OLS regressions with controls for region (Asia, Latin America, Middle East/North Africa, with sub-Saharan Africa as reference region).

Early transition phase

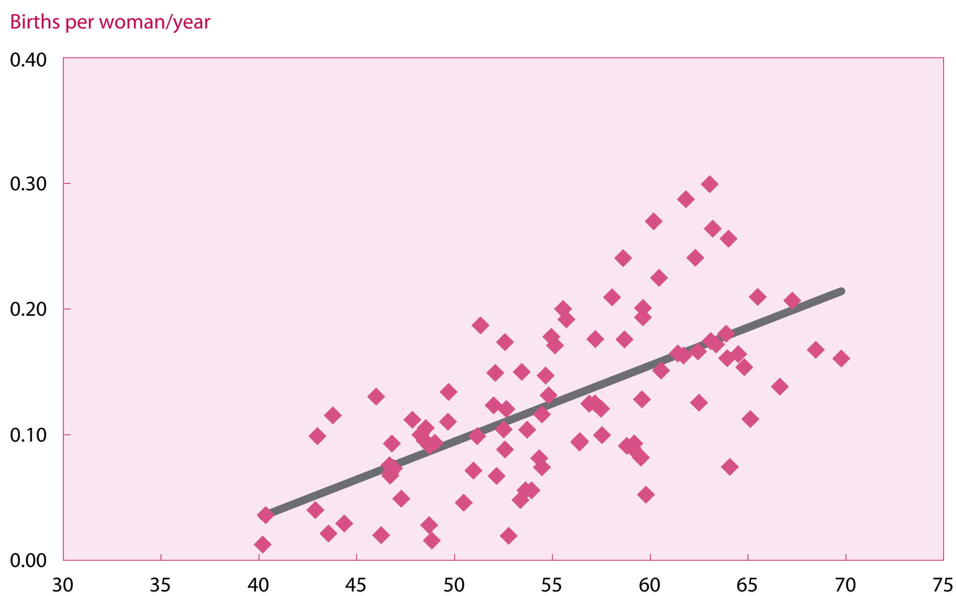
Once a transition starts it tends to continue. Reversals and plateaus are very unusual in the early phases of the transition. The pace of decline is typically faster immediately after onset than in any other phase of the transition. An earlier study of these trends by Bongaarts and Watkins (1996) concluded that the initial pace of change in fertility was not associated with the pace of development. However, the pace of initial decline was positively associated with the *level* of development at the time of onset. These findings are confirmed here with a more complete data set. For example, figure IV plots the annual decline in TFR in the decade after transition onset by level of life expectancy at the time of onset. The significant positive association between these variables indicates that when a country begins its transition at a low life expectancy it has, on average, a slower initial pace of fertility decline than a country with a high life expectancy at the time of onset. Similar significant effects on the initial pace of decline are found for level of literacy and per cent of labour force in agriculture at the time of onset.[10]

These findings are consistent with the previous observation (figure II) that the pace in the initial transition stage has declined over time. Apparently, in later decades countries enter the transition at lower levels of development, but because of these lower levels of development the initial pace is lower than for countries that entered the transition in earlier decades at higher levels of development.

The key features of the early phases of the transition are summarized in figure V, which presents stylized plots of typical trends in fertility for three groups of countries with transitions starting in the 1960s, 1970s and 1980s. The solid lines represent the approximate observed average fertility trends for these three groups. The dashed lines represent the simulated fertility trends that would have been observed if the groups starting in the 1970s and 1980s had been exposed to the same average development level at transition onset and had experienced the same initial pace of decline as observed in the group starting in the 1960s. For example, line A plots the approximate observed average trend for countries starting their transitions in the 1970s. If the transitions in this group had started at a level of development and with a pace that was typical for the 1960s, their transitions would have started later (say around 1980 when their level of development

[10] OLS regressions of the decline in the TFR in the decade after transition onset on the level of development indicators in the year of the transition onset (with controls for region) show statistically significant effects for life expectancy, per cent literate, and per cent in agriculture, but not for GDP per capita and per cent urban. OLS regressions of the decline in the TFR in the decade after transition onset on the change in development indicators in the same decade (with control for region) show no statistically significant effects for change in life expectancy, literacy, per cent in agriculture, and per cent urban.

Figure IV
Pace of TFR decline in decade after transition onset by life expectancy in year of onset



Source: United Nations, 2001.

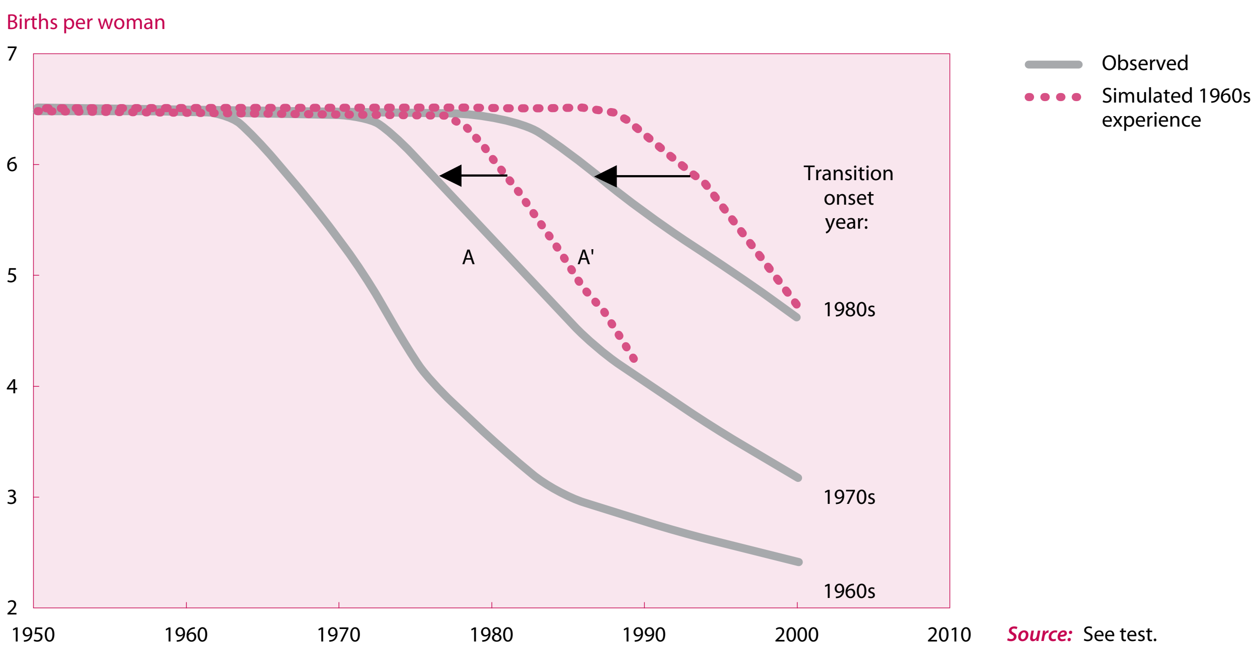
would have been higher than it was in the 1970s) and at a faster pace than they actually experienced (compare dashed line A' with solid line A). Similarly, if the populations with transition onsets in the 1980s had followed average patterns of the 1960s, their transitions would have started considerably later (say in the 1990s) and at a faster pace. Because the relatively early onset of transitions in the 1970s and 1980s is associated with a slower initial pace, over time the observed fertility trends in these groups of countries tend to converge to the levels that would have been observed without these effects (i.e., the solid and dashed lines in figure IV converge). As a result, these effects are important early in the transition, but their role diminishes over time.

An explanation for these at first puzzling trends in fertility in the early phases of the transitions is likely to be found in diffusion and social interaction processes, which interfere with a smooth adjustment of fertility to changing socio-economic circumstances. Diffusion refers to the spread of information, ideas and behaviours among individuals, communities, and countries, and social interaction refers to the fact that reproductive attitudes and behaviours of individuals can be influenced by the attitudes and behaviours of others. An extensive literature exists on this subject (Bongaarts and Watkins, 1996; Caldwell, 2001; Casterline, 2001a and 2001b; Cleland, 2001; Cleland and Wilson, 1987; Kohler, 2001; Knodel and van de Walle, 1979; Montgomery and Casterline, 1996; National Research Council, 2001; and Watkins, 1986 and 1987) and only a brief outline of the main points will be given here:

- The first key element of an explanation is an initial resistance to reproductive change in pretransitional societies with natural fertility. Traditional norms and values tend to support large families and to discourage the deliberate limitation of family size through contraception. This resistance to change leads to a growing gap between actual and desired family size when child mortality and desired family size decline with development, thus building a potential for future fertility decline.

As development proceeds, the desire for reproductive change becomes sufficiently large and widespread that a few innovators adopt contraception—typically first among highly educated and urban couples. Once begun, reproductive change spreads rapidly

Figure V
Approximate fertility trends in observed and simulated transitions for groups of countries with transition onset in the 1960s, 1970s and 1980s



Source: See test.

Table 3
Regression results (*OLS*) for total fertility rate and development indicators for countries in mid or late transition (>10 years past transition onset)

Variable	Coefficient	t statistic	Significance level
Life expectancy	-0.104	-6.28	0.000
Per cent literate	-0.015	-3.02	0.003
GDP per capita (log)	-0.157	-0.45	0.650
Per cent urban	0.002	0.48	0.631
Per cent labour in agriculture	0.004	0.68	0.498
Region=Asia	-0.150	-0.63	0.527
Region=Latin America	0.433	1.92	0.056
Region=Middle East	0.445	1.71	0.089
Year=1960-1969	0.341	1.56	0.120
Year=1970-1979	0.200	1.22	0.222
Year=1980-1989	0.175	1.32	0.187
Constant	11.57	8.10	0.000
R2 = 0.60			

Source: See text.

as diffusion and social interaction processes reinforce rather than inhibit such change. The cost of contraception (broadly defined to include social costs) drops. In addition, diffusion and social interaction can alter couples' evaluation of the costs and benefits of childbearing, thus reducing fertility preferences. The combination of a substantial (and growing) existing demand for and a reduction in the cost of contraception results in "a sharp acceleration in fertility decline that is a kind of 'catching up' as pent-up desires for limiting fertility are released" (Casterline, 2001a). This initial fertility decline is typically more rapid the more developed a society is at the time of onset because higher levels of development are associated with lower desired family size and hence with larger gaps between actual and desired behaviour. And the more developed a country is, the more extensive the channels for social interaction and diffusion of innovative ideas, information and attitudes.

- Finally, social interaction among countries is an important cause of the reduction over time in the average development level at transition onset. The fact that some countries in the world or in a region have already entered a transition tends to facilitate the onset in other countries that are still pretransitional. Interaction among countries occurs through many channels including trade, exchange of technology, labour migration, tourism, and the media, all of which facilitate the spread of ideas and information about the means for and desirability of family limitation. A large international effort to implement family planning programmes in many developing countries has also played an important role because these programmes give couples access to and information about birth control methods.

While this general explanation for observed transition patterns is plausible, many details remain to be settled and further research is needed to confirm its validity.

Mid- and late transition phases

In the later phases of the transition, fertility behaviour is more consistent with expectations of most demographic and economic theories of fertility (Becker, 1991; Bulatao and Lee, 1983; Caldwell, 1982; Easterlin, 1975; Notestein, 1953). According to these theories, the main driving force of fertility transitions is a rise in the cost of children and a decline in their value to parents as traditional agricultural societies are transformed into modern industrial ones. This shifting balance of costs and benefits leads to declines in desired family size and, with the implementation of these preferences through contraception and abortion, to lower fertility. As a consequence, fertility levels are inversely related to development indicators.

This conclusion is supported by the regression results presented in table 3. Five development indicators and year of observation are the explanatory variables for the level of the TFR.[11] All observations from 1960-1965 to 1990-1995 in which a country is more than a decade past the year of transition onset are included. The main findings from this regression are:[12]

- The coefficients for life expectancy and literacy are highly significant and negative, implying that these development indicators are inversely related to fertility.
- The effects of GDP per capita, per cent urban and per cent of labour force in agriculture are not significant.
- Regional dummy variables for Asia, Latin America and the Middle East are not significantly different from zero (Africa is reference region).
- None of the dummy variables for year of observation is significant. This suggests that the relationship between fertility and development does not vary with time. (The fact that the coefficients for these dummy variables are positive and decline with time leaves open the possibility of a slight downward drift over time in the TFR for given levels of the development indicators.)

These findings support the view that human development (in particular, improvements in health and education) is the most critical determinant of progress through the fertility transition (Sen, 1999). In fact, it is possible for fertility in poor populations to drop to the replacement level provided literacy and life expectancy are high. Well-known examples of this trend are Sri Lanka and the state of Kerala in India. It should be noted that the two human development indicators included in this analysis (literacy and life expectancy) where selected because long time series were available for a large number countries. It is possible that closely related variables such as child mortality or level of school enrolment are equally or even more important determinants of fertility, but this issue will not be examined here in part due to a lack of data.

Reaching near-replacement fertility apparently requires high levels of human development in most countries. To illustrate this point, consider the set of developing countries that had life expectancy above 70 combined with literacy above 90 per cent in the late 1990s. Only 20 out of 137 countries met these criteria. In this small group of countries with high human development the TFR averaged 2.24 (i.e., near replacement), average life expectancy was 74.5 years, and average literacy was 94.3 per cent (see table 4, first column). The finding that the fertility—development relationship has not significantly shifted since the 1960s suggests that similarly high levels of life expectancy and literacy will likely be needed to reach TFRs near replacement in the future. Since the large majority of developing countries fall well short of these levels of human development, considerable progress will have to be made before near-replacement fertility becomes widespread.

It is of interest to compare these statistics for countries with high human development with the same statistics for countries with below-replacement fertility in the late 1990s. Twenty-one countries had a TFR of 2.1 or less and their TFRs averaged 1.76. As shown in the last column of table 4 this low fertility was accompanied by about the same

Table 4
Average levels of life expectancy, literacy, and TFR in countries with high human development and countries with low fertility, 1995-2000

Average in 1995-2000	20 countries with high human development (life expectancy>70 and literacy>90)	21 countries with low fertility (TFR<=2.1)
Life expectancy (years)	74.5	73.5
Literacy (per cent)	94.3	93.0
TFR (births per woman)	2.24	1.76

11 The relationship between the TFR and the socio-economic measures is likely to be nonlinear at very high levels of development, because fertility cannot continue to fall indefinitely as development proceeds. This issue will not be examined further because very few populations have reached this endpoint in the transition.

12 A fixed-effects regression that controls for unobserved country variables and using the same explanatory variables gave very similar results: significant negative effects for life expectancy and literacy, no significant effects for GDP per capita, per cent of labour force in agriculture, and the dummy variables for year of observation. The only difference with the OLS results presented in table 3 is that the effect of per cent urban is significant and negative. A test for interactions between development measures and year found no significant effects.

levels of life expectancy and literacy as in the group of countries with high development. However, fertility differed by 0.5 births—2.24 versus 1.76—between the two groups of countries. This difference is largely explained by the nature of countries with low fertility. Populations that now have below-replacement fertility are a select group, in which fertility is on average more responsive to socio-economic changes than are countries with the same levels of development that have not reached the end of the transition. Their experience is not a useful guide for future trends in other developing countries. In particular, it is not possible to conclude that all or most developing countries will closely follow the trajectory of this small, selected subset of countries.

One reason why reaching replacement fertility is difficult is that it requires a high level of birth control. The TFR at any point in time equals the sum of wanted and unwanted fertility. Even if wanted fertility declines to 2, a fairly typical level in developing countries approaching the end of the transition, the overall level of fertility will be higher because of unwanted childbearing. According to DHS surveys the unwanted TFR ranges from a few tenths of a birth (e.g., in Indonesia) to nearly two births per woman (e.g., in Bolivia) (Bankole and Westoff, 1995). Ready access to family planning methods and abortion services is needed to achieve low levels of unwanted childbearing. Reaching replacement fertility requires a low desired family size and excellent control of fertility. In the absence of either of these conditions, fertility will remain above replacement.

It should be noted that any analysis of levels and trends in the TFR can be confounded by so-called tempo effects, which are caused by a change in the timing of childbearing (Bongaarts and Feeney, 1998; Bongaarts, 1999). It is likely that these tempo effects exist in many developing countries because the mean age at marriage and at first birth is rising, but a full discussion of this issue is beyond the scope of the present study.

The role of family planning programmes is not explicitly examined in the regression summarized in table 3 because reliable time series of programme effort are not available for the 1960s and 1970s. A separate regression (not shown) restricted to observations in the early 1990s and with programme effort score added as an explanatory variable yielded a significant effect for programme effort. This result confirms earlier studies which found that these programmes reduce fertility by assisting couples in implementing their fertility preferences (Bongaarts, 1997; Tsui, 2001). A high-quality family planning programme can move a country closer to replacement fertility than would be expected from its level of development alone. An example of this effect is found in Bangladesh, which has a TFR of 3.3 despite scoring relatively low on most development indicators.

This review of the effects of development on fertility leads to the following tentative conclusions. Although a decline in the demand for children is the main driving force of the transition, each of the transition phases is characterized by a different process. In the least developed pretransitional societies fertility is natural and initially unresponsive to changes in development. In contrast, in the years immediately following the transition onset fertility change is usually most rapid as diffusion and social interaction processes reduce the cost of contraception and facilitate the establishment of new reproductive attitudes and behaviours. These processes apparently have their main impact early in the transition and as a result the pace of decline slows over time. Finally, as the transition proceeds to its later stages fertility is closely associated with development indicators, and continued fertility decline usually requires further development. This does not imply that social interaction and diffusion effects are absent later in the transition, but rather that such effects are then closely tied to development.

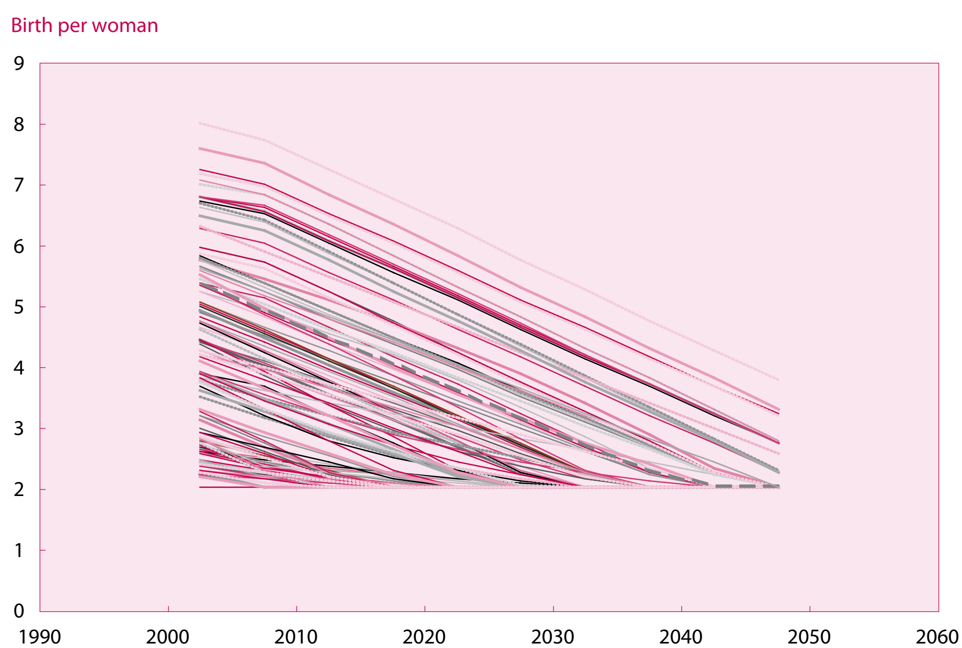
PROJECTING FUTURE TRENDS IN FERTILITY

The past record of fertility transitions provides the main basis for making fertility projections. Existing projections by the United Nations Population Division and other agencies, such as the World Bank (2000), IIASA (Lutz, 1996) and the U. S. Census Bureau (1999), generally assume that pretransitional countries will enter the transition in the near future and that, once underway, a transition will continue until the TFR reaches 2.1 or less. The specifics of how these projections are made in each country are complex and will not be examined here, but a brief comment on the most widely used projections by the United Nations is in order.

The United Nations methodology for projecting fertility in the large majority of developing countries that have not yet completed their transition consists of three steps. First, available data from surveys, censuses and other sources are analysed to obtain an estimate of the TFR for the most recent five-year period (i.e., 1995-2000 for the 2000 revision). Next, the target year in which fertility reaches 2.1 is determined. This year is estimated by taking into account "a range of socio-economic factors, such as population policies and programmes, adult literacy, school enrollment levels, economic conditions (gross domestic product or gross national product per capita), infant mortality and nuptiality, as well as historical, cultural and political factors" (United Nations, 1998). Finally, linear interpolation between 1995-2000 and the target year yield the projected trajectory for the TFR (except in countries that were still pretransitional in 1995-2000, which are assumed to initiate a decline after 2005). The advantage of this procedure is that it is simple to apply in a large number of countries. For a small number of countries the United Nations makes more detailed assumptions and the resulting trajectory is nonlinear.

The main features of the United Nations projections of the TFR by country are evident from an inspection of figure VI, which plots expected trends from 2000 to 2050 for all developing countries with above-replacement fertility. A comparison of these trajectories with the pattern experienced in the past by countries that entered the transition in the 1960s (see figure I) reveals two main differences. First, after three decades of transition experience, observed past fertility levels and trends are considerably more diverse than is implied by the United Nations assumption of convergence to 2.1. Although the transitions plotted in figure I are not yet complete, it seems likely that substantial differences in fertility levels will remain in the future. Some countries will end the transition below 2.1, while others will end above 2.1. Although it is difficult to predict future fertility levels at the end of ongoing transitions, it is reasonable to assume that fertility will vary with socio-economic conditions. Second, as shown in figures I and II the trend in fertility during the transition is not linear. Instead of being constant (as the United Nations assumes

Figure VI
Projections of TFR for developing countries, United Nations medium variant 2000-2050



Source: United Nations, 2001.

for most countries), the observed pace of past transitions has been lower in the later than in the earlier phases of the transition.

The medium variant of the United Nations projections expects the average TFR of developing countries to decline from 4.1 in 1995-2000 to 2.8 in 2020-2025. It also expects a large number of countries to end their transitions with a TFR of exactly 2.1 and only a small number with a TFR below 2. Actual trends at the country level will no doubt deviate from projected trends because of unexpected events and unpredictable errors. In addition, the foregoing analysis indicates that there will be some systematic errors. For example, the number of countries with fertility below 2 will almost certainly be higher than the United Nations projects, and, other things being equal, this would bring the average TFR for 2020-2025 below projected levels. However, the United Nations projections for most countries do not assume a significant deceleration of the pace of fertility decline at the end of the transition as has been observed in the past. This feature implies that actual fertility trends in some countries will be higher than projected. The net result is a set of small positive and negative errors in the projections that will partially offset one another. Since it is not clear whether the positive errors will be larger or smaller than the negative ones, there is no reason to conclude that the United Nations projections on average are too high or too low over the next quarter-century.

CONCLUSION

Assuming the past record of fertility transition will be repeated, at least in broad outline, and assuming continued development, the following trends can be expected in the next few decades:

- The small number of countries that are still pretransitional will likely enter the transition. When this will happen depends on achievement of some socio-economic progress, but the level of development for entering the transitions has been dropping.
- Fertility decline will proceed relatively rapidly for countries in the early phases of the transition. The pace of this early decline will be lower in the future, because future transitions are expected to start at lower levels of development than in the past. Effective family planning programmes assist couples in preventing unplanned pregnancies, and hence speed up a population's progress through the transition.
- As countries approach the later stages of the transition, the pace of decline will slow down. The main reason for expecting this deceleration is that diffusion and social interaction processes accelerated the decline early in the transition. Once this process has largely run its course, fertility late in the transition becomes more closely tied to level of socio-economic development. Rapid fertility decline then usually requires rapid development. Increases in life expectancy and literacy appear to be particularly conducive to fertility decline.

The wide variation in the level and pace of change that has characterized fertility in the past will no doubt be observed in the future. As a consequence, the TFRs of countries in 2025 will likely vary from less than 2 to well above 3. It would not be surprising if fertility in a nontrivial number of developing countries were to stall above replacement for a few decades. Past examples of such a pattern are found in Argentina and Uruguay. These two countries began their transitions in the first half of the twentieth century, and in the 1950s their TFRs had declined to about 3. Since then fertility has changed very little and was still above 2.5 in 1995-2000. The apparent stalling of fertility in the 1990s in a number of countries with DHS surveys supports this conclusion.

The future course of fertility depends crucially on progress in human development. The recent experience of countries with high levels of development suggests that life expectancy near 75 years combined with literacy near 95 per cent is needed on average to approach replacement. A strong commitment to human development can lead to much progress in literacy and life expectancy in a relatively short time. It will be a challenge, however, for many countries to reach these high levels of human development in the next quarter-century. For example, the medium variant of the United Nations population projections expects (unweighted) average life expectancy to reach only 69 years in 2020-2025. The United Nations does not project literacy levels but average literacy will probably fall short of 95 per cent. The implication is that average fertility can be expected to remain significantly above replacement until at least 2025.

This conclusion is consistent with the United Nations medium variant projections, which expect the (unweighted) average TFR of all developing countries to decline at a modest pace to 2.8 in 2020-2025. Although the preceding analysis has identified factors that will make these projections too high for some countries and too low for others, the average trend for the next quarter-century seems about right. The proportion of developing countries with fertility below 2—currently one in ten—will no doubt rise over time, but it will almost certainly remain substantially less than one-half by 2020-2025.

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The proximate determinants during the fertility transition

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INTRODUCTION

Fertility has declined very markedly in the majority of developing countries over the past 30 to 40 years, and it continues to decline almost everywhere. As a result, fertility has reached very low levels in many countries. In addition, currently more than 40 per cent of the world's population lives in countries with total fertility levels lower than 2.1 children per woman, the level that, under conditions of low mortality, assures the long-term replacement of the population. The increasing number of countries with below-replacement fertility raised the question as to what are the prospects for the future fertility levels of countries with "intermediate" fertility today, that is, those where fertility is still above replacement level but is below five children per woman. Will their fertility, which continues to decline, inevitably reach levels below replacement, leading the whole world to below-replacement fertility? Or will their fertility follow sufficiently diverse paths determined by factors which remain to be identified?

Since the transition from high to low fertility is now virtually universal, it is clear that its onset does not depend on the level of development and that the path it will follow is not necessarily determined by socio-economic factors such as levels of education, female employment or urbanization. However, there is no doubt that the so-called "proximate" determinants of fertility continue to be relevant since they represent the mechanisms through which the reduction of fertility is effected. Consequently, to assess the likelihood that countries with intermediate-fertility levels today will reach levels below replacement in the medium-term future, it is useful if not essential to consider what reaching such a goal implies in terms of changes in the proximate determinants of fertility.

This paper focuses on the implications of future below-replacement fertility levels for the evolution of the proximate determinants of fertility in the geographical regions used by the United Nations Population Division. By focusing on future levels and trends of contraceptive prevalence, abortion and marriage patterns consistent with the expectation that fertility will decline to low levels by 2050, this paper concludes that not all regions and countries with intermediate-fertility levels today are likely to reach fertility levels below replacement by mid-century. Examination of trends in the proximate determinants of fertility is made by using the FAMPLAN model. The paper also discusses different options for the formulation of assumptions on future fertility trends for the elabour ation of population projections.

THE RECENT FERTILITY DECLINE AND ITS INTERMEDIATE DETERMINANTS

Contrary to common wisdom, the worldwide fertility decline which occurred over the past 40 years was anticipated by demographers and population forecasters, as evidenced by the United Nations population projections made in the 1950s and 1960s. What was not really

Table 1
Estimated total fertility rates from 1950-1955 to 1995-2000, and declines by various periods, by subregion*

Subregion	Total fertility rate						Variations in total fertility rate		
	1950-1955	1960-1965	1970-1975	1980-1985	1990-1995	1995-2000	1950-1955 1995-2000	1960-1965 1995-2000	1980-1985 1995-2000
World	5.0	5.0	4.5	3.6	3.0	2.8	-2.2	-2.2	-0.7
More developed regions	2.8	2.7	2.1	1.8	1.7	1.6	-1.3	-1.1	-0.3
Less developed regions	6.2	6.0	5.4	4.1	3.4	3.1	-3.1	-2.9	-1.0
Eastern Africa	6.9	7.0	7.0	6.9	6.3	6.1	-0.8	-0.9	-0.8
Central Africa	5.9	6.0	6.3	6.6	6.5	6.4	0.5	0.4	-0.2
Northern Africa	6.8	7.1	6.3	5.5	4.1	3.6	-3.2	-3.5	-2.0
Southern Africa	6.4	6.5	5.5	4.7	3.5	3.3	-3.2	-3.2	-1.4
Western Africa	6.8	7.0	7.0	7.0	6.4	5.9	-0.9	-1.0	-1.0
Eastern Asia	5.7	5.2	4.5	2.5	1.9	1.8	-3.9	-3.4	-0.7
South-Central Asia	6.1	6.0	5.6	4.8	4.0	3.6	-2.5	-2.4	-1.2
South-Eastern Asia	6.0	6.1	5.5	4.2	3.2	2.8	-3.1	-3.3	-1.4
Western Asia	6.4	6.2	5.6	5.0	4.2	3.9	-2.5	-2.4	-1.1
Caribbean	5.2	5.5	4.4	3.4	2.7	2.5	-2.7	-3.0	-0.9
Central America	6.9	6.8	6.4	4.5	3.4	3.0	-3.8	-3.8	-1.5
South America	5.7	5.8	4.7	3.7	2.8	2.6	-3.1	-3.2	-1.1
Melanesia	6.3	6.2	5.8	5.1	4.8	4.4	-1.9	-1.8	-0.7
Micronesia	6.2	6.4	4.8	3.8	4.1	4.3	-1.9	-2.1	0.4
Polynesia	6.8	7.0	5.5	4.3	3.7	3.2	-3.5	-3.7	-1.1
Eastern Europe	2.9	2.4	2.2	2.1	1.6	1.3	-1.6	-1.1	-0.8
Northern Europe	2.3	2.7	2.1	1.8	1.8	1.7	-0.7	-1.1	-0.1
Southern Europe	2.7	2.7	2.5	1.8	1.4	1.3	-1.3	-1.4	-0.5
Western Europe	2.4	2.7	1.9	1.6	1.6	1.5	-0.9	-1.2	-0.1
North America	3.5	3.3	2.0	1.8	2.0	2.0	-1.5	-1.3	0.2
Australia/New Zealand	3.3	3.4	2.6	1.9	1.9	1.8	-1.5	-1.6	-0.1

Source: United Nations (2001a). *World Population Prospects: The 2000 Revision*.

* Decades during which maximum total fertility rates were observed.

anticipated was its magnitude, the fact that developed regions would also experience sustained fertility declines after the baby booms of the 1950s and 1960s, and that several less developed countries could reach and maintain below-replacement fertility levels by 2000.

Until the early 1960s, the world was divided into two distinct demographic groups: (*a*) the less developed countries and regions with total fertility rates above five children per woman, and (*b*) the less developed regions with an average fertility rate below 3.5 children per woman (see table 1). Forty years later (in 1995-2000), the picture is much more varied. First, out of the five regions of Africa, three still have a total fertility of about 6 children per woman or higher. In contrast, in Asia, Eastern Asia had already reached below-replacement fertility. In addition, the three regions of Latin America and South-Eastern Asia had total fertility levels ranging from 2.5 to 3 children per woman; and Western and South-Central Asia, Northern and Southern Africa, and Polynesia had a total fertility ranging from 3 to 4 children per woman.

In the 1960s, Eastern Asia, the Caribbean, South America, and to a certain extent South-Eastern Asia, already had lower fertility levels (6 children per woman and less) than the other less developed regions. This certainly accounts for their present lower fertility (less than 3 children per woman). But their present lower fertility is also the result of the large fertility declines (at about 3 children or higher) that these regions experienced between 1960-1965 and 1995-2000. For the other regions that had similar large fertility declines, namely, Northern Africa, Southern Africa and Central America, but higher fertility in the 1960s, their 1995-2000 total fertility was higher at between 3.3 and 4.0 a children per woman. Western Asia and South-Central Asia had a different experience. In fact, their higher 1995-2000 average fertility rates of 3.9 children per woman in Western Asia, and 3.6 in South-Central Asia, are the result of both moderately high fertility in the 1960s, with 6.2 and 6.1 children per woman in 1960-1965, respectively, and more modest fertility declines of minus 2.4 children per woman for both regions.

To go beyond this subregional analysis, one has to take into consideration the diversity of the countries within each subregion, and the varying degree of socio-economic development between countries. Using the data of the *World Population Prospects: The 2000 Revision* (United Nations, 2001a), we can sort out according to various criteria the 187 countries (143 less developed and 44 developed countries) for which age-specific population estimates and projections are available. During 1950-1955, only five countries, all developed, had total fertility rates at or below replacement level, 128 countries had high fertility (5 children and more) and all except two were less developed (Albania and the former Yugoslav Republic of Macedonia were the exceptions), and only 54 countries were at intermediate-fertility levels. Among the latter, 17 were less developed countries or areas: five in the Caribbean (Bahamas, Cuba, Jamaica, Barbados, Puerto Rico), two in Eastern Asia (Democratic People's Republic of Korea, China, Hong Kong Special Administrative Region of China), one in Middle Africa (Gabon), three in South America (Uruguay, Argentina, Chile), two in South-Central Asia (Kazakhstan, Kyrgyzstan), and four in Western Asia (Georgia, Cyprus, Israel, Armenia). During 1960-1965, when many developing countries recorded their highest fertility levels since 1950, the number of countries with fertility levels at or below replacement level, above 5 children per woman and at intermediate levels was exactly the same, although the countries within each group had changed since some countries moved from one group to another. Three less developed countries joined the intermediate-fertility group, two in the Caribbean (the Netherlands Antilles, Trinidad and Tobago) and one in South-Eastern Asia (Singapore).

By 1995-2000, the situation had changed dramatically. The group of intermediate-fertility countries comprised 73 developing countries plus Albania. That is, half of the less developed countries had moved from the high-fertility group to the intermediate-fertility one. Only a third of all less developed countries (49) were still experiencing high fertility.[1] In addition, one of every six less developed countries (21) was already in the group with fertility at or below replacement level, the same group that included all the developed countries with the sole exception of Albania. These developments confirm the view that reductions in fertility since 1950 are global and irreversible, tending to lead to below-replacement fertility that could eventually result in what Chesnais (2001) called a "world population implosion". Interestingly, the less developed countries with fertility at or below replacement level are located primarily in the Caribbean and Eastern Asia, although they also include other countries in Asia, such as Armenia, Cyprus, Georgia, Kazakhstan, Singapore, Sri Lanka and Thailand, and one in Africa (Mauritius). However, only 12 of the 20 less developed countries which were in the intermediate-fertility group during 1960-1965 had reached a fertility at or below replacement level by 1995-2000. The eight other countries that had reached intermediate levels of fertility in 1960-1965 and had not seen their fertility drop below replacement level by 1995-2000 were Argentina, Bahamas, Chile, Israel, Jamaica, Kyrgyzstan and Uruguay, all of which had started the transition to low fertility earlier than most developing countries. Gabon, the eighth country, constitutes a special case, since its relatively moderate level of fertility in the 1960s was the result of high prevalence of sub-fecundity and sterility caused by sexually transmitted diseases which, once controlled, made way for increases in fertility. The evidence available indicates, therefore, that rapid fertility decline leading to replacement or below replacement fertility levels occurred mostly in countries of East Asia and the Caribbean. The latter and Mauritius are mainly countries with "Creole-type societies" built up by immigration from Africa and Asia and experiencing in recent times significant

[1] Of the 49 countries in this "high-fertility" group, 37 were in sub-Saharan Africa, four in South-Central Asia and five in Western Asia. Note also that about 20 countries of this group may be considered as predominantly Muslim countries. However, about 30 other predominantly Muslim countries belong to the other groups, mainly the "intermediate"-fertility group.

emigration to North America and Europe. In addition, contrary to what one might have expected, countries such as Argentina, Chile and Uruguay, despite experiencing an early transition to low fertility and being countries of European settlement have not seen their fertility levels drop below replacement.

Let us turn now to the magnitude of the fertility decline between 1960-1965 and 1995-2000, for those less developed countries with "intermediate" fertility during the 1995-2000 period (see Annex, table 1A). Surprisingly enough, the higher fertility decline, minus 4 children and more, is observed in very different countries, such as Tunisia –4.9, Viet Nam –4.7, Bahrain –4.5, Dominican Republic –4.4, . . . Algeria –4.1, Mexico –4.1, Colombia and Uzbekistan –4.0, all countries which had in the early 1960s total fertility rates around or above 7 children per woman. It should be noted that among the countries which had similarly large fertility declines, five: China, Hong Kong Special Administrative Region of China, Macao Special Administrative Region of China, the Republic of Korea and Thailand were very close to or below replacement fertility during the 1995-2000 period. At the other extreme, the more modest fertility declines within the intermediate-fertility group, are observed first in South America: Argentina –0.5, Uruguay –0.5, and next, again in very different countries such as Israel –0.9, Lesotho –1.1, Nepal –1.2, . . . Papua New Guinea –1.7, the Sudan –1.8, Haiti –1.9, Guatemala –1.9. As has already been pointed out, high declines are observed for many countries which had high fertility in the 1960s (7 children and more, such as Tunisia, Viet Nam, Bahrain, Dominican Republic, Kuwait and Algeria). However, similar large fertility declines are also observed for countries like Brazil, which had a lower fertility rate in the 1960s. Some of these countries had strong population and family planning programmes, but others did not. In fact, high fertility in the 1960s did not systematically lead to large fertility declines. At the subregional level (see annex, table 1A) fertility declines appear more homogeneous in certain subregions than in others. For example, almost all countries experienced fertility declines above three children per woman in Northern Africa (except in the Sudan), in Western Asia (except in Israel) and in Central America (except in Guatemala). By contrast, in Southern Africa, South-Central Asia, South-Eastern Asia and South America, fertility declines vary greatly from one country to another (i.e., between the Islamic Republic of Iran –3.8 and India –2.5, between Viet Nam –4.7 and Indonesia –2.8, between Colombia –4.0 and Argentina –0.5). Subregional approaches certainly remain useful in interpreting fertility levels and trends, but obviously it is not a panacea given the heterogeneity of each subregion, and the particular history and socio-economic development of each country.

Concerning the intermediate variables, our analysis was limited to the most recent period, using on the one hand the human development index and its components for 1997 (PNUD, 1999), and the 1995-2000 total fertility rates estimated by the Population

Table 2
Single regression results for total fertility rate, 1995-2000, and human development index, life expectancy at birth, adult literacy rate, real GDP per capita and gender-related development index, 1997, by fertility group

	R^2 values				
Total fertility rate 1995-2000	Human development index	Life expectancy at birth	Adult literacy rate	Real GDP per capita	Gender-related development index
All countries	0.75 (N=167)	0.71 (N=167)	0.68 (N=167)	0.31 (N=167)	0.77 (N=143)
Countries with total fertility rate equal or above 5 children per woman	0.22 (N=45)	0.08 (N=45)	0.15 (N=45)	0.06 (N=45)	0.21 (N=33)
Countries with total fertility rate above 2.1 and less than 5 children per woman	0.40 (N=67)	0.35 (N=67)	0.23 (N=67)	0.12 (N=67)	0.46 (N=58)
Countries with total fertility rate equal or less than 2.1 children per woman	0.00 (N=55)	0,01 (N=55)	0.09 (N=55)	0.01 (N=55)	0.00 (N=52)

Sources: United Nations (2001a). *World Population Prospects: The 2000 Revision*; PNUD, Programme des Nations Unies pour le Développement (1999), Rapport mondial sur le développement humain.

Division of the United Nations on the other (United Nations, 2001a). As one would expect, the human development index for 1997 appears fairly well correlated with the 1995-2000 fertility rates. For the 167 countries for which both data were available, the linear regression yields to an R^2 of 0.75 (see table 2). Similar results are obtained when making simple regressions between the 1995-2000 fertility rates, life expectancy at birth and the adult literacy rate, two of the three components of the human development index. The correlation between the total 1995-2000 fertility rates and life expectancy at birth yields an R^2 of 0.71, and an R^2 of 0.68 with adult literacy rate. However, the correlation between the total fertility rates and the third component of the human development index, i.e., the real per capita GDP is much lower, with an R^2 of "only" 0.31. Turning now to the gender-related development index which measures the disparity in achieving human development between women and men (calculated for 143 countries), the correlation between the 1995-2000 total fertility rates and this index also appears to be high: 0.77, reflecting the fact that, at given levels of human development, the higher the disparity between men and women, the higher the total fertility rate.

However, all these associations appear much weaker when dealing separately with each of the three fertility groups: high fertility (45 countries), intermediate fertility (67 countries) and at or below replacement fertility (55 countries). In fact, the linear regression between the total fertility rates and the human development index yields an R^2 of 0.22 for the high-fertility group, an R^2 of 0.40 for the intermediate-fertility group and an R^2 close to zero for the at or below replacement group. Similar results are obtained when making regressions between the total fertility rates and the three components of the human development index and the gender-related development index. For the group of high-fertility countries and the at- or below-replacement group, the R^2 obtained are quite low. Those obtained for the intermediate-fertility group are a bit higher, but they suggest, at best, a weak relationship between fertility levels and each of the variables considered.

In our opinion, these results suggest that the well-established and accepted relationship between socio-economic development and fertility levels can still be used to explain a country's fertility differentials and the overall fertility transition. However this framework is not really appropriate to explain what is happening after the onset of the fertility transition and before the post-transition period, and it appears inappropriate to explain post transitional fertility differentials. An illustration of these statements is provided by figures I and II, which present the relationships between total fertility rates on the one hand and life expectancy at birth and adult literacy rate for each of the three fertility groups: high, intermediate, and at or below replacement, on the other.

Concerning first life expectancy at birth (figure I), among the high-fertility group, life expectancy at birth varies from less than 40 years (three countries: Sierra Leone, Malawi and Uganda) to more than 70 years (three countries: Oman, Saudi Arabia and Solomon Islands). Among the intermediate-fertility group, only one country, Botswana, had in 1997 an estimated life expectancy at birth of less than 50 years, and 40 countries (almost two out three in this group) had a life expectancy at birth of between 50 and less than 70 years. Last, among the at or below replacement fertility group, only 12 countries had life expectancy at birth estimated between 65 and 70 years and the 43 remaining countries (four out of five in this group) had life expectancy at birth of above 70 years. This indicates that, if it is difficult to envision a fertility decline for those countries with a life expectancy at birth of below 50 years, higher life expectancy at birth is not a sufficient condition to trigger fertility decline. Also, life expectancy at birth above 65 or 70 years can be associated with fertility levels above 3 children per woman.

Turning to the adult literacy rate (figure II) among the group with high fertility, the adult literacy rate varies from less than 50 per cent in 22 countries (one out of two in this group) to more than 90 per cent in two countries (Zimbabwe and Maldives). Among the intermediate-fertility group, four countries had adult literacy rates of less than 50 per cent (Nepal, Bangladesh, Haiti and Morocco), and 42 countries (two out three in this group) had an adult literacy rate of above 80 per cent (and 24 countries had an adult literacy

Figure I
Relationship between total fertility rate and life expectancy at birth by fertility group

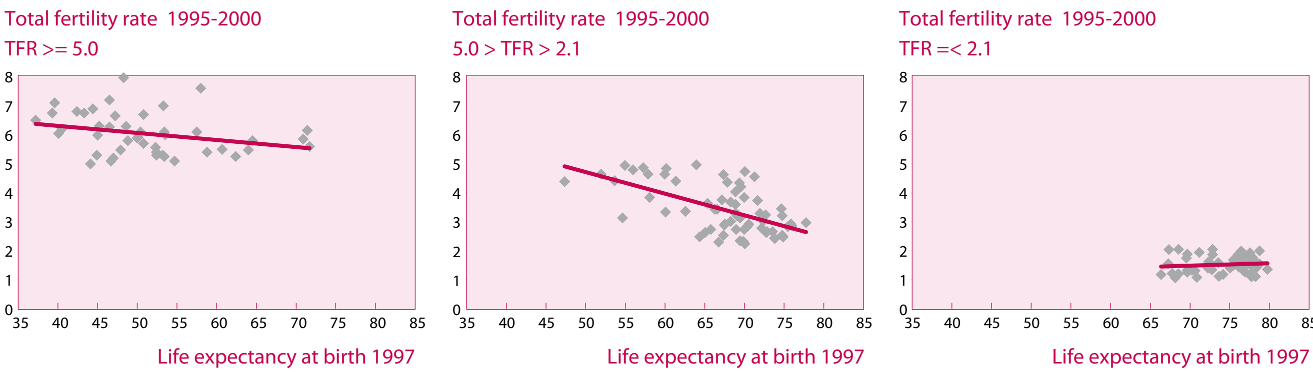
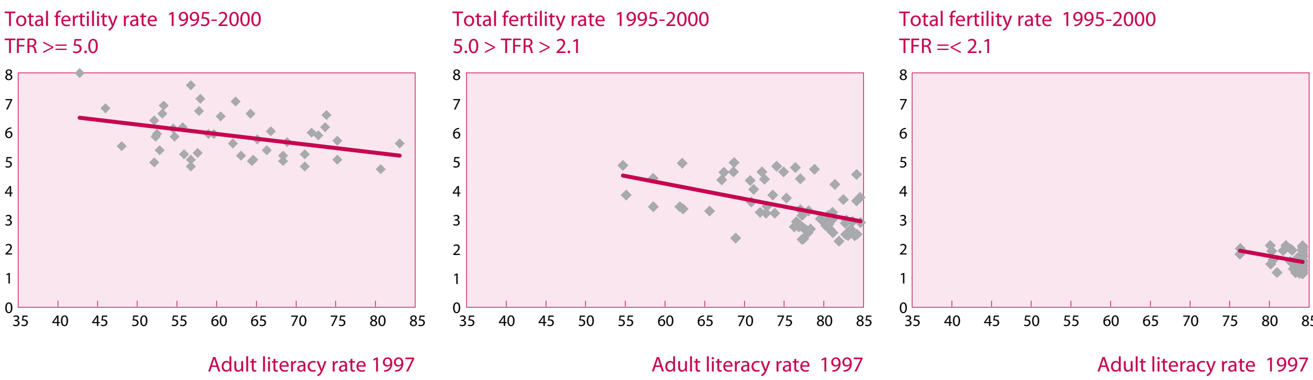


Figure II
Relationship between total fertility rate and adult literacy rate by fertility group



rate of above 90 per cent). Last, among the at or below replacement fertility group, only 2 countries had adult literacy rates of below 90 per cent (China and Mauritius). This indicates that, if it is difficult to envision a fertility decline for those countries with an adult literacy rate of below 50 per cent, a higher adult literacy rate is not a sufficient condition to trigger fertility decline. Also, an adult literacy rate of above 80 or 90 per cent can be associated with fertility levels of above 3 children per woman.

Overall, the relationships between fertility levels and intermediate determinants seem to become weaker, as countries and subregions approach the end of their fertility transition (i.e., with total fertility rates of less than 3 children per woman). In fact, the relationship between fertility and the human development index for those countries with 1995-2000 total fertility rates below 3.5 children per woman appears quite loose ($R^2 = 0.27$), and for the countries with 1995-2000 total fertility rates below 3.0 children per woman, this relationship is even weaker ($R^2 = 0.11$).

THE ROLE OF THE PROXIMATE DETERMINANTS IN THE COMPLETION OF THE FERTILITY TRANSITION

Future fertility levels, especially for those countries and subregions with intermediate-fertility and approaching the end of their fertility transition, are likely to be increasingly the result of the interplay of the proximate determinants of fertility according to the initial values and the future evolution of these determinants (contraceptive prevalence, marriage patterns, duration of breastfeeding associated with the length of post-partum insusceptibility, and the level of abortions).

Since the early 1980s, the United Nations Organization makes periodic assessments of the levels and trends of contraceptive use in the world and they also calculate the contraceptive prevalence needed to reach their fertility assumptions. The latest assessment was done in 1998 and refers to the levels and trends of contraceptive use around 1993 (United Nations, 2000). Future contraceptive prevalence was calculated according to the 1998 fertility assumptions up to year 2025. In this exercise, the dependent variable is the level of contraceptive use, and it was assumed that the combined influence of marriage, post-partum insusceptibility and abortion remains constant over the projection period. This work needs to be reviewed for at least three reasons. First, given the importance of the changes made in the fertility assumptions of the *2000 Revision* of the *World Population Prospects*, the level of contraceptive use needed to match the new assumptions has changed and should be updated. Second, contrary to what was assumed in the past, the combined impacts of marriage, post-partum insusceptibility and abortion do not necessarily compensate each other at all stages of the fertility transition, especially at the end of the transition. Third, given the number of countries now at or below replacement fertility, the time may have come to consider fertility as a dependent variable of the proximate determinants, and to make assumptions on future contraceptive use, and on future values of the other proximate determinants, not only in terms of evaluating the commodities needed by family planning programmes, but also to evaluate possible future levels of fertility.

We have tried to evaluate the impact of the proximate determinants on future levels of fertility for those subregions with intermediate-fertility by using the FAMPLAN computer programme developed by The Futures Group International (Stover and Heaton, 1999) based on the "Bongaarts model" (Bongaarts, 1978). Starting from a classic cohort-component demographic projection, FAMPLAN enables one to evaluate the relationships between total fertility rates, on the one hand and the proximate determinants of fertility, as well as the average effectiveness of contraceptive use resulting from the method mix (i.e., the percentage of all users according to the method they use), on the other. For each method, effectiveness is measured by the proportion of users who do not become pregnant during one year of method use.

The projections and the analysis of the proximate determinants of fertility were run for each of the eight subregions with intermediate fertility, under various assumptions. Given the heterogeneity of these subregions, this exercise has serious limitations. However, its objective was not to produce a range of fertility assumptions for each subregion, but simply to get a better idea of the individual and combined impacts of the various determinants, as these regions approach the end of their fertility transition. The values, by year 2000, of the various parameters used in the projections are presented in table 3. The limitations both in terms of definition and of quality of data of these parameters must be kept in mind.

In all the eight intermediate-fertility subregions considered here, contraceptive prevalence by the year 2000 is high, i.e., at least 50 per cent of women in union. The average effectiveness of the methods used is also high, 90 per cent at least, except in one subregion, Western Asia. This said, the subregions can be divided into two groups. The first one includes the four subregions with contraceptive prevalence around 50 per cent and total fertility rates above 3 children per woman. It comprises Northern Africa, Southern Africa, South-Central Asia and Western Asia. The second one comprises the four subregions with contraceptive prevalence around or above 60 per cent and total fertility rates between 2.5 and less than 3 children per woman: South-Eastern Asia, the Caribbean, Central America and South America. Many countries belonging to the subregions of this second group have had strong family planning and population programmes over the past decades.

The percentage of women in union for each subregion by the year 2000 was taken from United Nations estimates (United Nations, 1999). These data generally refer to women in union, i.e., married women, and women in consensual or common-law un-

Table 3
Parameters used for running the FAMPLAN model

Subregion	Northern Africa	Southern Africa	South-Central Asia	South-Eastern Asia	Western Asia	Caribbean	Central America	South America
Total fertility rate, 2000	3.35	3.16	3.41	2.67	3.71	2.45	2.90	2.49
Contraceptive prevalence rate, 2000								
Any method	51	53	51	60	50	59	67	72
Modern method	47	51	44	52	30	54	58	62
Method mix, 2000, effectiveness								
Sterilization (female) (1.00)	5	16	53	13	6	39	40	43
Sterilization (male) (1.00)	0	3	7	2	0	1	2	3
Pill (0.92)	44	27	9	26	13	19	14	24
Injectable (1.00)	3	38	2	21	1	3	5	3
I U D (0.96)	37	11	8	21	29	22	20	6
Condom (0.81)	2	2	7	3	9	7	6	6
Vaginal barrier method (0.81)	0	0	0	0	2	1	0	1
Traditional and folk method (0.50)	9	3	14	14	40	8	13	14
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Average effectiveness	0.90	0.96	0.90	0.90	0.76	0.92	0.90	0.90
Other proximate determinants								
Per cent of women in union	60	45	75	63	65	60	62	60
Estimate of post-partum insusceptibility (in months)	8	12	12	9	9	6	9	7
Total abortion rate	0	0	0	0	0	0	0	0
Sterility (per cent)	3	3	3	3	3	3	3	3

Sources: United Nations (2001a). *World Population Prospects: The 2000 Revision*; United Nations, Levels and Trends of Contraceptive Use as Assessed in 1998, ESA/P/WP.155, New York: United Nations (1999); and John Stover and Laura Heaton (1999). FAMPLAN: Version 4. A Computer Program for Projecting Family Planning Requirements. Spectrum System of Policy Models. Washington, D.C.: The Futures Group International, The POLICY Project.

ions, since virtually all surveys provide data on contraceptive use among women in union. However, in societies where many unions are without cohabitation ("visiting unions" type, as they are called in the Caribbean), estimates of the women in union might not be accurate. For instance, in most countries in the Caribbean, between a quarter to about half of the unions are "visiting unions". Because of the instability or the irregularity of the relationship between the two partners, these unions are less fertile than the unions with cohabitation, in the absence of contraception. For this reason, it has been suggested that when calculating the value of the index of marriage in the Bongaarts model, these unstable unions be counted as half of a stable union (see examples in Guengant, 1996). It remains that if available data do not include all unstable unions, the lowering impact of marriage on fertility is overestimated (with a Cm Bongaarts index lower than it should be). If all unstable unions are well accounted for, but considered as stable unions, the lowering impact of marriage on fertility is underestimated (with a Cm Bongaarts index higher than it should be). Beyond the accuracy of the data, it should be clear that a high proportion of unstable unions may have an important negative effect on fertility, as demonstrated by previous analyses on Caribbean countries (Guengant, 1996). For instance, the Cm index found in the 1980s for the Dominican Republic, Trinidad and Tobago, Jamaica and Barbados were quite low (between 0.50 and 0.56) and this explains to a large extent the intermediate-fertility of these countries (ranging from 3.8 in the Dominican Republic for the 1981-1986 period, to 2.2 in Barbados for 1980-1981). The same is true for Southern African countries. In Botswana, for example, another extreme case, the Cm index, when adjusted for births occurring outside unions (corresponding to unstable unions), stands at a low 0.46, against 0.87 when just using married women data (Foote and others, 1993). Overall, this means that, the use of published percentages of women in union for the Caribbean and Southern Africa when running FAMPLAN may lead to results that are difficult to interpret. This also means that for the other subregions, any evolution from stable unions to less stable ones is likely to have a negative impact on fertility.

Concerning post-partum insusceptibility, the initial values adopted were drawn from a recent review of available data (Ross and others, 1999). According to this source, which presents data from 51 surveys undertaken mainly in the 1990s, post-partum insusceptibility remains "high": 20 months and more in sub-Saharan African countries with total fertility rates still above 5 children per woman. However, high values are also found in some countries with intermediate fertility during the 1995-2000 period: 18 months in Ghana (4.6 children per woman) and Mexico ("only" 2.8 children per woman), and 16 months in Botswana (4.4 children per woman). Low values, 6 months, are found in countries as different as the Dominican Republic (2.9 children per woman), Morocco (3.4 children per woman), Jordan (4.7 children per woman), Turkey (2.7 children per woman) and Brazil (2.3 children per woman). The lowest value, 5 months is given for Trinidad and Tobago, already below replacement fertility. In fact, in other Caribbean countries, such as Barbados, also below replacement fertility, post-partum insusceptibility is as low as 4 months, which corresponds to a mean duration of breastfeeding of 6 months. Finally, at the subregional level, the highest value, 12 months, was adopted according to available data for Southern Africa and South-Central Asia. The lowest values were adopted for the Caribbean, 6 months, and South America, 7 months. These data mean that future potential increases of fertility, due to a reduction of post-partum insusceptibility is already quite limited in certain subregions, whereas in others this factor can still play a role.

The same source (Ross and others, 1999) provides data on abortion for 46 countries or areas, referring mainly to the 1990s. According to these data, total abortion rates vary from about 3 abortions per woman for Romania, Viet Nam and Russia to between two abortions and one abortion per woman in, by decreasing order, Peru, Kazakhstan, Cuba, Chile, the Dominican Republic, Kyrgyzstan, Brazil, Tajikistan, Colombia, Turkmenistan, the Republic of Korea, China and India, and, last, to less than one abortion per woman in Mexico, Turkey, Singapore, Uzbekistan, Israel, Tunisia, Hong Kong Special Administrative Region of China and Bangladesh. Several of the less developed countries or areas in this list had already reached below replacement fertility (Cuba, China, Singapore, Hong Kong Special Administrative Region of China) in 1995-2000, or had a total fertility rate of 2.5 children per woman or less (Viet Nam, Brazil, Chile and Tunisia). It should be noted that in the former Republics of the USSR abortion is still widely used as a means of contraception. All that points out, as noted by the United Nations (United Nations, 2000), is the importance of the trade-off between abortion and contraception to control fertility during the course of the fertility transition and also in post-transitional situations. In that respect it should noted that, according to the same source, total abortion rates vary in European countries roughly from 0.2 to 0.4 in Northern, Southern and Western Europe, to between one to two in Eastern European countries. In fact, it can be easily demonstrated using the Bongaarts model that, with a Cm of about 0.50, a total fertility rate of 2.1 children per woman can be achieved either with a contraceptive prevalence rate of 70 per cent, and no abortion, or with a contraceptive prevalence of 50 per cent and a total abortion rate of 2 abortions per woman. In fact, the latter scenario corresponds to the situation of Barbados in the early 1980s. According to the data from the Barbados 1980-1981 CPS survey, the total fertility rate of 2.16 children per woman corresponded to a Cm of 0.55, a Cc of 0.5 as a result of a contraceptive prevalence rate of 52 per cent among women in union (and an average effectiveness of the methods used of 0.90), a Ca of 0.66, corresponding to an abortion rate of 1.8 abortion per woman (abortion is legal in Barbados), and a Ci of 0.86, corresponding to a mean duration of breastfeeding of about 6 months and a duration of post-partum insusceptibility of 4 months (Guengant, 1996). For all these reasons, and also because of the limitations of the data on abortion, we have chosen to set the abortion rate at zero in all subregions. This means that the contraceptive prevalence rate corresponding to the fertility assumptions of the *World Population Prospects: The 2000 Revision,* United Nations (2001a) will correspond more to a combined index of contraception and abortion indices (Cc and Ca), or to situations where widespread use of family planning method limits the use of abortion to low levels (as presently occurring in Northern, Southern and Western Europe).

Last, available data on sterility (Ross and others, 1999), measured by the percentage of women who remain childless at age 45-49, appear at the subregional level, close to what is generally observed in non-pathological settings. Therefore the percentage of sterile women was set at 3 per cent, in all subregions.

Using these data, and keeping in mind all the limitations just described, we first attempted to evaluate the contraceptive prevalence required to reach the 2025 and the 2050 fertility levels as proposed by the *2000 Revision* of the *World Population Prospects* (medium variant) (United Nations, 2001), **provided** that all the other factors remain constant. In this case, the dependent variable is the level of contraceptive use, according to the initial method mix and the default effectiveness rates for each method, as well as the values of the other proximate determinants, which are kept constant over the entire 2000-2050 projection span.

Under these assumptions and to reach 2.3 children per woman by the year 2050 in Western Asia and more or less replacement fertility in the other seven subregions, contraceptive use should reach a "low" 66 per cent of the women in union in the Caribbean and 68 per cent in Southern Africa, and a "high" 77 per cent of the women in union in Western Asia, Central America and South America (see table 4). The lower contraceptive rates of use obtained for Southern Africa and the Caribbean are the result of several factors: the initial high proportion of unstable unions, the higher efficiency of the method mix, and possibly use of abortion higher than in the other subregions. The higher levels of contraceptive use needed to reach 2.3 children per woman by 2050 for Western Asia is primarily the result of the low average efficiency of the initial method mix, and of a relatively high percentage of women in union. For Central America and South America, the high level of contraceptive use needed in 2050 to reach replacement fertility is certainly the result of the initial association of high contraceptive use with relatively low-fertility levels (less than three children per woman). This scenario is a likely reflection of a more stable union pattern and a less important use of abortion than in the Caribbean. It should be noted that according to the 2000 United Nations fertility assumptions, most of the move towards replacement fertility, and to the associated levels of contraceptive use, is

Table 4
Results of the FAMPLAN model: contraceptive prevalence required for each subregion to reach the total fertility rates projected by the United Nations under the medium variant of the 2000 Revision (the method mix, the effectiveness rate per method and the other proximate determinants for each subregion are kept constant)

Subregion	Northern Africa	Southern Africa	South-Central Asia	South-Eastern Asia	Western Asia	Caribbean	Central America	South America
Total fertility rate, 2000	3.35	3.16	3.41	2.67	3.71	2.45	2.90	2.49
Total fertility rate, 2025	2.19	2.20	2.29	2.10	2.90	2.16	2.18	2.13
Total fertility rate, 2050	2.10	2.10	2.12	2.08	2.30	2.02	2.10	2.10
UN projections 2000								
Contraceptive prevalence rate, 2000—any method	51	53	51	60	50	59	67	72
Implied contraceptive prevalence by								
2025	69	66	68	69	66	64	76	76
2050	70	68	70	70	77	66	77	77
Annual percentage point increase in contraceptive use								
2000-2025	0.7	0.5	0.7	0.4	0.6	0.2	0.4	0.2
2025-2050	0.1	0.1	0.1	0.0	0.5	0.1	0.0	0.0

supposed to take place before year 2025. As a result, average annual percentage point increases of contraceptive use between 2000 and 2025 remains relatively high for most subregions, given their initial high levels of contraceptive use. For these subregions, annual percentage point increases between 0.4 and 0.7 point within the next 25 years are not unlikely, but it is not excluded either, that reaching replacement fertility takes longer than what is currently forecast.

Let us consider now the total fertility rate as a dependent variable of the various proximate determinants. In this exercise, we tried basically to replace the norm of replacement fertility, by the norm of universal use of contraceptive methods (primarily modern methods), set at 75 per cent of women in union for all subregions. As we have just seen, such a level of contraceptive use is close to the 77 per cent of women in union using a method needed to reach in 2050 the medium fertility assumption of the *2000 Revision* of the *World Population Prospects,* United Nations, adopted for Western Asia, Central America and South America. It is also the level of contraceptive use projected by the United Nations by the year 2025 for Southern Europe, Western Europe and North America. Starting from this basic assumption, additional assumptions were made on the other proximate determinants to produce various scenarios. The initial values entered in FAMPLAN are the same as those presented in table 3, and for the future, the various assumptions adopted are presented below (see table 5). These assumptions might be deemed somewhat simplistic or arbitrary. However, the speculative nature of the exercise must be kept in mind.

(*a*) Contraceptive prevalence assumption;

(*b*) Increase up to "universal use" of contraceptive methods: For each subregion, the contraceptive prevalence rate is increased gradually from the level estimated by year 2000 (see table 3), to 75 per cent of the women in union by year 2050. In addition, for each subregion, the initial method mix was maintained constant over the 2000-2050 period, with the same "default" effectiveness rates for each method (see table 3). This choice was made because of the already relatively high average effectiveness of the methods used, and because the method mix is the result of the particular history of the diffusion of the various contraceptive methods in each country and subregion. For these reasons, it was deemed not necessary to change the 2000 initial method mix;

(*c*) Post-partum insusceptibility assumptions;

(*d*) Constant duration of post-partum insusceptibility assumption: For each subregion, the initial mean duration of post-partum insusceptibility (see table 3) is maintained constant over the 2000-2050 period.

(*e*) Reduced duration of post-partum insusceptibility assumption: For each subregion, the initial mean duration of post-partum insusceptibility is shifted gradually to 4 months by 2050, corresponding to the lowest values observed in less developed countries;

(*f*) Percentage of women in union assumptions;

(*g*) Constant percentage of women in union assumption: For each subregion, the initial percentage of women in union (see table 3) is maintained constant over the 2000-2050 period;

Table 5
Projection variants in terms of contraceptive prevalence, post-partum insusceptibility and marriage

Contraceptive prevalence in 2050	Projections variants: variables Contraceptive prevalence	Contraceptive prevalence, and post-partum insusceptibility	Contraceptive prevalence, post-partum insusceptibility and marriage
75 per cent of the women in union use a contraceptive method in 2050, according to the initial method mix	A. Impact of increase to 75 per cent in contraceptive prevalence only	B. Impact of increase to 75 per cent in contraceptive prevalence and reduced duration of post-partum insusceptibility to 4 months by year 2050	C. Impact of, by year 2050: (i) Increase to 75 per cent in contraceptive prevalence; (ii) Reduced duration of post-partum insusceptibility to 4 months; and (iii) Reduced percentage to 50 per cent of women in union

(*h*) Reduced percentage of women in union assumption: For each subregion, the initial percentage of women in union (see table 3) is shifted gradually to 50 per cent by 2050 (a percentage slightly above the 45 per cent estimated by 2000 for Southern Africa, and close to those estimated for North America, Northern Europe, Western Europe, and Australia and New Zealand).

No specific assumptions were made concerning abortion. In fact, it was assumed that the present level of abortion in subregions will remain constant and will not affect the FAMPLAN results. One can assume also, that in subregions where the recourse to abortion is important (and possibly growing), there will be over time, parallel to the move toward universal use of efficient contraceptive method, a reduction of the number of abortions. The assumption of an increase to contraceptive use by 75 per cent of the women in union by year 2050 is supposed to reflect this phenomenon.

The three scenarios, combining these assumptions, are presented in table 5.

In this exercise, one can consider variant A, which measures only the impact of increased contraceptive prevalence to 75 per cent by 2050, as the medium variant at the 2050 horizon. Concerning the two other determinants, the reduced duration of post-partum insusceptibility to 4 months envisaged here will have a positive, although modest, impact on fertility, since the initial durations of post-partum insusceptibility for each subregion are not really high, whereas on the contrary, the reduced percentage of women in union to 50 per cent is likely to have an important negative impact on fertility, since the initial proportions of women in union are relatively high (except for Southern Africa where the initial value, 45 per cent, is lower). For these reasons, variant B, which combines the impact of increased contraceptive prevalence to 75 per cent and the positive impact of a universal reduced duration of post-partum insusceptibility to 4 months, can be considered as the high variant, and variant C, which adds the negative impact of reduced percentage of women in union, can be considered as the low variant (except for Southern Africa).

The results obtained are presented in table 6.

Let us examine first the results obtained for the year 2025. The objective of 75 per cent of the women in union by 2050, achieved through a gradual increase from the level of contraceptive use estimated for each subregion in year 2000, to 75 per cent by 2050, implies a slower move to universal use of contraception than the contraceptive use needed to reach the fertility assumptions of the *2000 Revision* of the *World Population Prospects*, United Nations. As a result, the total fertility rates obtained under variant A (which only measures the impact of increased contraceptive prevalence to 75 per cent by 2050) are higher than the fertility assumptions adopted by the United Nations for the year 2025, for all subregions, except for the Caribbean. Under this scenario, the Caribbean is the only subregion having a total fertility rate below replacement by 2025, and South-Eastern Asia is the only one close to replacement fertility, with 2.2 children per woman. The other subregions remain above replacement fertility, especially Western Asia, South-Central Asia, Northern Africa and Central America. Under variant B, which combines the impact of increased contraceptive prevalence to 75 per cent and the impact of a universal reduced duration of post-partum insusceptibility to 4 months by 2050, total fertility rates by 2025 are logically higher than under variant A, since no subregion had such a low initial value. When the initial value of duration of post-partum insusceptibility is low, as in the case of the Caribbean and South America, the difference between the total fertility rates obtained under variant A and variant B is slim. For the other subregions, the difference between the total fertility rates obtained under variant B and variant A varies from +0.2 to +0.5 children per woman. Under variant C, which combines the three impacts of increased contraceptive prevalence to 75 per cent, reduced duration of post-partum insusceptibility to 4 months and, reduced percentage of women in union to 50 per cent by 2050, the total fertility rates obtained for the year 2025 appear quite close to those obtained under variant A (which only measures the impact of increased contraceptive prevalence) for six of the eight subregions. For Southern Africa and Northern

Table 6
Estimated impact of increase in contraceptive prevalence to 75 per cent by 2050, reduced duration of post-partum insusceptibility to 4 months by 2050 and reduced percentage of women in union to 50 per cent by 2050, on total fertility rates in 2025 and 2050, by subregions

Subregion	Northern Africa	Southern Africa	South-Central Asia	South-Eastern Asia	Western Asia	Caribbean	Central America	South America
Total fertility rate 2000	3.35	3.16	3.41	2.67	3.71	2.45	2.90	2.49
Contraceptive prevalence 2000	51	53	51	60	50	59	67	72
A. Impact of increase in contraceptive prevalence to 75 per cent by 2050								
Contraceptive prevalence								
2025	63	64	63	68	63	67	71	74
2050	75	75	75	75	75	75	75	75
Total fertility rate								
2025	2.57	2.37	2.61	2.21	3.07	1.98	2.57	2.37
2050	1.80	1.58	1.81	1.75	2.43	1.51	2.24	2.25
B. Impact of increase in contraceptive prevalence to 75 per cent by 2050 and reduced duration of post-partum insusceptibility to 4 months by 2050								
Total fertility rate								
2025	3.03	2.73	3.00	2.43	3.38	2.06	2.83	2.52
2050	2.12	2.14	2.45	2.14	2.97	1.64	2.74	2.55
C. Impact of increase in contraceptive prevalence to 75 per cent by 2050, reduced duration of post-partum insusceptibility to 4 months by 2050 and reduced percentage of women in union to 50 per cent by 2050								
Total fertility rate								
2025	2.78	2.88	2.50	2.18	2.99	1.89	2.56	2.31
2050	1.76	2.38	1.64	1.70	2.28	1.37	2.21	2.13

Africa, total fertility rates under variant C are higher than those obtained under variant A. These results seem to confirm the hypothesis according to which the impact of reduced post-partum insusceptibility on the one hand, and the impact of reduced percentage of women in union on the other, compensate each other. However, it should be pointed out that the various assumptions adopted under variant C converge at the same values for contraceptive prevalence, mean duration of post-partum insusceptibility and proportion of women in union. This is not the case in the work done by the United Nations, which uses a different methodology (United Nations, 2000). In this work, only the assumptions made for the total fertility rates are spelled out and converge at replacement fertility by the year 2050, and the only dependent variable is the contraceptive prevalence rate. Also, the fact that the total fertility rates obtained under variant C are different from those obtained under variant A, for Southern and Northern Africa, points out that the compensation of the impact of reduced post-partum insusceptibility in one hand and the impact of reduced percentage of women in union on the other, should not be taken for granted any time in all contexts.

By the year 2050, variant A yields below replacement fertility in five of the eight subregions considered, and results close to replacement fertility: 2.2 children per woman for Central America and South America and to 2.4 children per woman for Western Asia. Under variant B, which reflects the potential increase of reduced post-partum insusceptibility on fertility (thus, which can be considered as a high variant), only one subregion, the Caribbean, falls below replacement fertility by 2050. Three subregions have at replacement fertility: Northern Africa, Southern Africa and South-Eastern Asia, and the four remaining subregions still have above replacement fertility: Western Asia: 3 children per woman; Central America: 2.7; South America: 2.6 and South-Central Asia: 2.5. Last, under variant C (which can be considered as a low variant), by the year 2050, four subregions have below replacement fertility: Northern Africa, South-Central Asia, South-Eastern Asia and the Caribbean. The other four subregions have at, or slightly above replacement fertility: Southern Africa: 2.4 children per woman; Western Asia: 2.3; Central America: 2.2; and South

America: 2.1. Of course if we had made an additional assumption on an increase of total abortion rates to the three assumptions made under variant C, all subregions would have fallen below replacement fertility. However, the combination of an assumption of increased abortion, and the assumption of 75 per cent of the woman in union using a contraceptive method, is probably not a valid one, since, as pointed out before, such a high level of contraceptive use is generally associated with low total abortion rates.

Despite the limitation of this exercise, the results obtained point out at least one important thing: the future is not yet written, and it is far from granted that all countries and subregions of the world presently with intermediate fertility will reach rapidly below replacement fertility in the coming decades. What could be the implications of these findings for making future population projections?

PROJECTING TOTAL FERTILITY RATES OR THE PROXIMATE DETERMINANTS

Up to now, when preparing their population projections, the United Nations, as all population forecasters, set up their fertility assumptions without looking at the associated values of the proximate determinants. The correspondence, rather than the consistency, between the fertility assumptions and the proximate determinants, it looked at, but afterwards, and only for the implied values of the contraceptive use. It is fortunate that, with the *2000 Revision* of the *World Population Prospects,* United Nations, the "paradigm" of the 2.1 children per woman, accepted for so many decades as the implicit ultimate childbearing goal relevant for all people of the world, has been abandoned. Yet, there is no replacement for the lost "replacement fertility" paradigm. Now, in the *2000 Revision*, the medium assumption for the high fertility countries is that fertility will decline at an average pace of nearly 1 child per decade starting in 2005 or later, which means that some of these countries will not reach replacement level by 2050. In intermediate-fertility countries, fertility is assumed to reach replacement level before 2050, and last, in below-replacement-fertility countries, fertility is generally assumed to remain below the replacement level. All this means that if all countries of the world are no longer supposed to converge to replacement fertility, for those countries with intermediate fertility, forecasters are still stuck with replacement fertility, because of lack of data, lack of in-depth analysis, or lack of imagination.

Parallel to classic population projections, projections of contraceptive prevalence and method mix have been made on various occasions at national and international levels (Ross, Stover, and Willard, 1999). These projections, however, are made primarily to estimate future numbers of contraceptive users of modern methods and the corresponding supplies. These two sets of projections have obvious different objectives and fulfil different needs of information. But is it not the time to look carefully at the proximate determinants before setting fertility assumptions? And vice versa, that is, looking at existing range of fertility assumptions when setting assumptions on future contraceptive needs? This does not necessarily mean that fertility assumptions in population projections should be built on assumptions on future values of the proximate determinants, although this is not impossible. Recent population projections made for Chad have built the high-, low- and medium-fertility hypotheses on various assumptions on the proximate determinants, and interestingly enough the total fertility rate arrived at for year 2025, 4.62, is quasi-identical to the one of the 2000 United Nations medium-fertility assumption. However, for the year 2050, it differs: 3.15 children per woman with the "proximate determinants" method, against 2.23 for the United Nations (Ningam, Nodjimbatem and Guengant, 2002). In our opinion, at least the value of the proximate determinants associated with given total fertility assumptions should be checked before setting fertility assumptions and running the population projections. Also, these values (of the proximate determinants) should be clearly spelled out, in presenting the fertility assumptions and the results of the population projections. This will help a lot to clarify what has been done, and what we demographers are doing.

Such an exercise, i.e., verifying the consistency of the values of the proximate determinants with given fertility assumptions should be done, not at the subregional level as we did in this paper, but at the country level. Hopefully, this will help to define some "typical" associations between total fertility rates and the values of the proximate determinants according to various fertility levels, using an approach similar to the one used to associate average method mix by levels of contraceptive prevalence (Stover and Heaton, 1999). Fertility levels, especially those close to, or below replacement fertility, can be associated with several combinations of values of the various proximate determinants. For example, reaching replacement fertility can be achieved through several combinations of values of the proximate determinants. In that respect, the case of Barbados, where replacement fertility was achieved through a combination of moderately high contraceptive use, large recourse to abortion, minimum length of post-partum insusceptibility, and important marriage-inhibiting effect (resulting from a moderately high proportion of women in union, but with a large proportion of unstable union), is certainly only one among several other possible combinations to reach 2.1 children per woman. This particular "proximate determinants mix" may also explain why Barbados fell afterwards below replacement fertility, probably through an increase in contraceptive prevalence and unabated recourse to abortion. Whether, in-depth analysis of the variations of the values of proximate determinant during the fertility transition, but as importantly, when fertility is at, or below replacement level, will help to define models which can be used to project future fertility levels remains to be seen, but, such a work needs to be done.

DISCUSSION

Previous assumed convergence before year 2050 of all countries of the world to 2.1 children per woman was a simple, easy to understand, assumption. However, so many countries are now below replacement fertility, and at the other extreme the fact that fertility has not started yet to decline in a number of least developed countries has forced forecasters to abandon this too-simple assumption (Guengant and May, 2001). Now, the world has been divided into high, intermediate and below replacement fertility. However, the United Nations and other population projections continue to be based upon assumptions of total fertility rate, considered as an independent variable, whereas fertility is anything but a dependent variable. Is not that also too simple? To be sure, nobody knows what to do once a country has reached replacement fertility, or is below replacement fertility, as so many less developed countries did in recent years. The proximate determinants framework can help, to a certain extent, to explain why fertility levels among below replacement fertility countries vary as much as from 1.1 to 2.1 children per woman.

Nonetheless, the difficulties associated with the use of the proximate determinants framework to explain fertility differentials between countries at intermediate or at or below replacement levels, and to build fertility assumptions, should not be overlooked. The first difficulty is the question of convergence. Are convergence hypotheses, as a result of globalization, universal education, large access to mass media and global messages anywhere in the world, realistic ones? The previous convergence assumption to 2.1 children in all countries of the world has proven to be wrong. Are convergence assumptions towards universal use of contraception, set up at 75 per cent of the women in union, reduced duration of post-partum insusceptibility to 4 months, reduced percentage of women in union, set up at 50 per cent, and marginal recourse to abortion by 2050, more realistic assumptions? Probably not. But using these assumptions has the advantage of identifying some of the well-known determinants of fertility. Also, so far, the proximate determinants framework has proven to be robust enough to be used in a large variety of contexts.

The other difficulties associated with the use of the proximate determinants framework relate to each determinant. Let us start with union patterns. Union patterns are the result of complex social processes, and the difficulty here relates to the evolution of both the proportion of women in union and of the type of union. The proportion of women in union varies greatly from one country to another and over time, and is very difficult to project. Making assumptions on future types of union will certainly prove to be even more difficult, although the proportion of unstable unions is likely to have an important effect on fertility, as important as the total proportion of women in union. In many societies of different cultural backgrounds (in Europe, in sub-Saharan Africa), informal types of unions (common law and visiting union types) seem to have gained importance recently. As explained before, the growing importance of unstable type of unions will have—provided that all the other factors remain constant—a depressing effect on fertility. But such an evolution is also likely to affect the timing of childbearing and the number of desired children. In societies where these types of unions are traditionally well accepted, this will not necessarily further affect negatively the number of desired children. By contrast in societies where a stigma is attached to these informal types of relationships, any increase in the number and proportion of unstable unions is likely to affect fertility negatively.

Concerning the use of modern contraceptive methods, future contraceptive use of various methods, will depend in part on the availability of the methods. Lack or severe limitation to certain groups (for unmarried teenagers for instance) is likely to increase the will to recourse to abortion. However, in the majority of less developed countries with intermediate fertility, abortion is illegal, and the costs and conditions under which illegal abortions are performed are serious limitations to this option. As a result, the trade-off between contraception and abortion will work differently depending on the countries, and the impact on fertility will vary accordingly. Last, the method mix should not be a major problem for most of the intermediate-fertility countries. High levels of contraceptive use have been achieved in several countries through high proportion of sterilization. The shift to reversible methods will not necessarily affect the average method mix effectiveness, in particular if the newly adopted reversible methods are highly efficient, such as the injectables.

Last, one may accept that the mean duration of post-partum insusceptibility is likely to decrease. It remains that it is difficult to predict the extent and the pace of this decrease. The assumption made in this paper of a mean duration of post-partum insusceptibility decreasing to 4 months in all countries will not necessarily materialize. However, one may assume that as countries will approach replacement fertility, this factor is likely to have less importance. This means that when countries approach replacement fertility, for those countries where contraceptive prevalence is already high, the main proximate determinant of fertility is likely to be marriage (proportion of women in union, and types of unions). If replacement fertility has been achieved with a relatively modest contraceptive prevalence, the main proximate determinant of fertility might be abortion, associated with various impact of marriage patterns.

CONCLUSION

Recent opinions on the rapid fertility declines observed in most countries of the world and future prospects fall into three categories. The first envisions the continuation of those declines everywhere and a global and irreversible trend toward below-replacement fertility (Chesnais, 2001). According to this view after the population explosion of the twentieth century, mankind could progressively experience population implosion. A second view presents the world as divided into two groups. The first group consists of the countries, both developed and developing, with below-replacement fertility or likely to attain it in the medium-term future, and the second consists of the least developed countries, most of them in sub-Saharan Africa, whose fertility remains high (Caldwell, 2002). According to this view, tomorrow's challenges will be to cope with ageing and possible population declines in most countries of the world, and at the same time to maintain favourable attitudes, policies and assistance to programmes aimed at reducing fertility in countries where population growth continues to be high. Lastly, one can consider the *2000 Revision* of the *World Population Prospects* of the United Nations as a third and more pragmatic approach to future fertility trends. According to the medium-fertility assumptions made in the *Revision*, by 2050 the world could still be divided into three groups: first, the group of countries where fertility could be around or above 2.5 children per woman (Eastern Africa, Middle Africa, Western Africa and Western Asia); second, the group of countries where fertility could be at replacement level (South-Central and South-Eastern Asia, Northern and Southern Africa, Central and South America, Melanesia, Micronesia, and Northern America); third, the group of countries where fertility could be below replacement (Australia/New Zealand, the Caribbean, Eastern Asia and all regions of Europe).

"Visions" about mankind's future and population dynamics can be stimulating and remain welcome. However, the future is not yet written and its realization depends on many factors, some of which are not even envisioned today. Population projections are needed to have some sense of the challenges ahead. Pragmatically, they provide some sense of how many children will need to be immunized or educated, how many people will need food or employment etc. As more and more countries progress to the later stages of the transition to low fertility, demographers seem reluctant to abandon the stationary population and replacement-level fertility as the goal. They also seem not to be ready to admit that population projections are not as robust as they had appeared and that, as fertility increasingly falls in the realm of control and choice by couples and individuals, it will become considerably more volatile than in the past. The time has come to recognize all these changes and to address the challenges posed by them.

At the global level, population projections and the corresponding assumptions on fertility, mortality (and on the impact of AIDS on mortality) and on international migration should be presented and explained more thoroughly than at present. In particular, the implications of assumed future fertility trends in terms of the proximate determinants of fertility could be explored and documented. All in all, demographers should be more modest in expressing views on the future of population and should reinforce the work of analysis and monitoring. They should also learn to think about a more diverse world, where at any given time countries will be at quite different stages of the demographic transition.

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ANNEX

Table 1 A

Decreases of total fertility rates between 1960-1965 and 1995-2000, and total fertility rates 1960-1965 and 1995-2000, by country and subregion

Country	Variations in total fertility rate 1960-1965 1995-2000	Total fertility rate 1960-1965	Total fertility rate 1995-2000
Tunisia	-4.9	7.3	2.3
Viet Nam	-4.7	7.2	2.5
Bahrain	-4.5	7.2	2.6
Dominican Republic	-4.4	7.3	2.9
Kuwait	-4.4	7.3	2.9
Suriname	-4.4	6.6	2.2
Algeria	-4.1	7.4	3.3
Costa Rica	-4.1	7.0	2.8
Saint Lucia	-4.1	6.8	2.7
Mexico	-4.1	6.8	2.8
Lebanon	-4.1	6.4	2.3
Colombia	-4.0	6.8	2.8
Uzbekistan	-4.0	6.8	2.9
Brunei Darussalam	-3.9	6.7	2.8
French Polynesia	-3.9	6.5	2.6
Brazil	-3.9	6.2	2.3
Peru	-3.9	6.9	3.0
Iran (Islamic Republic of)	-3.8	7.0	3.2
Morocco	-3.8	7.2	3.4
Guyana	-3.7	6.2	2.5
United Arab Emirates	-3.7	6.9	3.2
El Salvador	-3.7	6.9	3.2
Venezuela	-3.7	6.7	3.0
Egypt	-3.7	7.1	3.4
Ecuador	-3.6	6.7	3.1
Kenya	-3.5	8.1	4.6
Turkey	-3.5	6.2	2.7
Malaysia	-3.5	6.7	3.3
Syrian Arab Republic	-3.5	7.5	4.0
Cape Verde	-3.4	7.0	3.6
South Africa	-3.4	6.5	3.1
Libyan Arab Jamahiriya	-3.4	7.2	3.8
Réunion	-3.4	5.7	2.3
Jordan	-3.3	8.0	4.7
Mongolia	-3.3	6.0	2.7
Bangladesh	-3.3	7.1	3.8
Panama	-3.3	5.9	2.6
Qatar	-3.3	7.0	3.7
Philippines	-3.2	6.9	3.6
Turkmenistan	-3.2	6.8	3.6
Jamaica	-3.1	5.6	2.5
Honduras	-3.1	7.4	4.3
Belize	-3.0	6.5	3.4
Nicaragua	-3.0	7.3	4.3
Chile	-2.8	5.3	2.4
Indonesia	-2.8	5.4	2.6
Samoa	-2.8	7.3	4.5
Fiji	-2.8	6.0	3.2

Subregion and country or areas	Variations in total fertility rate 1960-1965 1995-2000	Total fertility rate 1960-1965	Total fertility rate 1995-2000
Eastern Africa			
Kenya	-3.5	8.1	4.6
Réunion	-3.4	5.7	2.3
Northern Africa			
Tunisia	-4.9	7.3	2.3
Algeria	-4.1	7.4	3.3
Morocco	-3.8	7.2	3.4
Egypt	-3.7	7.1	3.4
Libyan Arab Jamahiriya	-3.4	7.2	3.8
Western Sahara	-2.1	6.5	4.4
Sudan	-1.8	6.7	4.9
Southern Africa			
South Africa	-3.4	6.5	3.1
Botswana	-2.6	6.9	4.4
Swaziland	-1.7	6.5	4.8
Lesotho	-1.1	5.8	4.8
Western Africa			
Cape Verde	-3.4	7.0	3.6
Ghana	-2.3	6.9	4.6
Eastern Asia			
Mongolia	-3.3	6.0	2.7
South-Central Asia			
Uzbekistan	-4.0	6.8	2.9
Iran (Islamic Rep. of)	-3.8	7.0	3.2
Bangladesh	-3.3	7.1	3.8
Turkmenistan	-3.2	6.8	3.6
Tajikistan	-2.6	6.3	3.7
Kyrgyzstan	-2.5	5.4	2.9
India	-2.5	5.8	3.3
Nepal	-1.2	6.1	4.8
South-Eastern Asia			
Viet Nam	-4.7	7.2	2.5
Brunei Darussalam	-3.9	6.7	2.8
Malaysia	-3.5	6.7	3.3
Philippines	-3.2	6.9	3.6
Indonesia	-2.8	5.4	2.6
Myanmar	-2.7	6.0	3.3
East Timor	-2.0	6.4	4.4
Western Asia			
Bahrain	-4.5	7.2	2.6
Kuwait	-4.4	7.3	2.9
Lebanon	-4.1	6.4	2.3
United Arab Emirates	-3.7	6.9	3.2
Turkey	-3.5	6.2	2.7
Syrian Arab Republic	-3.5	7.5	4.0
Jordan	-3.3	8.0	4.7
Qatar	-3.3	7.0	3.7
Israel	-0.9	3.9	2.9

Table 1 A

Decreases of total fertility rates between 1960-1965 and 1995-2000, and total fertility rates 1960-1965 and 1995-2000, by country and subregion (*continued*)

Country	Variations in total fertility rate 1960-1965 1995-2000	Total fertility rate 1960-1965	Total fertility rate 1995-2000
New Caledonia	-2.7	5.3	2.6
Myanmar	-2.7	6.0	3.3
Tajikistan	-2.6	6.3	3.7
Botswana	-2.6	6.9	4.4
Kyrgyzstan	-2.5	5.4	2.9
India	-2.5	5.8	3.3
Vanuatu	-2.4	7.0	4.6
Paraguay	-2.4	6.6	4.2
Ghana	-2.3	6.9	4.6
Bolivia	-2.3	6.6	4.4
Western Sahara	-2.1	6.5	4.4
Bahamas	-2.1	4.5	2.4
Guam	-2.1	6.0	4.0
East Timor	-2.0	6.4	4.4
Guatemala	-1.9	6.8	4.9
Haiti	-1.9	6.3	4.4
Sudan	-1.8	6.7	4.9
Swaziland	-1.7	6.5	4.8
Papua New Guinea	-1.7	6.3	4.6
Nepal	-1.2	6.1	4.8
Lesotho	-1.1	5.8	4.8
French Guiana	-1.0	5.0	4.1
Israel	-0.9	3.9	2.9
Uruguay	-0.5	2.9	2.4
Argentina	-0.5	3.1	2.6

Subregion and country or areas	Variations in total fertility rate 1960-1965 1995-2000	Total fertility rate 1960-1965	Total fertility rate 1995-2000
Caribbean			
Dominican Republic	-4.4	7.3	2.9
Saint Lucia	-4.1	6.8	2.7
Jamaica	-3.1	5.6	2.5
Bahamas	-2.1	4.5	2.4
Haiti	-1.9	6.3	4.4
Central America			
Costa Rica	-4.1	7.0	2.8
Mexico	-4.1	6.8	2.8
El Salvador	-3.7	6.9	3.2
Panama	-3.3	5.9	2.6
Honduras	-3.1	7.4	4.3
Belize	-3.0	6.5	3.4
Nicaragua	-3.0	7.3	4.3
Guatemala	-1.9	6.8	4.9
South America			
Suriname	-4.4	6.6	2.2
Colombia	-4.0	6.8	2.8
Brazil	-3.9	6.2	2.3
Peru	-3.9	6.9	3.0
Guyana	-3.7	6.2	2.5
Venezuela	-3.7	6.7	3.0
Ecuador	-3.6	6.7	3.1
Chile	-2.8	5.3	2.4
Paraguay	-2.4	6.6	4.2
Bolivia	-2.3	6.6	4.4
French Guiana	-1.0	5.0	4.1
Uruguay	-0.5	2.9	2.4
Argentina	-0.5	3.1	2.6
Melanesia/Micronesia/Polynesia			
French Polynesia	-3.9	6.5	2.6
Samoa	-2.8	7.3	4.5
Fiji	-2.8	6.0	3.2
New Caledonia	-2.7	5.3	2.6
Vanuatu	-2.4	7.0	4.6
Guam	-2.1	6.0	4.0
Papua New Guinea	-1.7	6.3	4.6

Source: United Nations (2001a), *World Population Prospects: The 2000 Revision.*

PART THREE

COUNTRY PAPERS

Completing the fertility transition: the case of Argentina

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INTRODUCTION

The fertility decline in Argentina has several original features. Regarding the timing of its onset, it was early compared to other Latin American countries (except Uruguay) and was almost contemporary with many European countries. Regarding its relation with mortality, the descent of both variables—as measured by the crude rates—has been practically simultaneous, contrasting with the predictions of the demographic transition theory (Lattes, 1975; Pantelides, 1983). Regarding the rhythm of descent, it has shown two (small) "baby booms" that interrupted the decline of the birth rate, and several periods of quasi-stability or very slow decline of that rate. After this heterodoxical behaviour, will the future of fertility in Argentina follow a predictable path? These will be the themes of our paper. We will not go into a sophisticated analysis—which would anyway be hindered by the quality and availability of data—but will try to show the general picture of the past, and try to speculate about the future.

THE PATH OF THE FERTILITY TRANSITION

The onset of the fertility decline

It is generally accepted that when talking about the onset of the fertility decline in general, it is referred to as an irreversible decline in fertility that follows a period of relatively constant high fertility. There can be fluctuations but there is no going back to the pre-decline level (Knodel, 1974). The threshold that defines the precise point of no-return is somewhat arbitrary.

In the case of Argentina, if the crude birth rate (CBR) is used as a measure of fertility, the series calculated by different authors (Collver, 1965; Lattes, 1975; Rothman, 1973; Torrado, 1970) show values of CBRs ranging from 45 to 50 live births per thousand population before the 1890s. All of the series show very small declines starting in the period 1885-1889, with oscillations in some cases. But by the 1900s, all the series show declines of 10-15 per cent in the CBRs, that bring them down to a range from 41 to 42 per thousand. After that, the decline becomes faster, and by the mid-1940s all estimates show CBR values around 25 per thousand, a decline of unusual speed for the time.

We adopt Lesthaeghe's (1977) criterion to define when the fertility transition definitively started, namely, the date at which the CBR falls below 30 live births per 1,000 population, never to regain its former level; we can show the first of the unusual features of the fertility decline in Argentina: its early onset compared to almost all other Latin American countries and the closeness in time with many European countries (table 1).

Sources: Edith A. Pantelides (1984), *The Decline of Fertility in Argentina, 1869-1947*. Doctoral dissertation presented to the Faculty of the Graduate School of the University of Texas at Austin. Ann Arbor, Michigan: University Microfilms International, adapted from Ron J. Lesthaeghe (1977), *The Decline of Belgian Fertility, 1800-1970*.

With additional data from:

Cuba, Centro de Estudios Demográficos (n. d.), La Población de Cuba;

Héctor Gutiérrez Roldán (1975), *La Población de Chile*;

Alfredo E. Lattes (1975). El crecimiento de la población y sus componentes demográficos entre 1870 y 1970, in *La Población de Argentina*;

Adela Pellegrino, and Raquel Pollero (1998), Fecundidad y situación conyugal en el Uruguay. Un análisis retrospectivo. 1889-1975.

United States Bureau of the Census (1980). *Statistical Abstract of the United States: 1980*.

Table 1
Decade during which the crude birth rate fell below 30 per thousand, selected countries

Decade	Countries
1830	France
1840	Ireland
1890	Sweden, Denmark, England and Wales, Scotland, Australia, New Zealand
1900	Netherlands, Norway, Germany
1910	Canada, Finland, Austria, Hungary, Czechoslovakia
1920	Italy, Spain, Portugal, Uruguay
1930	Poland, Bulgaria, Romania, Argentina
1940	Soviet Union, Cuba
1950	Yugoslavia, Japan
1960	Chile

Other measures, calculated for the census dates,[1] show that fertility started to decline sometime between the 1895 and 1914 population censuses, when the total fertility rate (TFR) dropped from 7.0 (Arretx, Mellafe and Somoza, 1977) to 5.3 (Rothman, 1973).[2] The same is indicated by the index of overall fertility (I_f) that shows a very small drop from 0.58 in 1869 to 0.55 in 1895 and a very steep decline to 0.42 by 1914 (Pantelides, 1996). The long time that elapses between the first three censuses makes it impossible to pinpoint more exact dates for the phenomenon we are trying to measure.

In previous work (Pantelides, 1984b, 1996) we have discussed the reason for the discrepancy among the various measures: it mainly lies in the different impact on them of the population size and structure which, from the 1860s up to the 1930s, was "distorted" by massive European immigration in childbearing ages, which immediately contributed to the denominator of the rates but only after a time lag to the numerator, since it was heavily male and made up, in large part, of single individuals that did not procreate until they settled and formed a family, or of married men that left their spouses and children behind until they found themselves established.

An analysis of the parity structure of non-single women[3] in the censuses of 1895 and 1914 (Pantelides, 1996) shows no indication of fertility declining: there is no reduction in the proportion of women of highest parities (35 per cent have 6 or more children in both censuses) and only a very small increase (less than 1 percentage point) in that of women with 0-3 children. Parity progression ratios calculated for the cohorts of women that were 45-49 years old in 1885 and 1895 also show no change.

Based on all the previous evidence, plus estimates for specific geographical areas (Celton, 1987; Ferreyra, 1989; Mychaszula, Pantelides and Foschiatti, 1989), we suggest that, by the end of the 1800s, fertility was on the level of a TFR of 7 and did not change noticeably before 1895. However, as indicated by a value of I_f of 0.58 in 1869, which is below that of populations with no voluntary fertility control, and by the presence of rural-urban and native-migrant differences in fertility levels[4] (Pantelides, 1984b, 1986, 1997), we can conclude that there was some degree of fertility control in some subpopulations. The fact that marital fertility started to decline later than overall fertility (Pantelides, 1984b) indicates that such—probably involuntary—control may have been "exercised" through postponement of marriage.[5]

The decline of fertility and mortality

Let us now proceed to look at another of the interesting features of the fertility transition in Argentina: its simultaneity with that of mortality. We have called this feature the unorthodox demographic transition (Pantelides, 1983), unorthodox, of course, in relation

1 National census dates: 1869, 1895, 1914, 1947, 1960, 1970, 1980, 1991, 2001.

2 This value was estimated by Pantelides (1984b) from the gross reproduction rate calculated by Rothman (1973), adopting a ratio of 105/100 male to female births.

3 Marital status categories in the censuses were "single", "married" and "widow". The persons living in consensual unions were most probably included in the "single" category (see Pantelides, 1984a, 1984b, appendix IV).

4 Data not shown here. See Pantelides (1984b, 1986, 1996).

to the classic theory of demographic transition that stated that mortality declines earlier than fertility.[6] In the case of Argentina, there has never been a period of high natural growth, characteristic of the transition; crude birth rates and crude death rates (CDR) followed a parallel path (table 2) and the highest natural growth rates are never larger than 20 per thousand, with the highest values occurring from the onset of the decline until the 1920s.

Declines in CDR registered in the late 1870s, have probably been due to epidemics in the previous period (there was, in fact, an epidemic of yellow fever in 1871), that made the rate for the period 1870-1875 higher and produced the impression of a decline in the following period.

Table 2
Argentina: Crude birth rate, total fertility rate net reproduction rate and crude death rate: estimates and projections.[a]
Selected dates between 1870 and 2050

Dates	CBR	CDR	Dates	TFR	NRR
1870-1875	49.1	31.9	1869	6.8	
1875-1880	49.0	29.6			
1880-1885	48.9	29.8			
1885-1890	45.8	29.7			
1890-1895	44.0	28.4	1895	7.0	
1895-1900	44.5	28.9			
1900-1905	44.3	26.1			
1905-1910	42.1	22.7			
1910-1915	39.2	19.7	1914	5.3	
1915-1920	36.5	17.7			
1920-1925	34.9	15.1			
1925-1930	32.5	14.1			
1930-1935	29.0	12.5			
1935-1940	25.7	12.5			
1940-1945	25.5	11.3	1947	3.2	
1945-1950	26.3				
1950-1955	25.4	9.2		3.2	1.4
1955-1960	24.3	8.7		3.2	1.4
1960-1965	23.2	8.8		3.1	1.4
1965-1970	22.6	9.1		3.0	1.4
1970-1975	23.4	9.0		3.1	1.4
1975-1980	25.7	8.9		3.4	1.6
1980-1985	23.1	8.5		3.2	1.5
1985-1990	21.8	8.5		3.0	1.4
1990-1995	20.8	8.2		2.8	1.3
1995-2000	19.9	8.0		2.6	1.2
2000-2005	19.1	7.8		2.4	1.2
2005-2010	18.0	7.7		2.3	1.1
2010-2015	16.9	7.6		2.2	1.0
2015-2020	15.9	7.5		2.1	1.0
2020-2025	15.5	7.6		2.1	1.0
2025-2030	15.1	7.8		2.1	1.0
2030-2035	14.6	8.1		2.1	1.0
2035-2040	14.1	8.4		2.1	1.0
2040-2045	13.7	8.7		2.1	1.0
2045-2050	13.4	9.1		2.1	1.0

5 Although in the case of Argentina the age at marriage estimated from legal registration overestimates age of entry into unions because consensual unions were usually legalized after some time; and although the singulate mean age at marriage (SMAM) calculated from census data suffers from the fact that persons in consensual unions are enumerated as single (Pantelides, 1984a, 1984b), there are indications that in some areas with lower fertility, age at marriage was higher than in those with higher fertility levels.

6 After the Princeton study we know that this was not always the case.

Sources: Alfredo E. Lattes (1975), El crecimiento de la población y sus componentes demográficos entre 1870 y 1970, *La Población de Argentina*.

CEPAL/CELADE (2001), América Latina: Fecundidad 1950-2050, *Boletín Demográfico*.

Edith A. Pantelides (1996), A century and a quarter of fertility change in Argentina: 1869 to the present, *The Fertility Transition in Latin America*.

Ana María Rothman (1973), La fecundidad en la Argentina entre 1869 y 1970, *Temas de Población de la Argentina. Aspectos Demográficos*.

Susana Torrado (1970), Natalidad y fecundidad en Argentina desde fines del siglo XIX, *Conferencia Regional Latinoamericana de Población*.

Carmen Arretx, Rodolfo Mellafe and Jorge Somoza (1977), Estimación de la fecundidad mediante el método de los hijos propios. Aplicación a datos de la Argentina en 1895, *Notas de Población*.

a Medium hypothesis.

The shape of fertility decline

Another characteristic of the decline of fertility in Argentina is the presence of two upward trends in the CBR (table 2) that took place in the late 1940s and in the late 1970s. Since births by the age of the mother are only available from 1954, there is no way to determine if the first upward trend was just a result of a compositional change or of changes in the spacing of births (Ryder, 1983; Bongaarts and Feeney, 1998), or of a real increase in fertility levels.

The increase registered in the late 1970s (and in some areas in the early 1980s) happened in all the provinces of Argentina (except Río Negro), but was more marked—also in absolute terms—in those areas which previously had the lowest fertility levels. Calculations made with incomplete data[7] (Pantelides, 1989) showed that completed fertility for the cohorts of women that would end their childbearing period between 1990 and 1995 would be somewhat higher than that of previous cohorts. Calculations made for this paper with more complete data, now available, show very similar results: women who completed their childbearing period from 1980-1985 to 1990-1995 have an average of 3.06 children, whereas those who completed their fertility between 1995 and 2000 have 3.12, and the following 5-year cohort will still have an above-average 3.09 children. Admittedly, the differences are small, and the population data used are still projections based on the 1991 population census, that may change.

[7] Some of the data for the calculations were missing and had to be estimated, and the denominators of the rates were projected populations.

As pointed out earlier, the upward change was larger in the areas with previous lower fertility. An estimate for the city of Buenos Aires (Pantelides, 1989), made under the assumption that the fertility of the older cohorts who had not yet completed their fertility at the time would be equal to the lowest historically registered value for each age (a probable underestimation of the true level), yielded a completed fertility of 1.75 children for 1980, 1.82 for 1985, 2.01 for 1990 and 2.14 for 1995. So we can tentatively conclude that the increase of the CBR reflected, at least in part, an increase in fertility.

The last of the characteristics of fertility trends in Argentina that we have mentioned, namely, the suspension of the decline for an extended period of time, is also shown in table 2. Between the first half of the 1940s and the first half of the 1970s there was no change in the TFR, which afterwards resumed its slow downward trend. The small oscillations observed are probably due to variations in mortality, as suggested by the five quinquennia of an unchanged net reproduction rate (NRR).

WHAT LIES AHEAD

According to the United Nations estimates and medium hypothesis projections (CEPAL/CELADE, 2001) shown in table 2, Argentina has practically completed its fertility transition, with a NRR of 1.2 for the period 2000-2005, and will reach the level of exact cohort replacement in the period 2010-2015 (NRR 1.0). However, given the levels of its CBR and CDR, the population will continue to grow beyond mid-century. Low and high hypothesis projections do not make a great difference in the case of Argentina, given the already low fertility level.

Are these projections adequate? It is difficult to say, but let us examine some of the factors that could modify the expected trend.

Nuptiality patterns

Changes in nuptiality patterns could affect fertility through changes in the age of entry into stable unions and/or in the proportion of definitive celibacy, with the ensuing change in time of exposure to the risk of pregnancy. They could also affect fertility if there are changes in the proportion of unions that are consensual, if legal and consensual unions have differential fertility levels. Some of these changes may have been happening, but they are very difficult to document, as was mentioned earlier, until the data from the 2001 population census are released.

Research on marriage patterns in Argentina is almost non-existent. However, there is some work done with data from vital registration and from household surveys for the city of Buenos Aires. This city's population behaviour has always been in the forefront, showing the way other cities, and eventually the rest of the population of the country, seem to be heading, and as such should be interpreted. According to Mazzeo (n.d.) and Pantelides (1984b) in the city of Buenos Aires the age at legal marriage for women has always been high, between 22 and 23 years, from the 1890s to the early 1900s. Then it slowly increased to reach 28.6 years by 1999 (Mazzeo, n.d., table 4). But household surveys taken starting in 1990 show a steady increase in the proportion of consensual unions from 7.6 per cent in 1990 to 13.7 per cent in 1999. The age of entry into consensual unions is most probably lower in average than the age of legal marriage, so the whole picture may be one in which the age of entry into unions has not changed much. However, if many consensual unions are a step previous to marriage and if this means that childbearing is postponed, then the picture could be one of overall delayed childbearing.

Age at childbearing

But is childbearing being postponed in consensual unions or at all? Again for the city of Buenos Aires, Mazzeo (n.d. figure 3) shows a steady increase in extramarital births (births form single mothers and from mothers in consensual unions). From 1960 to 1999 the proportion of extramarital births more than tripled. However, the mean age at childbearing calculated form vital registration data for the whole country has been constant at 27 years since 1980.

Compositional changes

Could there be any change in the population composition that would affect fertility levels?

Let us examine first the possible effects of migration trends. The 2001 census will tell us if the immigration—most of them in childbearing ages—from countries with higher fertility than Argentina (Bolivia, Paraguay and Peru) has shown an increasing trend as anecdotal evidence seems to show. Still, we will need to know if their fertility in Argentina will be closer to that of their country of origin or that of their country of arrival. However, the situation has changed due to the profound economic crisis and its effect on the relation of the peso to the dollar. The new, higher rates of exchange have made it unprofitable, for those migrants who needed to send remittances home, to stay in Argentina. Again anecdotal evidence seems to show that a reverse flow is starting. If this were true, the composition of the population could be more conducive to a lower fertility. The emigration of mostly urban educated Argentines that has been increasing in the last two years (again no hard data available, but plenty of evidence of increased demand for passports and visas that would allow emigration) could act in the opposite direction, decreasing the numbers of the population that, although in childbearing ages, has low fertility.

Education and labour force participation of women

Recent work by Wainerman shows that labour force participation rates of women of all ages except 14-19 in the Metropolitan Area of Buenos Aires (which concentrates one third of the country's population) have been growing consistently since at least 1980. For women in the childbearing ages (20-44), those rates were around 62 per cent in the year 2000. Moreover, Wainerman's data show that there has been a consistent increase in the proportion of households where the wife is working and of those where the man is unemployed but the wife is working, both trends consistent with an increased labour force participation of married women. If the trend of increased economic activity of women—and especially of married women—continues and if it leads to lower fertility, the expectations are that fertility will continue falling in the future.

The illiteracy level among both men and women was around 4 per cent in the 1991 population census. By then the trend towards higher school enrolment (at all levels) and of higher course completion of women vis-à-vis men was already evident. That situation has not changed, but there are indications of increased dropout due to the economic crisis. It is difficult to say what its impact on fertility may be. However, there is some research showing that risky behaviour conducive to pregnancy is higher among adolescent women that are not enrolled in school (Pantelides, Geldstein and Infesta Dominguez, 1995), and since around 14 per cent of births are presently of adolescent mothers, an increase in adolescent fertility may result in an increase in total fertility.

Use of contraception

Although there is no good information about knowledge and use of contraception in Argentina for lack of a nationwide survey, research covering subpopulations (Geldstein and Schufer, 2001; López, 2000; López and Tamargo, 1995; Pantelides, Geldstein and Infesta Domínguez, 1995) shows that knowledge of contraception is already very high among those surveyed (male and female adolescents and young adult men as well as women in childbearing ages, residing in the Metropolitan Area of Buenos Aires).[8] The use of contraception, although not so widespread, is considerable in those sub-populations. The expectation is that such use will continue to rise unless economic conditions prove so difficult as to impede affording the expense of contraceptives. Since the economic crisis has affected both individual's income and savings as well as the purchase of medication and other supplies for hospitals, the result may be an increase in unwanted births among the poor and the lower middle class served by those hospitals.

Population policies and programmes

The population policy of Argentina has never been promoting fertility control. It has gone from fierce pronatalism to benign neglect (Novick, 1996). Reproductive health laws have failed to pass through National Congress. However, they were approved in a few provinces and in the city of Buenos Aires, and 15 provinces have now either laws or programmes on reproductive health. The existence of such laws and programmes, however, has not meant the provision of adequate funding and/or organization for the free delivery of contraception to the population that cannot buy it. On the other hand, the contraceptive behaviour of the population does not seem to have been affected either by the Catholic church's opposition to birth control or by public policy, except perhaps for the period (1974-1983) during which there was a prohibition (which had an impact mainly on the public and social security services) to provide or recommend contraception. The prohibition affected the poorer people, since the middle and upper classes could buy contraception freely or under the guise of menstrual regulation.

Economic rather than population policies may have been the basis for the two temporary increases in CBRs (and of fertility in the most recent episode) we have already analysed. Although their causes are not understood, they coincided with populist governments that redistributed income in favour of the lower strata of society through higher salaries, housing plans, social security and health benefits. This kind of policy did not happen again. On the contrary, in the last 12 years the economic policies resulted in high unemployment (not lower than 16 per cent in the last 4-5 years) and in an unprecedented proportion of the population (estimated at 40 per cent for the year 2001)[9] falling below poverty level. If the cause of the temporary increases was the feeling that the future was secure, fertility will not increase but will decrease beyond what is expected in the medium hypothesis projections.

8 The Metropolitan Area of Buenos Aires concentrates one third of the population of Argentina.

9 This estimate is based on unpublished data from the last household survey (October 2001) by the Instituto Nacional de Estadística y Censos—INDEC, using the "line of poverty" methodology.

What can be expected

The previous analysis of different possible determinants of fertility trends has not yielded a clear picture about a future direction of those trends, since the effect of some factors is counterbalanced by the opposite effect of others. The social and economic landscape of Argentina is changing rapidly and in previously unexplored directions. However, the long history of fertility decline has established norms and behaviours that have—from our point of view—a strong inertia, and fertility will probably continue to decline. The persistence of positive values regarding family and parenthood, and of the belief that having siblings is positive for children's development, on the one hand, and the enlarged enclaves of poverty (with their higher fertility) on the other, will probably maintain fertility levels above replacement for another 10-15 years, as shown by the medium hypothesis of the United Nations projections.

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When will Bangladesh reach replacement-level fertility? The role of education and family planning services*

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INTRODUCTION

The rapid decline of fertility, from over 6.5 births per woman to 3.3 births, in the last two decades in Bangladesh is, indeed, a historic record in demographic transition. The country is poor and has remained traditional and conservative. Although the extent and rapidity of the decrease in fertility have been very impressive by international standards, continued fertility decline is desirable, as population crowding, environmental deterioration, massive migration from rural areas to unplanned urban settings, and rapid depletion of resources are becoming acute. However, recent statistics suggest that, despite a continuing increase in contraceptive use, the fertility decline in Bangladesh has stalled: Three successive Demographic and Health Surveys show that the total fertility rates were 3.4, 3.3, and 3.3 in 1991-1993, 1994-1996, and 1997-1999, respectively. Contraceptive prevalence increased over this same period, from 45 per cent in 1993-1994 to 54 per cent in 1999-2000 (Mitra and others, 2001).

The purpose of this paper is to explore the possibility of further fertility decline in Bangladesh, with special attention to the role that might be played by further improvements in women's education and family planning services. In particular, we attempt to estimate how long, and under what conditions, it should take for Bangladesh to reach replacement-level fertility (2.1 children per woman). We begin with a brief review of the programmatic development, policy evolution, and social and economic transformation in Bangladesh that might have influenced couples' family-building strategies. We then describe the data and methods that we use. Next, we attempt to project a time frame of when fertility may reach the replacement level.

Finally, we discuss possible future challenges to further fertility decline. The medium-variant scenario of the United Nations projection indicates that Bangladesh will achieve replacement-level fertility around 2025 (United Nations, 2001). We assess whether our analysis yields a similar conclusion.

POSSIBLE REASONS BEHIND BANGLADESH'S FERTILITY DECLINE: SUPPLY VERSUS DEMAND FACTORS

The number of children that couples have can be viewed as the result of their demand for and the supply of fertility regulation. In this framework, the demand for fertility regulation derives from desired family size. Couples have a demand for fertility regulation if they wish to have fewer children, or have their births timed later or spaced further apart,

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than they would in the absence of any efforts (e.g., delay in or reduced frequency of sexual intercourse, use of contraception, abortion) to regulate their fertility. Desired family size and the desired timing and spacing of births are influenced by such factors as the value of children (both while young [e.g., work in the household or on the family farm] and as a source of old-age support for parents), the monetary costs of raising children (e.g., expenses for food, housing, clothing, school fees), and the time costs of children (the opportunity costs of parents' time).

It has been asserted that the main mechanism behind the fertility decline that has occurred in Bangladesh has been the increase in contraceptive use—from 7 per cent in 1975 to 54 per cent by 2000. It has been claimed that in addition to making contraception available to couples already interested in regulating their fertility, the Bangladesh family planning programme helped both to bring ideational changes towards small families and to change couples' attitudes about the use of modern contraceptives (Cleland and others, 1994). Supporting this line of argument, Carty and others (1993) have emphasized that Bangladesh has had a strong and sustained political commitment to an effective family planning programme. All governments in power since the country's independence (in 1971) have placed high priority on reducing the country's high rate of population growth, which was 3 per cent per year during the 1970s. Since 1973, the Government has received strong support from international donor agencies to intensify family planning programme efforts.

There has been debate about the role that socio-economic change has played in contributing to the fertility decline that has taken place in Bangladesh. Caldwell and others (1999) show that there have been considerable social and economic changes in the country and contend that these have changed couples' attitudes about family size in such a way as to lead to a decline in fertility. These changes include the following:

- There has been a tremendous growth of urban infrastructure in the country, including roads, commercial places, housing, and others.
- The size of the urban population grew by 5 per cent annually compared to 1 per cent rural population growth. In 1997, 20 per cent of the population lived in urban areas, compared to 13 per cent in 1985.
- Between 1976 and 1986 the number of electrified villages quadrupled, the number of doctors increased three times, and nurses five times.
- The human development index[1] increased by 45 per cent between the 1960s and the 1990s.
- Changes in agricultural structure have freed more children for schooling. The increase has been especially large for girls. Whereas only half of girls of primary-school age attended were enrolled in school in the 1980s, by the 1990s virtually all girls in this age group were enrolled in school.
- More than one million of young women now work in garment factories in the country's two largest cities (Dhaka and Chittagong).
- A large number of people of working age migrate to foreign countries, especially to the Middle East, and send back remittances that help the local economy.

Cleland and others (1994), however, contend that these changes in economic structure, urbanization, women's participation in economic activities and education were sufficient but not necessary for the fertility transition that occurred in Bangladesh.

As mentioned above, fertility seems to have reached a plateau since 1992 in Bangladesh. The programmatic, social and economic determinants of this plateau are not understood yet, although part of the apparent plateau may be associated with measurement issues (Islam and others, 2001)[2]. This plateau raises a debate about what further changes are needed for Bangladesh to reach replacement-level fertility.

[1] HDI, a commonly used index, is calculated on the basis of life expectancy, literacy rate and real GDP per capita.

[2] In Bangladesh, both fertility and mean age of childbearing are declining. The period measure of the total fertility rate (TFR) that is obtained from a survey like the Bangladesh Demographic and Health Survey (BDHS) is unlikely to give the true picture of fertility decline because of both pace and tempo effect of fertility decline. The period TFR is likely to provide an underestimation of cohort TFR for recent years when fertility has been declining. Therefore, in the Bangladesh situation, it seems that actual cohort fertility is likely to be higher than has been estimated.

We attempt to shed some light on this issue in this paper by asking three questions:

- *Are there socio-economic subgroups in Bangladesh that already have replacement-level fertility?* If so, if in the future more of the population will be like the groups that already have replacement-level fertility, this change in population composition should lead to declines in fertility toward replacement level.
- *How does couples' "wanted fertility" compare to the number of children that they are likely to have?* If couples desire to have fewer children than they are actually having, presumably better family planning services can help reduce unintended childbearing and lead to reductions in fertility.
- *How does fertility in an area with better family planning services compare to that in an otherwise similar area with standard government services?* This will demonstrate the extent to which, everything else the same, better family planning services can affect fertility.

DATA AND METHODS

We use data from two sources. To answer the first and second questions above, we use data from the 1999/2000 Bangladesh Demographic and Health Survey (BDHS), a nationally representative survey of 10,544 women of reproductive age. We use these data to examine the relationship of education with actual and desired fertility and to look at trends in education in Bangladesh.

Education in the BDHS sample is grouped into four categories: no education, some primary education, primary completed, and secondary. The secondary education group consists of women with six or more years of schooling.

We also use data from Matlab Demographic Surveillance System (DSS). Matlab is a typical rural subdistrict in Bangladesh; the lifestyle, social and economic circumstances, and the educational level of the Matlab population are similar to most rural parts of the country. The DSS, which is operated by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), has collected data on pregnancy outcomes in two otherwise similar areas—the "treatment" and "comparison" areas—since 1966. The comparison area is typical of much of Bangladesh in contraceptive practice (ICDDR,B, 2002) and fertility (Mitra and others, 1994). In this paper we consider data on about 33,000 births that occurred among about 318,000 women-years in Matlab between 1995 and 2000. The DSS includes data on pregnancy outcomes (live births, stillbirths, miscarriages and abortions), deaths, migration, and marital unions. The DSS also conducts censuses occasionally to collect socio-economic information; the last census was conducted in 1996. In this paper we use data on education and household space from the 1996 census.

The Matlab Maternal and Child Health and Family Planning (MCH-FP) Project provides an opportunity to shed light on the likely effect of improvements in the availability and quality of family planning services. Since 1977, the Maternal and Child Health and Family Planning (MCH-FP) Project in the treatment area has provided more accessible and higher-quality family planning services than the standard government services provided in the otherwise similar comparison area. Because of the experimental variation in family planning services, the Matlab data allow much stronger tests of the influence of family planning programmes on fertility than analyses that compare less similar areas or different time periods. The DSS provides high-quality data on fertility for assessing such effects.

Married women in the comparison area were supposed to (but did not always) receive visits every two months from female welfare assistants of the Government family planning programme who provide counselling and supply pills and condoms. In the treatment, or MCH-FP, area, until 1997 female community health workers (CHW) visited married women of reproductive age every two weeks to provide counselling about family planning services and to deliver injectables, pills and condoms at the doorstop.

Between 1966 and 1997, female CHWs employed by the DSS visited each household every two weeks in both areas to record the pregnancy status of women and any pregnancy outcomes occurring since the previous visit. Since late 1997, workers have visited every household monthly to gather these data. Beginning in 1999, the Matlab project has shifted, in a phase-wise manner, from doorstep delivery of family planning services to fixed-site services. The female CHWs currently provide family planning services from their homes, where the village women gather to receive services. In the comparison area, services are delivered from fixed-site centres.

In addition to the standard government Health and Family Welfare Centres available in both areas, the treatment area also has ICDDR,B sub-centres that provide maternal and child health and family planning services. The MCH-FP area is characterized by greater contact among clients, workers, and supervisors as well as greater availability and a broader mix of contraceptive methods than is available in the comparison area. Women in the MCH-FP area reported greater accessibility and higher quality of family planning services than reported by women in the comparison area. MCH-FP-area women were more likely to report receiving family planning service visits, to spend more time with family planning workers on such visits, and to believe they would receive good care at a health or family planning clinic (Koenig and others, 1992).

The mean desired number of children in both areas has been similar and declined at similar rates, from about 4.5 in 1975 to 3.0 in 1990 (Koenig and others, 1992) to 2.5 in 2000 (Bairagi and Datta, 2001).

In the late 1970s, contraceptive use was very low and similar in the two areas, whereas by the mid-1990s it was nearly 70 per cent in the treatment, or MCH-FP, area but below 50 per cent in the comparison area. Table 1 compares fertility rates in the two areas, and shows that fertility rates fell in both areas as contraceptive use increased. Since the 1980s, fertility rates have been consistently and significantly lower in the treatment area—the area that has better family planning services and higher rates of contraceptive use. However, DSS data show that fertility rates in the MCH-FP area have stalled since 1991 and remained at the level of 3.0 children per woman. Despite intensive and relatively high quality MCH-FP services and high levels of contraceptive use, fertility is not declining further. (In the comparison area, fertility rates have stalled at around 3.6 since 1995.) Some (e.g., Bairagi and Datta, 2001) contend that without further social and economic development it is quite unlikely that Bangladesh will reach replacement-level fertility. Contraceptive use and the TFR in the MCH-FP area have stalled for almost a decade. The project has not been able to design effective strategies that have led to further declines in fertility.

Table 1
Total fertility rates (TFR) and contraceptive prevalence rates (CPR), by calendar year in the Matlab comparison and MCH-FP areas and in Bangladesh

	Comparison area		MCH-FP area		Bangladesh	
Calendar year	TFR	CPR	TFR	CPR	TFR	CPR
1987	5.4		4.2	51.3	4.8	
1988	5.4		3.8	52.5		
1989	4.9		3.4	58.8		30.8
1990	5.0	27.9	3.4	60.6	4.3	
1991	4.3		3.0	61.1		39.9
1992	4.0	30.3	3.0	61.1	3.4	
1993	3.8		2.9	62.7		44.6
1994	3.8		3.0	65.6		
1995	3.6		2.9	68.6	3.3	
1996	3.5	46.9	2.7	68.1		49.2
1997	3.4		2.8	67.4		
1998	3.6		3.0	68.8	3.3	53.8

Sources: Matlab data are taken from the DSS; and Bangladesh data from the 1999-2000 BDHS (Mitra and others, 2001).

We use the DSS data to calculate TFRs by education and economic conditions. We group education into four categories: no education, one to five years of schooling, six to nine years of schooling, and 10 and more years of schooling. These groups are termed "non-literate", "primary," "lower secondary", and "upper secondary". Household space is taken as an indicator of the economic status of a household. We have classified households as economically low, medium, and high according to the amount of their household space.[3] Household space is likely to be positively associated with household income in Bangladesh, and numerous studies in Matlab find the association between demographic behaviours and household space (see, e.g., D'Souza and Bhuiya, 1982). The number of women-years between the ages of 15 and 49 years that are included in our analysis is shown in Appendix A for the comparison area according to education and household space. We have fairly large samples except for the upper secondary-education group; cell sizes vary from 748 to 40,000 during the 1995-2000 period.

The Matlab comparison and treatment areas are comparable in terms of both education and economic conditions (LeGrand and Phillips, 1996). In 1995, 27 and 30 per cent women had some secondary education in the comparison and treatment areas, respectively. In both areas, nearly half and more than a quarter of women, respectively, are categorized as having low and high levels of economic condition. The category "low" economic status probably represents the poor in Bangladesh. Approximately half of the households in the country are landless, and they are the poorest section of the population.

We compare group-specific total fertility rates (TFR) to data on the same women's wanted (desired) fertility. The group-specific TFR refers to the number of children a group of women are predicted to have if at each age they experience the age-specific fertility rates of their group. The BDHS calculates the TFR using the births that occurred in the three years preceding the survey. For each of the births reported in the BDHS for the three years prior to the survey, the survey asked whether or not the birth was wanted then, wanted later, or not wanted at all. The total wanted fertility rate (TWFR) includes those births for which mothers said that they wanted to have the births then or later.[4]

The BDHS also collects data on ideal family size, which come from answers to the hypothetical question "If you could go back to the beginning of your reproductive life, how many children would you have wanted?" We chose to focus on the TWFR in our analysis because it refers to a real-life situation.

ANALYSES

One of our approaches to understanding how long it will take for Bangladesh to achieve replacement-level fertility is to determine whether there is a group of women who have already achieved that level. Data from the 1999/2000 BDHS show that the TFR for women with at least five years of schooling was 2.4 (figure I). Given the level of overall mortality in Bangladesh, a TFR of 2.4 children per woman is not far from replacement.[5] By contrast, women with less than secondary education have fertility rates well above replacement level. Women with primary education and no education, on average, bear one child and two children more than those with at least five years of schooling.

Figure I also presents data on the same women's wanted (desired) fertility (TWFR). The figure shows that all educational groups of women, except those with no education, want to have around replacement-level fertility or lower. Women who have completed primary school report that they want to have 2.2 children, whereas those with some, but incomplete, primary want 2.1 children, and those with at least some secondary (more than five years of schooling) wanted to have only 1.8 children. The wanted fertility for women with no education, however, is about three children, meaning that non-literate women still have a desire for an above-replacement level of fertility.[6]

For all educational groups, the total fertility rate exceeds the total wanted fertility rate. The difference is greatest for the group with no education—the TFR exceeds

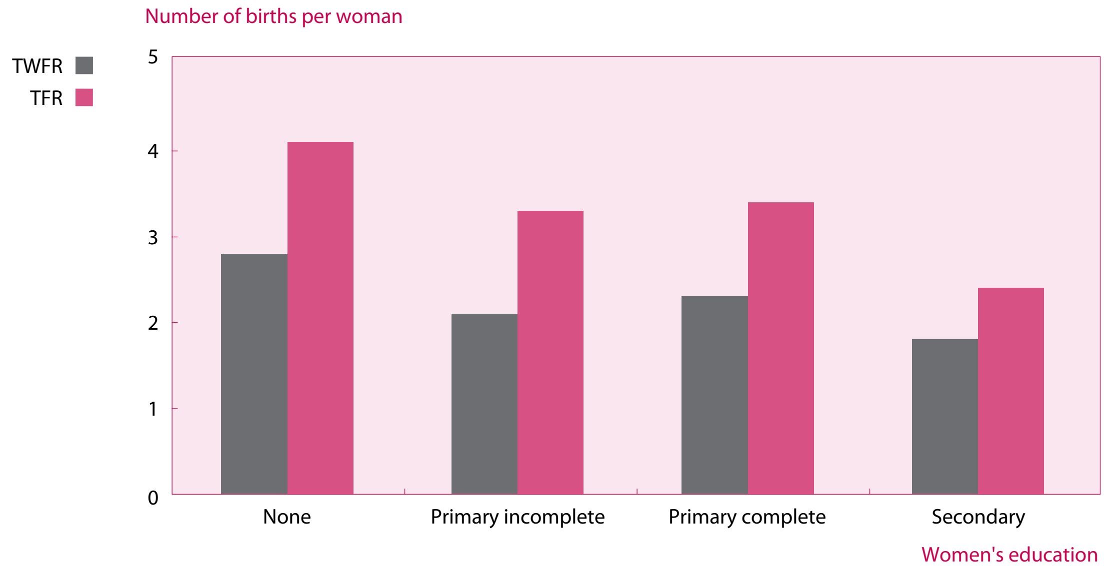
[3] "Low" represents a household space below 250 square metres, "medium" 250-349 square metres, and "high" 350 square metres or more.

[4] The total wanted fertility rate may be an overestimate of the number of children women really wanted to have, since respondents have a tendency after the fact to report children as "wanted" whose pregnancies may have been unintended at the time.

[5] About 90 per cent of newborn girls are likely to reach the mean age of childbearing in Bangladesh. This means that about 2.2 children out of 2.4 children born among educated women will reach the mean childbearing age. However, the survival rate is probably higher than 90 per cent for women with secondary education.

[6] Mean ideal family size, another measure of desired fertility, also indicates that educated women want to have a family size that is compatible with replacement-level fertility. In the 1999-2000 BDHS, average ideal family size is just 2.5 for all women in Bangladesh, and it is 2.3-2.4 for women below 25 years of age. For women younger than age 25, it is 2.2 for those women who have more than primary education and 2.4-2.5 for other women.

Figure I
Total wanted (TWFR) and actual total fertility rates (TFR) by women's education, Bangladesh, 1999-2000



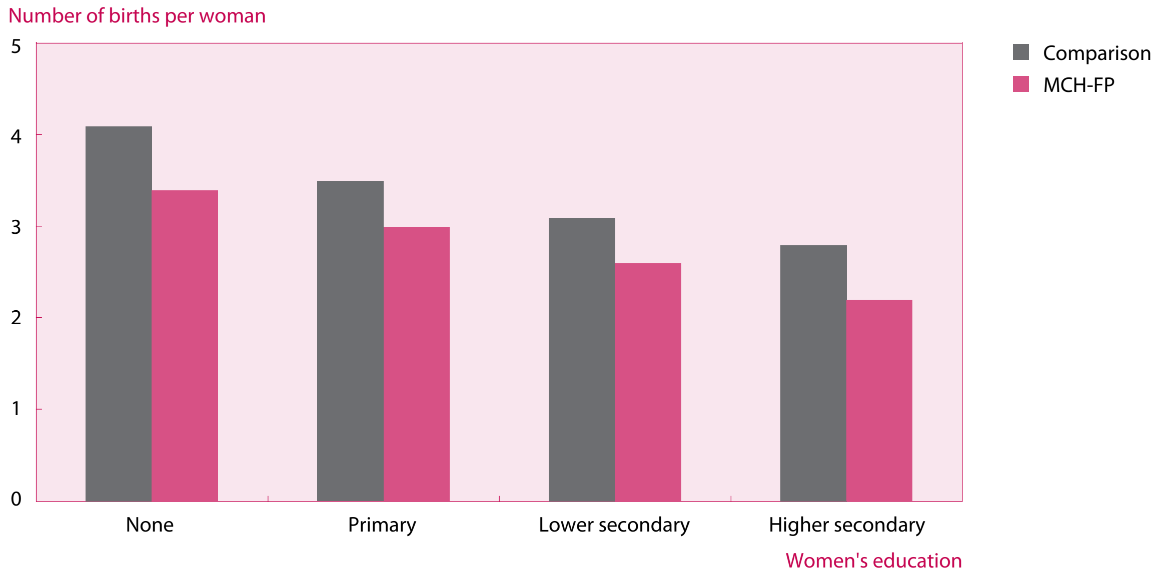
the TWFR by 1.3 children—and decreases with education to 0.6 children for the most educated group. If we can interpret this difference as unwanted fertility, we can conclude that enabling women to avoid unwanted fertility, e.g., through better family planning services, would lead to fertility rates around replacement level for all women except those with no education.[7] We should, however, exercise caution in interpreting the effect of education on fertility from these results primarily because there is a confounding effect of urbanization on the relationship between education and fertility. Educated women are more likely to be from urban areas and they may have lower fertility due to greater access to quality family planning services and other modernization effects. The BDHS data are nationally representative and include urban as well as rural women. In 2000, about 25 per cent of the population of Bangladesh lived in urban areas.

The Matlab data also show a strong relationship between education and fertility in both the treatment and comparison areas. Figure II shows for the period 1995-2000 that women in the Matlab MCH-FP area with 10 or more years of education had achieved replacement-level fertility. In both areas, women with no education have more than one more birth than women with 10 or more years of education. In the MCH-FP area the TFRs are 2.6, 3.0 and 3.4, respectively, among women with 6-9 years of schooling, with 1-5 years of schooling and with no schooling. Women in the comparison area with 10 or more years of education had a TFR of 2.8, whereas women with 6-9 years of schooling, 1-5 years of schooling, and no schooling had TFRs of 3.1, 3.5 and 4.1, respectively. In all education groups, women in the MCH-FP area had significantly lower fertility than those in the comparison area. The extent of the difference does not vary much with education, though it is larger for the uneducated group (0.7 births).

In an analysis not presented here, we compared educational differentials in fertility between the treatment and comparison areas and between time periods 1995-2000 and 1983-1986. As in 1995-2000, fertility was negatively associated with education during 1983-1986 in both areas, though fertility levels were higher at each educational level. During 1983-1986, educational differences in fertility were greater in the MCH-FP area than in the comparison area, meaning that educated women are the ones who took advantage of the newly introduced family planning services and achieved a low level of fertility before the other groups. By 1995-2000, as we observe, the educational differentials are similar for the two areas.

[7] In 2000, 40 per cent of women between 15 and 49 years of age did not have any education.

Figure II
TFR by women's education and area, Matlab, 1995-2000



The better family planning services in the treatment area are associated with lower fertility rates for women with all levels of education. Therefore, the family planning programme should focus on women regardless of their education in order to facilitate further reduction of their consistently high fertility.

The negative relationship between fertility and education is seen within each economic category as well. Data in table 2 show that, in the 1995-2000 period, women in the treatment area with 10 or more years of education had 2.5, 2.0 and 2.2 children, respectively, in the "low", "medium", and "high" economic groups (economic group being measured here by household space). In the comparison area, the comparable numbers are 2.9, 2.7 and 2.8—more than one half of a birth over replacement level.

Fertility varies with economic group, though such variation is relatively small compared to educational variation of fertility. In the comparison area, there were 3.8, 3.2 and 3.1 births per woman for those in the low, medium, and high economic groups, respectively. In the MCH-FP area, the comparable rates were 3.1, 2.7 and 2.6. Once the woman's level of education is held constant, in both areas the relationship between economic status and fertility becomes very weak. The better family planning services in the treatment area of Matlab are associated with lower fertility rates within each economic category.

The data shown above indicate that women's education is likely to be an effective social intervention for sustainable fertility decline. We now examine the trend in education in Bangladesh to see roughly how long it will take for the country to attain universal education for women and thus a fertility level that is comparable to a replacement level.

Table 2
Total fertility rates in the Matlab comparison (C) and MCH-FP (M) areas, by education and economic group, 1995-2000

	No schooling			1-5 years of schooling			6-9 years of schooling			10 years + schooling			All		
Economic group	C	M	C-M	C	M	C-M	C	M	C-M	C	M	C-M	C	M	C-M
Low	4.2	3.4	0.8	3.8	3.2	0.6	3.3	2.6	0.7	2.9	2.5	0.4	3.8	3.1	0.7
Medium	4.0	3.5	0.5	3.3	3.2	0.1	3.1	2.5	0.6	2.7	2.0	0.7	3.2	2.7	0.6
High	4.0	3.3	0.7	3.3	3.0	0.3	3.0	2.6	0.4	2.9	2.2	0.6	3.1	2.6	0.5
All	4.1	3.4	0.7	3.5	3.0	0.5	3.1	2.6	0.5	2.8	2.2	0.6	3.5	2.9	0.6

Source: Matlab DSS.

Figure IIIa
Per cent of people who have one or more years of education, by gender and year of birth, Bangladesh, 1999-2000

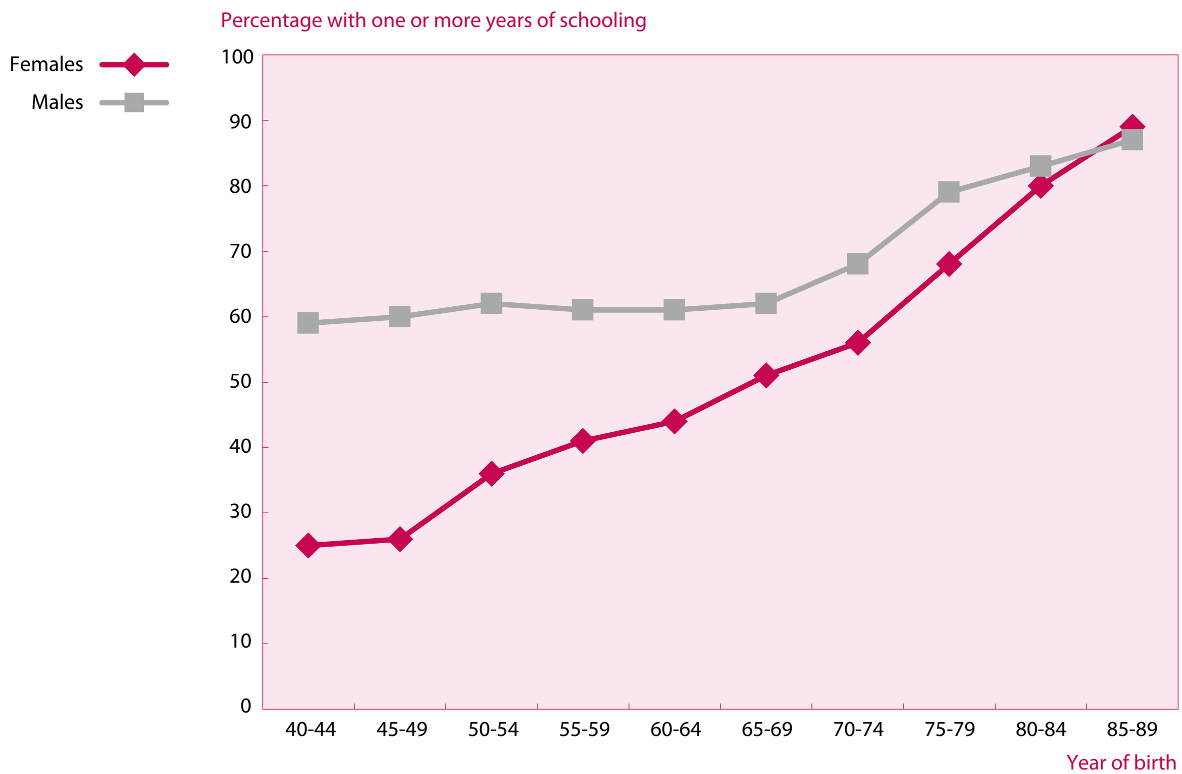
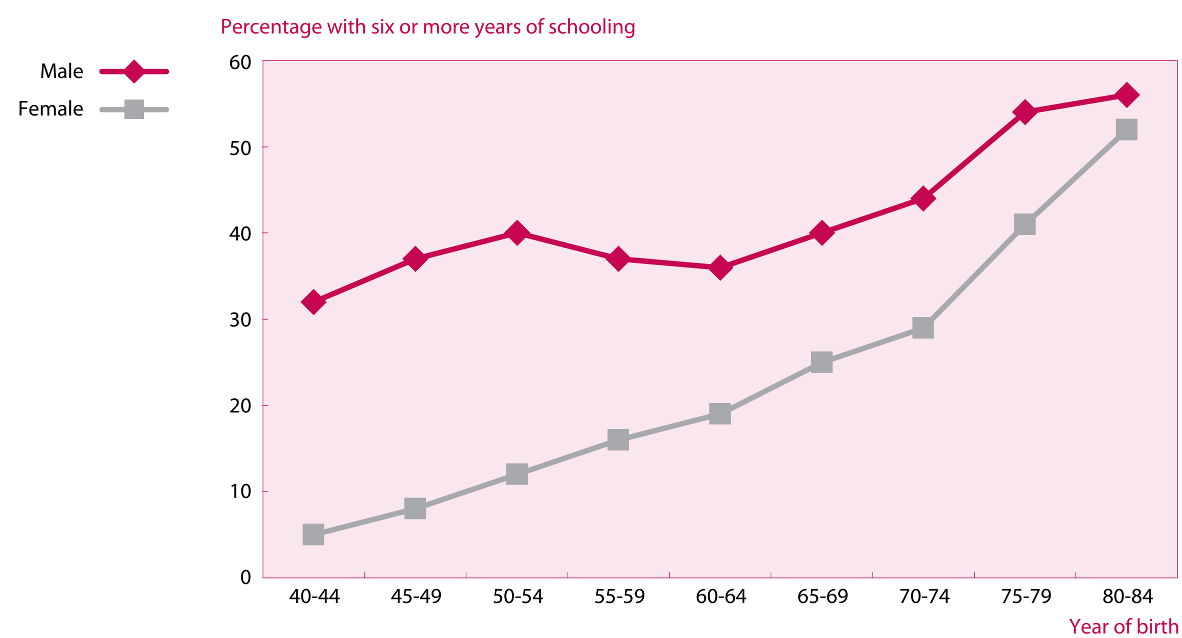


Figure IIIb
Per cent of people who have six or more years of education, by gender and year of birth, Bangladesh, 1999-2000



TRENDS IN EDUCATION IN BANGLADESH

Bangladesh has also done extremely well in raising the educational level of its people, especially women. Given its limited resources, the government has put high priority on girls' education. Primary education has always been free for boys and girls in Bangladesh. Beginning in 1994, the government Food-for-Education project has delivered rice and wheat to poor families that have kept sending their children to primary school. In 1994, the government introduced free education of girls up to the highest level of secondary education on a pilot basis. Recently, the government introduced a programme that provides scholarships to girls up to secondary education to provide economic incentives for girls to continue higher education. It is expected that the scholarships will help poor families be in a better position to provide girls with required educational materials, clothes, and transportation.

Non-governmental organizations (NGOs) in Bangladesh, especially the Bangladesh Rural Advancement Committee (BRAC), have been famous for their non-formal primary education programmes that run low-cost schools for the poor. Because poor children help in household economic activities, school timing is set in such a way that the poor can participate in both school and household economic activities. Non-formal schools emphasize girls' education by enrolling more girls than boys. Poor children are taught primary-equivalent education over a period of four years. After graduating from these non-formal schools, children can get into formal middle schools and avail themselves of opportunities for free education and scholarship programmes.

In figure III we present trends in education in Bangladesh by years of birth for those born in the last 50 years, using data on education from the 1999-2000 BDHS. We show in figure IIIa the percentage of individuals with at least one year of schooling. The education trends have several noteworthy features. First, there was a large difference between girls' and boys' education in the early days. Among those who were born in the 1940s, girls were one third as likely as boys to have some education. Second, although boys were more likely to have some education than girls, boys' education barely changed for the cohorts born in the decades of the 1940s, 1950s and 1960s, while girls' education increased steadily for those who were born during these decades. Girls' education has been increasing remarkably for those who were born since the late 1940s, and for those who were born in the recent decades since 1970, the extent of increase has been even greater. Since the early 1970s, the percentage of girls who have one or more years of education has increased by 10 percentage points in every five years. For the 1985-1989 birth cohort, the most recent one that we consider, the percentage of girls with some education has surpassed the percentage for boys.

Figure IIIb shows trends of six or more years of schooling. The percentage of the population with that level of education has increased dramatically in Bangladesh, especially for women, for whom the growth has been exponential. Only about 5 per cent of the cohort that were born in 1940-1944 had six or more years of education. In contrast, over 50 per cent of women in the birth cohort of 1980-1984 have six or more years of schooling. Men's education has improved over the period under study, but at a much slower pace—from over 30 per cent to nearly 55 per cent.

In what follows, we examine trends in women's education since we observe a strong and negative education-fertility relationship. Fertility will decline in the future due to increases in women's education. Also, according to BDHS data, when women have education beyond primary education level, they are likely to have replacement-level fertility. In the Matlab treatment area where contraceptive use is high due to greater accessibility and better quality of services, women with higher secondary education have achieved replacement-level fertility. An understanding of educational improvement is likely to help policy formulation for social development and fertility reduction. Since accessibility to education is associated with households' economic status, we examine education trends by economic status.[8] In the next two figures, we show how the education of women aged

[8] We consider the woman's household space at the time of the 1996 Census. This is not necessarily the household-space group that was pertinent for the woman at the time when she was attending school.

Figure IV
Per cent of women who have one or more years of education by year of birth and economic group, Matlab comparison area, 1995

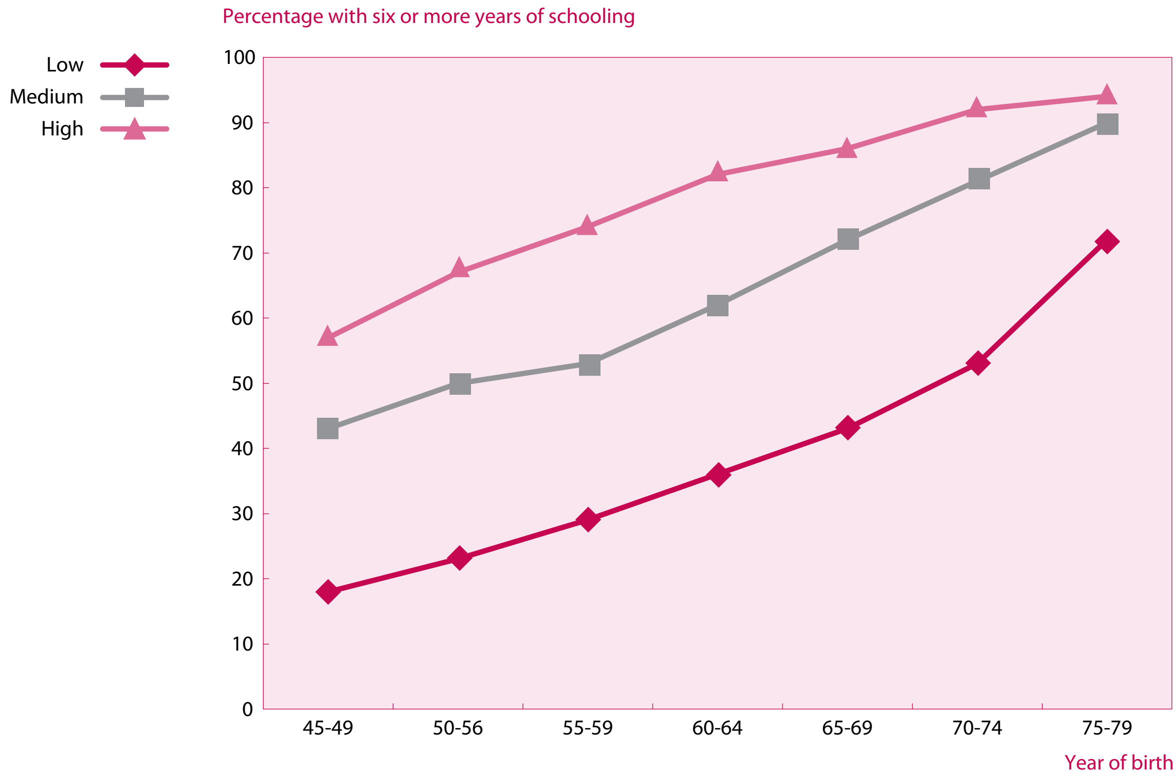
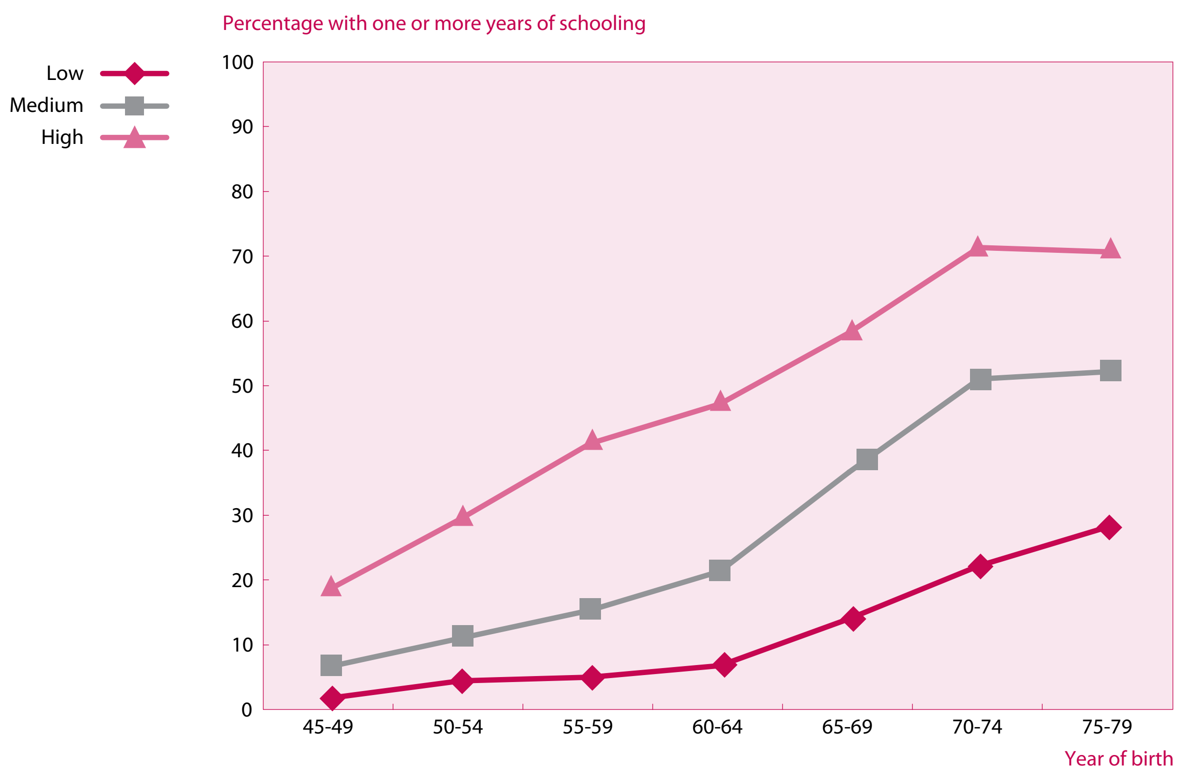


Figure V
Per cent of women who have six or more years of education by year of birth and economic group, Matlab comparison area, 1995



15-49 improved for those in the Matlab comparison area who were born over the period 1945-1979. The reader should be reminded that the two Matlab areas are comparable in terms of education and economic conditions. As we noted earlier, 27 and 30 per cent of women in the study have more than primary education in the MCH-FP and comparison areas, respectively. Similarly, 48 and 43 per cent of women are in poor economic groups, respectively, in these areas.

Figure IV presents data for women similar to that in figure III, but separately for our three categories of household space, for five-year birth cohorts beginning with those born between 1945 and 1949. Figure IV shows that the percentage of women with at least one year of education has increased over time (i.e., is higher for those born more recently) for all three economic groups. For each birth cohort, the percentage of women with at least one year of education is highest for those with the most household space and lowest for those with the least household space. The increases in percentage of women with at least one year of education have been greatest for those with the least household space and, as a result, the differences among the economic groups have shrunk over time. For example, for those born between 1945 and 1949, 57 per cent of those in the highest economic group had at least one year of schooling compared with 42 per cent of those in the medium group and only 18 per cent of those in the low group. For the 1975-1979 birth cohort the comparable percentages are 93 per cent, 90 per cent and 72 per cent (which is four times the percentage 30 years earlier for this group). The two higher economic groups had nearly reached parity for the youngest birth cohort that we consider.

Figure V shows that the percentage of women with at least some secondary education also increased considerably for all three economic groups. For the highest economic group, the percentage of women with at least some secondary education increased to a level for the 1975-1979 birth cohort that was 3.5 times that for the 1945-1949 birth cohort. The difference between these two birth cohorts was around 10 times for the lowest economic group. However, for this measure, substantial economic disparities remain. Over 70 per cent of the youngest cohort of high economic group has more than five years of education, while only 28 per cent of the low economic group have achieved such a level of education. On average, about 45 per cent of the youngest cohort has secondary education. It is likely that it will take a while for women of all economic groups to achieve a secondary-level education. The "free education for girls" and "scholarship for secondary education of girls" programmes of the Government will reduce the economic disparity of educational achievements of girls, but this will take time.

We wanted to see how long it would take for all Bangladeshi women of reproductive age to have six or more years of education. We use the rate of change in the educational experience of the cohorts of women who comprise our Matlab sample. The projection implies that all women aged 15-49 will have more than primary education in 2025. Under the assumption that women with six or more years of education will have replacement-level fertility, as was the case in the 1999-2000 BDHS, it may be possible that Bangladesh will have the replacement-level fertility by 2025. However, the Matlab experience shows that among rural women, only those with 10 years of education and with good-quality family planning services, as has been the case in the Matlab MCH-FP area, currently have the replacement-level fertility. Under such a scenario, it may take a longer time.

DISCUSSION

In this paper, we have investigated whether there are particular socio-economic groups that have already achieved replacement- or nearly replacement-level fertility in Bangladesh. Using national data, we find that women who have more than five years of education have almost achieved this level of fertility. We also find that female education is increasing rapidly in Bangladesh. According to our projection based on the Matlab experience of educational improvement, virtually all women of reproductive age in Bangladesh will have at least some secondary education by 2025. By this time the country should reach replacement-level fertility. However, the Matlab experience suggests that it may not be the case unless there is an improvement in family planning services that will lead to higher and efficient use of contraception. Therefore, our study indicates that improvements in both education and family planning services should receive priorities in policies. Education is important for reducing fertility (and also infant and child mortality), as well as in its own right for improving the human capital (and economic potential) of the population. Family planning services can help women avoid unintended pregnancies and the abortions that sometimes follow them (Rahman and others, 2001).

We find that there is a substantial amount of fertility that is excess of desired fertility. Excess fertility is higher among women with no or little education. Family planning programmes can play a crucial role, especially among the women with no or little education, in reducing the gap between desired and actual fertility. Fertility among the educated could reach below replacement level if family planning programmes would be stronger; in the late 1990s educated women desired below-replacement fertility and wanted to have about half of a birth less than they actually had.

We observe that women in the area of Matlab with more accessible and better-quality family planning services had lower fertility than those in the otherwise-similar area with standard family planning services. However, fertility in the former area has stabilized at a TFR of 3.0 children per woman. This suggests that replacement-level fertility cannot be reached through a "supply" approach alone (or at least not the approach currently being used in the MCH-FP area). The family planning programmes' challenges lie in effectively addressing the disadvantaged (i.e., less educated) group of couples who have a large extent of undesired fertility rates.

Bangladesh's health and family planning programmes are improving steadily, but there is room for further improvements in the accessibility and quality of services. There are many low-performing subdistricts where simply greater access to services should increase contraceptive use (and reduce fertility). The effectiveness of contraceptive use can be improved both by changing the method mix toward more effective methods and by reducing discontinuation rates. The pill is the dominant method used in Bangladesh, followed by the injectable. However, continuation of these methods and other temporary methods is low. About half of pill or injectable users discontinue use of their methods within 12 months of beginning (Mitra and others, 2001). About one fifth of users use traditional methods, which have high failure rates. In addition, the use of permanent methods of contraception is on the decline. During 1999-2000, 7.2 per cent of couples were using permanent methods, while the comparable figure in 1991 was 10.3 per cent. Carefully designed strategies with better counselling and supervision should lead to increases in contraceptive adoption and continuation and hence should further reduce fertility.

Bangladesh society is undergoing phenomenal changes. The perceived utility of children is changing, and there is little doubt about the impact of parents' education on this. The medium-variant scenario of the United Nations projection of fertility indicates that Bangladesh will achieve replacement-level fertility around 2025 (United Nations, 2001). This does seem to be a likely scenario for Bangladesh. Our rough projection, based on the projection of women's education, also indicates that this may be the case.

Our projection assumes that levels of education will change, but that education-specific fertility rates will not. However, education-specific fertility rates have declined in Bangladesh and, in the future, other factors may also help to accelerate further decline in fertility by reducing fertility rates within education groups. Bangladesh already has very high population density, and high population growth will continue for years to come because of momentum. Rapid urban growth, shifts in agricultural structure, economic improvement, women's employment, and many other social and economic changes may accelerate the transition, meaning that replacement-level fertility may be reached before the time period we project. It may also, for example, be possible that women with secondary education will begin to have below replacement-level fertility, as indicated in their wanted fertility. In the future, more and more women will be in the secondary-education category. This process may shorten the time required to achieve replacement-level fertility. According to the United Nations low variant, replacement-level fertility may occur about 10 years earlier than the time frame the United Nations medium variant (and we) projects. That may indeed be the case if social, economic or other changes drastically affect the value or cost of children and reduce fertility rates within women's education groups. Improvement in family planning programmes may hasten the transition to replacement level as well.

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Appendix A

Distribution of Matlab comparison-area women-years by education and economic group, 1995-2000

Economic group	No schooling	1-5 years of schooling	6-9 years of schooling	10 years + schooling	All
Low	40 164	20 746	6 278	748	67 936
Medium	12 451	13 771	8 038	2 109	36 369
High	8 109	12 792	11 689	4 564	37 154
All	60 724	47 309	26 005	7 421	141 459

Source: Matlab DSS.

What will happen to Brazilian fertility?

*Ana Maria Goldani**

BACKGROUND

Despite the absence of an official family planning policy, demographic changes in Brazil occurred at an unprecedented pace in the second half of the twentieth century, ushering in an era with total fertility rates near the replacement level. According to the population censuses, the total population in Brazil was 52 million in 1950 and 170 million in 2000. This reflected a mean annual growth rate of about 3 per cent at the beginning of the period, which fell to 1.5 per cent per year in recent years. Brazilian life expectancy at birth increased from 44 to 68 years and the total fertility rate declined from 6.2 to 2.2 in the same period. The changes in life expectancy and in the total fertility rate were pervasive, extending through all social strata, ethnic-racial groups and regions, transforming the "average" life course and family structure for Brazilians. Although the demographic components of such changes are well known, there are currently no integrated explanations for their rapid pace.

Several authors have discussed the multiplicity of factors underlying Brazil's rapid fertility decline and reviews of these studies mostly agree that despite important contributions, we still lack of a full understanding of the phenomena. Martine's revision of the studies points to a consensus that several institutional actors, including the State, the Catholic Church, women's movements, the Population establishment and health sector professionals contributed to fertility decline but that their influences were mainly unanticipated and unintended. He also notes that many studies have focused on the effects of "modernization", generally confirming the inverse relation between fertility and both income and education although they are less clear about the impact of women's labour force participation. The urbanization process was another important factor contributing to the acceleration of the fertility decline "because it is associated with a wide range of social, economic and political changes that transformed the country during the last half-century" (Martine, 1996).

During this period, the State led import-substitution industrialization model, which characterized the growth regime of the Brazilian economy from the 1950s until the 1970s, entailed an active—even if not very efficient—role of the State in the provision of basic goods and services. In the late 1970s and especially in the early 1980s, with an economic crisis, most of the social protection systems began to show signs of deterioration and even collapse, consequently generating further social exclusion. At the same time, the pattern of urban industrial growth with social exclusion generated a Brazilian mass and consumer society as Faria (1991) describes. Governmental policies regulating direct consumer credit, telecommunications, social security benefits and health care led to a "real or symbolic integration of the population in a consumer market", which have changed individual behaviour, including increasing the demand for marital fertility regulation (Faria, 1997/1998).[1]

Among the challenges to Brazilian demographers in analysing their country's fertility behaviour over time is the great regional diversity that has characterized its development. Recent findings for regions show a strong and consistent relationship between

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[1] As an unexpected consequence of these polices there was a growing demand for fertility regulation among women, which was met mostly by the market and less so by non-governmental family planning agencies. The number of oral pills purchased annually increased from a 1.7 million cycles in 1960 to 61.2 million in 1980. The absence free governmental family planning services and the high cost, high falure rate and collateral effects of pills led to a general disrepute of reversible contraceptive methods. Along with the risks from illegal abortion, this opened the way for sterilization to become the preferred method of contraception in Brazil (Corrêa, et al., 1998).

fertility decline and measurable changes in social and economic circumstances between 1960 and 1991. For instance, they show the relevance of changes in mother's schooling and household electrification on the pace of fertility decline throughout the transition (Potter and others, 2002). During the same period, growing women's participation in the labour market and women's education increased, which are closely correlated with period and cohort-fertility decline (Lam and Duryea, 1999; Rios Neto, 2000). High levels of social inequality along with substantial social mobility characterize Brazilian society and seem to be important factors for understanding recent fertility trends (Pastore and Silva, 2000)[2] but these factors seem to have lost significance for demographers[3] given the widespread and rapid pace of fertility decline, largely attributed to female sterilization. Female sterilization among Brazilian married women rose from 27 to 40 per cent in the period 1986-1996 and oral contraception remained the only other widely used modern method or birth control (BEMFAM, 1997).

The critiques of feminists[4] that such structural explanations overlooked the high costs paid by women for the fertility transition through sterilizations, Caesareans and clandestine abortions,[5] led demographers to pursue these as new explanations for fertility decline. Although sterilization emerged initially among the upper class in Brazil, it is common today in all classes, generations, racial groups and other segments of society, leading to a "culture of sterilization" (Berquó). The prevalence of pairs of mothers and daughters or sisters who have been sterilized increases in number with educational level, although it is present as well among women with no education" (1999a)".

Demographers have also concluded that the adoption of new contraceptive technologies in Brazil is not a result of individual choices but of "collective processes", where doctors appear to have played an important role in the choice process and to have been heavily influenced by the behaviour of the community of medical doctors (Potter, 1999; Caetano, 2001). Potter notes that in the early years of fertility decline, as Brazilian medicine and public health policy changed from prevention and control of diseases to specialized, hospital-based curative care, women increasingly demanded surgical interventions including sterilization in private hospitals affiliated with the social security system. Aside from women's growing demand for birth control, doctors and hospitals in the public system encouraged Caesarean deliveries since they were paid double to perform these procedures compared to vaginal deliveries.[6] Thus, many Caesarean sections were unnecessary and in 1996, they accounted for fully 71 per cent of all Brazilian sterilizations. While in the majority of Brazilian regions, sterilizations are more likely to be performed during a Caesarean delivery and paid by the patient, in the north-east a larger fraction of non-Caesarean sterilizations were performed and the majority of them, 70 per cent, were paid for by politicians and doctors (Caetano, 2001).[7]

Therefore a general explanation for sterilization in Brazil is that it is the "result of the association of an increasing demand for contraception along with the absence of effective public policies, and poor birth control options, the influence of doctors amidst the diffusion of a hospital-based curative medicine, and the pervasiveness of political behaviour in which politicians provide goods and services to the poor in exchange for votes [as in the specific case of the north-east region]" (Caetano, 2001).

By emphasizing the need for a historical reconstruction of the various ways in which changes in social roles, purposes, motives and intentions are crucial to understanding the processes and causes of fertility change in Brazil, I suggest that although the mid-1960s may be an important turning point towards a generalization and acceleration of the process of decline, it does not represent its onset as frequently mentioned in Brazilian studies.[8] Furthermore, I conclude that the hygienist medical discourse in the middle of the nineteenth century, reinforced by the eugenics movement at the beginning of twentieth century, and the contraceptive revolution in the 1960s was socially absorbed and legitimated by what Brazilians believed it could offer. I also maintain that through this complex interaction, an interesting set of elements emerges pointing towards a profile of

[2] In 1998, a Human Development Index of 0.74 for Brazil reflects a series of indicators such as: a poverty rate of 28 per cent, an average per capita income of about 250 US dollars per month and income inequality that is the highest in the world among major countries.

[3] Studies concerned with differences by social strata and the rapid proletarianization effects on Brazilian fertility behaviour are mostly from the early 1980s.

[4] In the 1980s Brazilian feminists already noted the growing demand for fertility regulation among poor women, the precarious services of family planning and health services as well as the role of illegal abortion and the inequality of gender. At the same time feminists also called attention to demographers about the need to consider the experiences and motivations of women in the analysis of the demographic transition in Brazil (Correa, Piola and Arillha, 1998).

[5] Estimates of abortion for Brazil in 1996 vary between 800 thousand and 1.1 million. About 262,000 of these women received medical attention in public hospitals (SUS) due to post-abortion complications, which represented the fifth cause of obstetric hospitalization. It is Important to note that abortion complications represent 9 per cent of maternal mortality (Formiga, 1999).

[6] In the late 1970s in response to the rapid increase in the rate of Caesarean deliveries, the government schedule for reimbursing deliveries was adjusted so as to reduce and eventually eliminate the premium paid for Caesarean as compared to vaginal deliveries. However, until 1999, hospitals affiliated with the public system received about 2.4 times more for C-section procedures compared to vaginal deliveries (Caetano, 2001).

a policy affecting population reproduction that go beyond contemporary neo-malthusian conceptions or measures aimed to control population growth (Goldani, 2001).

Also, through the institutional arrangements and interactions I described, there are relevant indications of how gender systems; labour market practices and aspects of the national legal administrative system have constrained women's reproductive behaviour. Women's movement victories since the 1970s, in part encoded in the Brazilian Constitution of 1988, changed the official perspective on family and reproduction. Since then, Government and civil society has been instrumental in creating, both legally and in practice, more equality and equity between men and women. However, as the discussions about sterilization practices show, there continues to be an enormous gap between the legal victories and actual life conditions.

PERSPECTIVES ABOUT FUTURE FERTILITY FROM BRAZILIAN DEMOGRAPHERS

Recent declines in Brazilian fertility, the continued use of sterilization as the main mechanism of fertility control and their concentration at early ages have led to a consensus in the demographic community that Brazilian fertility will soon be below replacement. There is little disagreement among Brazilian demographers that fertility in Brazil will reach below replacement levels in the next decade although the official projections maintain that total fertility rates will be around replacement levels by 2050. There are different views regarding the pace and levels at which below replacement fertility rates could be reached. Moreover, there is no agreement about the irreversibility of this tendency or for how long Brazilian fertility rates will be below replacement.

The facts are that the recent steep fertility decline from 4.3 in 1980 to 2.2 in 2000 comes with increasing female sterilization among young married Brazilian women, which rose from 4 to 11 per cent for women age 20-24, between 1986 and 1996 (BEMFAM, DHS 1986, 1996). Also, a steep decline in infant mortality from 116.9 in 1970 to 44.1 in 2000 contributed to the decline in fertility and increase in life expectancy. However, a large increase in mortality among young men 15-34 from external causes during the 1980s limited the gains in male life expectancy and increased the gender gap. From 1991 to 2000, male life expectancy increased from 62.6 to 64.8 while females increased from 69.8 to 72.6 (IBGE, 2002).

Below replacement fertility rates are already part of the demographic regimes of almost all Brazilian metropolitan areas, ranging from 1.8 in Belo Horizonte to 2.2 in Curitiba, compared to an average of 2.4 for Brazil in 1999. Seven of 10 married women in metropolitan areas that use some form of contraception have chosen sterilization for themselves or their partners (Wong, 2001). This high rate of sterilization may also explain the lack of a correlation between fertility and infant mortality among metropolitan areas. For instance, the metropolitan area of Salvador (Bahia) had one of the highest infant mortality rates (62 per thousand) and one of the lowest total fertility rates (1.8 children).

Table 1
Demographic indicators for Brazil as established and projected by the Government of Brazil, 1970-2050

	Censuses Projections					
Indicators	1970	1980	1991	2000	2025	2050
Total fertility rate	5.76	4.35	2.61	2.20	2.06	2.06
Infant mortality	116.9	69.1	44.1	33.8	24.2	15.1
Life expectancy at birth	52.7	61.8	65.9	68.6	71.0	73.6
Per cent less than Age 20	53.1	49.7	45.0	39.1	29.9	25.7
Per cent more than Age 65	3.1	4.0	4.8	5.0	9.6	16.2
Population in 1000s	93 140	119 003	146 825	170 143	216 952	238 162

Source: Instituto Brasileiro de Geografia e Estatistica (IBGE), various statistical yearbooks, censuses and population projections.

7 The north-east region is one of the five macro-regions of Brazil and represents 43 per cent of the Brazilian population in 1996, with 36 per cent living in rural areas. This region is considered as being the poorest in the country with the highest inequality. Fertility decline in this region lagged behind, at least a decade, compared to the other four macro-regions of Brazil. While the north-east total fertility rates declined from 6.1 to 3.1 in the period 1980-1996, the rates declined from 3.6 to 2.3 and from 3.2 to 2.1 respectively in the south and south-east, considered the wealthiest regions. In the central-west region, the total fertility rate declined from 4.5 to 2.3 and in the north region the total fertility declined from 6.4 to 2.7 (Carvalho,1997/1998).

8 Here it is important to mention that although some fertility studies note that fertility declined since the beginning of the twentieth century, most studies continue to emphasize the 60s as the onset of Brazilian fertility. See for example Leone and Caetano, 2002.

Recent estimates and projections of total fertility rates by cohort and period suggest that fertility for Brazil will continue to decline and will soon reach sub-replacement levels. A concern among Brazilian demographers that the exclusive reliance on the conventional age-based total fertility rate (TFR) and period measures might contribute to the confusion about whether the current trends are real or short-term fluctuations led to the generation of cohort age-fertility rates. The most recent findings confirm a systematic decline of fertility by cohort during the twentieth century with a total fertility rate of 6.9, 5.8 and 4.2 for cohorts of women beginning their reproductive periods, respectively, in 1903, 1933 and 1963 (Horta and others, 2000). Another study projects fertility rates by cohort and suggests that total fertility rates below replacement (1.9) will be reached by women that began their reproductive years in 1988.The projection of fertility in the same study shows a total fertility rate of 2.0, 1.8, 1.6 and 1.5, respectively, for the years 2000, 2005, 2010 and 2015 (Carvalho and others, 2000).

The expectation that low fertility will endure in Brazil, thus leading to long-run demographic decay, could be unwarranted according to a few demographers. They believe that we may merely be experiencing the trough of a long-term cyclical movement and population changes are moving into a largely unknown future. For some analysts, average fertility level tells only part of the story of low fertility. Following this hypothesis and closely related with the "demand side" interpretation of future fertility, a study based on the 1996 DHS notes the importance of the desired or ideal family size in different regions. For instance, the ideal number of children varies only between 2.4 in Rio de Janeiro and 2.8 in São Paulo and the north-east and the proportion of women who declared an ideal of two children varies from 47 per cent in Rio to 37 per cent in the north-east. Also, a substantial number of women declared their ideal number of children to be higher than two. In São Paulo, 29 per cent declared an ideal of three children and in the north-east, 28 per cent of the women desired four children. The study also found that a high proportion of north-eastern women without children, 24 per cent, had no desire to have any children but among women with one living child, about 68 per cent wanted to have another (Camarano and others, 1999).

In discussing the prospects for future fertility in Brazil in this paper I conducted a survey of expert Brazilian demographers[9] (EBDs) in January 2002. Five questions were asked, which I translate in footnotes throughout the text. The first two questions asked EBDs their opinion about trends in Brazilian fertility behaviour, including whether fertility levels will reach below replacement levels.[10]

Most of the EBDs agreed that Brazil could follow the patterns experienced by the more developed countries, i.e., attaining below replacement fertility levels. Rios Neto suggested that Mediterranean countries (Italy, Portugal, Spain and Greece) are the closest models for Brazil because of common cultural roots and their type of "welfare state" although differences in the patterns of nuptiality and fertility need to be considered. Similarly, Sônia Corréa also claims that the experience of the Mediterranean countries is similar to Brazil's. She argues that they share the Catholic ethos and a general pattern of gender inequality in comparison with Northern Europe. Also, in Mediterranean countries, support from the State for women's reproductive health and gender equity programmes was weaker, including the illegality of abortion (except in Italy where abortion has been legal since the 1970s).[11]

Some EBDs were more emphatic than others regarding the tendency toward below replacement:

- For sure Brazilian fertility rates will reach below replacement (KB).
- There is no doubt that Brazilian fertility rates will reach below replacement as soon as the first decade of the twenty-first century (JAC).
- Brazilian fertility rates will be below replacement but they will also fluctuate (FRA).

[9] Identified EBDs as Brazilian demographers that had a track record of study in fertility and/or population projections. I consulted 10 persons that I considered EBDs (Expert Brazilian Demographers), of which eight responded. All respondents suggested general tendencies in Brazilian fertility and six provided specific estimations of total fertility rates. Those that responded are Ana Amelia Camarano (*AAC*) of the Instituto de Pesquisas de Economia Aplicada (IPEA), Eduardo G. Rios-Neto (*ERN*) of the Centro de Desenvolvimento e Planejamento Regional (CEDEPLAR), Elza S. Berquó (*EB*) of the Nucleo de Estudos de População (NEPO), Fernando R. P. de Albuquerque (*FRA*) of the Instituto Brasileiro de Geografia e Estatistica (IBGE), José Alberto M. de Carvalho (*JAC*) of CEDEPLAR, Kaizô Beltrão (*KB*) of the Escola Nacional de Estatistica (ENCE), Laura R. Wong (LRW) of CEDEPLAR, and Sônia Corréa (*SC*) of the Instituto Brasieiro de Análises Sociais e Econômicas (IBASE).

[10] The questions were: No. 1. "Will Brazilian fertility rates follow the trends of so-called developed countries, i.e., reach below replacement levels? Or will Brazilian fertility rates stabilize at a level about replacement levels?" and No. 2. "What is your opinion of Brazilian fertility behaviour in the next 50 years?"

[11] In fact, by the end of 2001, six women were condemned for the crime of abortion in Portugal.

Others, although agreeing with the tendency toward below replacement, stressed the particularities and difficulties of estimating Brazilian fertility:

- Brazilian fertility rates will follow the experience of developed countries except with its peculiar dynamic of highly concentrated fertility at younger ages. Changes to a pattern of late fertility as in developed countries is possible in the medium term but this is not guaranteed (ERN).
- At a certain point in time, there is no doubt that fertility rates below replacement will occur. Even being conservative, I would say that this is already happening for about 30-40 per cent of the Brazilian population. For the entire country, it is possible that below replacement will be reached in the next five years. Also, since Brazil still has sub-groups of population with relatively high mortality levels, a TFR above 2.1 for them may imply intrinsic rates of growth that are already below zero (LRW).
- It is difficult to think about fertility below replacement because the regional heterogeneity is masking the average fertility trends for the country. While fertility rates in regions like São Paulo and Rio de Janeiro seem to be close to below replacement levels. I do not think the north-east, a large region with the highest fertility rates, will reach below replacement (AAC).
- If we take a regional example like Rio de Janeiro, it does not seem absurd to think of a strong trend towards “sub-replacement”. Also we should consider the relative weight of the phenomena of “youth waves” in the Brazilian population structure and their potential contribution to future population projections” (SC).

PREDICTING TOTAL FERTILITY RATES: 2000-2050

In a question about Brazilian fertility behaviour in the next 50 years, six of eight EBDs responded that total fertility rates would continue declining to below replacement levels while one EBD believed that fertility would oscillate around replacement levels. Two in the group of six considered the possibility of a slight increase at the end of the 50 years although they do not expect rates to recuperate to the replacement level.

When asked to specify the average total fertility rates for three periods during the next 50 years, six of the eight EBDs responded.[12] Their answers are as follows:

Years	JAC	ERN	LRW	FRA	KB	AAC
2000-2005	2,0	1.9	2.1	2.3	2.4	2.1
2005-2025	1,8	1.3	1.8	2.1	1.9	1.7
2025-2050	1,8	1.7	1.5	1.9	1.6	—

These demographers also offered justifications for their predictions, as requested.[13] They provided a combination of methodological and substantive reasoning. The assumption of the past tendency of decline is common as an explanation for the estimated rates for the period 2000-2005 (KB, AAC, ERN, JAC, FRA). Other justifications included the convergence of behaviour among social groups and regions (JAC, FRA), increases in the female educational level, which is highly correlated with the fertility rates (ERN), and a continuing precarious socio-economic situation for larger segments of the population (LRW).

In the 2005-2025 period, when below replacement rates are estimated by the majority of EBDs, the estimated rates result “from a logistic regression model of projection” (AAC, KB), or the convergence of behaviours since “fertility rates among middle and high income groups were already 2.1 in 1970” (JAC). Other justifications are that it

12 Question No. 3 was “What is your estimate of the average fertility rate in the following periods: 2000-2005, 2005-2025, 2025-2050?”

13 The survey question No. 4 was “Why do you think these will be the average expected fertility behaviours in each of the periods?”

would be difficult to revert the tendency toward below replacement "without structural changes and in the absence of a strong public policy intervention directed through an increase of a contraceptive mix that could work in the direction of spacing instead of stopping fertility" (ERN, LRW). For the 2025-2050 period, fertility rates could increase, decrease or remain stable with respect to the previous period. Some believe that potential recuperation of the rates (not necessarily recovering to replacement levels) could be a result of long-term public policies but especially due to the externalities associated with the social security system and the labour market (ERN); or the result of the globalization of mass media systems and the economy (LRW, KB).

BRAZILIAN POPULATION PROSPECTS: THE UNITED NATIONS POPULATION DIVISION SCENARIOS

In considering the "reasonableness and soundness" of the assumption of future fertility used by the United Nations Population Division (UNPD) to produce its projections for Brazil, my first conclusion is that their medium variant is overly cautious about the speed of fertility decline. The UNPD estimate for Brazil for the next 50 years, in the medium variant, is greater than that expected by EBDs and recent findings. If fertility is the key determinant of Brazilian population growth then it seems that the UNPD low variant better fits the Brazilian situation.

The UNPD medium variant for Brazil assumes total fertility rates near the replacement level, varying from 2.15 to 2.10 over the course of the period 2000-2050. In this "variant", infant mortality is expected to drop systematically, from 38 to 8 per thousand and life expectancy at birth would increase from 68 to 77 years for both sexes. Net migration is considered zero and then growth rates will decrease from 1.22 to 0.32 per cent per year between 2000-2050.

Thus, most EBDs would agree with the UNPD that the Brazilian TFR is near the replacement level in the 2000-2005 period. However, most also expect below replacement levels to be reached by 2025, contrary to the UNPD's expectation of stabilization at replacement levels. These opinions are reinforced by findings in which fertility rates below replacement were in place in almost all metropolitan areas by the year 2000, which collectively represent 30-40 per cent of the country's total population. Therefore, the main differences between the scenarios presented by the UNPD (medium variant) and by Brazilian demographers stem from the distinct pace of fertility change and population growth in their respective projections. As I observed, the UNPD low variant for Brazil, with its below replacement fertility rate of 1.83 in the initial period of 2000-2005, followed by a TFR of 1.6 until 2050 would better fit the recent findings and opinions of the majority of EBDs.

The slowing rates of Brazilian population growth result primarily from declining fertility. Although the rise in life expectancy at birth, from 49.3 to 67.0 years between 1950-2000 has contributed to population growth, the effect of declining fertility has been greater than the effect of increasing life expectancy. Despite the decline in growth rates, population growth is expected to continue because of the high growth rates of the past. Thus, the population of Brazil will continue to increase even as fertility declines. UNPD's most recent revision of projections to 2050 estimated a total population, in the medium variant, of 247 million, or an increase of 45 per cent compared to 2000. Because the UNPD medium estimates of fertility were so different from the recent findings and opinions of Brazilian demographers, I decided to look at other recommended projections for Brazil. I compare the UNPD medium variant with the U.S. Census Bureau (USCB) projection for Brazil because the latter assumes fertility to reach below replacement by 2005, which is closer to the recent findings and opinions of most EBDs. Also, the two organizations used similar sources of data and processes for estimating demographic variables.[14]

[14] The UN and the USCB rely on the same data sources and generally use similar techniques to estimate demographic parameters. The United Nations makes its new estimates and projections every other year and the Bureau of census revises its projections once a year and updates the International Data Base (IDB) at least twice a year. There are differences in the software used in the projections. However the USCB notes how their projections differ from the UN projections: "significant differences in projections of population 20 or 30 years into the future are unlikely to be attributable to differences in computer software. Anything other than minor differences in projections are much more likely to be due to: differences in availability of country data to the two organization; differences in the assessment of data quality and differences in estimates based on country data made by United Nations and USCB analyst teams; differences in institution-specific protocols in terms of the way projections are made of fertility, mortality and international migration" (U. S. Census Bureau, 1999, B-16-17).

HOW THE UNPD PROJECTIONS FOR BRAZIL DIFFER FROM THOSE OF THE USCB

The contrast between the UNPD's and USCB's recommended projections for the total population of Brazil is striking. By 2050 the difference in the estimated population for Brazil is 20 per cent or 40.5 million people more in the UNPD than in the USCB projection (see figure I). Although the two projections assume similar jump-off values for total fertility (TFR = 2.1), they make different assumptions about the pace and level of fertility decline over the course of the 50 years from 2000-2050. As table 2 shows, the USCB assumed that Brazil's TFR will be below replacement as early as 2005 and a TFR of 1.7 will endure over the course of the 2025-2050 period. The UNPD assumes fertility will remain at replacement levels (TFR = 2.1) throughout 2000-2050. Although subjective elements are always factors in model choice, for these first years the assumptions are relatively "objective" and the projections produce similar results. In contrast, for more distant years, all population forecasts involve judgement, making them especially subjective.

Also, the UNPD and the USCB project different age structures at different intervals. According to the UNPD projection, by 2025, 47.2 per cent of the Brazilian population will be "dependent" ages (less than 20 and more than 65 years of age) compared to 34.7 per cent for the USCB. This difference of 12.5 per cent, or more than 20 million people, is mostly for young, dependents (10 of the 12.5 per cent difference) and apparently results from the UNPD's higher projected fertility rate.

Although the fertility rate plays a crucial role in the projections, we should also note the differences in the assumptions about mortality between the two organizations. Assumptions for mortality were set in terms of increases in life expectancy at birth per decade and the differences appear to reflect different outlooks about future developments affecting mortality and their timing. It seems that the USCB considers that contrary to earlier beliefs, there now is a considerable degree of uncertainty about the future of mortality. In developing countries like Brazil, this stems from the uncertain future of the

Figure I
USCB and UNPD population projections for Brazil, 2000-2050

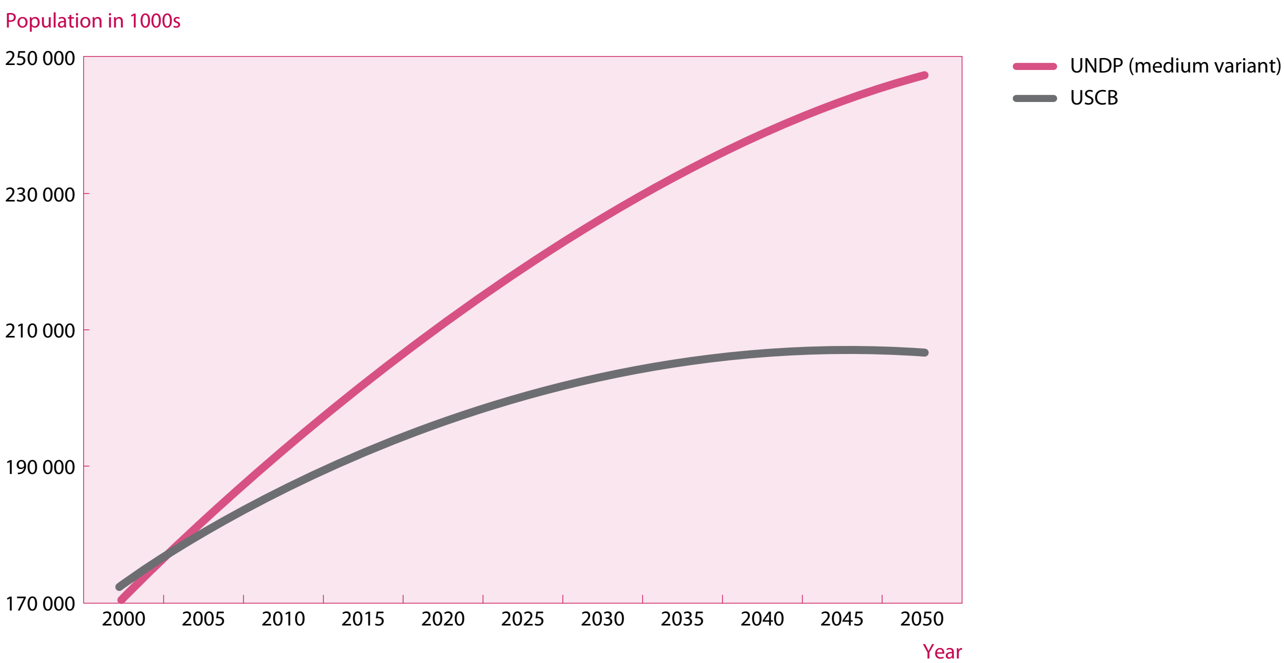

Table 2
Demographic indicators for Brazil as projected by the United Nations Population Division and by the U. S. Census Bureau for 2000, 2025 and 2050

	United Nations Population Division			U. S. Census Bureau		
Indicators	2000	2025	2050	2000	2025	2050
Total Fertility Rate	2.15	2.10	2.10	2.13	1.71	1.70
Infant Mortality	38	22	8	38.0	17.4	7.5
Life Expectancy at Birth	68.3	73.0	76.9	62.9	70.5	79.9
Per cent Less than Age 20	38.9	37.0	26.5	39.2	27.0	21.7
Per cent More than Age 65	5.1	10.2	17.9	5.3	7.7	21.1

AIDS epidemic and other infectious diseases and the development of health services. In industrialized countries, uncertainty is more associated with the scientific dispute about whether we are already close to a biologically determined limit to life expectancy. As a consequence, the USCB estimates a lower life expectancy for 2000 and 2025 (62.9 and 70.5) compared to the UNPD (68.3 and 73.0). However, after 2025, the USCB expects gains to life expectancy to surpass the UNPD's, so that life expectancy assumptions by 2050 are 79.9 for the USCB and 76.9 for the UNPD.

Therefore, the jump-off value of life expectancy at birth for both sexes is 5.4 more years in the UNPD projections and by 2025 the UNPD continues to predict an advantage of 2.5 years over the USCB. The USCB's assumption of setbacks in mortality in Brazil for the period 2000-2025 contributes to lowering the total population compared to the UNPD estimates and deserves a special discussion, which is impossible to do here. I should say that while many mortality studies in Brazil support the UNPD projections, recent findings support the USCB. As shown in table 1, the Brazilian Government, through the IBGE estimates, recognizes the impact of increasing young men's mortality on life expectancy. They project a life expectancy that is almost the same as USCB for 2025 but fully six years less than the USCB in 2050. Beltrão and Camarano (2001) similarly project lower life expectancies at birth than the USCB and the IBGE. For instance, they expect a life expectancy of 62 years for males and 68 years for females in 2025 although they leave open the possibility of improved life expectancy in the following decades.

The effects of the different projections are especially apparent on the age structure. The proportion of elderly dependents increases nearly threefold from 7.7 to 21.1 for the USCB between 2025 and 2050, while it increases barely 3.1 percentage points for the UNPD, apparently reflecting the effects of the USCB's sustained regime of below replacement fertility. Carvalho maintains that although mortality will not play a major role in the future of Brazilian fertility, the gains in mortality in the next decades will be mostly among people in advanced ages, which could mean an even faster growth in the proportion of the aged in the Brazilian population (JAC).

The most recent projections for Brazil seem to reinforce previous evaluations, that the UNPD projections are quite good at highly aggregated levels but less accurate at the country level. I understand that Brazilian projections are a small subset of global population projections and, as such, it is difficult for the UN Population Division to take into account expert opinions and specificities about demographic rates for each country. However, I would hope that expert opinion of the Brazilian demographic community might serve the UNPD in building more effective assumptions in their projections. I also would like to acknowledge the importance of the debate about probabilistic projections and the importance of granting more attention to uncertainty in the projections. Certainly, error assessments do not directly improve the accuracy of forecasts but to recognize the uncertainty correctly increases the possibility of producing interval forecasts that more appropriately reflect "reasonable future paths" of fertility (Alho, 1997; Lutz and others, 1998).

FORCES THAT WILL SHAPE BRAZILIAN FERTILITY

Most of the Brazilian demographic literature and opinions of the EBDs agree that Brazil's demographic legacy and current reproductive behaviour are most likely to determine Brazilian fertility in the next decades.[15] Moreover, there is a consensus that the future laws and policies related to sterilization, gender equity and public support will also potentially shape the future of Brazilian fertility.

Demographic legacy and current reproductive behaviour

In 2000, 39 per cent of the Brazilian population was under age 20, which is partly the result of a "youth wave" that was born to the large number of mothers born during the high fertility period.[16] These youth, who mostly reached 15-24 in the early 90s, have reduced their fertility contributing to the current near replacement levels (TFR = 2.3). Fertility underwent a "rejuvenating process" from 1970-1988, in which 15-24 year olds accounted for 30 per cent of births at the beginning of the period and 45 per cent at the end. From 1988-2000, this proportion remained constant. At the same time, as noted before, sterilization increased among young (20-24) married women from 4 to 11 per cent between 1986 and 1996. Brazilian women's reproductive intentions, like their reproductive practices, are also striking. About 80 per cent of married Brazilian women in 1996 of reproductive ages cannot have or do not want to have more children[17] and 44 per cent of women not using any contraceptive method would consider sterilization as a method to control their fertility. Collectively, these demographic indicators suggest a fertility trap in which below replacement levels are a certain destiny.

Brazilian demographers believe that among the forces capable of changing the timing in the levels and age pattern of fertility in Brazil are changes in the prevalence of the "mix" of contraceptive methods, out-of-wedlock births or any other variable that could decrease the exposure time to the risks of conception, such as median age of marriage and cohabitation (LRW, JAC, ERN, KB). Relatedly, it is important to note that although fertility is higher among women in cohabitation than among the legally married, there an increase in the limiting index of cohabitating couples (extent of fertility control after 10 years of marriage) during the period 1976-1984, leading to a convergence of fertility rates between married and cohabitating couples (Lazo, 1994).

Growing rates of marital instability illustrate the changing expectations about the permanence of marriage in Brazil. Cohabitation increased from 18 to 28 per cent between the 1991 and 2000 censuses and the percentage of women of reproductive ages with more than one union changed from about 10 to 13 per cent in the period between 1986 and 1996. Separation and divorce rates more than doubled in the past two decades and recent reforms in divorce and custody laws reinforced changing attitudes and behaviours. Married couples are having fewer children and an increasing number of women are bearing children out-of-wedlock. In the early 1990s, over 15 per cent of all births in Brazil were to unmarried mothers.

The potential impact of increasing teenage fertility and marital instability on the total Brazilian fertility rate suggests that fertility decline in Brazil would have been steeper in the absence of the increase in teenage pregnancy and union instability[18] (Leone and Caetano, 2002). The findings show that between 1986 and 1996, the total Brazilian fertility rate appears to have increased by 2.4 per cent due to teenage fertility, maintaining constant the pattern of unions and the sterilization levels; and if fertility rates of women with only one union would apply for every woman, the total fertility rate would be 3.2

15 The question No. 5 was "In your opinion what will be the factors or lead indicators that might be especially relevant and useful for formulating plausible assumptions on future fertility in Brazil?"

16 The "youth boom" is a resulted of a 66 per cent increase in the cohorts born between 1965 and 1980 compared to previous cohorts (Bercovich and Madeira, 1999/2000).

17 This proportion is roughly constituted of 43 per cent sterilized women, 4 per cent infertile women, 12 per cent women without children that do not want to have them and 21 per cent of women with children that do not want any more.

18 Data for this study come from the 1986 and 1996 DHS. They show:
an increase in the fertility rate for adolescents (15-19), from 74.2 to 86.3;
a decrease of the mean age at first birth from 20.9 to 19.8;
and an increase of ever-married women (15-49) with more than one union from 9.6 to 13.3 per cent (Leone and Caetano, 2002).

per cent higher in 1996, keeping constant the teenage fertility rate and sterilization at the 1996 levels. At the same time, the measure of the magnitude of the effect of sterilization upon fertility in Brazil shows that, in the mid-1980s, the Brazilian total fertility rate was 17 per cent lower than it would otherwise have been and, by the mid-1990s, the fertility-reducing effect of sterilization had increased to 26 per cent. Leone and Caetano thus conclude that the diffusion of female sterilization exceeded the positive effects of the other two variables, contributing to lowering the TFR in Brazil.

Finally, lower fertility enables women to participate more widely in activities outside the home, and in most cases women are generally finding the day-to-day "on-call" work of parenting less attractive (Presser, 1995). Then, the positive effect of fertility decline on women's lives and the feasibility of a return to a traditional breadwinner-homemaker type of family become central questions to thinking about the future of fertility. Given quantitative and qualitative research reporting a permanency in the labour market participation among Brazilian women of different social groups, their improvements in education and active participation in other public spheres points to the unlikelihood of a return to a traditional breadwinner-homemaker model of family, as a stimulus to reversing fertility decline in Brazil. Although conscious of the physical and emotional costs of the double shift, Brazilian women are not willing to give up employment despite its often modest rewards since it has allowed them greater independence and negotiating power in their households (Sarti and others, 1990). Even when they desire to have children, they may end up deciding to have less or no children at all. This is especially true for young women because they have more education than previous generations, more information about sexuality and contraception, more opportunities in the labour market and more chances of obtaining economic independence.

Sterilization law[19] and public policies

Despite the efforts of the women's movement and the frustrated initiatives of public family planning services in offering broad options of contraceptive methods, Brazilian women in the mid-1990s continue to face a dramatic choice: "to practice clandestine abortion, get sterilized or continue with an undesired pregnancy" (Berquó, 1999a). High rates of maternal mortality (114 deaths per 100,000 live births in 1991) and the growing rates of sterilization, both directly related to the abusive use of caesareans, are indicators of the difficulties of implementing women's health programmes. However, it is important to note that in the second half of the 1990s, there was some progress with respect to pre-natal care, obstetric assistance and access to abortion in the case of rape and risk of life (Corrêa and others, 1998).

The constitutional definition of family planning as a right and a Brazilian Government responsibility was established in 1988. But the ordinary law that regulates this constitutional definition was not approved until nine years later. In 1997 a law establishing clear norms for sterilization procedures was adopted although it is likely not be implemented for another five years as previous experience indicates.) Corrêa (2001) notes that "the distortions in contraceptive prevalence (and high percentage of C-sections associated with sterilization) crystallized by ten years of policy delay are not so easily undone". In fact, a recent study confirms that the implementation of the sterilization law is far from desirable and leads Berquó and Cavenaghi (2002) to conclude that "the law has changed little the usual practice of sterilization and yet not satisfying individual reproductive rights".

The influence of the Brazilian state on fertility behaviour has been widely debated (Goldani, 2001). Some of the EBDs agree that the role of the state and public policies will be critical for any possibility of reversing the trend towards sub-replacement fertility. Without a serious investment of the Brazilian State in altering structural conditions for low fertility and developing a set of "women-friendly policies", it will be very difficult to reverse current trends (ERN, SC). The uncertainty of the effects of public policies in-

[19] The sterilization law was passed in August 1997 and establishes: sterilization as a right for men and women older than 25 years; people seeking sterilization through the public system should wait 60 days following the request, a period during which they will be counseled about options of contraceptive methods and potential side effects of sterilization; post-partum sterilizations (within 48 hours of the delivery) will be authorized only if there is a medical indication such as a history of multiple cesareans. The Ministry of Health implemented the regulatory legislation to provide sterilization services in public hospitals, by incorporating the surgical procedure in its list of reimbursable medical procedures and by giving states and municipalities the responsibility of licensing public system facilities to provide tubal ligations and enforcing the law. Therefore, the licensed hospitals are the only units allowed to receive payment for the sterilization procedures (Ministério da Saúde, 1997).

cludes uncertainty about the time of implementation, resources and public acceptability, as in the case of the legalization of abortion.

> The effects of the sterilization law (1997) in terms of maintaining a "potential fertility" among young women will only be successful if consistently accompanied by an effective policy of increasing access to reversible contraceptive methods, which is just beginning. Also it is important to recognize that the levels of sterilization in Brazil would not be the same if abortion were not illegal and risky. Then, in a context marked by a "culture of sterilization", the increasing supply of reversible methods should be associated with an enlarged access to abortion in order to guarantee a back-up when reversible methods fail. The "policy timing" then becomes a crucial factor because the Brazilian experience has been of long delays in properly implementing laws and required health programs, Consider that the 1997 sterilization law that is not yet fully in effect. Thus, even in a more favourable social and policy environment, which seems to be the case in Brazil, the impacts or influences of good reproductive health policies will not be visible before five years. [Relatedly] the possibility of legalizing abortion and obtaining universal public support for women to cope with the burden of social reproduction is still remote. It is also critical to note that none of these measures will work without a strong effort to bring about gender equity (SC).

Therefore, the needs and guarantees of the reproductive rights of millions of Brazilian women are not being met and Brazil faces about a 15 per cent increase in the size of the reproductive-age population in the coming two decades. There is a growing concern that supplies of reproductive-health commodities for family planning, safe motherhood, and prevention and treatment of sexually transmitted diseases will become even scarcer due to the economics and inequalities of Brazil and the reductions in international aid. Or as Corrêa (2001) well put it, "the major problem we face globally is not scarcity of resources per se but rather the challenge of a skewed distribution of resources—between men and women, between North and South, and between the private and public sectors". Then, efforts to mobilize public and private resources, and to build partnerships in looking to address these concerns are crucial. The Brazilian Government also must improve its accountability in addressing social policy priorities to avoid the previously mentioned setbacks in health conditions and mortality.

Gender relations and public systems of support

The extraordinary persistence of the family and the gender hierarchy and its effect on fertility decline is an intriguing and critical question that has gone almost unexamined in the various explanations of the Brazilian fertility decline (Goldani, 2001). In a study of the north-east using 1991 DHS data, I discuss the effects of egalitarianism in husband-wife relations on the total fertility rate. I find that the levels of egalitarianism regarding reproductive choices were very low—only 52 per cent of the couples had at least some egalitarianism—and that for each increment of one point on the egalitarianism scale where the highest was three points, there was a reduction of over half a child (-0.570) among couples with the same union duration and ideal number of children (Goldani, 1999/2000). Findings based on the 1996 DHS suggest that although, on average, the fertility goals of men are not too different from those of their spouses,[20] the negotiation process between spouses for resolving differences may result in outcomes that are systematically higher or lower than those based on the perceptions of either spouse. Also, the author of that study concluded that no evidence was found that men's preferences tend to prevail over those of their spouses in defining the final fertility outcome in Brazil as well as in other Latin American countries (Hakkert, 2001).

Looking at reproduction from a male point of view, a study of two generations of middle-class Brazilian men showed that their contraceptive practices can best be under-

[20] The mean ideal family size among Brazilian couples, where at least one declared a definite number, was about 2.6 for the wife and 2.9 for the husband in the 1996 DHS. However, if disagreements between the spouses are systematically resolved by assuming the larger number as the joint ideal size of family of the couple, this would yield an average of 3.4 children, but if they choose the smaller number, the average family size would be 2.0 (Hakkert, 2001).

stood as part of the dynamics between the genders. The importance of the condom and the rhythm methods among the middle classes of Brazil's largest metropolis (São Paulo) is noted as a surprising finding but this is consistent with the arguments of survey respondents, particularly among younger cohorts, who believe the pill is harmful to women's health. Although younger cohorts show signs of change, the authors emphasize the need for gender-sensitive educational programmes for men that help them to better negotiate the use of contraception (Oliveira and others, 2001).

Brazilian women, who head one-quarter of all households and represent almost half of the paid labour force today, have made important gains in the public sphere but these have had little effect on the individual and family decisions that affect their lives. Negotiation of gender relations continues to be difficult even for women in paid work. In 1996, for every 100 married women who worked and had children under the age of five, 23 of them looked after their own children, while husbands helped in only 4 cases. In 46 per cent of the cases, other relatives were primarily responsible for helping the women[21] while the remainder relied on other arrangements, especially paid day care. The increase of dual-earner families, who comprised fully 52 per cent of families in 1995, and employed single parent families, has raised concerns about the quality of employment protections such as maternity leave, wage-equity policies, and childcare services. As working mothers become the norm, the balance between work and family has become more difficult because traditional gender roles have persisted. A 1997 survey of the south-eastern and north-eastern regions, which represent about two-thirds of the country's total population, found that out of the total working population, fully 79 per cent of the women and only 29 per cent of the men spent time on housework. Among those men and women working in both "productive labour" and housework, women spent 61 hours on both activities each week while men spent only 46 hours (Goldani, 1999/2000).

[21] Data from the same survey also show that although only a few husbands look after the children while the women work, a lot of them decide what to do with their wife's salaries. For a total of Brazilian women in union who work and have an income, 63 per cent decide themselves about the use of their salaries, 30 per cent say they decide together with their husbands and 7 per cent say that their husbands decide on the use of their salaries (Goldani, 1999/2000).

Therefore, the reorganization of family life in Brazil has become increasingly costly for women over time and at the same time the costs of childrearing have increased. Raising children should be more and more a collective responsibility and the state should provide policies for reconciliation between family life and work. Public policies are crucial for transforming gender responsibilities and thus contraception and child-rearing as the experiences of some industrialized countries have shown (Corrêa, 2002; Goldani, 2001).

Gender equality—the most important "enabling condition" that is at the core of current approaches to population policies—is also key to avoiding below-replacement fertility. Women in industrialized countries typically want two children. If society's organization of the "care economy" did not put an enormous burden on the shoulders of those who want to combine children with a career, we could well see some increase in fertility (Barroso, 2001).

FINAL REMARKS

By way of conclusion I would say that in Brazil, as in most other countries, there is no single precondition or determinant of individual and social choices regarding future fertility behaviour. However, the failure to identify "the key factors" should not hold back efforts to incorporate some of the mentioned elements in the projections. Then, among the indicators to consider are: (*a*) structural changes that alter the rewards and costs of both raising and educating children; (*b*) declines in infant and young-adult mortality; (*c*) increases in women's education and labour market participation; (*d*) social empowerment of women and greater concern with gender equality; (*e*) changing social norms in the context of a high value of children; (*f*) family planning as public policy; (*g*) the sterilization law; (*h*) the mix of contraceptive methods; and (*i*) desired or preferred family size.

Population projections serve to make us aware of possible future trends and help to expand the horizon of policymakers beyond short-term priorities. It is important to note that UNPD releases not one but three so-called variants, all officially designated to be equally plausible. Differences between the low and medium variant for Brazil are about 51 million persons in 2050, compared to a difference of 40 million between the United Nations medium variant and the U.S. Census Bureau. Keeping in mind these differences, we recognize that the projections are useful to address the challenges of the changes in sex and age structures. Rather than denying or ignoring these prospects, we have to discuss them in order to advance discussions of the policy issues for addressing the implications of Brazilian population trends such as: (*a*) the growing number of older persons and the consequences for gender and intergenerational relationships; (*b*) education demands; (*c*) pension systems; (*d*) work-family relations; and (*e*) gender equity. Finally, we should remember that projections change as reality changes, responding to different circumstances, which I believe only reinforces the importance of combining subjective and data-based probabilistic assessments of error to give users a more realistic assessment of the uncertainty of demographic forecasts in this new century.

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India's changing dates with replacement fertility: a review of recent fertility trends and future prospects

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INTRODUCTION

In 1952, India became the first country in the world to launch a family planning programme aimed at reducing population growth. But since then, as one keen observer had aptly put it, it has been "a saga of great expectations and poor performance" (Srinivasan, 1998). The overly optimistic demographic goals that have been set in various planned documents and policy statements have been continuously put off to the extent that such statements now fail to enthuse anyone. Spurred by the unprecedented growth of population recorded by the 1961 census, a goal of reaching a crude birth rate of 25 per 1,000 in 1972 was set. This goal was not attained even by 2002. Since the 1980s, it has become a practice to set goals in terms of net reproduction rate (NRR). Accordingly in 1981, the goal of reaching NRR of one was set for the year 2000. In plan documents this goal was postponed to 2006-2011 in the mid-1980s, and further to 2011-2016 in the beginning of 1990s. Interestingly, the National Population Policy announced in 2000, perhaps to underscore the renewed commitment to population stabilization, had advanced the date to the year 2010!

In the meanwhile, the Sample Registration System (SRS)—India's main source of information on vital rates—shows that fertility levels have indeed fallen since 1971, even though the decline is occurring at a much slower pace than what had been anticipated. According to this source, total fertility rate has fallen from 5.1 in 1971-1973 to 3.2 in 1996-1998. It is possible that the actual pace of decline was somewhat faster than that suggested by this source, because over the years, the completeness of birth reports under the system has probably improved. The objective of this paper is to review the current levels and trends in fertility and to suggest when India is likely to reach replacement level fertility. I will also briefly discuss the factors contributing to the current decline, and speculate on the chances of Indian fertility falling below replacement.

RECENT LEVELS AND TRENDS IN FERTILITY

From an application of the general growth-balanced method, I have shown that during 1981-1991, the SRS was underestimating adult mortality by about 8-9 per cent, and the birth rate by about 7 per cent (see Bhat, 2002a). This conclusion is supported by a recent application of the own-children method to the data from the two rounds of the National Family Heath Survey (Retherford and Mishra, 2001). This analysis showed that the level of general fertility rate was higher than the corresponding SRS estimate by 9.6 per cent during 1978-1992 (i.e., 15-year period before the first NFHS in 1992/1993) and 6.8 per cent during 1984-1998 (i.e., 15-year period before the second NFHS in 1998/1999). An important implication of this result is that SRS-based TFRs are on a lower side, but they underestimate the pace of fertility decline in India.

A similar conclusion emerges from the analysis of preliminary results of the 2001 census. By reverse-surviving the population age 0-6 years in 2001 (by using the child mortality rates from the SRS) I have estimated the crude birth rate during the 7-year period preceding the census. These crude birth rate estimates were converted to estimates of TFR using their ratios from the SRS.

Table 1 shows these estimates of TFR along with similarly estimated TFRs from the 1981 and 1991 censuses for the major states of India. The census-based estimates of TFR tend to be slightly lower than the estimates from the SRS for the corresponding periods. This is expected because of the under enumeration of child population in the census. But interestingly, they show a faster reduction in total fertility than the SRS. Thus, at the all India level, the implied percentage fall in fertility is 15 per cent during 1977-1987 against the SRS estimate of 11 per cent, and 22 per cent during 1987-1997 instead of 19 per cent from the SRS.

MIDDLE-LEVEL STAGNATION OR ACCELERATION?

Does fertility decline tend to accelerate or slow down in the middle of the transition? This is an important question that one must attempt to answer while making population projections. There are two antithetical views on this. From the innovation-diffusion perspective, fertility decline should accelerate at the middle because it is assumed that decline occurs as a result of social interaction of the adopters with the non-adopters. At the beginning, as adopters of innovation are few, transition occurs at a slow pace; the pace also slows down at the end as potential adopters become few. On the other hand, it can

Table 1

Estimates of total fertility rate derived from reverse-surviving the population age 0-6 years enumerated in 1981, 1991 and 2001 censuses, and estimates from the Sample Registration System for the corresponding period for all India and major states

	Sample Registration System			Census reverse-survival estimate			Per centt fall, c.1977-1987		Per cent fall, c.1987-1997		Change in rate of fall	
States	1974-1980	1984-1990	1996-1998	1974-1980	1984-1990	1994-2000	SRS	Census	SRS	Census	SRS	Census
Andhra Pradesh	4.27	3.52	2.49	4.30	3.44	2.24	17.5	20.2	29.3	34.7	11.9	14.5
Assam	4.20	3.85	3.22	..	4.11	3.14	8.4	..	16.4	23.6	8.0	..
Bihar	—	5.31	4.38	5.73	5.38	4.59	..	6.1	17.5	14.6	..	8.5
Gujarat	4.92	3.66	3.00	4.61	3.40	2.74	25.6	26.2	18.1	19.6	-7.5	-6.6
Haryana	5.32	4.37	3.41	5.23	4.14	3.17	17.8	20.8	21.9	23.5	4.0	2.7
Himachal Pradesh	4.10	3.52	2.39	4.21	3.26	2.08	14.1	22.6	32.1	36.3	17.9	13.6
Karnataka	3.67	3.47	2.48	4.22	3.36	2.25	5.5	20.3	28.4	33.0	23.0	12.7
Kerala	3.14	2.17	1.83	2.95	2.05	1.75	30.8	30.5	15.8	14.7	-15.0	-15.8
Madhya Pradesh	5.51	4.89	3.98	5.64	4.91	3.80	11.2	13.0	18.8	22.6	7.5	9.6
Maharashtra	3.72	3.50	2.74	4.03	3.45	2.60	6.0	14.3	21.6	24.6	15.5	10.3
Orissa	4.37	3.85	3.03	4.48	3.74	2.77	11.9	16.5	21.4	26.1	9.4	9.6
Punjab	4.36	3.43	2.68	4.33	3.25	2.36	21.3	24.9	21.9	27.4	0.6	2.5
Rajasthan	5.21	4.97	4.17	5.90	5.10	4.21	4.6	13.6	16.0	17.5	11.4	4.0
Tamil Nadu	3.67	2.68	2.01	3.52	2.45	1.78	27.0	30.5	25.1	27.4	-1.9	-3.1
Uttar Pradesh	6.08	5.44	4.73	6.28	5.56	4.51	10.5	11.4	13.0	18.9	2.5	7.5
West Bengal	—	3.60	2.54	4.04	3.58	2.54	..	11.6	29.6	28.8	..	17.3
All India	4.62	4.10	3.32	4.77	4.05	3.17	11.2	15.1	18.9	21.8	7.6	6.7

NOTE: .. = not available.

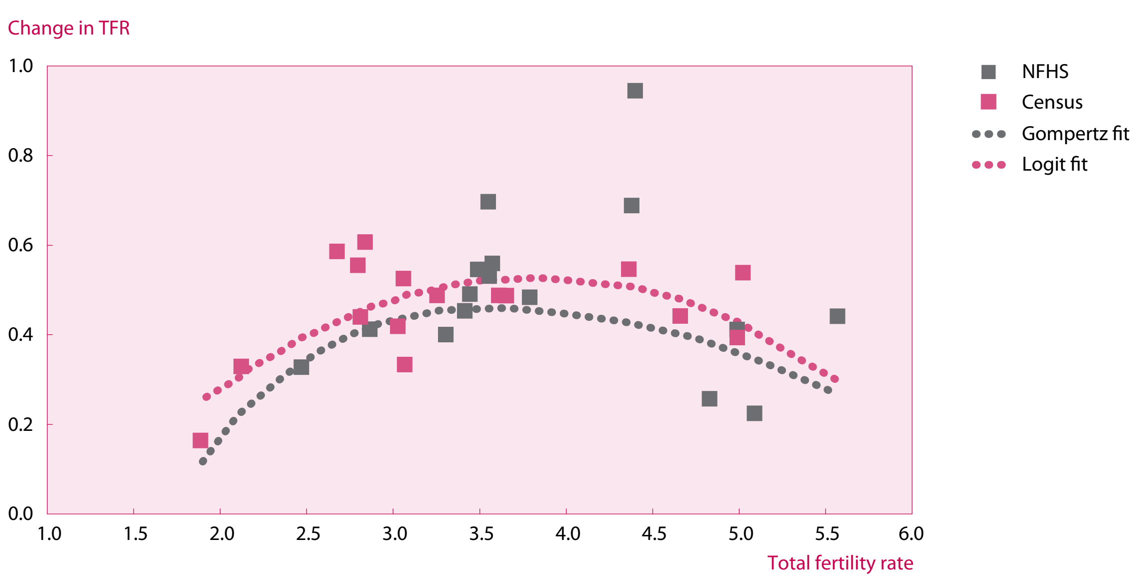
be argued that total fertility can be brought down fairly quickly from a level say over 6 to a level near 3-4 because there were that many births only because of high mortality levels. But bringing total fertility drown from 3-4 to a level near 2 could prove difficult because it requires changes in desired family size, which can be achieved only through significant social transformation and a change in gender relations. This is especially so in India where there is a strong son preference, and generally, the desire was to have at least two sons and a daughter. Therefore, this question can only be answered empirically.

As has been already pointed out, the percentage fall in TFR was higher during 1987-1997 than during 1977-1987. The estimates of TFR estimates from both SRS and the censuses suggest the acceleration in the in the rate fall (see table 1). Figure I shows a plot of the state-level estimates of the change in the TFRs as estimated from the NFHS (between 1978-1992 and 1984-1998) and the censuses of 1981 and 1991 (for 1984-1990 and 1994-2000) against the level of TFR (at the middle of the respective time periods). The plot shows that change in TFR has a curvilinear relationship with the level of TFR. The change in TFR is generally high when TFR is around 3-4 births per woman. This suggests that fertility decline accelerates at the middle level as predicted by the diffusion model of fertility change. A Gompertz curve was fitted in its differential form to this data (see appendix for details). It provided a reasonably good fit (R^2 = 0.37). The fitted curve suggested 1.7 and 7 as lower and upper limits to TFR, with the point of inflection at 3.7. An attempt was also made to fit a logistic curve to the data (in the differential form) but it did not perform as well as the Gompertz curve (see figure I). In particular, it suggested 1.2 as the lower limit to TFR.

Encouraged by this result that Gompertz curve describes well the changes in fertility, an attempt was made to fit the Gompertz curve to the annual time trend in TFR for every major state. Specifically, the following curve was fitted:

$$y_t = \frac{TGF_t - \alpha}{\sigma} = a^{b^t}, \quad 0 < a < 1 \;\; y \;\; b > 1$$

Figure I
The relationship between change in TFR to the level of TFR as indicated by state-level estimates from the NFHS (for 1978-1992 and 1984-1998) and the censuses (for 1984-1990 and 1994-2000)

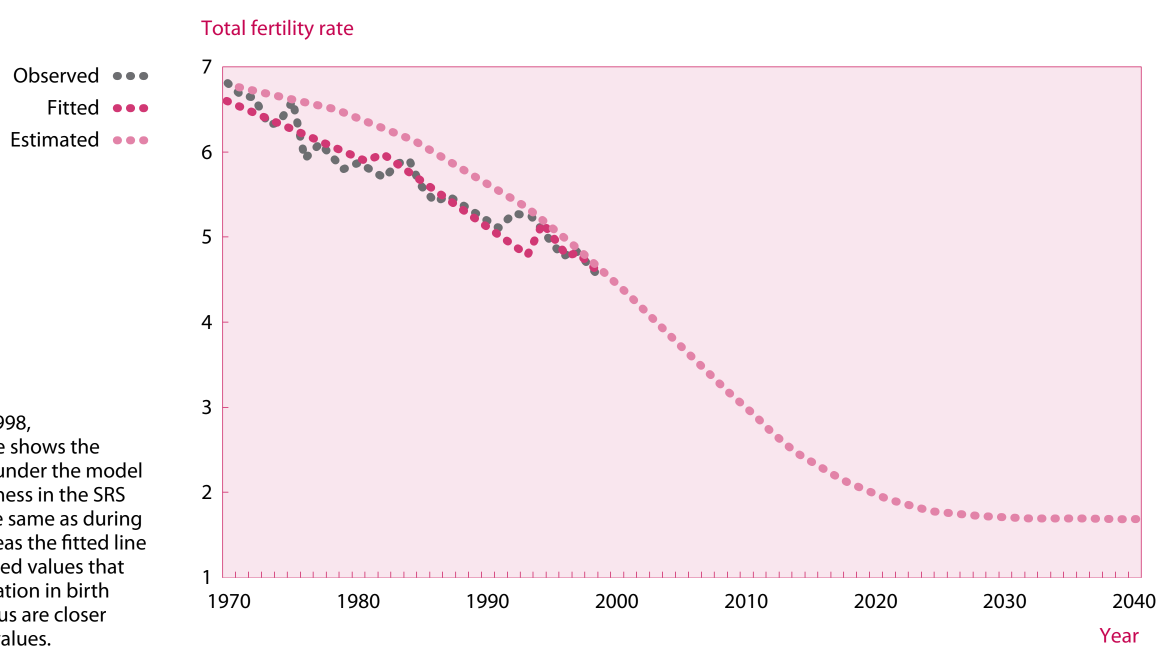


Where α is the minimum value of TFR (lower asymptote), σ is the difference between the lower and upper asymptotes of TFR, a is the lag parameter that shows the value of y when time $t = 0$ (but must necessarily be less than 1), and b is the parameter that measures the speed of fall.

The model was fitted through linear regression using the double-log form of the model (see appendix). But for two states, Bihar and West Bengal, data on TFR were available from 1971. To guard against the changing completeness of SRS affecting the results, two time dummies for 1971-1981 and 1982-1993 were also included in the regression. Also, the regressions were done using data for the entire available time range, 1971 to 1998, as well as using data for only the more recent period of 1982-1998. However, in order to make the estimates of parameter a comparable, in both the cases, the time variable t was initialized at 1951. Figure II shows how the model fits to the data in the case of Uttar Pradesh, the largest state of India. Table 2 shows the results of the regressions for all-India (rural and urban areas separately) and major states. With respect to the completeness of births, the estimated coefficients of the relevant dummy variables suggest that compared to the period 1994-1998, underreporting was 9 and 5 per cent more during 1971-1981 and 1982-1993, respectively. The suggested levels of incompleteness of SRS births are surprisingly close to that indicated by other sources (see Bhat, 2002a).

However, the key result in table 2 is with respect to the estimate of model parameter b, which measures the speed of fertility decline. Surprisingly, it shows little geographical variation. Except for a somewhat faster fertility decline in Kerala, the decline in north and south India appears to be occurring at about the same pace. We obtain this result in spite of making the assumption that fertility began to fall from a higher level in north India than in south India (a difference of 0.5 births in σ has been assumed and, other things remaining the same, higher the assumed σ, lower will be estimate of b). The lower fertility in south India is largely attributable to lower values of a, which implies earlier lowering of fertility. To illustrate this result, table 2 shows the year when TFR was 90 per cent of the maximum. According to the fitted model, if this level had been reached before the 1960s in south Indian states, it was attained only in the 1970s in the large

Figure II
The observed, fitted and estimated values of total fertility rates for Uttar Pradesh obtained by fitting the Gompertz curve with time dummies for 1971-1981 and 1982-1993



NOTE: For 1971-1998, the estimated line shows the expected values under the model if birth completeness in the SRS had remained the same as during 1994-1998, whereas the fitted line shows the expected values that incorporates variation in birth completeness, thus are closer to the observed values.

Table 2
Results of fitting the Gompertz curve to the time trend in TFR from the SRS, for India and major Indian states

Region, state and assumed value of R	Period	Estimates of model parameters[a] a	b	Relative completeness of recorded TFR[b] 1971-1981	1982-1993	Medel R^2	Estimated year when TFR was 90 per cent of maximum
South (R = 5.0)							
Andhra Pradesh	1971-1998	0.883	1.061	0.937	0.995	0.959	1953
	1982-1998	0.922	1.071	..	0.956	0.961	1959
Karnataka	1971-1998	0.773	1.043	0.932	1.050	0.944	1937
	1982-1998	0.789	1.045	..	1.041	0.961	1940
Kerala	1971-1998	0.932	1.095	0.797	0.833*	0.910	1959
	1982-1998	0.960	1.108	..	0.789*	0.738	1963
Tamil Nadu	1971-1998	0.803	1.057	0.981	0.991	0.955	1943
	1982-1998	0.910	1.077	..	0.904*	0.957	1957
West (R = 5.3)							
Gujarat	1971-1998	0.917	1.063	0.956	0.898**	0.967	1959
	1982-1998	0.875	1.053	..	0.933*	0.941	1952
Maharashtra	1971-1998	0.825	1.048	0.854***	0.962	0.921	1944
	1982-1998	0.812	1.046	..	0.970	0.965	1942
East (R = 5.3)							
Assam	1971-1998	0.945	1.069	0.805***	0.855**	0.841	1965
	1982-1998	0.902	1.055	..	0.895***	0.905	1957
Orissa	1971-1998	0.890	1.055	0.881**	0.943	0.931	1955
	1982-1998	0.930	1.066	..	0.907**	0.947	1961
West Bengal	1982-1998	0.875	1.058	..	0.999	0.965	1952
North (R = 5.5)							
Bihar	1982-1998	0.972	1.074	..	0.950	0.867	1974
Haryana	1971-1998	0.993	1.118	0.880	0.827*	0.854	1978
	1982-1998	0.930	1.062	..	0.953*	0.954	1962
Himachal Pradesh	1971-1998	0.904	1.067	0.866*	0.972	0.933	1956
	1982-1998	0.880	1.061	..	0.996	0.962	1953
Madhya Pradesh	1971-1998	0.919	1.053	0.968	0.990	0.925	1961
	1982-1998	0.929	1.055	..	0.982	0.953	1963
Punjab	1971-1998	0.908	1.065	0.893*	0.905*	0.956	1957
	1982-1998	0.805	1.046	..	0.982	0.970	1941
Rajasthan	1972-1998	0.966	1.071	0.872*	0.944	0.725	1972
	1982-1998	0.976	1.079	..	0.927*	0.833	1974
Uttar Pradesh	1971-1998	0.980	1.077	0.952	0.941*	0.893	1977
	1982-1998	0.938	1.049	..	0.989	0.889	1967
India (R = 5.3)							
Total	1971-1998	0.889	1.052	0.912***	0.956**	0.980	1955
	1982-1998	0.899	1.054	..	0.949***	0.988	1956
Rural	1971-1998	0.917	1.055	0.914***	0.955**	0.979	1960
	1982-1998	0.929	1.059	..	0.945***	0.988	1962
Urban	1971-1998	0.803	1.049	0.856***	0.948	0.957	1942
	1982-1998	0.817	1.051	..	0.940	0.968	1944

NOTE: c = $p < 0.05$, d = $p < 0.01$ and e = $p < 0.001$.

[a] In all cases, the regression coefficients from which *a* and *b* are derived are significant at 0.001 level.

[b] Completeness level relative to its level during 1994-1998, except for urban India where it is relative to the level during 1993-1998; the significance levels shown refer to the coefficients of the dummy variables representing these periods.

north Indian states of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. A caveat in this analysis is that the Gompertz model does not allow for the possibility of some rise in fertility before the 1970s as a result of mortality decline. Nonetheless, the post- 1970 patterns of fertility decline suggest that fertility is currently lower in south India because the decline began earlier there, and perhaps from a level lower than in north India.

CAUSES OF FERTILITY DECLINE

In demographic literature, rising levels of education, especially of women, is widely regarded as the major factor in fertility decline (see Diamond et al., 1999 for a recent review). In the case of Indian fertility transition as well, the paramount role of female education has been argued as forcefully in recent years by Dreze and Murthi (2001). But in a recent paper, I have argued that fertility is declining in India primarily because of its decline among illiterate women, and they are doing so because of the diffusion of a new reproductive idea of having only a few children but investing more on their future (Bhat, 2002b). It has been contended that fertility decline is not only outpacing educational transition, but also contributing to it. Through a decomposition of the change in fertility differentials by education, it has been shown that more than half of the recent fertility decline is due to its decline among illiterate women (see table 3). The rise in female education accounted for less than 20 per cent of the overall change. The contribution of this factor to the increase in contraception is estimated to be even less, 10-15 per cent only (see table 4). It has been further shown that a quantity-quality trade-off is occurring as illiterate women are accepting contraception. They are observed to be sending more of their children to school, especially the first-born daughter, who perhaps gets released of the burden of taking care of younger siblings. It was found that the odds of sending children to school is about 50 per cent higher among illiterate women who are using contraception compared to those who do not.

Thus given the possibility that fertility levels can have a significant impact on the education of children, a simple, macrolevel analysis of the relationship between and female education and fertility could be misleading. Before claiming the re-eminence of female education, it would be necessary to analyse how much of the correlation is because of the effect of mother's educational level on her fertility, and how much of it is derived from the effect of mother's fertility on child schooling. In my considered judgement, during the early phase of the transition, the first effect dominates while the second effect takes over in the later phases of the transition when illiterate women begin to accept contraception in large numbers.

Table 3
Change in total fertility rate between 1981 and 1991 by educational level of women, India

	1981 census*		1981 census*		Within class decline in TFR	
Educational level of women	TFR	Per cent women	TFR	Per cent women	Amount	Percentage of total
Illiterate	4.8	75.1	4.3	67.3	0.5	48.9
Below middle	4.3	14.4	3.3	15.5	0.9	20.0
Middle school	3.6	5.0	2.8	7.8	0.8	7.4
Matriculate	2.6	4.3	2.2	7.1	0.4	3.5
Graduate and above	1.8	1.1	1.7	2.4	0.1	0.2
All women	**4.7**	**100.0**	**3.9**	**100.0**	**0.8**	**80.0**
Contribution of fertility change among illiterate women =						49%
Contribution of fertility change among educated women = 20.0 + 7.4 + 3.5 + 0.2 =						31%
Contribution of change in educational composition of women = 100.0 – 80.0 =						20%

* TFRs refer to the one-year period preceding the census.

Table 4
Contraceptive use by educational level of women, educational composition of women and increase in contraceptive practice recorded by three national surveys, India, 1970 to 1999

Educational level of women	Per cent using contraception: ORG survey[a] 1970	Per cent using contraception: NFHS-1 1992-1993	Per cent using contraception: NFHS-2 1998-1999	Per cent of women in the class: ORG survey[a] 1970	Per cent of women in the class: NFHS-1 1992-1993	Per cent of women in the class: NFHS-2 1998-1999	Per cent contribution of within class increase: 1970-1993	Per cent contribution of within class increase: 1993-1999
Illiterate	10.0	33.9	42.9	79.3	62.6	57.4	62.9	71.0
Below middle	20.7	50.4	55.5	10.9	18.3	19.4	16.1	12.6
Middle school	33.5	50.8	52.2	9.0	7.4	8.5	5.2	1.5
Matriculate and above	56.2	54.7	57.0	0.8	11.7	14.7	-0.3	4.0
All women	**13.6**	**40.6**	**48.2**	**100.0**	**100.0**	**100.0**	**83.9**	**89.0**
Contribution of fertility change among illiterate women =							63%	71%
Contribution of fertility change among educated women =							21%	18%
Contribution of change in educational composition of women =							16%	11%

Source: Operations Research Group (1971); International Institute for Population Sciences (1995); International Institute for Population Sciences and ORC Macro (2000).

[a] As this survey used slightly different educational categories, the comparisons shown with the NFHS are only approximate.

Perhaps rising levels of aspiration for material well-being is prompting illiterate couples to give precedence to quality over quantity in reproductive matters. The prevalence of this trade-off is probably aided by easier access to contraception and increased exposure to mass media. On the latter, wherever it has been included in the analysis of fertility or use of contraception (not all do!), it has shown strong independent effects (Bhat, 1996; Ramesh and others, 1996).

LIKELIHOOD OF BELOW-REPLACEMENT FERTILITY

According to the SRS, there were at least two major states in India, Kerala (1.8) and Tamil Nadu (2.0) with below-replacement fertility in 1998. The recent NFHS results suggest some underestimation of fertility in the SRS in these states (Retherford and Mishra, 2001), though my own analysis for 1981-1991 did not suggest this (Bhat, 2002a). Whatever may be truth in this regard, there is a real possibility that the period TFR would fall below-replacement level in many states, even though the desired family size has not fallen below two children anywhere. This is because female age first marriage in India is still below 20 years (IIPS and ORC Macro, 2000). It is unlikely that it would continue to remain at such low levels. Owing to the tempo effect, as age at marriage rises, period fertility rates would fall even if the cohort fertility remains unaltered. As population projections are generally based on period TFRs, it would be correct to assume the prevalence of below-replacement fertility for some time. But will the period fertility rise once the tempo effect ceases? The following two considerations are relevant in the context: first, many regions in India are experiencing substantial declines in fertility without concomitant increase in work participation of women. For example, in urban India, TFR is close to replacement level but less than one third of women are in the labour force. The cessation of population growth in working ages (expected in 20-25 years) could be expected to provide an opportunity for women to enter the labour force. This could reduce further the desired family size and thus the cohort fertility. Second, with over one billion people, India already considers itself overpopulated; before NRR reaches one, it is expected to add at least another 300 million to 400 million to its fold. With population growth rate well above one per cent at this stage, India could still be viewing its huge population as a liability. Seeing a virtue in below-replacement fertility, India may continue to push its family planning programmes aimed at reducing population size, especially in densely populated regions of the north. Thus, one seems justified in assuming a long-term below-replacement fertility scenario for India.

PROJECTION OF TOTAL FERTILITY RATE

While making projections for India, it is useful to keep in mind the following: (i) the base period fertility should be adjusted for under enumeration of births in the SRS; (ii) instead of linear or log-linear projections, TFRs should be projected assuming a S-shaped curve such as the Gompertz; and (iii) because of the vast regional heterogeneity, the all-India TFRs should be derived as weighted averages of state-specific assumptions. Table 5 presents an illustrative projection of TFRs for India and major states up to the year 2051.

First, corrected TFRs for 1997 are derived as follows: the SRS-based TFRs for 1984-1990 are corrected by using the average of the under enumeration of births implied by the NFHS analysis for 1978-1992 and my own analysis for 1981-1991. By assuming the trend in TFR implied by the census-based TFRs for 1984-90 and 1994-1990 (see table 1) as correct, the adjusted SRS TFRs for 1984-1990 is brought forward to 1994-1990, i.e., for circa 1997. In the case of all India, the corrected TFR is 3.4 instead of the SRS estimate of 3.2.

With the corrected TFRs for 1997, and the estimated values of the parameter b for 1982-1998 (see table 2), TFRs are projected by single year time interval using the Gompertz model:[1]

$$a = \frac{TGF_0 - \alpha}{\quad}, \quad \text{where } TGF_0 \text{ is the adjusted TGF for}$$

$$a = \frac{TGF_0 - \alpha}{\sigma}, \quad \text{where } TGF_0 \text{ is the adjusted TGF for 1997}$$

Table 5
Projected values of total fertility rate using the Gompertz curve, India and major states

States	Adjusted TFR, 1997	Parameter b	Projected TFR 1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050
Andhra Pradesh	2.39	1.071	2.30	1.94	1.76	1.71	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Assam	3.66	1.055	3.56	3.05	2.58	2.20	1.93	1.78	1.72	1.70	1.70	1.70	1.70
Bihar	4.89	1.049[a]	4.81	4.40	3.95	3.49	3.03	2.62	2.26	2.00	1.83	1.75	1.71
Gujarat	3.00	1.053	2.91	2.48	2.13	1.90	1.77	1.72	1.70	1.70	1.70	1.70	1.70
Haryana	3.63	1.062	3.51	2.94	2.44	2.06	1.83	1.73	1.70	1.70	1.70	1.70	1.70
Himachal Pradesh	2.26	1.061	2.19	1.91	1.76	1.71	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Karnataka	2.63	1.045	2.56	2.24	2.00	1.85	1.76	1.72	1.70	1.70	1.70	1.70	1.70
Kerala	1.93	1.108	1.87	1.71	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Madhya Pradesh	3.96	1.055	3.85	3.33	2.84	2.40	2.07	1.86	1.75	1.71	1.70	1.70	1.70
Maharashtra	2.92	1.046	2.84	2.47	2.17	1.95	1.81	1.74	1.71	1.70	1.70	1.70	1.70
Orissa	3.02	1.066	2.91	2.38	2.01	1.80	1.72	1.70	1.70	1.70	1.70	1.70	1.70
Punjab	2.73	1.046	2.66	2.32	2.05	1.87	1.77	1.72	1.70	1.70	1.70	1.70	1.70
Rajasthan	4.41	1.079	4.27	3.54	2.83	2.24	1.88	1.73	1.70	1.70	1.70	1.70	1.70
Tamil Nadu	2.03	1.077	1.97	1.76	1.71	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Uttar Pradesh	4.83	1.049	4.75	4.33	3.88	3.42	2.96	2.55	2.22	1.97	1.81	1.74	1.71
West Bengal	2.78	1.058	2.68	2.26	1.96	1.79	1.72	1.70	1.70	1.70	1.70	1.70	1.70
India, unweighted	3.49	1.054	3.39	2.89	2.46	2.11	1.88	1.76	1.71	1.70	1.70	1.70	1.70
India, state-weighted	3.51		3.42	3.01	2.65	2.36	2.14	1.97	1.86	1.78	1.73	1.71	1.70
Implied per cent change			2.50	12.09	11.81	10.98	9.54	7.70	5.84	4.14	2.60	1.34	0.52
India, with α = 1.7	**3.49**		**3.40**	**2.99**	**2.64**	**2.35**	**2.12**	**1.96**	**1.84**	**1.77**	**1.72**	**1.70**	**1.69**
India, with α = 1.8	**3.49**		**3.40**	**2.99**	**2.65**	**2.37**	**2.16**	**2.01**	**1.91**	**1.84**	**1.79**	**1.79**	**1.79**

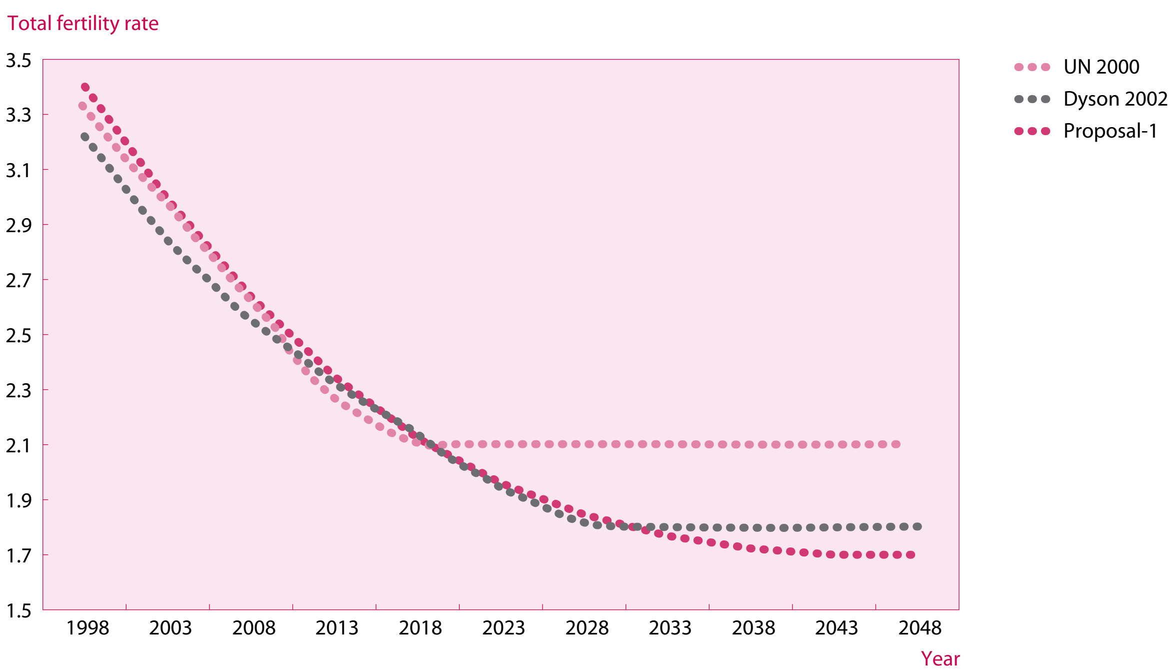
[a] Assumed to be the same as that of Uttar Pradesh.

For all states, the lower limit for TFR (α) has been assumed to be 1.7, as estimated earlier using the differential form of the curve, and σ was varied around 5.3, as reported in table 2.

Table 5 shows two estimates for all India: one that uses the estimate *b* made for 1982-1998 (India, unweighted), and the other derived from the weighted averages of the state specific estimates of TFR (India, α = 1.7). According to the first, India will reach replacement fertility by 2011-2016. But that based on the weighted average shows that it would be a delayed by at least 5 years because of spatial heterogeneity. Figure III compares the trajectory of TFR as proposed here (with α = 1.7) for all India with that assumed under United Nations projections (United Nations, 2001) and by Dyson (2002). While the estimates of TFR proposed now are higher than either that of United Nations or Dyson's up to 2015, they are lower for the subsequent periods.

Some important state-specific results may also be noted. If the current pace of decline were to continue, by 2005, Andhra Pradesh and Himachal Pradesh would join Kerala and Tamil Nadu in attaining the replacement level TFR. Six more states—Karnataka, West Bengal, Orissa, Punjab, Gujarat and Maharashtra would join this group by 2010. Four more states, Haryana, Assam, Madhya Pradesh and Rajasthan are expected join them by 2020. But the two most populous states, Uttar Pradesh and Bihar, are not expected to attain replacement fertility until about 2030. Thus, for India to attain replacement fertility by 2016-2020, it is imperative for some leading states to have fertility below this level. But for this to happen, how crucial is it for the TFR to decline to 1.7 in every state? Table 5 also shows all-India estimates of TFR (state-weighted) derived by assuming the lower limit to be 1.8 instead of 1.7. As can be seen, at the all-India level this hardly makes a difference until 2020. Both sets suggest that TFR would reach replacement level during 2016-2020. Thus, a marginal difference in the lower limit has no significant bearing on our result that fertility would reach replacement level in India by 2016-2020.

Figure III
Comparison of TFR as assumed in the projections made by the United Nations, Tim Dyson and with that proposed here



APPENDIX

Gompertz model

Under this model, total fertility rate (TFR) is first rescaled to vary between 0 and 1 by applying the following transformation:

$$y = \frac{TGF - \alpha}{\sigma}, \quad 0 < y < 1 \tag{1}$$

where α is the lower limit for TFR , and σ is the difference between the lower and upper asymptotes of TFR.

The transformed variable y is assumed to fall with time (t) according to the Gompertz curve:

$$y = a^{b^t}, \quad 0 < a < 1 \; y \; b > 1 \tag{2}$$

where the parameter a is the value of y when time $t = 0$ (thus reflects the lag in fertility decline), and b is the parameter that measures the speed of fall.

By differentiating equation (2) with respect to time we have,

$$\frac{\partial y}{\partial t} = \frac{1}{\sigma}\frac{\partial TGF}{\partial t} = 1\mathrm{n}b \; y 1\mathrm{n} \; y \tag{3}$$

From equations (1) and (3) we have,

$$\frac{\partial TGF}{\partial t} = \ln b\left(TGF - \alpha\right)\ln\left(\frac{TGF - \alpha}{\sigma}\right) = -\ln b \ln \sigma (TGF - \alpha) + \ln b (TGF - \alpha)\ln(TGF - \alpha) \tag{4}$$

From equation (4), the model parameters b, σ and α can be estimated by linear regression, using an iterative search procedure for α: assume a value for α and regressing the changes in TFR on TFR-α and product of TFR-α and logarithm of TFR-α. The regression is carried out without the intercept term, and its residual sum of squares (RSS) is computed. The trail value of α is increased or decreased until RSS of the regression is minimum (or R_2 is maximum). If C_1 and C_2 are, respectively, the estimated coefficients of the first term and the product term in equation (4), then

$$b = \exp(C_2); \quad \sigma = \exp\left(\frac{-C_1}{C_2}\right)$$

An attempt was made to fit the Gompertz model in this form by using the estimates of state-level TFRs derived from the NFHS and census data for the 1980s and the 1990s (see table 1). The regression was run by pooling the data from the two sources on the average annual change in TFR for 16 major states. However, information for Assam from the NFHS was not considered as the suggested decline in fertility seemed implausible. The regression gave the following fit:

$$\underset{}{TGF} = \underset{(19,3)}{-0,0892}\,(TGF - 1,7) + \underset{(11,65)}{0,5344}\,(TGF - 1,7)\ln(TGF - 1,7) \qquad R^2 = 0,371; \; N = 31;$$

$$RSS = 0,0114$$

where the figures in parentheses are the t-ratios of the respective regression coefficients. The estimated coefficients suggest the value of b as 1.055 and σ as 5.31. The estimate of α was obtained by trail and error: When it was assumed as 1.8, R_2 of the regression was 0.352 and when it was assumed as 1.6, the R_2 was 0.367. Thus, as per the fitted Gompertz model, TFR has a lower limit of 1.7 and an upper limit of 7 (= 1.7 + 5.3). It may also be noted that the fitted curve has a point of inflection at 3.7 (= 1.7 + 0.37 × 5.3).

When the annual estimates of TFR are available, such as from the Sample Registration System as in India, the model can be fitted using the double-log version of the model in eq (2):

$$\ln\left(-\ln\left(\frac{TGF-\alpha}{\sigma}\right)\right)=\ln(-\ln a)+\ln b\,t \tag{5}$$

In fitting the model using equation (5), it would be necessary to assume a value each for α and σ. In the state-level analysis using the SRS data reported here, for every state, α has been assumed as 1.7 as estimated from the census and NFHS data for the 1990s using differential form of the model. But the value of σ was varied slightly around the estimated value of 5.3 as there is some evidence to suggest that pre-transitional level of fertility may have been somewhat higher in north India than in south India (see Bhat, 2000; Guilmoto and Rajan 2001). Also, since there is evidence to suggest that SRS completeness may have changed overtime (Bhat, 2002a), two time dummies were included in the model so as to minimize the effect of change in completeness on parameter estimates

$$\ln\left(-\ln\left(\frac{TGF-\alpha}{\sigma}\right)\right)=\ln(-\ln a)+\ln b\,t+c_1D_1+c_2D_2 \tag{6}$$

where D_1 and D_2 are set to 1 for the time period 1971-1981 and 1982-1993, respectively. Thus, the coefficients c_1 and c_2 respectively measure the completeness of births is 1971-1981 and 1982-1993, relative to the level after 1993. These time periods are chosen keeping in mind the replacement of SRS sampling units affected in 1982 and 1994. If completeness of birth recording had improved in the SRS, the coefficients, c_1 and c_2 would be significantly lower than zero, and $c_2 > c_1$. The average level of birth completeness for any given period, relative to that in the reference period (here, 1994-1998) can be obtained by comparing the predicted TFRs from equation (6) with and without the relevant dummy variable term. The results of fitting the model using the annual estimates of TFR from the SRS are discussed in the main text.

Logit Model

In the logit model we assume that

$$y=\frac{TGF-\alpha}{\sigma}=\frac{ae^{bt}}{1+ae^{bt}},\quad b<0 \tag{7}$$

where the lag parameter a is the value of $y/(1-y)$ at time $t = 0$, and b represents the speed of decline in fertility.

By differentiating equation(7) with respect to time (t) we have

$$\frac{\partial y}{\partial t}=\frac{1}{\sigma}\frac{\partial TGF}{\partial t}=b\;y(1-y) \tag{8}$$

From equation (1) and (8) we have

$$\frac{\partial TGF}{\partial t}=b\left(TGF-\alpha\right)-\frac{b}{\sigma}\left(TGF-\alpha\right)^2=-\frac{b}{\sigma}TGF^2+\frac{b}{\sigma}(\sigma+2\alpha)TGF-\frac{b}{\sigma}(\sigma\alpha+\alpha^2) \tag{9}$$

As equation (9) suggests, the model parameters b, σ and α can be estimated by regressing the changes in TFR in a given period on TFR and TFR_2. If C_0 is the intercept, and C_1 and C_2 are, respectively, the estimated coefficients of TFR and TFR_2, then from equation (9) we have

$$=-\sqrt{C_1^2-4C_oC_2}\,;\qquad \alpha=\frac{-C_1+b}{2C_2}\,;\qquad \sigma=$$

The model was fitted to the same data to which earlier we applied the Gompertz model. The result was the following:

$$TGF = 0{,}1169 - \underset{(3{,}80)}{0{,}1162}\ TGF + \underset{(3{,}79)}{0{,}0152}\ TGF^2 \quad \underset{RSS = 0{,}0120}{R^2 = 0{,}340;} \quad N = 31$$

The estimated regression coefficients imply α as 1.19, σ as 5.28 and b as – 0.080. The estimated point of inflection is 3.8 (= 1.2 + 0.5 × 5.3). Thus, the lower limit to TFR suggested by the logit model (1.2) is significantly lower than the one indicated by the Gompertz model (1.7).

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On the future of human fertility in India

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The trouble with our times is that the future is not what it used to be.
Paul Valéry

Prophecy is a good line of business, but it is full of risks.
Mark Twain

This paper addresses the issue of the trend and level of fertility in India during the coming decades. It takes as its starting point (i) the requirement to produce population projections which are as accurate as possible, and (ii) the fact that countries with fertility around or below the replacement level currently hold over 40 per cent of the world's people. Since India contains one sixth of humanity, the future of its population is clearly of great interest. And the question of what will happen to the country's total fertility rate (TFR) is crucial—because it will doubtless be the most important variable determining by how much the population will grow.

The paper has six parts. First, I provide an explanation for the phenomenon of below-replacement fertility. Second, I comment briefly on the processes involved in framing assumptions for population projections. Third, I review some past population projections for India—with particular reference to their fertility assumptions. This involves forwarding some fertility assumptions and rationalizations of my own. Fourth, I make some additional comments about the nature of future fertility decline in India. Fifth I examine the subject of regional fertility variation—a discussion which inter alia touches upon how low future total fertility may fall. Here I suggest that there are deep-seated social-structural considerations which will probably influence regional fertility variation over the mediumterm. The final section of this unreservedly speculative paper summarizes and concludes.

EXPLAINING BELOW-REPLACEMENT FERTILITY

Before considering the specific case of India some words are in order about two related, but distinct questions. Why is fertility declining in the developing world? And why do some countries now have below-replacement fertility?

The answer to the first question is mortality decline. The remote force which, operating at what I have elsewhere termed the "super-macro" level, has ultimately caused all sustained fertility declines since the late eighteenth century is persistent and massive mortality decline (Dyson, 2001a). Confronted with a major fall in the death rate no society can remain with a TFR of five or six live births for more than a few decades. Because sustained mortality decline leads to bigger and bigger cohorts entering the working ages it has a depressing effect upon relative wages. Cohorts of young people are eventually forced to choose between experiencing a fall (or significantly reduced rate of improvement) in their levels of living, or limiting fertility (Macunovich, 2000). When people restrict their fertility they usually rationalize the decision with proximate explanations (e.g., we cannot afford many children). In other words, they do not appreciate that mortality decline is the ultimate cause of their behavioural change. Many factors—social, cultural, economic—

influence the timing and speed of the fertility decline response in particular populations. But the remote causal force behind all fertility transitions is mortality decline. This is just as true for the developing world today as it was for historical Europe. But because they have benefited from what is sometimes termed a “late development effect” changes in contemporary developing countries tend to be faster than was the case in Europe.

The answer to the second question is that because of mortality decline and—still more—fertility decline, women have become more like men (Dyson, 2001a). In all societies women not only give birth to the children, but they also do most of the childcare. Therefore circumstances of high fertility tend to lock them up within the domestic domain. In high fertility societies women’s relatively short lives were—and in some places still are—dominated by the responsibilities of childbirth and childcare. But this is not true of places where fertility is low and life expectation at birth (LEB) is high.

As Davis and van den Oever (1982) argued in a seminal piece, a major social-structural adaptation to conditions of persistent low fertility is a weakening of the institution of marriage. For women especially, but also for men, marriage in the sense of a formal lifetime commitment for the having and rearing of children becomes much less important than it used to be. Given such conditions women have more time—and partly because they live longer, more reason—to pursue their lives away from the domestic domain. Consequently, especially in the most developed countries (e.g., Europe, North America, Japan) levels of gender differentiation have tended to fall. And measures of gender equality tend to be greatest in societies with low fertility. In Europe and North America, for example, recent decades have seen women become more like men vis-à-vis their levels of education, employment patterns, appearance, and even their names (Dyson, 2001a).

These reductions in gender differentiation have been asymmetrical i.e., it is the women who have become more like the men, rather than the reverse (e.g., see Lieberson, Dumais and Baumann, 2000). I stress that I am not saying that women have become the same as men (thankfully differences remain and, of course, a majority of women still marry and have children at some point). Nor have all gender inequalities disappeared. Nevertheless it is this basic fact—i.e., that women have become increasingly like men—which explains why for an increasing proportion of women in the demographically most advanced countries getting married and having children are simply not as important as they used to be. I see no reason why given conditions of low fertility (and mortality) and knowledge of what is occurring in places like Europe, women elsewhere in the world will not eventually follow the same broad path.

Certainly there are clear signs that these developments are already under way in India. Fertility decline has been occurring for several decades now. And it is this phenomenon, above all, which is opening up completely new employment and educational prospects for young women. Among the general population there has been a rise in women’s share of agricultural employment and an increase in the average wages they earn. There has also been a fall in male-female wage differentials. The truth is that in rural areas many young men simply do not want to work in agriculture. In contrast, however, young women are often more motivated. These processes are contributing to a reduction in the traditional preference for sons. Consequently, Bhanwar Rishyasringa (2000) has rightly stated that economic changes are occurring in the country in the direction of empowering women relative to men. In addition, education, plus the mass media, are raising women’s aspirations. It is increasingly apparent that young women can lead lives largely independent of men. Of course, these developments are most apparent among the better-off sections of urban Indian society—where many well educated young women see no particular reason to get married and where, with increasing individualism, the incidence of divorce is almost certainly on the rise. Among the growing urban elite many couples are content to have just one child—even if it is a daughter.

So below-replacement fertility results from the process of fertility decline itself. Women become more like men. Marriage and childbearing become less important. In the long run the only thing that is likely to reverse these trends in the world is some kind of fundamental renegotiation of gender roles—a renegotiation in which (to simplify) men may be required to become more like women (e.g., in terms of childcare responsibilities). The implication of what I am saying is that unless there is such a renegotiation then below-replacement fertility will eventually be a fact almost everywhere, including India.

FERTILITY ASSUMPTIONS FOR POPULATION PROJECTIONS AND THE INFLUENCE OF "HERD INSTINCT"

As noted above, the context for this paper includes the need to make accurate population projections. And when considering the future of fertility in India the matter of what the numerical level of the TFR will be at given times has to be confronted. In other words the discussion cannot be conducted solely in abstract terms; the "numbers" must be addressed at some point. Moreover, because the preceding brief theoretical discussion ended with the sweeping suggestion that below-replacement fertility may one day be a universal feature of human society, a few words of caution are probably appropriate.

It is especially important to bear in mind that most social scientists are "herd animals" to some degree. And there tends to be a prevailing view in the demographic community about what is generally happening vis-à-vis fertility trends. Thus, 25 years ago many demographers were concerned with understanding why fertility levels in developing countries were so high. Therefore there was sometimes a corresponding predisposition to be doubtful about evidence of falling fertility. As late as 1979 a leading demographic journal led with an article (Cavanaugh, 1979) the title of which asked in sceptical vein: "[i]s fertility, declining in the less developed countries?" Accordingly in my view there was truth in Nicholas Eberstadt's allegation, made around that time, that in many developing countries fertility declines were occurring while demographers were still debating whether even incipient declines were still 15 or 25 years away (Eberstadt, 1981).

Today we should at least be aware that the pendulum may have swung too far in the opposite direction. For nowadays the prevailing view is that fertility is falling appreciably faster than was expected just 10 to 15 years ago. This view is conditioned by the fact of below-replacement fertility in many economically advanced countries and—albeit in a very different socio-political context—China, too. One result of this fairly widespread view that future fertility may fall faster than expected is that analysts sometimes favour the United Nations low variant population projection or, "in a spirit of compromise" they use the average of the United Nations low and medium projections (e.g., see Seckler and Amarasinghe, 2001; also Seckler and Rock, 1997).

It is equally important to be open about the iterative nature of making projections. It must be rare for the assumptions of a population projection to be made, the projection run, and then the results written-up. What usually happens in practice is that the initial projection results are considered, the assumptions are revised, and the projection is then run again. Indeed, several iterations may be involved before the "final" projection is made. Of course a major reason for making such preliminary projections is to ensure a plausible and acceptable final result. Among other things the projected population totals must not be too different from the results of other projections. To illustrate: the latest United Nations high variant projection for India's population in 2025 is 1,442 million (United Nations, 2001). It would be difficult for anyone making a single projection for the country to defend fertility assumptions which led, say, to a population of 1,500 million. Again, this reflects the influence of the "herd instinct"—and we are all influenced by it to some extent.

REVIEW OF SOME PAST FERTILITY ASSUMPTIONS USED FOR INDIA

The assumptions of past population projections for India merit consideration in part because they represent attempts to forecast the country's future TFR trajectory in specific numerical terms. Probably the most important distinction which can be made about past projections is between those which project the country's population at the national level (i.e., for all India) and those that project at the state level. In the first category are the population projections of the United Nations (and the US Census Bureau and World Bank). In the second category are those of the Registrar General of India, the Population Foundation of India (PFI), and some of my own. More detailed comparisons of the assumptions and results of these projections can be found elsewhere (Dyson and Hanchate, 2000; Dyson, 2002). Here I summarize some of the most germane points vis-à-vis fertility.

The United Nations medium variant projection assumes that India's TFR will fall to the approximate replacement level—i.e., 2.1 births—by 2015-2020 and that it will then remain there over the longer run. This "2.1" assumption has been described by Demeny (1997) as the "received wisdom" on the course of future fertility, although "convenience" might be a better word than "wisdom". The United Nations high and low variant projections also reach their lower limits in 2015-2020, but their corresponding TFRs are 2.6 and 1.6 (United Nations, 2001). For the period 2020-2025 the U.S. Census Bureau and World Bank projections envisage that total fertility will be around 2.3 and 2.2 births respectively (Dyson, 2002, table 1).

Discussion of the state-level projections immediately raises a crucial question. How valid and sensible is it to formulate fertility assumptions for India as a whole? Of course international organizations are often obliged to make population projections for individual nation states. So country-level assumptions must be made. Otherwise, however, several associated considerations favour a state-level approach for India. First, there is the sheer size of the population. Second, because of different rates of demographic growth in different states, the composition of the country's population is changing over time. Third, and relatedly, there is considerable fertility variation within the country. Finally, there is the practical fact that for many reasons Indian planners and policymakers require results from state-level projections.

Table 1 shows the provisional population totals for the country's 15 major states from the 2001 census. For reasons elaborated below the states have been grouped into three broad regions—the south, north and east—with an element of subdivision. Note that India's states vary in size from about 21 million in the case of Haryana to almost 175 million in the case of the (former) state of Uttar Pradesh (UP). Ten states have populations of 50 million or more.

To generate assumptions about future fertility the most recent population projections made by the Registrar General of India (1997) employed regression equations fitted to estimates of annual state-level TFRs from the early 1980s to 1993. As with all such projections, the TFRs used to formulate the assumptions were taken from India's Sample Registration System (SRS)—a demographic registration system which, while not perfect, is thought to be comparatively reliable (Mari Bhat, 1998). Table 1 gives the state TFRs assumed by the Registrar General for the first and last projection periods (i.e., 1996-2001 and 2011-2016) and the years when the assumed trends in total fertility imply that a TFR of 2.1 will be reached. The statistics illustrate the considerable variation of fertility within India. In particular, fertility levels are substantially higher in what I will term the "core" northern states of Rajasthan, UP, Madhya Pradesh (MP) and Bihar. Elsewhere, fertility is lower—especially in the south. Notice too that were the TFR trajectories assumed by the Registrar General to extend into the future then it would take roughly four decades for a TFR of 2.1 to be reached in Bihar and Rajasthan, around six decades in MP, and more than a century in the case of UP! Yet in 2001 these four core states contained 41.1 per

Table 1
Selected population projection fertility assumptions and demographic measures for India and its major states, grouped by region

Region/state	Population 2001 (millions)	Registrar General's projections: Assumed TFR 1996-1901	Registrar General's projections: Assumed TFR 2011-2016	Registrar General's projections: TFR = 2.1 (year)	Dyson's projections: TFR 1996-01	Dyson's projections: TFR=1.8 (period) or TFR in 2021-26	CF for SRS TFR
South							
Kerala	31.8	1.62	1.60	1988	1.80	1996-2001	1.157
Tamil Nadu	62.1	1.87	1.65	1993	1.96	2001-2006	1.095
Andhra Pradesh	75.7	2.27	1.78	2002	2.34	2001-2006	1.006
Karnataka	52.7	2.54	2.01	2009	2.41	2006-2011	1.021
Maharashtra	96.8	2.51	1.97	2008	2.63	2011-2016	0.992
North							
Gujarat	50.6	2.73	2.11	2014	2.93	2016-2021	0.975
Rajasthan	56.5	3.91	3.06	2048	4.13	2021-2026	1.030
Uttar Pradesh	174.5	4.75	4.05	>2100	4.73	2.32	1.024
Madhya Pradesh	81.2	3.99	3.27	>2060	3.93	1.88	1.041
Bihar	109.8	3.92	2.93	2039	4.28	2.11	1.031
Punjab	24.3	2.65	2.11	2019	2.64	2011-2016	1.027
Haryana	21.1	3.25	2.47	2025	3.31	2016-2021	1.011
East							
West Bengal	80.2	2.56	1.99	2009	2.44	2006-2011	1.021
Orissa	36.7	2.64	2.01	2010	2.89	2011-2016	1.017
Assam	26.6	2.82	2.17	2015	3.16	2016-2021	1.066
All India	1027.0	3.64	2.52	2026	3.21	2016-2021	1.020

Sources: Registrar General, India (1997, 2001); Dyson (2002); Retherford and Mishra (2001a).

NOTES: The 2001 census populations are provisional. Here and in table 3 the figures shown for Uttar Pradesh (UP), Madhya Pradesh (MP) and Bihar relate to the former jurisdictions of these states (i.e., including the recently established states of Uttaranchal, Chhattisgarh and Jharkhand, which had populations in 2001 of 8.5, 20.8 and 26.9 million respectively). The all India TFR shown for 2011-2016 is the "pooled" figure. For UP, MP and Bihar the penultimate column gives the values of the corresponding TFRs in 2021-2026 since these states do not attain a TFR of 1.8 until later periods. The CFs shown are 15-year aggregated ratios derived by Retherford and Mishra from analysis of NFHS-2 data.

cent of India's population. Were their TFRs to decline as slowly as is suggested in table 1 then this would act as a significant "drag" on the rate of national fertility decline.

It is an unfortunate fact that—despite the inevitable arbitrariness and associated imposition of a false future constancy—population projections for countries like India really have to incorporate assumptions about how low total fertility will fall. The TFR "floor" assumed in the Registrar General's projections is 1.6 births. No justification is given for this figure. But notice from table 1 that only Kerala achieves it by 2011-2016, although Tamil Nadu—another southern state—comes close. In fact there must be a suspicion that a figure as low as 1.6 was chosen partly to offset the extremely slow fertility trajectories which arose from the regressions for the core northern states. Note that if a lower boundary of 2.1 had been used by the Registrar General then no less than six states would have had higher levels of assumed fertility in 2011-2016. And, of course, the country's projected population would have been appreciably larger as a result—perhaps "unacceptably" so over the longer run.

Another key point is that the all-India TFR of 2.52 births shown in table 1 for the period 2011-2016 is a "pooled" figure, i.e., it arises from weighting the assumed state-level TFRs by the corresponding proportions of the country's females projected to be aged 15-44. However the Registrar General's report makes clear that were the regression approach to be applied to the available SRS TFRs for all India then this would produce a TFR of only 2.33 by 2011-2016. Thus, other things equal, a state-level approach tends to produce a significantly slower rate of national fertility decline. It is a fact, however, that states with relatively high TFRs are constituting an increasing fraction of India's population over time. Thus in 1971 the four core northern states contained only 38.7 per cent of the country's population. So changes in the regional composition of the population will affect the future course of all-India total fertility.

The state-level projections of the PFI also use a TFR floor of 1.6. Again, there is no discussion of this choice. And, again, a plausible explanation is that it helps to facilitate an acceptable rate of national fertility decline. Thus, in the PFI projections no fewer than seven major states achieve a TFR of 1.6 by 2016, and this reaches 12 by 2026. However, the assumed TFR for UP in 2016 remains as high as 4.0 births, and in 2026 it is still as high as 3.5. The PFI projections too illustrate that a state-level approach implies a slower rate of national fertility decline. Thus, the authors state that "[w]hile extrapolation of India's TFR during 1971-1996 would have resulted in a TFR of 2.1 in the [year] 2016, when the regional variations are taken into account it appears that replacement fertility corresponding to a TFR of 2.1 [will] be achieved by the year 2026, i.e., 10 years later. This [latter] assumption has been used to project India's population." (Natarajan and Jayachandran, 2001).

Finally, in this section, table 1 summarizes the fertility assumptions of my own state-level projections (Dyson, 2002). I am sceptical that total fertility will fall to an average level of 1.6 births in many states in the period to 2026. Therefore, to be candid, what I aimed to achieve in framing these assumptions was some form of "middle way"—i.e., an approach which simultaneously produces a reasonably fast rate of fertility decline in all states, but which also avoids the use of an extremely low floor. Several approaches were tried to achieve this compromise. But the one eventually used involved fitting linear regressions to the available state-level SRS TFRs for 1986-1998. These were then employed to extrapolate into the future until the TFR reached a floor of 1.8 births, at which point it was held constant. Essentially, the figure of 1.8 is a compromise between 1.6 and 2.1. For Assam (where the SRS has been affected by political disturbances) suspect TFRs for 1994 and 1995 were omitted from the regressions. And for Rajasthan the period used to fit the regression was 1984-1998 (because the inclusion of TFRs for 1984 and 1985 produced a somewhat faster fertility decline). Clearly, these modifications are arbitrary. But they can be defended on the grounds that they are modest and that they produce fertility trajectories which seem more plausible. Also for Kerala the TFR was assumed constant at 1.8 births throughout the projection; this was because the SRS suggests that below-replacement fertility has already been reached (but see below).

However in the case of Uttar Pradesh (a mere 175 million people) fitting a linear regression to the TFRs for 1986-1998 still produced a very slow pace of fertility decline—in which fertility would still be about 3.2 births by 2021-2026, while in all the other major states it would be around or below 2.1. Yet if linear extrapolation produces a TFR of 2.1 for the neighbouring core northern state of Bihar in 2021-2026 it seems unlikely that the TFR will be over one birth greater at that time in UP. Accordingly, I made the subjective—although arbitrary—assumption that the TFR in UP during 2021-2026 will be about 10 per cent higher than that in Bihar (as applied during the baseline period, 1996-2001 (see table 1)). This means that UP's assumed TFR falls to around 2.3 in 2021-2026, and that the state is not left as the sole significant outlier. This is an instance where our knowledge that fertility has fallen faster than expected in many populations overrides any simple extrapolation of the numbers. I believe that the TFR in UP will fall faster than is assumed in either the Registrar General's or the PFI projections. Indeed the state's TFR could be less than 2.3 by 2021-2026.

Table 2 summarizes the implications of these state-level assumptions for the all-India path of total fertility (the state-level TFRs being weighted on the corresponding projected female populations aged 15-49). Of course the resulting all-India fertility trajectory is non-linear. Notice that the country's TFR falls from around 3.2 during 1996-2001 to just above replacement (2.13 births) by 2016-2021—a trajectory which is

Table 2
Future all India TFR trajectories derived from assumed state-level trajectories, but incorporating different lower TFR "floors"

Period	High floor (TFR = 2.1)	Middle floor (TFR = 1.8)	Low floor (TFR = 1.5)
2001-2006	2.92	2.84	2.81
2006-2011	2.68	2.55	2.46
2011-2016	2.48	2.33	2.20
2016-2021	2.30	2.13	1.98
2021-2026	2.14	1.94	1.78
2026-2031	2.10	1.81	1.59
2031-2036	2.10	1.80	1.50
2036-2041	2.10	1.80	1.50

Source: Dyson (2002).

similar to that assumed by the United Nations medium projection. However, unlike the United Nations projection, total fertility continues to fall until it reaches an assumed floor of 1.8 (in 2031-2036). For interest table 2 also gives the assumed all-India TFR trajectories which arise when state-level floors of 2.1 and 1.5 births are used instead. These latter trajectories represent an attempt to generate "high" and "low" variant national projections working, so to speak, from the state-level up. Note that by 2021-2026 India's TFR may be between 2.14 and 1.78 births; the central value being 1.94. Over 50 years these different assumptions imply all-India populations varying greatly in size—the corresponding projected populations in 2051 being 1,731, 1,579 and 1,458 million. The latter figure, based on a TFR floor as low as 1.5 seems highly unlikely.

In concluding this section, I stress three points. First, the value—and difficulties—of adopting a state-level approach. Second, that iterations and compromises are inescapable, particularly when making state-level projections. Third, we are all encumbered to some degree by preconceptions about what assumptions and outcomes are acceptable.

FURTHER COMMENTS ON THE NATURE OF FUTURE FERTILITY DECLINE

Several additional points of substantiation and qualification must be made apropos the preceding discussion. It is worth emphasizing, for example, that fertility is falling in virtually all of India's states, including the core northern ones. Perhaps the only exceptions to this statement are Kerala and Tamil Nadu—where according to the SRS total fertility is already below 2.1. That fertility is falling everywhere is established by both the SRS and analysis of own-child data from the two rounds of the National Family Health Survey (NFHS) which were conducted during 1992-1993 and 1998-1999 (see Retherford and Mishra, 2001a). The SRS suggests that total fertility has been falling in most states since the 1970s—in some cases the early 1970s, or perhaps even earlier (Dyson, 2001b).

That said, it is likely that most of the SRS estimates used in the population projections discussed above understate slightly the true level of total fertility. Thus, for Uttar Pradesh, Retherford and Mishra undertook a comparative study of NFHS and SRS data which also benefited from the conduct of a post-NFHS evaluation check survey. They suggest that in 1997 the true TFR in UP may have been about 5.2 births as opposed to the figure of 4.8 indicated by the SRS (Retherford and Mishra, 2001b). Table 1 gives correction factors (CF) for the SRS TFRs derived from own-child analysis of NFHS data, also by Retherford and Mishra (2001a). Note that for the country as a whole the level of the SRS TFR in the 1990s may have to be adjusted upwards by perhaps 2 per cent. However, it is somewhat moot whether these CF values are sufficiently large, or sufficiently firm (alternative values are given) to merit their use when formulating fertility assumptions at the state-level.

The CFs in table 1 can be used to make another pertinent point. Inasmuch as there is any empirical justification for assuming a below-replacement "floor" for state-level total fertility it rests with the SRS estimates for Kerala and Tamil Nadu. According to the SRS the TFR in Kerala first fell below 2.1 births in 1988; during the years 1992-1994 inclusive it fell further to just 1.7; and in subsequent years it has risen slightly to 1.8. For Tamil Nadu the SRS suggests that total fertility fell below 2.1 in 1997, and in 1998 it was still at 2.0 births (Registrar General, India, 1999). Note, however, that the CFs for Kerala and Tamil Nadu are sizeable—being respectively 15.7 and 9.5 per cent. These values are sufficiently great to cast doubt on the suggestion that any Indian state has yet experienced a total fertility rate much below 2.1.

Another point worth making is that the available SRS time series provide little support for the idea that total fertility in any state will "plateau" for long at what might be termed an "intermediate" level (say, anything as high as 2.6 births). This is particularly so if when interpreting the data one takes account of past changes in the system's level of birth coverage and rotations in its sample. It is true that SRS data do occasionally reveal genuine rises in fertility—e.g., in Maharashtra during 1975, following the severe drought which depressed the TFR there in 1973-1974. And there is some suggestion that total fertility may not have declined much during the years following the emergency—called by Mrs Gandhi during 1975-1977—which instigated a period of setback for family planning activities. However, such events were comparatively short-lived. Clearly, there may well be short-term plateaus and even rises in total fertility in the future (e.g., following drought). But such events are impossible to predict and in the long run fairly inconsequential. So in general the SRS suggests that once the TFR starts to fall in any state, by and large the fall persists.

In my view the ongoing state-level fertility declines will continue during the medium-term future largely independently of trends in conventional socio-economic variables like per capita incomes and urbanization. In other words, to a considerable extent these TFR declines now have a "life of their own". This is not to deny that at most levels of analysis such socio-economic factors tend to be associated positively with each other, and negatively with fertility. Nor is it to deny that such variables may have some effect in facilitating—speeding up very slightly—state-level fertility falls. Moreover, most forward-looking analysts concur that in the next few decades average levels of per capita income and urbanization will continue to rise in most states (albeit at different rates, expected progress generally being faster in India's south). That said, as discussed below, there may be more deep-seated regional dimensions of South Asian society which have helped to determine the timing and extent of both socio-economic and demographic progress. Accordingly, when one looks at current fertility variation—e.g., across the country's major states—what one observes to a considerable extent are differences in the timing of fertility decline, more than differences in the impact of these socio-economic variables. As aforementioned, I regard fertility decline as an unconscious, lagged adjustment to the effects of sustained and massive mortality improvement. In India mortality decline—which at first was very slow—dates from around the 1920s. By Independence in 1947 life expectation had improved slightly to about 33 years. Today it is probably around 62 and still rising. While, of course, there is mortality variation between states, such interstate variation is of minor significance compared to the fact of sustained and major mortality improvement which has been occurring across the whole country for perhaps 70 years.

This is not to reject the power of the media, family planning activities and educational improvements to hasten slightly the fertility decline response. The pace at which various forms of communication (e.g., bus travel, public telephones, movies, even Internet cafes) are spreading in India—especially the south—is remarkable. The 1998-1999 NFHS found that 48 per cent of all households had a bicycle, 11 per cent owned a moped, scooter or motorcycle, 38 per cent owned radios, 25 per cent had black and white TVs, and 10 per cent had colour TVs (International Institute for Population Sciences and ORC Macro, 2000). Such developments will surely continue in the coming decades and give me confidence in my fairly rapid fertility decline assumptions summarized in tables 1 and 2. It should be noted too that control over family planning activities has increasingly become the province of individual state governments, rather than of the central Government in Delhi. This may not make much difference to the overall tempo of family planning activities in the country. But in some states—perhaps most noticeably Andhra Pradesh—it has meant that politicians have recently instigated fairly aggressive "target" and "incentive" driven strategies to promote sterilization—irrespective of what post-Cairo mainstream opinion may hold. Again, it is hard to gauge how such developments will turn out, but they may play an accelerating role. Particularly important would be improvements in the availability of family planning methods in states like UP and Bihar—because there is little doubt that these states face significant "supply-side" problems. Of course female education is viewed as a particularly powerful way of increasing fertility control. Between 1991 and 2001 the national literacy rate of females aged seven and above increased from 39 to 54 per cent (the figures for males are 64 and 76 per cent (Registrar General, India, 2001)). There are many signs that Indian parents are attaching much greater value to the education of their children. This trend too provides support for the idea that fertility in most states will decline at a fairly brisk pace. That said, it should not obscure the fact that especially in the south there are now tens of millions of poor women, with two children, sterilized, and with no education at all (McNay, Arokiasamy and Cassen, 2000). More educated women may reduce their fertility earlier and faster, but after some time less educated women do almost as well. Again, education affects the timing of the fertility reduction, but its direct impact upon the eventual level of fertility may be negligible.

Finally, in this section a word is in order regarding how the age pattern of fertility has been transformed as levels of fertility have fallen. Here, the NFHS data may be better than those of the SRS—although both sources reveal a similar picture. In short, especially in those states with relatively low levels of fertility there is an unusually young and extremely concentrated age pattern of fertility. Analysis shows that between the first and second rounds of the NFHS the age location of fertility declined still further and it became even more highly concentrated in almost all the major states (Dyson, 2002). For example, data from the 1998-1999 NFHS indicate that in Andhra Pradesh and Maharashtra about 70 per cent of age-specific fertility is located at ages below 25 years. And if recent trends continue this will soon apply to Gujarat, Haryana, Tamil Nadu and West Bengal too.

Female sterilization is the main form of contraception in India. The 1998-1999 NFHS found that 34 per cent of currently married women in the country were sterilized, and this method accounted for 71 per cent of total contraceptive prevalence (International Institute for Population Sciences and ORC Macro, 2000). The median age of female sterilization was found to be 25.7 years. So, what is suggested is a trend towards a fertility regime in which Indian women continue to start to cohabit at a relatively young age (an age which, admittedly, has probably risen), have two children in fairly quick succession (almost certainly including at least one son), and then get sterilized. Female sterilization is popular. Past analysts who—quite reasonably—considered that reversible forms of contraception would be required in order to get young Indian women to contracept essentially got the matter wrong (e.g., see Nortman, 1978).

THE REGIONAL DIMENSION

I hope to have shown that—while they are not without problems—consideration of the available "numbers" can produce insights about how fertility will decline in different parts of India. That said, as has been implied repeatedly, the "numbers" must be interpreted in their wider context. In particular, it seems sensible to ask whether there are deep-seated features of Indian society which may persist to influence fertility behaviour post the fertility transition.

Recall that I argued above that the occurrence of below-replacement fertility arises from the implications for women's lives of fertility decline itself. Especially in the later stages of the fertility transition young women increasingly have other avenues for advancement than marriage, having children, and a life spent largely within the domestic family domain. The importance of getting married and having children declines, although of course most women continue to get married and have children. However, given the basic fact of fertility (and to a lesser extent mortality) decline there seems to be no reason why this rationale for below-replacement fertility should not apply in all populations. But there may be variation in certain key social-structural factors—e.g., in the social centrality of marriage—which may affect how readily and quickly below-replacement fertility levels are reached.

No contemplation of India's future fertility can ignore the underlying regional dimension with its attendant social-structural correlates. The basic contrast between the groups of states in tables 1 and 3 is between the "north" and the "south"—with the "east" occupying an intermediate position. In the "north" the more economically advanced states of Punjab and Haryana have been separated out a little, as has Gujarat which borders Maharashtra (which here has been put in the south). Kerala deserves some separation in the south; indeed, from a demographic perspective it is very similar to Sri Lanka which lies just a few kilometres across the sea (Dyson, 2001b).

Although massive generalizations are involved, the main point—which table 3 illustrates with recent statistics—is that northern and southern parts of the Indian subcontinent appear to have long been governed by rather different demographic regimes. The north always seems to have experienced somewhat higher levels of fertility and mortality, an earlier age at marriage for women and greater excess female mortality. These regimes and their social-structural basis have been detailed elsewhere using data for different periods in the twentieth century (see Dyson and Moore, 1983). Table 3 shows that with some alterations the basic relative features persist. Fertility is highest in the four core northern states. And census child woman ratios (CWRs) suggest that until about the last third of the twentieth century fertility in Punjab, Haryana and Gujarat was also comparatively high. Fertility always seems to have been comparatively low in the south; and the southern states experienced fertility declines earlier than the core northern states. Interestingly, analysis using district-level CWRs for the period 1951-1991 shows fertility decline spreading gradually throughout southern India from an initial "bridgehead" in the extreme south; this is followed a little later by a second slower emanation of fertility decline from a bridgehead in Punjab/Haryana in the north (Guilmoto and Rajan, 2001). As previously intimated, differences in the timing of fertility declines have probably accentuated the current size of the former north/south differential. But the key point is that this differential probably existed prior to the onset of the fertility transition. Table 3 shows that a broadly similar relative picture of north/south variation relates to mortality, with Kerala having an exceptionally high life expectation at birth (LEB). Again, the north/south contrast is reflected in data from the middle of the twentieth century, and it may well have existed before. Notice that women in the core northern states tend to marry at younger ages—a feature which has clear resonances in census data from the late nineteenth century.

Table 3 shows that the exceptional masculinity of India's population is largely a northern feature. This differential too is deeply ingrained and of long standing. Sex ratios from the census have always been unusually masculine in the north—especially in Punjab/Haryana and neighbouring areas of western UP. As well as differential child neglect, in the past this phenomenon also reflected female infanticide among some higher castes. Using district-level data from the 2001 census, figure I shows the same basic pattern of north/south variation in child sex ratios. In much of northern India there is neglect of female infants and children, especially second or higher order girls. Indeed such biases may be heightened by fertility decline (Das Gupta and Mari Bhat, 1998) Interestingly, and probably facilitated by the increasing recent availability of sex-selective abortion, in

Table 3
The regional context of Indian fertility—selected measures illustrating the continuing influence of the country's northern and southern demographic regimes

Region/state	TFR (births) 1996-1998	LEB (years) 1992-1996	0-4 death rate (per 000) 1992-1996	Sex ratio (m/f) 2001	SMAM (years)		Per cent wanting more sons than daughters	Per cent not involved in any decision-making
					Male	Female		
South								
Kerala	1.8	73.1	3.2	0.945	27.9	21.5	14.6	7.2
Tamil Nadu	2.0	63.7	13.4	1.014	26.6	20.9	9.6	2.4
Andhra Pradesh	2.5	62.0	16.8	1.023	23.9	18.3	19.8	7.4
Karnataka	2.5	62.9	16.4	1.038	26.7	20.1	13.0	8.1
Maharashtra	2.7	65.2	12.2	1.084	25.3	19.8	27.1	7.2
North								
Gujarat	3.0	61.4	20.8	1.086	24.4	20.2	33.2	4.1
Rajasthan	4.2	59.5	29.5	1.085	22.3	18.3	47.5	13.3
Uttar Pradesh	4.8	57.2	31.1	1.109	23.3	19.0	53.3	16.4
Madhya Pradesh	4.0	55.2	32.3	1.067	23.5	18.9	42.5	12.5
Bihar	4.4	59.4	25.9	1.080	23.8	18.8	47.9	13.5
Punjab	2.7	67.4	14.9	1.145	25.7	22.1	29.1	1.0
Haryana	3.4	63.8	22.2	1.161	24.6	19.8	37.5	3.4
East								
West Bengal	2.5	62.4	16.8	1.071	26.2	19.6	20.7	8.0
Orissa	3.0	56.9	28.1	1.029	26.6	21.2	37.6	10.6
Assam	3.2	56.2	26.9	1.073	27.8	21.7	38.2	4.6
All India	3.3	60.7	25.2	1.072	24.9	19.7	33.2	9.4

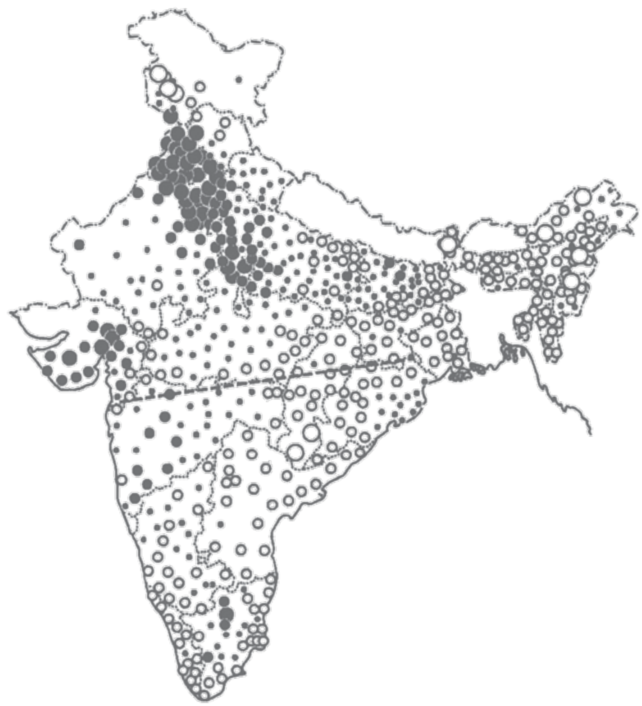
Sources: Registrar General, India (1997; 1999; 2000; 2001); International Institute for Population Sciences and ORC Macro (2000).

Notes: TFR = total fertility rate; LEB = life expectation at birth; SMAM = singulate mean age at marriage. The sex ratios shown are the ratios of the number of males enumerated by the 2001 census divided by the number of females enumerated. The all-India 0-4 death rate given above is the average of the rates for 1991 and 1996. All fertility and mortality measures are from the SRS. The SMAMs and remaining measures are all from the 1998-1999 NFHS. The percentages relating to son preference and decision-making are based on the responses of ever-married women interviewed in the NFHS surveys. Women classed as "not involved in any decision-making" made no decisions, for example, about when they might visit their natal kin, their own health care, or what foods might be cooked at home.

2001 the child populations of Punjab, Haryana, Maharashtra and Gujarat became much more masculine compared to 1991 (Dyson, 2001c). Note too that in the south certain districts of western Tamil Nadu now have exceptionally masculine child populations. This is a relatively new development. The essential north/south contrast persists, but we should be aware of modifications.

The explanation for this demographic contrast is complex (Dyson and Moore, 1983). But for present purposes it will suffice to say that northern society tends to place greater stress upon the male line. The main social units are patrilineally related groups of males (i.e., fathers and sons). Marriage rules are exogamic; "wife-giving" groups are socially inferior to "wife-taking" groups; and dowry (i.e., resources which go from the bride's family to that of the groom) is the main marriage transaction. Therefore in the northern kinship system as well as being a fundamental arrangement for the having and rearing of children (especially male heirs) marriage represents a statement of the relationship between different groups. It is central to the structure of the wider society. When women marry they often move over long distances into households where they are strangers. Their levels of personal autonomy are extremely low and son preference is very strong (table 3). A daughter will usually require the provision of a dowry. Producing a son is the chief route for a bride to raise her status. It is often said that son preference in India reflects the Hindu requirement for a son to light the funeral pyre. But this rite can be performed by others than a son, and the highest level of religious merit also requires that a daughter be given in marriage. So the real basis for strong son preference—and

Figure I
Sex ratio by district, for children aged 0-6, 2001



Males per 1,000 females

Above 1,176
1,176-1,112
1,111-1,054
1,053-1,001
1,000 and below
Approximate location of the Saptura hill range

Source: Registrar General, India, 2001.

daughter neglect—lies in the fundamental arrangements of kinship, inheritance and marriage.

Although some of the more invidious features of the northern kinship system—especially dowry—have increasingly affected parts of south India, the traditional southern system still prevails in places and has strong ramifications. Customary marriage rules in the south tended to be endogenous and women often married men to whom they were related (e.g., cousins or uncles). So the grooms frequently came from familiar households, perhaps in the same village. In this system approximate social equality existed between kin who were related by marriage. And for most of the twentieth century dowry was not very important in most of the south. Accordingly, son preference tends to be significantly weaker, and the birth of a daughter was and is more acceptable (table 3). Moreover, because southern women often marry men who they know, spousal relationships tend to be more balanced. After marriage women continue to interact with their parents more frequently than generally applies in the north, and there is less need to re-socialise young brides in their marital homes. In short, to quote Irawati Karve (1953) "the south represents . . . greater freedom for women in . . . society".

In my view there are several reasons why the basic north/south contrast will mean that for the foreseeable future, say the next 25 years, below-replacement fertility is much more likely to prevail in southern than in northern India. First, there is the basic fact that fertility seems always to have been a little lower in the south. Of course, because something is of long standing does not mean that it will necessarily persist, but at the same time this consideration cannot be entirely discounted. Second, other things equal, the particularly strong level of son preference found in the north should tend to promote somewhat higher levels of fertility there. Third, as argued above, in the north the institution of marriage is pivotal to the construction of the wider society. This is relevant chiefly because it implies that it will take northern women longer to explore avenues of life apart from the domestic domain. Indeed, southern women have long had a significant advantage in terms of their levels of "freedom", "autonomy", "personal decision-making", or call it what you will (see table 3).

It is also important to note that, in general, south Indian society and economy are appreciably more dynamic than those of the north. This is not to deny the existence of "bright spots" in the north, such as Delhi, Punjab and Haryana (although these places all have relatively small populations). Gujarat too is as socially and economically dynamic as is Maharashtra immediately to its south. But, that said, travelling around India there is certainly a lack of "buzz" about the northern, inland, Gangetic core. In contrast, south India, both its urban and rural parts, has a very different feel. Thus, compared to the core northern states, rates of per capita income growth have generally been much faster in the south. The southern states also tend to be more urban. In addition, most of the more vibrant, big urban centres—e.g., Mumbai, Pune, Bangalore, Hyderabad, Chennai—are located in the south. It is these cities, especially, which have benefited from the liberalization of the economy since the early 1990s, and where many new investment opportunities have been created. These are the main locations for the growing numbers of high-tech jobs, places where the newly installed high-capacity telephone lines have led to the establishment of large call-centres (often employing young women) which service overseas markets. These are the locations where much of the recent urban employment growth—e.g., in the service sector and light industry—has increasingly favoured women. And it is in the south where, one strongly suspects, in the future increasing levels of education and economic growth will augment the frequency of migration for employment, business and educational purposes for men, but also for women (Dyson and Visaria, 2002). Finally, one should reaffirm the roles of migration and the media in changing how Indian women will increasingly see themselves. In particular, past international migration (including, it must be said, significant outflows from Punjab and Gujarat) has, through mechanisms like the return visits of Indians resident overseas—and their children—had an inordinate effect by helping to spread elements of a so-called western lifestyle. The consequences are very evident among better-off young men and women living in cities like those mentioned above. Increasingly these lifestyle influences have been reflected in the wider media—something which will happen even more in the years ahead.

So south Indian society, in particular, holds out the firm prospect that increasing numbers of young women will carve out independent lives of their own—lives in which marriage and childbearing are less significant. The majority of them will marry, but they and their husbands will be happy with two children or one, even if it is a girl. But irrespective of the child's sex much greater attention will be given to its education. Frequently, in occupations like nursing, teaching and service, young women from Kerala can be seen as having been pioneers for some time. And if this state's level of total fertility is not already below replacement, there is nevertheless evidence that the TFR is well below replacement at least for some poor social groups (Pallikadavath and Wilson, 2000). Moreover, the nature of south Indian society is such that in 20 or so years time one can well envisage significant numbers of women in urban areas following their counterparts in South Korea, Thailand and Malaysia where young women are "staying away from marriage in droves" (Jones, 1997).

Finally, a brief word is required about the core northern states—because, albeit over a significantly longer time horizon, one can foresee the same fundamental processes eventually unfolding there too. One possible indication of this is that even for northern states there is now evidence from the NFHS to indicate that the unusually high levels of son preference, for example as evidenced in Gujarat and Punjab, are finally beginning to decline (Lahiri and Dutta, 2002). It seems likely that, in time, fertility decline in the north will bring about a more balanced view of the desirability of having daughters, perhaps partly because they will represent a more reliable source of support and security over the longer run than will sons. And a reduced level of sex preference will itself tend to facilitate a lower level of fertility. The populations of Gujarat, Punjab and Haryana should see replacement fertility within the next 10 years or so. But in general this will take at least 20 years in the core northern states.

SUMMARY AND CONCLUSIONS

Forecasting the future is certainly risky! There is always the danger that one will be swept along by the herd. The thrust of this piece has been that a consideration of future fertility trends in India should really be conducted at the state-level. And I have shown that, other things equal, a state-level approach to the formulation of fertility assumptions for population projections leads to a significantly slower rate of fertility decline than does an all India approach. Total fertility is falling in virtually all of India's states. It is unlikely that in any state the TFR will stagnate for long at a level that is well above replacement. The fertility declines which are occurring are ultimately a response to massive and sustained mortality decline. And while it is conceivable that in some states specific interventions—e.g., the instigation of a forceful approach to sterilization—may accelerate developments, on balance the fertility declines currently under way are probably better considered as having a momentum of their own. That said, India seems set to experience continued social and economic progress and this should do future fertility decline no harm. I predict that the TFR in the massive northern state of Uttar Pradesh will fall appreciably faster than is envisaged by other population projections. Consequently my state-level fertility assumptions produce an all India TFR trajectory which in the period to 2016-2021 is similar to that assumed by the United Nations medium-variant projection. Thereafter, however, I envisage that all India total fertility will fall below replacement—unlike the United Nations projection which assumes that the TFR will remain at 2.1. So although recent research suggests that no Indian state—not even Kerala or Tamil Nadu—has yet experienced fertility levels that are significantly below replacement, I do envisage this happening in some states fairly soon. In this context it is extremely important to consider the regional dimension. In general, fertility fell earlier and is appreciably lower in the country's south. Moreover, it is the southern states which show most clearly a situation developing in which women—irrespective of their household incomes or their levels of education—marry young, have two children and then get sterilized. South Indian society seems always to have allowed women a little more autonomy in their lives. And southern India—which often seems almost a different country from the north—tends to be socio-economically more advanced and progressive.

If, as I have argued here, below-replacement fertility occurs because with fertility decline an increasing proportion of young women begin to develop lifestyles in which marriage and children are less important, lifestyles which are sometimes independent of men, then circumstances are quite favourable to such a scenario developing in much of south India. In fact, this scenario is already under way. That said I am rather doubtful whether, looking at the next decade or so, average levels of total fertility will be as low as 1.6 throughout the main southern states, although in a few of them it may be. The core northern states, however, are a very different matter. To reiterate, it may take 20 years for these states to have TFRs that are around replacement. And in these states marriage is so central to grass-roots social structure that it will take longer still for an appreciable proportion of women to be able to reduce their lifetime commitment to the domestic domain and conjure with the possibility of leading a life that revolves less around marriage and children. So for core northern states like Bihar and UP sustained levels of below-replacement fertility are probably several decades off. And even then, total fertility may well remain somewhat higher in the north than in the south. Overall, however, India is heading for a future of below-replacement fertility, probably a little below 2.1, and the late development effect will mean that it gets there comparatively rapidly.

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Caught in transit: questions about the future of indonesian fertility

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SUMMARY

Three decades after the establishment of a government sponsored family planning programme in Indonesia attempts to predict the course of transition in fertility are frustrated by the complexity and opaqueness of demographic analyses. Economic crisis, political turmoil and social breakdown have undermined the optimistic scenarios painted a mere decade ago. The lack of reliable demographic data has been exacerbated by the impact of major budget cuts on the national census of 2000 and the radical decentralization plans implemented in 2001. Speculations about growing poverty, declining social institutions and political uncertainties abound, and commentators read potential demographic reverses into their prognoses about this, the fourth largest population, and largest Muslim majority nation in the world. Against such a contradictory backdrop demographers can only point to two basic arguments. First, detailed examinations of the available data indicate a possible slowing but not a reversal of trends. Specifically, the "proximate" determinants of contraceptive use and delayed marriage have been robust in the face of dramatic economic decline. Second, the rising cohorts of women of childbearing age continue to show higher levels of education, increasing involvement in both the formal and informal workforces, and firm resolution to control their fertility at comparatively low levels. When looking forward to 2025 it is well to remember that Indonesia is well past the halfway point in the transition from high to low fertility, and there is every indication that the decline in family sizes will continue.

INDONESIAN FAMILY PLANNING IN A CHANGING POLITICAL ORDER

Twenty years ago, Indonesia was depicted as a case where rapid fertility decline preceded major economic improvement and thus could justifiably be attributed to the efforts of the government family planning programme (Sinquefield and Sungkono, 1979; Freedman and others, 1981). While many demographers interpreted the role of the government programme (with the Indonesian acronym BKKBN) as that of a catalyst rather than the prime causative mechanism of fertility change, the political and popular interpretation of the situation was simplified down to the notion that Government had engineered a remarkable change through force of policy, planning and logistic management. This rather naive idea was welcomed by the financers of the programme—the World Bank and the U.S. Agency for International Development—and Indonesia was embraced as the model for other developing countries, with the award of numerous prizes and awards to the BKKBN and to President Suharto.

Even as Indonesia was being feted as a model for poor countries it became obvious that much more was changing than simply the spread of contraception and the fall of fertility. By 1980, the rapid pace of broad economic progress of the nation became more obvious, and the social changes accompanying that progress more dramatic. Still, many evaluations continued to treat the programme in isolation as a focussed institutional node. This was exemplified by the Mauldin and Lapham (1985) framework of analysis as critiqued by Entwisle (1989) and Hernandez (1984 and 1989) (see also Mauldin and Ross, 1991). If observers adopted a broader perspective, the family planning programme was seen as an instrumental means of achieving a wide range of economic and social changes through stressing income generating projects, family welfare goals or "acceptor groups", as described by Warwick (1986), Giridhar, Sattar and Kang (1989) and Suyono and Shutt (1989). Only rarely was the programme analysed in the context of deeper ideological and political changes in Indonesia (e.g., Hull, 1987; Hugo and others, 1987; Hull, 1994; Hull and Hull, 1997). This is strange since the political setting, and especially the ideological underpinnings of political changes, were crucial in determining the establishment, development, and results of Government programmes including family planning, health, education, and social development. Even those elements of the programme credited with carrying contraception and population education to villages, such as the establishment of community-based distribution systems, were ultimately products of changes to village structure and function rooted in the colonial period, and developed in an accelerated form under the New Order (Warren, 1986, MacAndrews, 1986). The central government succeeded in developing tight lines of control reaching through the various levels of political administration to a cadre of officials in the village who owed their livelihoods and their loyalties to the Minister of Interior Affairs. The family planning programme represented development at the margin (albeit an important margin) of new formations of governance and socialization in a society that was grappling with different options to build a national identity on a heterogeneous foundation.

The social change that was seen between 1965 and 1990—the time in which fertility rates were essentially halved—was incremental, and was a process of transformation via a series of mutually reinforcing marginal movements. The engine of that change was less the formal institution of the family planning programme than it was the oil boom beginning in the 1970s which fuelled development, the political controls which purchased stability and authority, and the bureaucratic reforms and communications innovations that made regions responsive to central direction. Without these more basic changes the BKKBN would not have had a foundation on which to implement actions to achieve the logistic and informational goals formulated to promote contraceptive use.

In Indonesia the key political and administrative changes were attributable to the nature of the post-coup New Order regime. The change from the old to the New Order in 1965-1967 involved a rearrangement of political power such that the major inhibitions to family planning (political Islam and nationalistic economic planning) were replaced by forces supporting birth control (secularist authoritarianism and modernizing technocratic planning). On the new agenda was high profile "institution-building" with large investments made in improving central government departments, strengthening control of regional and local government, and directing all social organizations to a goal of development under the common ideological banner of Panca Sila. These "five pillars" of national ideology were created in 1945 at the dawn of Indonesian Independence to give a foundation to a secular state. The pillars have been translated in various forms, but can be summarized as: belief in God, national unity, humanitarianism, social justice and rule by consensus (see the papers in van Ufford, 1987). At the time of the formulation of the ideology, and frequently and increasingly since, many leaders from the conservative Muslim stream of politics have pressed to modify or abandon the Panca Sila in favour of a religious based ideology supportive of an Islamic State. The family planning programme has grown as a product of a secular state even as it has shown policies that were formulated to be sensitive to Islamic values and teachings (Fathuddin and others, 1993).

The call for an Islamic State is based on the argument that the vast majority of the population is Muslim, and they often quote figures of as much as 95 per cent adherence, rather than the census figure of 87 per cent or the more pragmatic realization that a substantial proportion of those listed as adherents to Islam are "statistical Muslims" carrying out animistic and other spiritual practices. Resistance to such religious politics prevailed under the leadership of Sukarno in 1945, was maintained by Suharto through 1998, and since has found support from the religiously oriented leaders Habibie and Wahid. The latter two successors to Suharto refused to accept an Islamic State because they had visions for the nation as a technocratic powerhouse or a humanistic democracy, respectively. Their successor, Megawati Sukarnoputri, the daughter of Sukarno, has maintained a commitment to secular Government against growing pressures from many national legislators and local leaders who want a charter to institute a religious state with a range of laws and legal procedures for Muslims while respecting the political rights of other religions. The fear of many secularists is that changes to the ideology of the state would lead to disintegrative fractures across the society, and specifically would place the family planning programme in a firing line on issues related to morality, the family and particularly the issue of reproductive health of adolescents.

Through the entire period social changes related to marriage and family relations rode on the wave of "globalization" that was the hallmark of developmentalism and consumerism in the society. As Indonesia entered the 1990s, the family planning programme was again transformed in response to changing political ideologies and structures. Moves to deregulate and privatize state enterprises and the financial sector were mirrored in the "KB Mandiri" (Family Planning Self-Sufficiency) programme for privatizing contraceptive services, and a variety of initiatives to reduce Government spending on health care in favour of private sector developments. The rise of "private" and secular forces challenged the exclusionary type of authoritarianism of the early New Order period, and accompanied calls after 1989 for more "openness" in Government, a greater role for the parliament, and increased pluralization of power (MacIntyre, 1989). The demand for greater participation in Government and responsiveness from bureaucracy spawned investigativeness in the press and among professionals. It also led to the public airing of charges of undue pressure to ensure public compliance with family planning targets (Hull, 1991). It was thus not a surprise to see the BKKBN taking a "Quality of Care" (QOC) line in defining a more comprehensive reproductive health approach in the year leading up to and following the 1994 International Conference on Population and Development in Cairo. It was also not surprising to hear complaints from donors and NGOs that the QOC initiatives seemed to be more window dressing than commitments. Habits of authoritarianism could not be overcome by slogans, and it was only in 1997-1999 that the political forces could be mobilized to challenge and ultimately defeat the New Order and usher in a Reform agenda. Yet the fall of Suharto, the inter-regnum of Habibie, and the election of Wahid seemed, in 2000, to have placed Indonesia in unstable and unpredictable times. Since then, the fall of Wahid, and the emergence of Sukarnoputri as President, has demonstrated the persistence of debilitating conflicts within the national elite. In such a context, it is difficult for the nation to focus on issues such as the reproductive health needs of women, and the problems of measuring fertility, contraceptive use or mortality. To look at the future then, we have to consider the descriptions of the past, and extrapolate the likely trends of behaviour at the level of individual motivations, and institutional structures and functions.

MEASURED ACHIEVEMENTS IN CONTRACEPTIVE USE AND FERTILITY DECLINE

However unsteady the ship of state may have appeared in the year President Wahid came to power, the demographic situation in Indonesia provoked none of the fear and concern that had bothered the technocrats three decades earlier. Instead, the news on family planning and fertility seemed quite good, at least in terms of the direction of the trends. The new leadership inherited family planning data shown in table 1. Birth control in Indonesia had become majority behaviour, largely reflecting the use of a wide range of female methods of contraception. The lack of gender equity in these figures is highlighted by the steady decline in reported use of the male methods of condoms, vasectomy and withdrawal, from a combined total of 3.1 per cent of couples in 1987 to 1.9 per cent ten years later. Had there been more emphasis on male methods over this period of time it is possible that Indonesia would have achieved rates of contraceptive prevalence above 60 per cent. Instead, the bureaucracy faltered. Leaders in the community and the family planning programme became remarkably conservative about the idea of promoting male methods. Increasingly they questioned the efficacy of condoms and the acceptability of vasectomy, opting to ignore clear evidence that ordinary Indonesian men and women were quite interested in trying the male methods. It seemed to be a matter of frightening the horses—once a few leaders expressed concern about the morality or efficacy of male methods, the herd began running with unfounded ideas about primordial male fears of castration, and pinhole leaks in vulcanized rubber. As a result, Indonesia in a time of HIV saw the steady decline in condom use for family planning and the failure of relatively inexpensive male sterilization to reach even one third of the number of female sterilizations. Indonesian women were less prone to panic than men, or at least they were more tolerant of the side effects and discomfort they suffered in their attempt to control their fertility. In a relatively unsupportive environment they persevered with birth control by changing methods on a fairly regular basis.

Over time the patterns of contraceptive use tended to show a broad mix of methods, with most users choosing one or another formulation of hormonal methods, but a substantial minority persisting with the IUD, or experimenting with traditional methods such as rhythm or herbal preparations. Where in 1970 women were rounded up for mass lectures on the need for birth control, by 1997 virtually all Indonesian women knew how to obtain and how to use a number of contraceptive methods, and they were acting on that knowledge. Young women in particular saw the methods as the key to delaying and spacing pregnancies so they could participate in the formal labour force. Couples ap-

Table 1
Reported use of methods of birth control in Indonesia
(*percentage of currently married women aged 15-49*)

Methods	1976	1987	1991	1994	1997
Official programme methods	17.2	40.7	43.7	48.4	51.3
IUD	4.1	13.2	13.3	10.3	8.1
Pill	11.6	16.1	14.8	17.1	15.4
Injectables	-	9.4	11.7	15.2	21.1
Implant	-	0.4	3.1	4.9	6.0
Condom	1.5	1.6	0.8	0.9	0.7
Programme promoted but non-official methods	0.1	3.3	3.3	3.8	3.4
Female sterilization	0.1	3.1	2.7	3.1	3.0
Male sterilization	0.0	0.2	0.6	0.7	0.4
Traditional and folkloric methods	1.0	6.0	2.7	2.7	2.7
Rhythm	0.8	1.2	1.1	1.1	1.1
Withdrawal	0.1	1.3	0.7	0.8	0.8
Traditional (herbs or massage) and other methods	0.1	3.5	0.9	0.8	0.8
Reported use of any method	18.3	49.8	49.7	54.7	57.4
No method	**81.7**	**52.3**	**50.3**	**45.3**	**42.6**

Sources: 1976 SUPAS, 1987 Contraceptive Prevalence Survey, 1991, 1994 and 1997 Indonesian Demographic and Health Surveys, tabulated and published by the Central Statistical Board.

Notes: A dash indicates that data are not available in the particular surveys reviewed to compile this table.

proached by survey researchers no longer spoke of "each child bringing its own fortune", in the way of the Javanese proverb, but instead detailed the fortune required to bring up a child well in a rapidly changing world with consumer temptations and expensive schooling requirements.

While the rising trend of contraceptive use appeared to signal a deep change in the reproductive lives of Indonesian women, many policymakers feared that any faltering in the pressures exerted by the family planning programme could see a reversal of these trends. Essentially there was a belief among the elite that the women of Indonesia needed continual guidance to control their fertility. At the same time other observers feared that the logistics system delivering contraceptives across the nation was fragile, and any blow to the Government budget could produce a collapse of services. The 1997 economic crisis produced just the conditions feared by these interpretations—economic decline struck at the budget for family planning, and political change carried with it calls for an end to authoritarianism. New leaders in the family planning programme set about constructing new strategies to meet the needs of a mission statement revised to promote voluntarism and quality of care. Table 2 shows the results of annual surveys conducted by the Central Statistical Board using a standard set of questions to estimate the prevalence of use of contraceptives among women of reproductive age, and to show the method choice among users of contraceptives. While based on a different type of information than that shown in table 1, the results are comparable. They also show that there was virtually no decline in contraceptive use, and little change in the pattern of method choice. There are many reasons for the robust response of the family planning programme to the dramatic changes buffeting the country. Perhaps the key point is that family planning has become a universally accepted practice among all political, religious and social groups. In addition, the National Family Planning Coordinating Board (BKKBN) is widely regarded as one of the strongest government departments in terms of planning, administration, and evidence based policymaking. When the crisis hit, the staff of the BKKBN was ready to identify areas of need, and could justify immediate support for intervention. Donors moved quickly to respond to requests for help in providing supplies. The result was that from 1998 through 2000 there was not a crisis in contraception.

The steady growth of contraceptive use over three decades was related to major changes in the lives of Indonesian women. Table 3 shows some rough indicators of changes in schooling, work and family formation, the three elements of a change in the roles and place of women in society. While not necessarily indicating a revolution in the life situation of women, these census results do show some steady and significant

Table 2
Reported contraceptive use among married women aged 15-49, by prevalence and method used, 1993-2000

Year	Prevalence (Per cent of all women)	Pill	Injection	IUD	Implant	Sterilization	Condom	Others
		(Per cent of current users)						
1993	53.1	27.5	32.3	23.7	2.5	8.2	2.2	3.7
1994	54.2	28.4	33.1	23.6	2.5	7.2	1.8	3.4
1995	54.2	29.1	35.0	21.0	2.6	7.7	1.5	3.1
1996	54.2	27.0	37.5	19.8	4.0	7.2	1.6	2.9
1997	55.3	28.1	40.0	17.8	4.6	6.2	1.3	2.0
1998	55.4	27.2	41.2	17.4	4.7	6.0	1.3	2.3
1999	55.4	29.0	39.9	17.2	4.0	7.0	1.0	1.9
2000	54.8	26.9	42.5	16.4	4.4	7.3	0.7	1.8

Source: BPS (various years), *Statistik Kesejateraan Rakyat* [People's Welfare Statistics], Report of the annual National Social and Economic Survey (SUSENAS) results. Jakarta: Central Statistical Board.

changes that validate the impressions of rapid change coming from observations in cities and villages across the archipelago. Focussing on the crucial decision-making years of adolescence and young adulthood, we can see that over two decades there has been a marked rise in participation in schooling, and a change in the nature of participation in the formal workforce. Where around half of 10-14 year old girls were able to go to school in 1970, four out of five were studying in 1990. At the same time this age group showed a decline in involvement in the formal labour force, a trend that matches the observations in community studies showing that young adolescents were much less likely to participate in any form of house or informal work than previous generations, in part because they were enrolled in school. Another major factor changing the roles of 10-14 year old girls was the lower fertility among their mothers in the 1970s and 1980s, meaning that there were fewer young siblings requiring the care of pubescent girls. With high-parity births becoming more rare, low-parity children reaped benefits in terms of free time, increased shares of family resources and encouragement to study.

The situation of the maturing adolescents was somewhat different. While they were more likely to continue in school, the proportion of 15-19 year olds who were currently enrolled had only reached one third of the cohort in 1990, up from less than one fifth in 1971, while another third was active in the formal labour force. About one in five of the age group was married in 1990. This group seemed balanced in a series of incomplete changes. While there might be ambitions to continue schooling, there were barriers in either availability of places, or cost of enrolment. Employment might be attractive, but good jobs in the formal workforce required training and commitment that the adolescent might lack. Increasingly, late adolescent was defined as not yet an adult (a status bestowed with marriage) and no longer a child, but this meant a life of informal labour and confusion about options for the future. Certainly marriage figured prominently in the picture, but the search for a partner became more problematic with young people increasingly searching for love matches, while parents continued to have an important role in supporting the decision-making, and working for an appropriate match for their child.

Table 3
Changes in percentages currently in school or currently working and marriage status indices for Indonesian females, 1964-1990

	1971	1980	1990
Schooling and formal work			
Percentage currently in school among:			
10-14 year olds	57.5	77.6	82.5
15-19 year olds	17.0	26.0	37.3
20-24 year olds	3.0	3.9	7.2
Percentage currently working in the formal sector among:			
10-14 year olds	10.8	9.0	8.1
15-19 year olds	26.6	29.8	30.3
20-24 year olds	29.1	32.7	39.3
Marriage Status Indices			
Percentage never married among:			
10-14 year olds	97.7	99.2	99.6
15-19 year olds	62.6	70.0	76.5
20-24 year olds	18.5	22.3	25.3
Percentage married among:			
10-14 year olds	1.8	0.7	0.4
15-19 year olds	32.2	27.3	22.0
20-24 year olds	73.2	72.2	70.5
Singulate mean age at marriage	19.3	20.0	20.5

Source: Calculated from census reports published by the Central Bureau of Statistics.

Young adults found the social changes opening new options, depending on their social class. For the elite and growing middle class the rapid expansion of the tertiary education sector meant that studies could be prolonged in various professional and academic pursuits. Many of the tertiary institutions were run by the private sector and prepared young men and women for careers in the service or administrative industries, while others produced teachers and health sector workers. Few tertiary students could combine marriage with their studies, but some could work and study at the same time. The idea of a career made young women reconsider the timing and the style of their marriages. Increasingly, marriage did not necessarily mean early childbearing, both because the marriage might be delayed till after completion of tertiary education, but also because the initiation of a career competed with motherhood. Like women throughout the developed world, young Indonesian women struggled with competing expectations of their families, and their tentative ambitions for personal development. In the large cities an increasing number of women resolved the tensions by simply deciding to remain single and devote themselves to their careers. For most women though, marriage was the firm expectation, and they attempted to achieve career goals and motherhood goals by using family, servants and leave conditions to support them in the early difficult years of child-rearing.

The impact of these changes on fertility can be seen in the age specific fertility rates in table 4. Successive groups of 15-19 year olds have been less likely to be married and bearing children, such that the fertility of the group dropped nearly two thirds. Young adult women were only half as likely to give birth in the mid-1990s as were the same age group in the late 1960s. For these women the pattern of delayed childbearing in the early years of life promised to be followed by fewer children later on. After age 30 each successive group of women in each five-year age group has shown steady fertility declines, with an overall decline of 50 to 68 per cent between the late 1960s and the mid-1990s.

Table 4
Age specific and total fertility rates, Indonesia, 1964 to 1994

	Age specific fertility rates (ASFR)							
Reference period	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
1965-1970	158	290	277	224	146	75	12	5.9
1971-1975	127	265	256	199	118	57	18	5.2
1976-1979	116	248	232	177	104	46	13	4.7
1980	90	226	213	163	105	43	14	4.3
1981-1984	95	220	206	154	89	37	10	4.1
1983-1987	75	189	174	130	75	32	10	3.4
1983-1987	78	188	172	126	75	29	10	3.4
1985	46	176	173	134	83	32	10	3.3
1985-1989	71	179	171	129	75	31	9	3.3
1988-1991	67	162	157	117	73	23	7	3.0
1991-1994	61	148	150	109	68	31	4	2.9
1995-1997	62	143	149	108	66	24	6	2.8
Percentage decline								
1965-1970 to 1994-1997	60.8	50.7	46.2	51.8	54.8	68.0	50.0	53.0
Rele estimates of TFR based on SUSENAS data								
1989-1993								2.7
1990-1994								2.6
1991-1995								2.6
1992-1996								2.6
1993-1997								2.4
1994-1998								2.5
1995-1999								2.3
1996-2000								2.2

Sources: 1971 Census, 1976 SUPAS, 1987 Contraceptive Prevalence Survey, 1991, 1994 and 1997 Indonesian Demographic and Health Surveys, all tabulated and published by the Central Statistical Board using a variety of estimation methods. Figures calculated from the 1993 through 2000 SUSENAS (National Social and Economic Survey) were calculated from data tapes by Hendratno Tuhiman of the Demographic Institute, University of Indonesia, using the Rele regression method.

Again, the fears of policymakers centred on the notion that the economic crisis of 1997-1999 would produce a “baby boom”. These were the words in the front-page headlines of early 1998. As mentioned above, the BKKBN was prepared for the crisis, and the donor community supported efforts to maintain availability of supplies and equipment in times of tight budgets. Thus, the reported use of contraception did not waiver. In the bottom panel of table 4 we can see that the trend in fertility did not stall, but appeared to continue to decline.

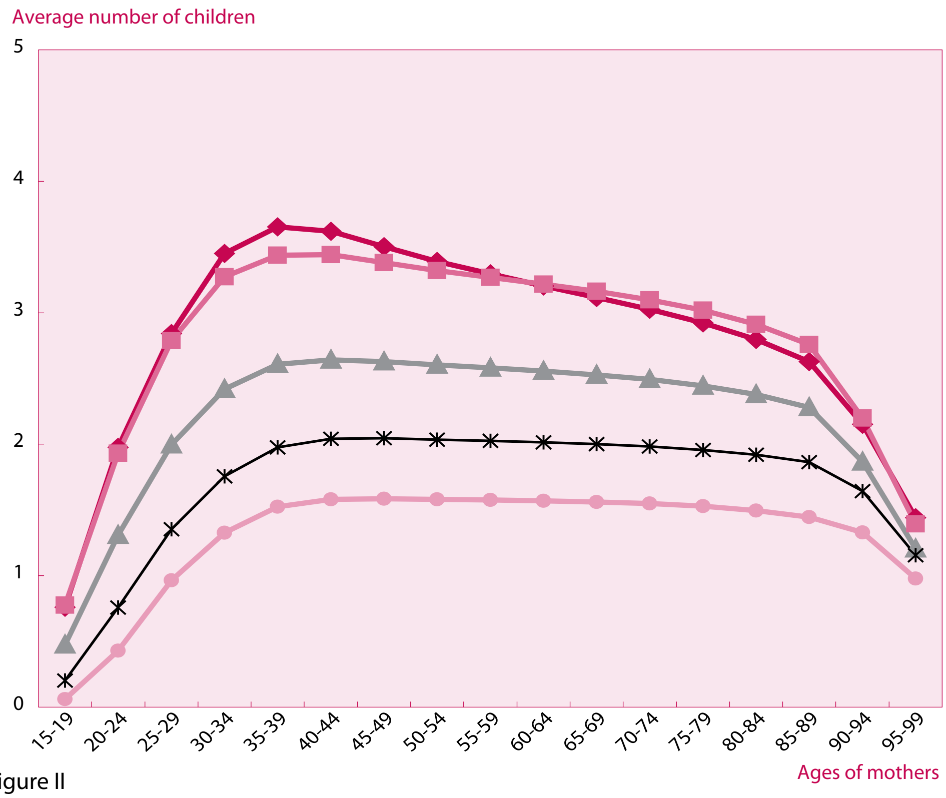
This statement has to be modified with expressions of uncertainty because the data source and method of estimating the total fertility rate are both less than ideal. The SUSENAS is a national sample survey held annually to collect a wide variety of data, and each year the structure and content of the questionnaire changes. Because of budgetary problems, there has also been some variation in the way samples have been drawn. While these issues should not have a major effect on the data, on the numbers and ages of people living in households, they could. The Rele method of fertility estimation takes the child-woman ratio—that is all children counted in the survey from birth to exact age 5, divided by the number of women of reproductive age—to estimate the level of fertility for the five years preceding the survey. Thus, successive annual surveys should be measuring overlapping periods of fertility experience. In the array of numbers from surveys between 1993 and 2000 the estimates show continuing decline, implying that the point estimate for 2000 would actually be well below the five-year average of 2.2. No analysts in Indonesia believe that fertility could have fallen so far by that time. A comparison of the estimates in the bottom and top panels indicates that the Rele method consistently underestimates TFR by 0.3 to 0.4 children for the same periods of time. It may be that we can gain confidence from the Rele estimates of annual trends, even though we distrust the level of fertility implied by the numbers. Indonesian women at the turn of the century thus appear to have reached replacement levels of childbearing. There is little reason to think that this trend will halt. It is instructive to look at these macrofertility measures from a microperspective.

From the viewpoint of individual women the issue is not how many children they have, but how many they can raise to adulthood. Figures I and II show the changes of fertility in terms of lifetime family sizes (surviving children) for cohorts of women as represented by the women beginning childbearing at age 15 in different years roughly a generation apart, and for the hypothetical cohorts of women assumed to follow cross-sectional fertility and mortality experiences that prevailed in different years from 1950 to 2010.

The cohort trends in figure I show the inefficiency of childbearing rates for the 1950 cohort because even though they had higher fertility than the 1965 cohort, the family sizes were smaller by the time they reached 60. All subsequent cohorts show lower, flatter family-size curves—the restricted fertility brings the level down, but the falling mortality means that survivorship is much improved. The women who began childbearing in 1995 are projected to have a two child family on average, and the assumptions of *World Population Prospects* indicates that the girls entering school in 2000 will raise an average of only 1.6 children over the course of their reproductive careers. The reduction of future fertility is, of course, a matter of speculation, but it is difficult to see how fertility would actually increase from levels of the 1990s, and figure II shows that the hypothetical cohort of 2010 could have two-child families on average if they follow the medium path, or 1.6 if they show much reduced fertility. The point is that neither assumption shows anything like a return to the family sizes of the 1980s (a time of remarkable economic growth and social change) and even to follow the 1995 pattern would seem to imply that many of the conditions and motivations for childbearing—including the educational and work aspirations of women—would have to be seriously modified.

With all the political uncertainties in Indonesia today, it would not be wise to say “never” but it is equally true to say that there are no indications in the Government or the

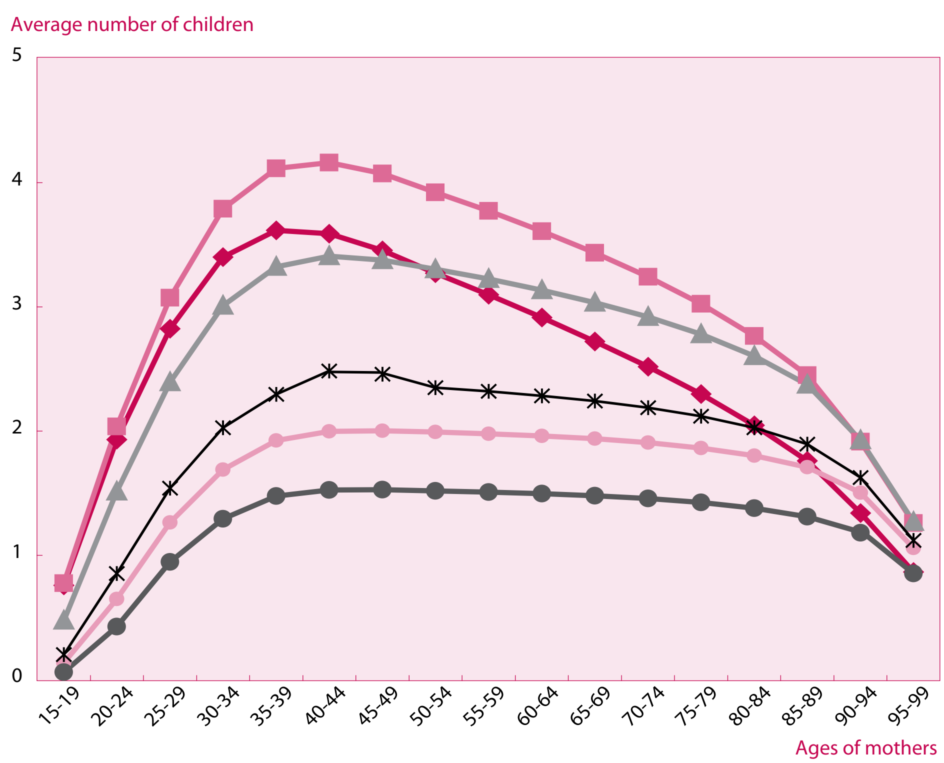
Figure I
Average number of children living over the lifetimes of cohorts of mothers turning 15 in 1950, 1965, 1980, 1995, 2010



Source: *World Population Prospects 2000 Revision*, United Nations Population Division.

Note: Cohort turning 15 in 1950, TFR = 5.45; cohort turning 15 in 1965, TFR = 4.57; cohort turning 15 in 1980, TFR = 3.11; cohort turning 15 in 1995, TFR = 2.22.

Figure II
Average number of children living over the hypothetical lifetimes of women giving birth in 1950, 1965, 1980, 1995, 2010



Source: *World Population Prospects 2000 Revision*, United Nations Population Division.

Note: Estimated actual fertility and mortality to 1995, projected fertility and mortality (medium and low) in 2010.

people to suggest that such changes would be welcome, or possible. It is likely that fertility in 2002 is continuing its decline, even if the rate of decline may have slowed because of the negative impact economic and political factors have on the provision of health and contraceptive services.

PREDICTING FUTURES FOR REPRODUCTIVE HEALTH IN UNPREDICTABLE TIMES

If the past is "plural" depending on the different interpretations that can be applied to events, then the future is also plural, but in accord with the wide variety of reasonable assumptions that can be made about the likely course of events. This reflection seems all the more apt as Indonesia struggles with the challenges of building democracy on the foundations of authoritarianism. It requires more time and a fuller revelation of the potentialities of the current political processes to make predictions of the political future of reproductive health, but already there are signs that some valuable legacies of the New Order may be preserved, and the more egregious errors of authoritarianism may be overcome.

The Health Reform initiatives of the Ministry of Health in 1998-2000 (Hull and Iskandar, 2000; Lieberman and Marzoeki, 2000) offer the strongest hope that women and men will continue to have access to contraceptive services. After all, in the development of the national family planning movement, medical personnel assisted by paid or volunteer outreach workers provided most basic services for the bulk of the population. The training and organization invezted in these groups by the BKKBN can be utilized in the construction of a more client-oriented, less authoritarian approach. The commitment to preventative health care offers a firm foundation to continue family planning services, and could be used to improve services for prevention of sexually transmitted diseases and the morbidities and mortalities of pregnancy. A network of factories and distribution channels that make a wide variety of contraceptives available to all Indonesians constitutes a major industrial resource worthy of preservation. Conservative politicians could, in time, question the maintenance of a specialized family planning promotional service in the BKKBN, but the work of such an organization as a facilitator of community mobilization is generally welcomed by society, even when some specific activities are questioned.

Errors arising out of patrimonialism and authoritarianism may be resistant to correction to the extent that cultural factors underpin many unhealthy practices. Complaints of coercion, insensitivity, lack of male participation or responsibility, lack of adequate information, and disrespectful treatment of clients can often be traced back to gender relations, class relations and organizational cultures that may require years, if not generations to redress (Hull and Hull, 1997). Nonetheless, when President Wahid appointed Khofifah Indar Parawansa as Minister for Women's Affairs in 1999, many observers were startled that two of her first actions were to rename her position as the Minister for Women's Empowerment, and to claim authority to oversee the BKKBN. It was clear that she had the desire to face issues of gender and morality in providing directions for the reproductive health programme, and that she would clearly set out a feminist agenda to ensure that women take an active role in shaping the programme and that men take on some of the burdens of contraceptive use. In the two years of her tenure in the post she steered the BKKBN to adopt a new "vision and mission" statement. The vision was for quality families in 2015 and the mission started with a goal to empower and motivate the community to build small, quality families, where the word small was not given a numeric value but a statement that families should be brought to an understanding that the best ages for childbearing are 20-30 and there is a need to maintain a healthy pattern of birth spacing. Effectively this implies a 2 or 3 child family, assuming a woman begins childbearing at 20, but as we have seen women are increasingly delaying marriage and childbearing for education and work reasons. Indonesia is certainly maintaining goals consistent with further fertility decline, even as it moves to commit Government attention to the empowerment of women. The programme has changed, but nothing in the change would seem to imply that fertility would rise.

Beyond the correction of errors and the preservation of valuable legacies of family planning are the challenges of big arena politics facing Indonesia. Discussions of reproductive health go quiet when newspapers headline murders in city streets, religious wars in neighbouring centres, and intractable corruption of enormous scale. Loss of self-confidence is a problem for an individual, but it can become a tragedy for a nation. It drains away resources needed to address the reproductive health needs of citizens. Worse, the loss of a sense of common purpose erases all realistic formulations of health goals from the national consciousness. In Eastern Indonesia and Aceh the new millennium was greeted with demands for separation from the Unitary State rather than plans for co-operation to overcome HIV/AIDS, maternal mortality or unwanted pregnancies. While unemployable youths fought in the streets over ethnic and religious slights, spectators to the violence took the lesson that national unity was fragile, humanitarianism conditional, social justice problematic, and rule by consensus impossible.

For many people the only pillar of the Panca Sila left standing was belief in God, and with all the other pillars weakened, that belief could be manipulated in unpredictable directions. Without social justice, humanitarianism or rule by consensus, religion could justify intolerance. Without national unity it could promote destruction. Hope lies in the fact that Indonesia's futures remain open, the five pillars set out in the 1945 revolution can be defended, and the commitment to citizens' welfare could become a reality, if both the leadership and the citizenry are committed to these values. If that were to happen, the reproductive health programme could return to the politics of improving the implementation of activities, rather than being caught in the politics of dealing with threats of disintegration.

PREDICTING FUTURES FOR FERTILITY IN INDONESIA

For most Indonesians the time horizon for thinking about the future has shrunk since 1997. Economic crisis, political turmoil, and concerns about the emergency support mechanisms available in society have come to dominate thinking. Politicians have a time horizon of 2004, the next general election. Economists focus on the IMF negotiations for the next year, and breathe hefty sighs of relief each time a positive growth estimate for the next year is released, and deep sighs of depression when they think of the national debt, the banking crisis and low foreign investment.

While it is easy to dismiss these as parochial interests of men in suits, there are clear links between these myopic visions and the factors shaping the plans and aspirations of young women entering the years of potential motherhood. Each woman who fails to progress to higher levels of education risks having parents urge marriage as an alternative future. Each worker laid off from a factory risks finding the most feasible alternative to be staying at home to engage in the work of the household, including raising children. Women without education and without work find their negotiating position in the family potentially undermined. In such situations elite Indonesians fear that poor women will simply retreat to childbearing to put meaning in their lives. The poor though may reject that option because they still desire education for their children, and see the economic problems as barriers to be overcome by investing more in each child, rather than gambling that many children will produce some natural winners. However the national political and economic problems work out, the thinking of individual Indonesians has changed in ways that imply moderate to low fertility, depending on the changing context in which they live. The prediction of future fertility levels then means that we have to predict the future society. Students of Indonesia are struggling to do that on an annual basis—2050 is an impossible distance to contemplate.

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Recent changes and the future of fertility in the Islamic Republic of Iran

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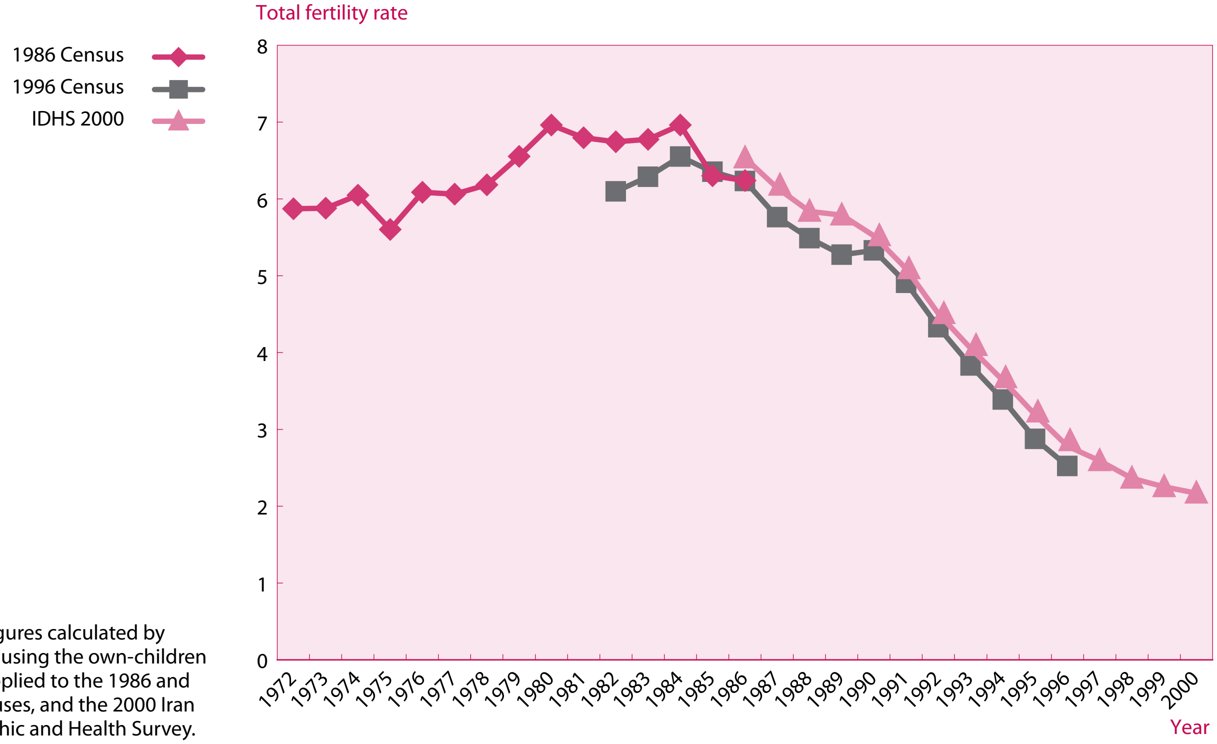
This paper briefly reviews population policy changes and fertility trends over the last three decades, puts forward some possible explanations behind the fertility transition in the Islamic Republic of Iran, and finally speculates about the future of fertility for the coming decades. Among the questions to be answered in this paper are: what are the recent changes of Iranian fertility? Will the Islamic Republic of Iran follow the patterns experienced by the more developed countries and attain fertility levels below replacement? If so, what are the leading factors explaining the fall of fertility in the Islamic Republic of Iran? What are the likely and plausible assumptions for the future of Iranian fertility?

PERIOD FERTILITY RATES

Trends of total fertility rates: 1966-2000

The fertility transition in the Islamic Republic of Iran has passed through different phases from 1972 to 2000 (figure I). Despite the implementation in 1966 of the first family planning programme, the changes in fertility were minimal during the late 1960s and early 1970s. Total fertility rate (TFR) decreased from around 7.7 in 1966 (Amani, 1970) to around 6.0 in 1976, and then rose to 7.0 in 1980. Despite the approval of the family planning methods by Ayatollah Khomeini in 1979, the pre-revolutionary family planning programme was suspended immediately after the revolution. Although, no specific population policy was introduced after the revolution, the new government adopted a pronatalist approach. The legal minimum age at marriage for girls and boys was reduced to 9 and 12 years, respectively. The war with Iraq created a pronatalist atmosphere by which families were encouraged to have more children and economic incentives were provided. Despite the post-revolutionary pronatalist ideology, the high fertility regime was short-lived, and fertility started to decline by the mid- 1980s. Total fertility rate declined from 6.8 in 1984 to 6.3 in 1986, and further to around 5.5 in 1988. In an earlier paper, Ladier-Fouladi (1997), using birth registration data reached the same conclusion that the decline of fertility began in 1984. The decline was slow until the Government population policy was reversed and a new family planning programme was officially inaugurated in December 1989. Total fertility rate fell sharply after 1989, dropping from 5.5 in 1988 to below 2.8 in 1996, more than a 50 per cent decline in six years. The own-children estimates of fertility for the Islamic Republic of Iran based on the 2000 the Islamic Republic of Iran Demographic and Health Survey show that the TFR has declined further and reached replacement level (2.26) during the period 1998-2000. The figure for the year 2000 is 2.17.

Figure I
Own-children estimates of total fertility rates for Iran: 1972-2000



Source: Figures calculated by the author using the own-children method applied to the 1986 and 1996 censuses, and the 2000 Iran Demographic and Health Survey.

Attainment of below-replacement fertility

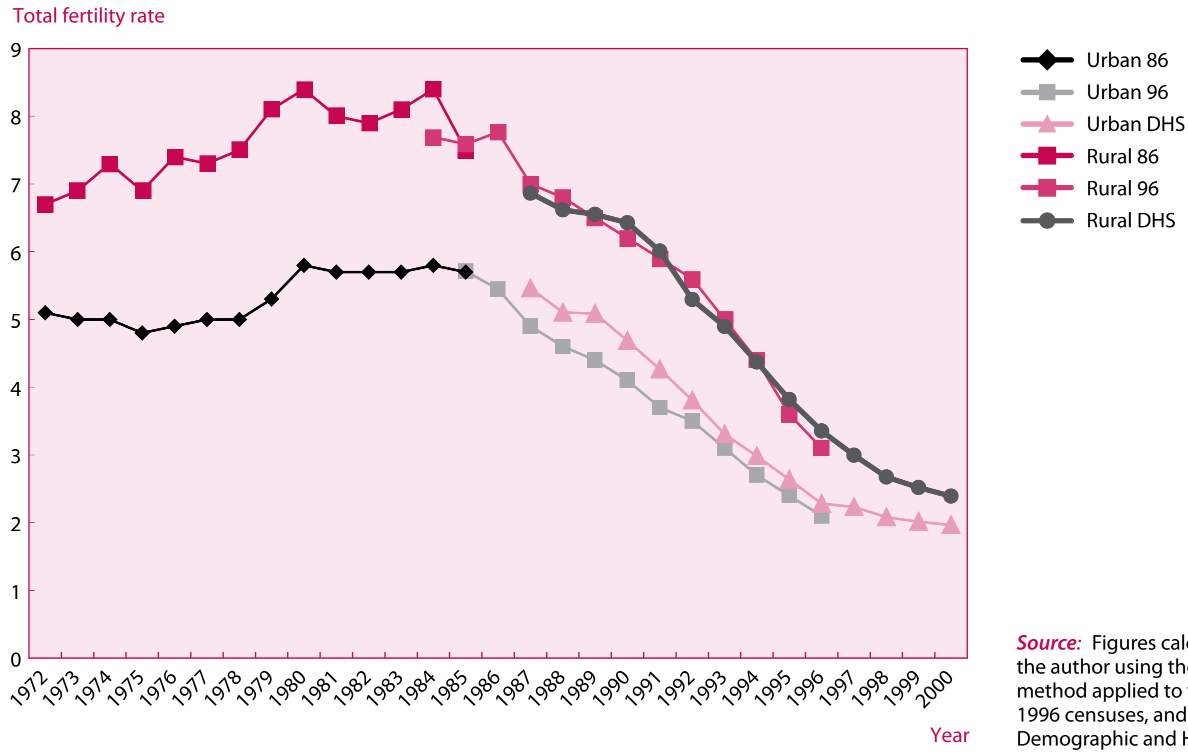
Signs of the attainment of below-replacement fertility in the Islamic Republic of Iran appeared in the first half of the 1990s. Four developed provinces of Gilan, Semnan, Tehran and Isfahan reached a TFR of below-replacement level by 1996 (Abbasi-Shavazi, 2001a). This was confirmed by the results of the Population Growth Estimation Survey (PGES) conducted by the Statistical Centre of the Islamic Republic of Iran in 1998. The survey divided the provinces of the Islamic Republic of Iran into five regions according to their level of development (from developed to least developed). According to the 1998 PGES, TFR for the Islamic Republic of Iran, as a whole, was 2.06, while TFRs in urban and rural areas were recorded as 1.88 and 2.39, respectively. Of the five regions included in the survey, three regions had experienced below-replacement fertility. The two least developed regions, regions 4 and 5, had TFRs of 2.4 and 2.9.

The result of the Islamic Republic of Iran Demographic and Health Survey conducted in 2000 was indicative of continuing fertility decline in the Islamic Republic of Iran. The own-children estimates of fertility based on the IDHS showed that out of 28 provinces, five provinces had TFRs of below-replacement fertility during the period 1995-1999, 20 provinces experienced TFRs of 2-3, two provinces had TFR of 3-4, and only in one province (Sistan and Baluchistan) the TFR was around 5.0. The own-children estimates for the three-year period of 1997-1999 also indicated that in eight provinces the TFR was below 2.0, and 18 provinces had TFR between 2-3. The highest TFR (4.6) was recorded for Sistan and Balucistan province.

Rural-urban differences

As shown in figure II, there was a large gap between TFRs in rural and urban areas during the early 1970s. Fertility in both rural and urban areas started to increase two years before the revolution and peaked in 1979-1980, and then started to decline in the mid

Figure II
Own-children estimates of total fertility rates for rural and urban areas of Iran: 1972-2000



Source: Figures calculated by the author using the own-children method applied to the 1986 and 1996 censuses, and the 2000 Iran Demographic and Health Survey.

1980s. The decline accelerated after 1989. The IDHS result showed that fertility continued to decline by the mid-1990s, although the trend in both rural and urban areas has slowed down recently. The large gap between TFRs in rural and urban areas has narrowed substantially. The total fertility rate in urban areas reached below-replacement fertility by 1996. In 2000, the TFR in urban and rural areas of the Islamic Republic of Iran ranged between around 1.9 and 2.4, respectively.

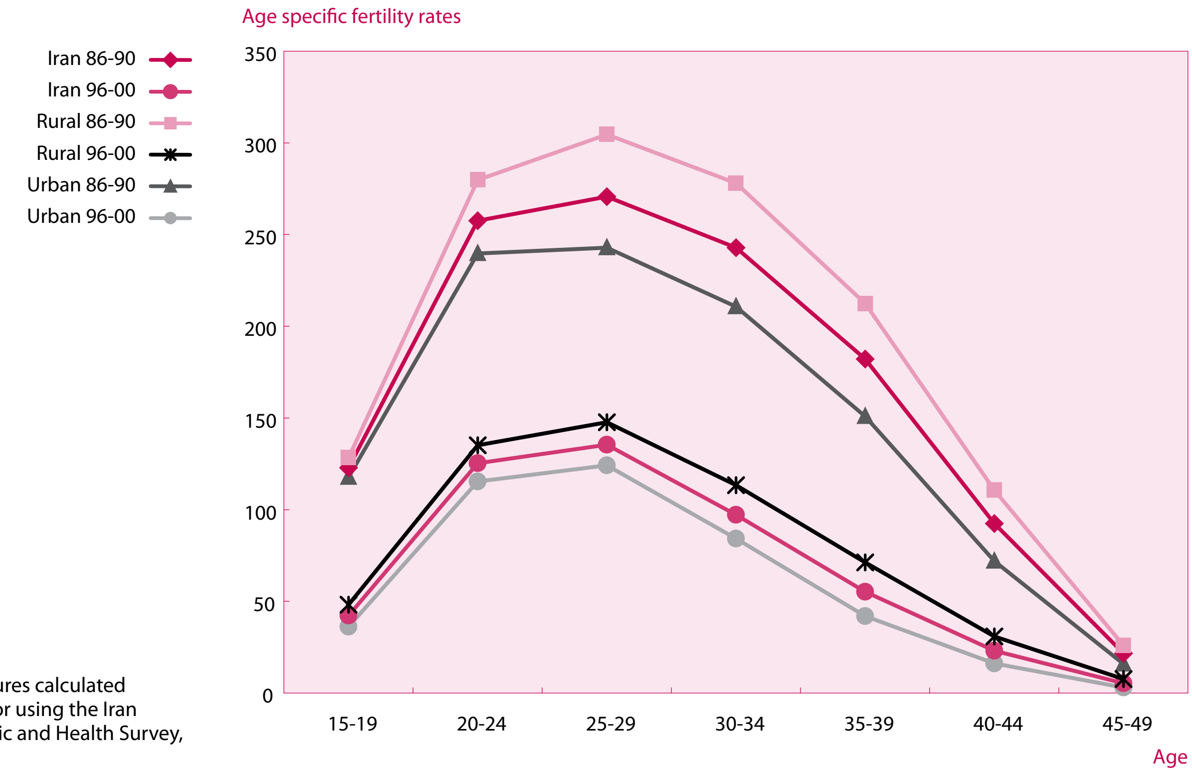
Age-specific fertility rates (ASFRs)

The own-children estimates of ASFRs for the Islamic Republic of Iran by rural and urban areas for the five-year periods of 1985-1989 and 1996-2000 are shown in figure III. As depicted, ASFRs in all age groups were high during 1985-1989. There was a considerable gap between the ASFRs for rural and urban areas. Fertility fell sharply in all age groups by 1996-2000. The steep fertility decline in all age groups between the two periods suggests that simultaneously young couples are starting their childbearing later, married women are spacing their births longer, and older women are stopping their childbearing. This interpretation would explain the very sharp fall in total fertility that has occurred in the Islamic Republic of Iran since 1988.

NUMBER OF BIRTHS AND THE DISTRIBUTION OF BIRTHS BY BIRTH ORDER

The decline of TFR can be examined in terms of annual number of births and the distribution of births by birth order. Statistics have shown that the number of births in the Islamic Republic of Iran peaked in 1980; declined slightly during 1981-1985, and continued to decline afterwards (Civil Registration Organization, 2001; Ladier Fouladi, 1997).

Figure III
Own-children estimates of total fertility rates for Iran by rural and urban areas, 1986-1990 and 1996-2000, Iran Demographic and Health Survey, 2000



Source: Figures calculated by the author using the Iran Demographic and Health Survey, 2000.

However, due to the effects of the post-revolutionary baby boom on the age structure of the population, it is likely that the number of births will increase in the future.

The changing distribution of women according to the number of their births provides useful insight into the fertility decline. Table 1 presents the percentage distribution of women aged 15-49 years by birth order for rural and urban areas in 1976 and 2000. It is apparent that the percentage with five or more births has drastically reduced from around 47 per cent in 1976 to around 30 per cent in 2000. The fall in the proportion of women with high parity has occurred in both rural and urban areas, although the percentage with five or more births in rural areas (38 per cent) was significantly higher than that in urban areas (25 per cent). As a result of the reduction of higher order births, there has been a sharp increase in the percentages of women with 1-2 births, and to some extent in the proportion of those with 3-4 order births. In 2000, slightly more than one third of women had 1-2 order births. While the measures shown in table 1 may be affected by shifts in the age structure of women within the age range 15-49 years, the movements observed are very large.

NUPTIALITY CHANGE: 1966-2000

As shown in table 2, from 1966 to 2000, there has been a sharp increase in the proportion of women who had never married. For example, the percentage of never-married women in age group 15-19 increased from 54 per cent in 1976 to around 84 per cent in 2000. The proportion of those never married in age groups 20-24 and 25-29 also increased from 1966 and 1976, but remained almost unchanged from 1976 and 1986 due to the post-revolutionary ideology. However, the figures rose again sharply from 1986 to 2000. The increases in age groups 25-29 and 30-34 became particularly noticeable.

Table 1
Percentage distribution of women aged 15-49 years by birth order in Iran by rural and urban areas, 1976 and 2000

	Iran Fertility Survey 1976			IDHS 2000		
Birth order	Total	Urban	Rural	Total	Urban	Rural
0	9.5	9.2	9.8	11.7	11.2	12.6
1-2	22.8	27.2	18.3	34.3	37.1	29.1
3-4	21.0	22.9	19.2	24.4	26.4	20.3
5+	46.7	40.7	52.7	29.6	25.3	38.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: H. Agha, Study of fertility in Iran and its relation with socio-economic indicators based on the Iran Fertility Survey, 1985 (Population Studies Center, University of Shiraz). Figures for 2000 were calculated based on the data from the Iran Demographic and Health Survey, 2000.

Table 2
Percentage never married: women aged 10-14 to 30-34, 1966 to 2000

Age group	1966	1976	1986	1996	2000
10-14	97.6	99.9	97.0	98.8	99.1
15-19	54.1	65.7	65.7	82.1	83.5
20-24	13.4	21.4	25.8	39.5	47.1
25-29	3.8	6.8	9.4	14.8	20.8
30-34	1.7	2.7	4.6	6.4	9.3

Sources: N. Doroudi Ahi, Marriage and sex imbalance in ages at marriage: marriage squeeze in Iran, 1966-1996, MA thesis, Department of Demography, Faculty of Social Sciences, University of Tehran, Tehran (2001); Iran Demographic and Health Survey, 2000.

Table 3
Mean age at first marriage for males and females in 1970, 1980, 1990 and 2000

	Males		Females	
Year	Rural	Urban	Rural	Urban
1970	23.1	23.4	14.4	14.4
1980	22.3	23.2	17.0	17.8
1990	22.4	24.9	19.6	19.5
2000	24.0	25.8	19.7	20.8

Source: Iran Demographic and Health Survey, 2000.

In accordance with the increase in the proportion of never married women, the mean age at marriage for females also increased from 1970 to 2000 (table 3). According to the IDHS 2000, the mean age at first marriage for females increased considerably from around 14.5 years (in both rural and urban areas) in 1970 to around 20 and 21 in 2000 for rural and urban areas, respectively. Statistics have shown that despite encouragement of the Government of early marriage, the singulate mean age at marriage for women increased slightly from 19.5 year in 1976 to 19.7 year in 1986, but then sharply increased to 22 years by 1996 (Abbasi Shavazi, 2000).

To what extent have nuptiality and marital fertility contributed to the fertility transition? Abbasi-Shavazi (2000) broke down the changes in the total fertility rate from 1976 to 1996 the components of changes in nuptiality and marital fertility. He found that most of the fall in fertility from 1986 to 1996 was due to the decline in marital fertility (3.11) with 0.6 being due to nuptiality change. In other words, 86 per cent of the fertility decline was due to the change in marital fertility and only 14 per cent to change in the age at marriage.

DETERMINANTS OF THE FALL OF FERTILITY IN THE ISLAMIC REPUBLIC OF IRAN

A number of important aspects of the Iranian fertility decline need to be dealt with in any comprehensive explanation. One is the fact that the decline began before the shift to an antinatalist policy. Another is the pervasiveness of the fertility decline. Unlike the early stages of fertility transitions in many countries, there is no evidence of selective declines at the young and old extremes of the childbearing ages, but rather a decline across all age groups. Likewise, there is no evidence of diffusion of fertility decline from urban to rural areas, but rather a simultaneous and substantial decline across all geographic regions and in both urban and rural areas. Over time, there was a considerable degree of narrowing of urban-rural and regional differences both in fertility levels and in contraceptive prevalence rates.

Due to the suspension of the family planning programme and the wholehearted campaigns for early marriage and for large families, fertility increased moderately in 1979 and was stable until the mid-1980s. Although, there was not a specific official population policy during the decade after the revolution, the social and psychological atmosphere of the society was favourable to high fertility during this period. The effect on people's lives was temporary, as was confirmed by the fact that fertility in the Islamic Republic of Iran began to decline as early as 1984, well before the official inauguration of the family planning programme in 1989.

The family planning programme implemented in December 1989 has made an important contribution to the continued fertility transition. By mobilizing various government organizations and the mass communication network, the programme succeeded in diffusing ideas throughout the entire country about the value of small families and about methods of family limitation. The contraceptive prevalence rate (CPR) has risen from 37 per cent in 1976 to around 72 per cent in the year 2000. The CPR in rural areas has increased from 20 per cent in 1976 to 67 per cent in 2000; the corresponding figures for urban areas are 54 per cent and around 78 per cent, respectively (Mehryar and others, 2001).

Why has the Iranian family planning programme been so successful in such a short time? In what follows, I argue that the social and cultural context of the society along with certain government policies such as rural development, health improvement and the rise of literacy paved the way for a successful family planning programme introduced by the Islamic government.

In contrast to the situation when the pre-revolutionary family planning programme was introduced, the Islamic Republic of Iran was culturally, economically and socially favourable to the introduction of the family planning programme by the mid-1980s. The perceived costs of children were relatively lower in the 1970s, whereas in the 1980s due to the increase in education, even in rural areas, the costs of children increased. On the other hand, the increased education, particularly for girls, may have contributed to a higher level of contraceptive use. The level of education for women at reproductive ages has increased substantially over the last four decades, and the gap between rural and urban areas has narrowed considerably (table 4).

Table 4
Literacy rate for women at age groups 15-19 to 25-29, Iran by rural and urban areas

	1966		1976		1986		1996	
Age groups	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
15-19	57.7	5.4	75.4	19.8	85.8	53.0	96.9	86.4
20-24	41.2	2.7	59.4	10.1	75.8	36.5	93.8	77.9
25-29	29.5	1.4	49.4	4.9	65.5	22.0	89.5	65.4

Sources: Statistical Centre of Iran, various censuses.

The Government's policies such as increasing public education, particularly for girls, the establishment of the health network system, and the increase in access to electricity and safe water, transport and communication in remote areas of the Islamic Republic of Iran have all are likely to have had an indirect effect on fertility decline. High aspirations and investments by families in their children's schooling have also affected couples' fertility decision-making. Iranian girls and women stay more years in school and university than was the case previously and this factor delays marriage and childbearing. The sex ratio of the university students has changed in favour of girls over the last few years. In 1998, around 52 per cent of university candidates who were admitted to government universities were girls. The figure increased to 57 per cent in 1999, to around 60 per cent in 2000, and then to around 62 per cent in 2001 (Abdollahyan, 2001). This has had a considerable impact on the improvement of the status of women and is, indeed, a central feature of social change in the society. Girls are staying in education longer; delaying their marriage, and this will affect their fertility decision-makings. Shadi-Talab (2001) in her study, "Iranian women: rising expectations" concluded that "Iranian women are moving towards convergence in basic gender sensitive values. . . . The main part of these reforms is the result of girls' empowerment through higher education from different socio-economic backgrounds. Therefore, Iranian women with rising expectations are an accelerating force of development in the Islamic Republic of Iran".

Furthermore, the official programme introduced by the Government in 1989 enjoyed the support of religious leaders. It should be noted that some religious leaders were opposed to the first family planning programme implemented before the revolution. However, Ayatollah Khomeini issued the first approval for the use of family planning methods in 1979. Despite this, the family planning programme was suspended after the revolution, but studies have shown that family planning services were available through clinics during the early 1980s (Mehryar and others, 2001). The support of religious leaders in the late 1980s legitimized the family planning programme, and the Government provided family planning services to people without any religious barriers.

The decline in infant mortality was also a very important factor in the demand for fewer births and a smaller family size. The infant mortality rate declined from around 114 per 1000 live births in 1975 to 64 per 1000 in 1985, and 34 in 1994. The establishment of the health network system and its extension to rural and deprived areas of the country has been one of the key factors in reducing infant mortality. Urbanization has also contributed to the decline as, by 1996, more than 60 per cent of the population, were living in urban areas.

Soon after the revolution, the Constructive Jihad Organization was established to revive and develop the economic and social conditions of the villages and deprived regions. The activities of the organization ranged from providing educational and health services to constructing roads and dams, and to distribution of agricultural machinery and equipment. This contributed to the establishment of a sound and healthy rural environment after the revolution, and made rural areas of the Islamic Republic of Iran significantly different from those of other countries in the region. By 1996, the majority of rural communities had access to electricity, TV, radio and piped water. Such developmental processes facilitated the success of family planning programmes in the Islamic Republic of Iran in general and in rural areas in particular during the second decade after the revolution.

However, despite the successful role of the family planning programme in the fertility transition during the last two decades, some evidence suggests that not all the credit of fertility decline should be given to the Government and its family planning programmes. The rise of fertility during 1976 and 1978, as well as the universal fertility decline after 1984 are evidence that the transition occurred independent of official family planning policy. Interestingly, in spite of an active campaign by a variety of official and unofficial organizations in favour of early marriage and reproduction as well as the presence of strong economic and social incentives for marrying and having children, the age at first marriage increased during the early 1980s (Abbasi-Shavazi, 2000).

There is also a strong case that economic hardship relative to material aspirations accelerated the fall in fertility in the Islamic Republic of Iran from the mid-1980s. Economic pressure has been a major factor in the postponement of marriage and the age at first marriage. The Islamic Republic of Iran has been experiencing economic hardship after the revolution, particularly the decade after the war with Iraq. The cost of living has risen dramatically in recent years. Young people tend to delay their marriage until they get a salaried job to be able to afford the high living costs. The increasing cost of rearing children, particularly the cost of education, is another important factor in family decision-making. There has been a convergence of fertility behaviours in the Islamic Republic of Iran in the recent decade, that is women of urban and rural backgrounds, as well as those from different social classes, the poor and the rich, illiterate and literate, have more-or-less similar fertility behaviour these days (Abbasi-Shavazi, 2002).

THE PAST PROJECTIONS OF FERTILITY FOR THE ISLAMIC REPUBLIC OF IRAN

Projecting fertility in such a situation where major social and political change has taken place is a difficult task. However, several attempts have been made to forecast the future of Iranian fertility.

The projection made in the Five Year Development Plan in the late 1980s, based on which the current family planning programme was planned and came into effect, projected that TFR wound decline to 2.3 by 2010. Zanjani (1993) in a study of fertility in the Islamic Republic of Iran, using the 1986 census results, projected the future of fertility for the period 1991-1996 to 2016-2021. His projection consisted of three (low, medium and high) variants. Zanjani argued that these assumptions are unlikely to come into reality and, thus, he presented his own plausible projection by which fertility would decline to 3.85 by the period 2016-2021. He argued that his target may not even be achieved given the fact that the experience of other countries where family planning programmes had been effectively implemented showed that fertility in those countries had declined only slightly. The other reason given in the report for this projection was that the family planning programme in the Islamic Republic of Iran is not coercive and, thus, may not be as effective as had been planned.

One of the reasons for the high projected TFR from the two studies was the fact that they used the 1986 census as the base population. This was also true for the projections made by the Population Division of the United Nations in the early 1990s. In the United Nations population projections, revised every two years, the assumed TFR for the 1995-2000 period in the Islamic Republic of Iran was as follows: in the 1990 projections, 4.30; in the 1992 projections, 5.40; in the 1994 projections, 4.52; in the 1996 projections, 4.77; in the 1998 projections, 2.8. It was not until the 1998 projections that the Population Division accepted the reality of the Islamic Republic of Iran's fertility decline. *World Population Prospects: the 2000 Revision* projected the future of fertility for the period 2000 to 2050 under three variants. According to the high, medium and low variants, by 2005-2010 TFR in the Islamic Republic of Iran would decline to 2.60, 2.32 and 1.98, respectively. The corresponding figures for the period 2010-2015 would be 2.60, 2.10 and 1.60, respectively.

Obviously, the changes in TFRs in the Islamic Republic of Iran have been so rapid that they could not have been predicted by those who projected the decline of fertility. As shown earlier, fertility in the Islamic Republic of Iran declined to around 2.8 in 1996, the figure that Zanjani was sceptical about being reached by 2016-2021. Fertility has already fallen to the level that has been predicted for the period 2005-2010 by the United Nations Population Division. As Chesnais (2000) argued "the process of demographic transition is progressing further and faster than in the minds of experts; it is widening and deepening, to a much larger degree than commonly expected".

THE FUTURE OF FERTILITY IN THE ISLAMIC REPUBLIC OF IRAN

The task of this paper was to examine the possibility of the decline of Iranian fertility to the replacement level. The data presented in this paper shows that fertility in the Islamic Republic of Iran has already declined to below-replacement level. The leading factors likely to be involved in the fall of fertility to such a low level were briefly discussed. A question that remains unanswered concerns plausible assumptions for the future of Iranian fertility. Will fertility in the Islamic Republic of Iran rise again in the near future, will it level-off at the current level, or will it decline further?

In what follows, I argue that fertility in the Islamic Republic of Iran will continue to decline for some years. I will also speculate about the possibility of rising fertility in the future.

Continuing fertility decline

Several reasons justify further fertility decline in the Islamic Republic of Iran.

First, as discussed earlier, there are still significant provincial as well as rural and urban differences in fertility in the Islamic Republic of Iran. Some provinces still have high fertility, while some have experienced below-replacement fertility. According to the IDHS, the highest TFR in the Islamic Republic of Iran was recorded for Sistan and Baluchistan Province (4.69), while Gilan Province experienced a TFR of 1.67 during the period 1998-2000. It is very likely that high fertility provinces will join the low-fertility provinces, thus the gap between the high- and low-fertility provinces will be reduced further. This will bring the fertility at the national level lower. Below-replacement fertility will be reached by most of the provinces of the Islamic Republic of Iran even if the socio-economic characteristics do not become similar to the national level. However, achievement of such low levels in remote provinces such as Sistan Baluchistan, Hormozgan and Ilam may not be as fast as other provinces due to their ethnic and religious diversity. The study of provincial fertility levels and patterns showed that, although the trend of fertility has been more or less similar in all provinces of the Islamic Republic of Iran, there exits substantial variations among the provinces. Thus, a reasonable degree of provincial variation is inevitable.

Second, the process of urbanization is another reason for the fertility decline in the future. According to the 1996 census around 60 per cent of the population were living in urban areas and it has been estimated that by 2020 around 75 per cent of the population will live in urban areas.

Third, the level of education is increasing rapidly. Children of all social classes, particularly the poor, have access to education, and the small educational differences in the society will be reduced further in the future. The level of girls' education has increased over the last two decades and the gap between male and female education has narrowed substantially. This has resulted in relative gender equity in the Islamic Republic of Iran and women have major roles in fertility decision-makings. Although the level of female employment is still low, given the "rising expectation" for Iranian women (Shadi-Talab, 2001) it is highly likely that the level of women's labour force participation will increase in the future. Age at first marriage for women has increased significantly. Doroudi-Ahi (2001) showed that there is a sex imbalance in ages at marriage in the Islamic Republic of Iran; that is the number of women in ages at marriage is higher than that of men. This has occurred due to the post-revolutionary baby boom by which the number of men in older cohorts who were born before the revolution is greater than women of younger cohorts who are the babies of the post-revolution. Women will be much less in demand as the cohort size rises and hence a lower proportion will marry. This will increase the age at marriage for women at least for the next decade.

The higher status of women in the Islamic Republic of Iran will have a negative effect on fertility in the future. This is in line with the "gender equity" argument made by McDonald (2000), and supports Dyson's (2002) hypothesis that one of the main factor of the fall of fertility in developing countries is that "women become more like men". Shadi-Talab (2001) has also noted that "Iranian girls gradually practice democracy within the family, and patriarchal power is slowly diminishing. Although, changing attitudes is a very slow process, the interaction between education and changes in norms and value system is observable in the share of girls participation at universities from the most deprived provinces and far from their home town".

Fourth, as Caldwell, Caldwell and McDonald (2000) have argued, Governments' contributions to population control in Asian countries has been very important. Given the fact that the echo of the post-revolutionary baby boom will occur in the 2000-2010 decade, that decade has been named as "the decade of population crisis" [daha-e bohran-e jamiyyat] in the Islamic Republic of Iran. The Government strongly supports the reduction of the number of births in this decade. All responsible Government departments and institutions, as well as NGO's are committed to this policy. A wide range of brochures and pamphlets are distributed in family planning departments. Two-child policy [two is enough] is advertised everywhere; in bus stops, public spaces, parks, cinemas and even on children's toys and chocolate boxes! Population and family planning is being taught as a compulsory unit to all university students. All the efforts are concentrated on the improvement of health, the expansion of reproductive health services, as well as the reduction of fertility in rural areas and the provinces with high fertility. These programmes will not only affect the attitudes of childbearing women, but also will shape the fertility attitudes and behaviour of young generations.

The result of a small-scaled qualitative research undertaken in 2001 by the author on fertility behaviour of women in Yazd Province supported the ideational change towards small family size norm in the society. Most of the women who had low level of education, preferred 2 or 3 children, and there was no difference between place of residence (rural and urban areas) as well as the economic status of the women (Abbasi-Shavazi and Kaveh Firouz, 2002).

Furthermore, the effectiveness of family planning methods is another factor supporting further fertility decline. According to the IDHS, the contraceptive prevalence rate was around 72 per cent in 2000. There exists a small gap between the level of CPR in rural and urban areas. However, a significant proportion of pregnancies (around 33 per cent) were still unintended (Abbasi-Shavazi and others, 2001). With the improvement of the quality of the family planning services, the level of unwanted pregnancies will be reduced, and thus, fertility will decline further.

Finally, as Chesnais (2000) argued, the impact of globalization on social life in other countries should not be ignored. No specific country or region can be seen in isolation from other countries in the exchange of ideas and culture today. However, resilience of cultures should also not be underestimated.

The possibility of rising fertility

Will the Islamic Republic of Iran or the selected provinces experience an increase in their fertility in the future? Some believe that economic hardship will be over within a certain number of years and then people will compensate their low fertility. The other proposition is that the low fertility that has been observed may be temporary. The reason is that fertility has fallen simultaneously at all ages. The low fertility of the older women may have been a response to past high fertility. However, it is possible that those now experiencing low fertility in their 20s, will in their thirties, have higher fertility than women who are now in their thirties. If this happens, there would be tendency for the TFR to rise over time. This is described by demographers as a tempo effect. However, given the high level of education and the change of values for the young generation, it is unlikely that couples will change their fertility behaviour in the future. In addition, women of the post-revolutionary baby boom who will start their childbearing in the coming decade, have smaller ideal family size, and thus, the proposed tempo effect may not be large.

It may also be possible that with the rapid fall of the fertility and slower population growth rate in the Islamic Republic of Iran, the Government will lose its interests in population control, or adopt a pronatalist policy in the future. Caldwell, Caldwell and McDonald (2000) noted that low level of fertility in some developing countries has caused surprisingly little reaction outside academic circles. They stated that one reason for the slow Government reactions is "population momentum; the fact that age structures are still adjusting to the relatively new low fertility levels and in most cases will not fully adjust for decades". Given that the Government of the Islamic Republic of Iran is faced with the prospects of a "post-revolutionary baby boom", no official policies are expected to be implemented with regard to low fertility in the Islamic Republic of Iran. Thus, the possibility of adopting pronatalist policies in the near future is unlikely.

The other reason why low fertility may not attract due attention in the near future is the fact that not all provinces have experienced below-replacement fertility. Some provinces, particularly in rural areas, still have higher fertility than the national level. Besides, some Government officials and experts believe that this low level of fertility is mainly due to recent economic hardship, and thus fertility may rise again after this economic hardship in over.

Even if the Government introduces a pronatalist policy, it may not affect people's fertility decision-making easily. Women who were interviewed in the qualitative study in Yazd, indicated that they would not increase their fertility, even if the Government provided some incentives to increase fertility. Economic factors have been involved in the onset of fertility decline, but the small family size has become a norm in the society. Families who had large family size have been aware of the disadvantages of large family size and have tried to control their fertility. The level of future fertility in the Islamic Republic of Iran depends upon the decisions which will be made by the current and the next generation. If the coming generations come to the conclusion that having small family size has disadvantages for them, then they may decide to increase their fertility. However, given the experience of the advanced countries today, it is unlikely that the fertility will simply increase in the future. Once the small family size norms internalizes, then it would be difficult to change it at least in the relatively short term.

Some may argue that with the presence of sex preference in the society, fertility is likely to remain high and/or will not decline further. Recent statistics have shown that sex preference, and particularly son preference, is no longer an issue in fertility decision-making. Women interviewed in the IDHS were asked about their attitudes on the sex of their next child. The majority of the women did not have sex preference for their future births. Interestingly, among the women who had a sex preference, a higher proportion indicated that they would prefer girls not boys. This is opposed to the generally held view that son preference is one of the factors of high fertility in developing countries in general, and Asian countries in particular.

SUMMARY AND CONCLUSION

Fertility trends in the Islamic Republic of Iran over the last three decades were reviewed in this paper. Total fertility rate declined moderately during the early 1970s, before it rose after the revolution due to the suspension of the family planning programmes. The decade after the 1979 revolution was marked by the pronatalist approach taken by the Islamic government, although no specific population policy was introduced. The pronatalist ideology did have a small impact on fertility for a few years during the early 1980s, and couples started to control their fertility by the mid-1980s, well before the revival of the family planning programme in 1989. Kaveh-Firouz (2002) argued that implicit policies of the Government such as the improvement of health system, rural development and the expansion of education throughout the country have indirectly contributed to the onset of the fertility decline in the 1980s, and undoubtedly helped the success of the family planning programme over the last decade.

The data presented in this paper showed the sharp fertility decline in the Islamic Republic of Iran in recent years. Total fertility has reached replacement level recently. The fertility in urban areas is below-replacement level and that of rural areas is also close to replacement level. Thus, the question of reaching replacement fertility in the Islamic Republic of Iran is not an issue. The phenomenal decline in the Islamic Republic of Iran is somewhat different from those of the advanced countries, as the decline occurred in such a short time, and all areas of the Islamic Republic of Iran and women of all ages experienced the fall simultaneously. The projections made for the Islamic Republic of Iran over the last decade have been behind the reality as most of them overstated the level of fertility for the Islamic Republic of Iran in their projections. The 2000 medium projection by the United Nations Population Division for the Islamic Republic of Iran for the period 2010-2015 has already been reached. I argued in the paper that the fertility in the Islamic Republic of Iran will decline further, although the decline would not be as rapid as it has been during the last decade.

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Fertility in Israel: is the transition to replacement level in sight?

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BACKGROUND: FORMATION OF THE RELIGIOUS-ETHNIC MOSAIC

The dynamics of Israel's fertility patterns revolve around three major socio-demographic dimensions—religion, ethnicity and socio-economic structure. Jews, Moslems Arabs, Christian Arabs, and Druze Arabs are the major ethno-religious groups. The second dimension is ethnicity among the Jewish population. Distinction is made between populations of European or American origins (to be referred to as European-American), and of Middle Eastern and North African origins (to be referred to as Asian-African). In the last two to three decades the role of ethnicity in the fertility patterns of the Jewish population, has attenuated, while religiosity and socio-economic status have become the most important distinguishing factors between high and low fertility.

After a short introduction section, I discuss theoretical considerations regarding fertility processes in general. Following that, I apply this theoretical framework to the various population subgroups in Israel, as a basis for the final section that attempts to assess future fertility patterns among these groups, and for the overall population of Israel.

The Jewish population (comprising about four fifths of Israel's population) has grown and developed primarily as a result of extensive immigration during the twentieth century. Up to the foundation of the State in 1948, immigration was predominantly from European countries in Eastern and Central Europe (primarily from Poland, the former USSR, Romania, Germany and Austria). During the three years following the foundation of the state in 1948, the Jewish population doubled, mainly through the wave of mass immigration. Almost 50 per cent of the 690,000 immigrants who arrived during that period came from Moslem countries in the Middle East (primarily Iraq, Yemen, Turkey and the Islamic Republic of Iran) and North Africa (Morocco, Algeria, Tunisia, the Libyan Arab Jamahiriya and Egypt), while the rest were primarily European, including many refugees from the Second World War. Immigration from Asian countries was concentrated in the first few years of statehood, while immigration from North African and European (and later from American) countries was spread over a longer period. These immigrants created a Jewish society marked by different cultures, languages and demographic regimes. Differences were especially dramatic between the European-American Jews and those from Asian-African countries. In particular, the total fertility rates in the early 1950s were just over 3 births per woman among the European-American ethnic group (which was similar to many European countries at that period) and 5.5-6.0 among the Asian-African ethnic group (which was similar to many less developed countries at that period).

As noted above, religiosity differences tended to increase over time while the ethnic differences have lessened. In particular, each of the two major Jewish ethnic groups contains a subgroup of the Orthodox population experiencing fertility levels over and above their group averages. Two religious subgroups can be identified, the national religious population and the Orthodox group. The fertility level of these two groups combined has been high, probably around 5.5 births per woman in the 1950s. Between these two groups the ultra-Orthodox experienced the highest, over 6 births per woman in the 1950s. The important implication is that under such high fertility rates combined with relatively high life expectancy, the relative weight of the Orthodox population could be expected to increase over time, other things being equal.

Overall, the total fertility rate during the early 1950s was about 3.9 births per woman for the entire Jewish population, an average of the very different fertility levels experienced by the two major ethnic groups, including their religious subgroups. Israel was at that time a relatively modern country, and it was expected that the newcomers from the Asian and African countries, would undergo a cultural and socio-economic transformation, among others in their fertility patterns (Goldscheider, 1996). We will show that among the three subgroups of the Jewish population, the National and the Orthodox (of both ethnicities), and the Asian-African and the European-American non-religious groups, the two latter completed their fertility transitions within 2-3 decades, the National-Orthodox has maintained its moderately high fertility, while the ultra-Orthodox population has increased its fertility levels over time. It should be noted that the distinction between religious and non-religious subgroups in terms of fertility patterns and or other sociodemographic characteristics is problematic because religiosity is not recorded in any formal registration or in census records. Therefore, whenever figures in this paper are quoted by religiosity, they are based on various kinds of indirect estimation.

The Arab population, comprising about one fifth of Israel's population, consists of three major religious groups. The largest is the Moslem (80 per cent) followed by Christians (11 per cent) and the smallest is that of Druze (9 per cent) of the Arab population. The Arab population has been in the country for many generations. Palestine was an undeveloped country during the early decades of the twentieth century. The economy of the Arab population was based on a feudal-agrarian system, and political power was in the hands of the heads of the Hamule (a group of families under patriarchal lineage structure), and of the heads of the extended family. For the extended family, whose economic base was subsistence agriculture, large family size was beneficial because children contributed to the family's economy at an early age, while their consumption was limited. Hence, Arabs of all religions experienced high total fertility rates of about 7.5-8.0 births per woman.

All Arab religious groups experienced major socio-economic changes for several decades under the British rule from 1917 to 1948. However, the particular characteristics and the intensity and timing of these changes differed considerably among these groups. Socio-economic change occurred earlier and more rapidly among the Christians than among Moslems and Druze. While fertility levels among Christians began their decline during the 1930s fertility levels among the Moslems and the Druze remained at high levels for another two to three decades. We show that all these religious groups experienced substantial fertility reductions since the 1960s, but fertility levels of the Moslems remained at a high level.

THE PROCESS OF FERTILITY CHANGE: SOME THEORETICAL CONSIDERATIONS

The theoretical perspective under which fertility patterns are evaluated in this paper, is that childbearing patterns are of functional importance to the family, operating under a system of strain and responses, within given cultural traits. Strain is defined as a widening discrepancy between current welfare and that which could be achieved (or aspired to) under a changed pattern of behaviour, demographic or otherwise (Davis, 1963). Such a perspective emphasizes the impact of changing societal or community socio-economic characteristics on the costs and benefits of children to their parents, as the major explanation of fertility change. The costs and benefits of children are functions of the roles of children in the family under varying socio-economic, cultural and demographic conditions in a given type of community (Friedlander and Okun, 1996). Hence, fertility levels in a population may be enhanced or depressed when family-formation patterns become inconsistent with the changing socio-economic structure (Davis and Blake, 1954). On the family level it means that at some stage of the reproductive span the conflict between an additional birth and the attainment of competing goals (such as the increase in standards of living) must be resolved. When such a conflict arises, some proportion of families may be expected to respond by delaying an additional birth, given the feasibility and desirability of the entire set of responses. Such intervention in childbearing patterns may result in a permanent postponement, or in a temporary postponement of childbearing until an additional birth is preferred. Consequently, changes in birth spacing and family-size limitation may take place and in turn, fertility levels in the community are altered (Friedlander and others, 1980).

SOCIO-ECONOMIC CHANGE AND FERTILITY TRANSFORMATIONS AMONG ISRAEL'S POPULATION GROUPS SINCE THE 1950S

The non-religious population of European and American origins

This population group, including third generation immigrants, comprised over 30 per cent of the population during the 1970s. It has practiced relatively low fertility levels for over three quarters of a century, similar to Western populations. It experienced a baby boom in the late 1940s and the 1950s and began its decline towards replacement fertility levels subsequently. Educational attainments in this population have been high for a long period, and have increased over time. Occupational status has been relatively high, and women's participation in the labour force has more than doubled between the 1960s and the end of the century. Hence, the aspirations of raising "quality" children and enjoying high standards of living became increasingly inconsistent even with moderately high fertility, particularly as both parents tended to participate in the labour force or were otherwise engaged in independent economic activities. Hence, their total fertility rate declined to 2.5 in the 1970s and to replacement levels towards the end of the1990s. This group comprises currently nearly 40 per cent of the entire population, including the immigrants from former USSR in the early 1990s.

The population of Asian and African origins

As mentioned above, the majority of this group immigrated between the late 1940s and the 1960s from less developed countries characterized with both high fertility and high mortality. Prior to immigration, they had a religious mode of behaviour and a social life centered on the family and the Jewish community. Economic activity was mostly based on small family-run businesses. Hence, the large family was functional in relation to such social and economic environments. Total fertility rate was between 5-6. The first-generation immigrants were generally a traditional, religious group, but it was only subsequent to immigration that an ultra-Orthodox mode of life was adopted by a segment of this population. This ultrareligious sector has been increasing over time, which affected considerably the characteristics of this ethnic group and indeed of the entire Jewish population. We return to this ultra-Orthodox group in a following section.

The development of a more secular segment of the population of Asian and African origins

This group tended to assimilate quite rapidly into the mainstream population in various respects. A large proportion of this population turned from family economic activities to being hired labourers or employees in larger industrial activities. They accepted modern education for their children, which replaced the traditional religious education before immigration. They modernized their consumption behaviour. These changes implied that direct and indirect costs of childbearing and child-rearing increased after immigration. Dramatic changes in family structure, mortality levels, and a series of other sociodemographic transformations occurred among this population subsequent to immigration. Under such conditions of structural discontinuity and rapid socio-economic transformation, the continuation of high fertility would have generated strain on the family. Hence, the process of fertility decline within this population group began soon after their arrival in Israel and was quite rapid, without Government intervention and with relatively simple family planning means (Okun, 1997). The total fertility rate, which was 5-6 prior to immigration, declined to just over 3 in the early 1970s and reached nearly replacement level (2.2 birth per woman) towards the end of the 1990s. This group currently comprises nearly 30 per cent of the entire population of Israel.

The Arab population

The Arab population, particularly the Moslem, rank far lower on the socio-economic scale than Jews. This gap has historical roots, and has not changed much during half a century since the foundation of Israel as a State. The major factor behind this wide socio-economic gap is the differential opportunity structure between the Jewish and the Arab populations, particularly Moslems. There are not only large differences in human resources between Jews and Arabs, but even for those Arabs whose educational status is relatively high, entrance into higher status employment is difficult. This differential opportunity structure results in reduced motivations for the attainment of higher educational levels among Arabs. This, and Government discrimination in the quality between Jewish and Arab schools explains why educational attainments of the Moslem population have not only been the lowest among the major population groups, but have actually declined over time in their attainment of post-secondary education.

Heterogeneity, which characterizes Israel's entire population, is also a characteristic of the Arab population. High proportions of both Moslems and Druzes reside in overgrown villages while the Christian population is predominantly urban. The Christian population has a higher socio-economic status than the Moslems or the Druze in various respects, such as educational attainments, occupational status, income etc. However, it should be noted that the proportion of Christians in the Arab population is just about 11 per cent, so that the impact of their higher socio-economic levels on those of the entire Arab population is minor.

The Christian population, which has been at a higher stage of socio-economic modernization since the 1930s has experienced major fertility declines from a total fertility rate of 7.5, to 3.6 in the early 1970s, and to 2.5 in the year 2000. Hence, the Arab Christian population is likely to proceed with its fertility decline towards replacement level. The Druze population is located between the Christian and the Moslem Arab population groups in their socio-economic status, and so in their total fertility rate. This declined to 7.2 in the early 1970s and to 3.0 in the late 1990s.

The most interesting fertility patterns among the three Arab religious groups are those of the Moslem majority group. Their total fertility rate was at the beginning of the 1940s about 7.5-8.0, and reached a record of 9.3 in the 1960s. It started to decline subsequently to reach a rate of 4.6 in mid-1980s, remaining at that level through the year 2000. How can this changing pattern be interpreted? The increases through the 1960s can be explained by various factors. Hence, since the 1940s, there were improvements in health services, there were increases in the availability modern consumer goods, improvements in the overall standards of living, and very probably improvements in the completeness of birth registration. Another interpretation that has been proposed was connected with the Israeli military administration under which the Arab population lived up to the early 1960s. This made communication and social interaction with the Jewish sector difficult. Under such circumstances, various state administration agencies found it convenient to deal with the Arab minority through its traditional political institutions—the Hamule. Thus, the social and economic power that was transmitted by these state agencies to these traditional institutions, and the importance of population size of the Hamule for its power vis-à-vis other Hamules, was not an encouragement for families to restrict their childbearing. It has been suggested that some of the changes mentioned above operated, through declines in breastfeeding, to increase fertility levels up to the 1960s (Schellekens and Eisenbach, 2001).

Two questions remain unanswered. First, what is the explanation of the rapid decline of Moslem fertility to about half the 1960s level in less than two decades? Second, why did fertility declines discontinue since the 1980s, remaining at moderately high levels of over 4.5 births per woman? These issues have not yet been adequately analysed and we propose our interpretation, which is based on socio-economic and political changes, that are likely to have affected the fertility behaviour of the Moslem population in accordance with the theoretical considerations outlined above.

The military administration ended in the early 1960s, which increased social and economic interaction with the Jewish sector. Hence, agriculture—the main economic branch of the Moslem population at that time—started to modernize, which was associated with a rapid decline in the percentage of agriculturally based households. Other things equal, large family size may be assumed to form stronger strains with modernization processes in the non-agricultural sector compared with the agriculture. Also, interaction with the Jewish sector introduced new, more costly, consumption goods, which could not be attained under conditions of high fertility. The law of compulsory elementary education which passed in the 1950s, implied that children who were previously a source of benefit to the family from a young age, turned into a net economic liability. All these changes tended to produce strain due to increasing costs of raising children, which could be relieved by limiting childbearing. However, one additional change, which had the opposite effect, was the law of child allowances enforced since 1959, which provided monthly payments to households on the basis of the number of children. Obviously, the contribution of these allowances to family welfare increased with family size, which was particularly significant for lower income families. A precise analysis, which might suggest the "optimum" childbearing behaviour at each parity under the changed socio-economic conditions, is complex. However, we suggest that the net effect of all these changes was conducive to the beginning of the onset of fertility decline.

The total fertility rate which declined by 1985 to half its 1965 value remained almost constant over the subsequent period of 14 years. Actually, between 1985 and 2000 the total fertility rate of the Moslem population varied between 4.6 and 4.8 births per woman. Why did fertility decline come to a halt at such a high level? No analysis has been made as yet to explain this fertility pattern. Our interpretation is that the modernization of childbearing patterns of the Moslem population, which was associated with socio-economic change, did not proceed rapidly enough. Although the increased economic and social interactions with the Jewish economic sector since the 1960s resulted in the formation of conflict with the very large family (TFR = 9.15), socio-economic change was, apparently, not enough to generate further declines in fertility. A large gap in the opportunity structure between the Jewish and the Moslem population remains. One conspicuous example of continuous discrimination is the lower quality of elementary and secondary education in Arab residential areas. It is not surprising that their attainment of post-secondary education has actually declined. Discrimination in the labour market did not provide encouragement for families to invest in education for the young generation, which made child-bearing and child-rearing less costly. Additionally, the generous child allowances have a pronatalistic effect, particularly for less affluent families for whom these account for a significant proportion of their income. It is our conclusion that under such conditions, moderately high fertility is beneficial for a high proportion of Moslem families.

The National and the ultra-Orthodox Jewish population

Our main discussion in this section is concerned with the two ultrareligious groups (of European and of Asian-African origins), because they form a large part of the Jewish religious population and because their fertility levels are the highest. In this discussion we deal with them as one group. In comparison to the ultra-Orthodox, the National Orthodox group can be characterized as a moderately high fertility group and differs from the ultra-Orthodox group in many respects very considerably. It has been argued that the roots of Israel's religious groups date back to the period of emancipation and enlightenment in nineteenth century Europe. Two groups have been identified historically. One, the acculturation group, favoured the promotion of cultural contact with the outer world, while retaining Jewish culture and beliefs. The contemporary national religious group has adopted this ideology. The second was the contra-acculturation group, which favoured turning away from the contemporary way of life in order to preserve traditional ways. Israel's ultra-Orthodox group originates from this ideological stream. Indeed, Israel's ultra-Orthodox group "strives to separate itself not only from every aspect of the outside world culture, but also from people or things that, having passed near or through that world, carried contaminating elements of it" (Heilman and Friedman, 1991).

How can the very high fertility (TFR of around 7.0) of this group be explained? We argue that it is the sociocultural structure of this group, which makes high fertility beneficial, if not for the individual family, then for the community and its political establishment. This group has its own independent educational system, which is the key for its intergenerational survival within a very materialistic outer world. Education begins at a very early age, and male students remain in the more advanced educational institutions (yeshiva) until their mid-thirties or forties. Women are regarded as supports of scholars and are the main breadwinners in many ultra-Orthodox families. They are engaged in various occupations such as teachers—in an ever-growing young population—and particularly in employment, which does not involve the necessity of mixing with people of the outer world.

Marriages are arranged and take place at an early age. Couples are expected to have their first child within a short time following marriage, and high fertility is an encouraged norm throughout marriage (Heilman and Friedman, 1991). Obviously, many years of education for men, early marriages and household formation, high fertility, and rapid population growth are societal characteristics which require economic resources over and above those generated within this ultra-Orthodox community. Where do such additional economic sources come from? The major source is the larger society of Israel through generous governmental child allowances, assistance in housing young religious couples etc. Another important source is specific funds which are allocated to families by their own community institutions, and which are secured by various governmental authorities. These have been granted for years as part of coalition agreements between the ultra-Orthodox parties and the main political parties either on the left or on the right. It has therefore, been argued that the ultra-Orthodox community lives in an ambivalent relationship with the larger society. It rejects the values of that larger world while depending on it. Hence, although the families of this community are the poorest, at least, in the Jewish population there is no conflict with high fertility, as long as women can work while children are either at school for the day, or with boarding arrangements with no costs to parents, where they are indoctrinated into their community norms. Not only child allowances, but also public funds administered through the community, are partly allocated in relation to family size,—clearly pronatalistic in their effects. Hence, the socio-economic structure of the ultra-Orthodox population, its internal educational system and its political power within Israel's society, are conducive to its survival as a high fertility group whose families conform to community norms of early-universal marriage and high continuous fertility.

PROSPECTS OF FERTILITY DECLINE TOWARDS REPLACEMENT LEVELS

The foregoing analysis attempted to show that Israel's society is characterized by heterogeneity and contrast in many respects, not the least in its fertility levels among the different population groups. While fertility differentiation during the 1950s and 1960s was mainly by religion, ethnicity and socio-economic levels, ethnic differentials have disappeared and replaced by religiosity differentials. By 1995-2000 we can identify four major population groups in terms of their total fertility rates and their approximate percentages in the population:

- The Jewish non-religious group of both ethnicities (67-70 per cent) with TFR of 2.0-2.2
- The Arab Christian population (2 per cent) with TFR of 2.6
- Arab Moslems and Druze (16 per cent) with TFR of 4.0
- The Jewish ultra-Orthodox, and the National Orthodox (12-15 per cent) with TFR 6.0-7.0
- Israel's overall TFR 2.9

What are our assessments for changes that are likely to take place in Israel's fertility levels in the coming 2-3 decades? This depends on changes that are likely to occur in marriage patterns and marital fertility levels among the different groups, on their changing proportions in the population and on immigration. The volume of immigration might increase or decrease unexpectedly. For example, immigration of some 900,000 immigrants from the former Soviet Union in the early 1990s increased significantly the proportions of Israel's low fertility population.

Prospects of fertility decline in major population groups

We begin with the fertility level of the Jewish non-religious population, which is around replacement level. It seems unlikely that the total fertility rate of this group will change enough to affect Israel's global TFR more than marginally. However, another wave of large-scale immigration may increase the proportion of the non-Orthodox low-fertility population and in turn, lead to a decline in the global TFR.

The Arab Christian population might well join the Jewish non-religious group in a further decline in their fertility level. However, because the proportion of the Arab Christian population is so small, such a possible change cannot affect significantly the global TFR.

The Druze minority has been classified with the Moslem population although their fertility level is only moderately high, in relation to that of Moslems, and it has declined in recent years. This is because no feasible change in fertility patterns of this group can possibly affect significantly Israel's global TFR, because their proportion in the population is so small.

Clearly, the most important among the religious Arab groups in its effect on Arab and on Israel's overall fertility, is that of the Moslem population. It is our view that fertility level within the Moslem population has reached some kind of an equilibrium between family size on the one hand, and the opportunity structure in terms of education, labour markets, child allowances, on the other. The verification of this hypothesis would show that fertility change occurs when there is a conflict between existing patterns and socio-economic structure under which families tend to regulate their reproductive behaviour. Their goal in this regulation is to increase their own welfare levels in the short run, and this has no connection with any macrolevel goals such as replacement levels or zero population growth. The acceptance of this contention implies that unless there is a radical change towards equalization in the overall structure of opportunities between the Arab and the Jewish population, there is little chance for substantial declines in Moslem fertility levels. However, such a radical socio-political change is not in sight at this time. It is our view therefore that a meaningful decline in Moslem fertility is unlikely in the foreseeable future.

The ultra-Orthodox Jews form a distinct group within Israel's society. Its religious ideology, particularly its strive for high fertility, has been backed up with political manipulation for decades. Their representation in Israel's parliament, the Knesset, is larger than its proportion in the population due to their appeal among some low status members of the Asian-African ethnic group. The ultra-Orthodox population, which supports the two major political parties, has held the balance of political power for most governments, either of the left or the right. Consequently, they succeeded in transforming political power into direct financial support for their independent educational system, for securing generous child allowances for large families, for highly subsidized housing projects for young couples, and more. It can be assumed that as long as these political realities persist in Israel's society, very high fertility levels of the ultra-Orthodox population will be maintained. Even if the political structure does change, which seems very unlikely, it will take years before growth rates of this population declines to lower levels, in part because their age structure is extremely young.

Future fertility levels of Israel's population

Roughly 30 per cent of Israel's population can be characterized as varying between high to very high fertility levels. We have argued that chances of fertility decline among these groups are extremely small. Roughly 70 per cent of Israel's population can be characterized as low fertility groups, at or near replacement levels. Our conclusion is, therefore, that Israel's global TFR will remain in the region of 2.5-3.0, probably closer to 3.0.

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Completing the fertility transition: Jordan, Lebanon and the Syrian Arab Republic

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THE DEMOGRAPHIC TRANSITION

The demographic transition in the Arab countries of Western Asia in general has been somewhat peculiar. Total fertility rose substantially before it began its historical decline. Life expectancy rose at a very fast pace. The very high fertility rates, resulted in extremely youthful populations which, combined with low mortality schedules, resulted in crude death rates (CDRs) of 3 to 4 per thousand population, that is, lower than rates ever achieved in developed and most developing countries. The maximum range between crude birth rates (CBRs) and crude death rates, therefore, reached, in some countries, particularly in the Gulf, the unprecedented levels of 4.5 to 5 per cent a year. Looking to the near future, as the ageing process advances with the expected fall in fertility, the further gains in life expectancy will be accompanied by an increase in crude death rates.

During the 100 years between 1950 and 2050, the relationship between CBRs and CDRs, therefore, is characterized by four distinct phases. This may be illustrated with data from Jordan. The first phase, from 1950 to 1970, rates of natural increase rose rapidly because of both a rise in CBRs and a fall in CDRs. The second phase, from 1970 to the present, rates of natural increase fell because the fall in CBRs was more substantial than the fall in CDRs. The third phase, which extends from 2000 to 2030, rates of natural increase will continue to fall due solely to the fall in CBRs as CDRs remained constant throughout the period. Finally, the fourth phase, from 2030-2050, rates of natural increase are expected to fall rapidly because of both a fall in CBRs and a steady and relatively sharp rise in CDRs. During this latter period (and beyond), CDRs will rise in spite of an improvement in mortality levels as indicated by a rise in life expectancy (see table 1).[1]

How will this demographic transition be completed? In other words, how will fertility and mortality behave in the foreseeable (and not so foreseeable) future?

[1] All data, unless otherwise indicated, are obtained from (United Nations, 1999a and 1999b).

Mortality

All indications are that mortality in the three countries under review will continue to fall in the sense that expectation of life at birth will continue to increase. At the same time, however, because of continued ageing process, Crude Death Rates are expected to begin to rise in the near future. According to United Nations medium projections, this will begin to happen in the next 15 to 25 years starting with Lebanon and ending with Syria. The process of rising CDRs is expected to continue for some time following the path of presently low fertility countries. In Syria, for example, the expected CDR in 2040-2050, according to medium United Nations projections, is around 6 per thousand as compared with a still rising present level of 12-14 per thousand in presently low fertility countries.

Table 1
Demographic indicators for selected Western Asian countries

Countries	Period	TFR	CBR	CDR	LE
Jordan	1950-1955	7.38	46.7	26	43.2
	1955-1960	7.38	46.7	23	45.7
	1960-1965	8	52.5	22	48.2
	1965-1970	8	52.5	21	51.7
	1970-1975	7.79	50	14.4	56.6
	1975-1980	7.38	45	9.6	61.2
	1980-1985	6.77	42.3	8.9	63.5
	1985-1990	6.03	39.9	7.1	65.9
	1990-1995	5.58	36.9	5.8	68.6
	1995-2000	4.86	34.8	4.6	70.1
	2000-2005	4.44	33	4.1	71.5
	2005-2010	4.01	30.3	3.8	72.6
	2010-2015	3.59	27.4	3.6	73.7
	2015-2020	3.16	24.6	3.6	74.7
	2020-2025	2.74	21.9	3.6	75.6
	2025-2030	2.31	19	3.8	76.4
	2030-2040	2.1	17.4	4.2	77.7
	2040-2050	2.1	16.1	5.3	78.8
Syria	1950-1955	7.09	46.6	21.4	46
	1955-1960	7.09	46.6	18.8	48.5
	1960-1965	7.46	47.4	16.6	51
	1965-1970	7.79	47.6	15.3	54
	1970-1975	7.69	46.6	12.1	57
	1975-1980	7.44	46	8.9	60.1
	1980-1985	7.38	45.7	8.7	62.6
	1985-1990	6.6	42.7	7	65
	1990-1995	4.7	33.2	5.6	67.1
	1995-2000	4	30.4	4.9	68.9
	2000-2005	3.58	29.2	4.5	70.2
	2005-2010	3.16	27.3	4.3	71.5
	2010-2015	2.73	24.3	4	72.7
	2015-2020	2.31	20.1	3.9	73.7
	2020-2025	2.1	17.7	4	74.7
	2025-2030	2.1	17.4	4.3	75.7
	2030-2040	2.1	16.8	4.9	76.9
	2040-2050	2.1	14.8	6.1	78.4
Lebanon	1950-1955	5.74	41	18.7	56
	1955-1960	6.15	43.4	15.2	58.5
	1960-1965	6.36	42.7	13.3	60.7
	1965-1970	6.05	38.8	11.8	62.9
	1970-1975	4.92	32.1	9.3	65
	1975-1980	4.31	30.1	8.7	65
	1980-1985	3.79	29.3	8.8	65
	1985-1990	3.42	27.9	7.8	67
	1990-1995	3.09	26.9	7.1	68.5
	1995-2000	2.69	23.8	6.4	69.9
	2000-2005	2.3	19.8	6.1	71
	2005-2010	2.1	17.6	6	72.1
	2010-2015	2.1	17.4	6	73
	2015-2020	2.1	17.4	6	73.9
	2020-2025	2.1	16.7	6.1	74.7
	2025-2030	2.1	15.5	6.4	75.7
	2030-2040	2.1	14	7.3	76.9
	2040-2050	2.1	13.7	8.9	78.2

Source: *World Population Prospects*, United Nations, 1998.

Furthermore, soon after the beginning of the rise in CDRs, the decline in the rate of natural increase in all three countries will come increasingly more from rising CDRs than from declining CBRs.

FERTILITY

The most important speculation for the present purpose, however, is that relating to the future of fertility. Here one must differentiate between short-term and long-term factors. Obviously, long-term factors are of greater relevance to this paper than short-term factors but both will be discussed below.

Short-term factors

One of the most important short-term factors affecting fertility in the three countries in question is the sex imbalance being created by intensive emigration in association with increased female education and some prevailing customs relating to marriage. This is most obvious in the case of Lebanon. Female education has spread considerably to the point where there is now a slightly higher enrolment ratio of females than of males at practically all levels of education. This has delayed the age at which girls become ready for marriage to the age group 25 to 29 years. Since the prevailing custom is that girls marry boys who are at least 5 years older, the relevant age group of males in this case becomes that between 30 and 34 years. Because of heavy emigration of males particularly in this and the earlier 5-year age groups, the ratio of single males 30 to 34 years of age to single females 25 to 29 years of age was found to be, in a national survey undertaken in 1996, 7 to 10 (UNDP, 1998). This ratio must have fallen further in view of the more intense emigration that has taken place since then. Add to this the fact that Arab women in general do not marry men who are less educated than they are and the sex balance (the availability of mate ratio) becomes even more lopsided. As a result, celibacy rates among women in Lebanon have virtually doubled between 1970 and 1996 for practically all age groups (table 2). Obviously, total fertility rates were negatively affected by increasing female celibacy and a large gap was created between marital fertility (6.1) and total fertility (3.0). Economic development will, therefore, tend to raise fertility in the short-run by increasing work opportunities for young persons and thus reducing emigration. Indeed, some new habits are already forming that would tend to move total fertility in that direction, particularly, the new phenomenon of emigration of educated females and the reduction in the sex gap in the age at first marriage.

Another short-term constraint on fertility arises from the depressed economic situation prevailing in the three countries in question. Many factors are behind this situation but the most important, perhaps, is the political insecurity arising from the Arab-Israeli conflict. A resolution of this conflict, therefore, will probably lead to rapid economic recovery and growth that, in turn, will increase income and reduce the income constraint on fertility resulting in a temporary baby boom in the region.

Table 2
Celibacy rate among women, Lebanon, 1970 and 1996

Age group	1970	1996
15-19	86.8	95
20-24	50.9	72
25-29	25.1	46.6
30-34	14.2	30.4
35-39	10.1	20.9
40-44	7.6	15.2
45-49	6.9	11.5

Source: PHS, 1996.

Long-term factors

Discussion of long-term factors is infinitely more complicated than that of short-term factors and requires at least a minimum of conceptual background. Three factors are believed to be most relevant to this long-term analysis of the future of fertility: the ideal family size, the cost of children and the adequacy of income. Some oversimplification is necessary for this paper.

The ideal family size

The ideal number of children is determined by the marginal utility and disutility functions of children for a given socio-economic group (Tabbarah, 1992). There is obviously a certain socio-psychological pleasure, or utility, that is generally derived by couples from acquiring a new child.[2] Whether the desire for children is due to prestige, religious fulfilment or even instinct, it is logical to assume that the part of this desire satisfied by the first or second child is likely to be greater than that satisfied by, say, the fourth or fifth child, that is, that there is decreasing marginal utility. But children are also a source of disutility to their parents in that they compete with the parents' extra-familial activities such as reading, going to the movies and theatre, travelling, or just pursuing other desirable activities than raising children.[3] Children may also impose some activities on parents which themselves generate disutility. As the number of children increases, more opportunities need to be foregone. The fewer of these opportunities left for the parents, the greater is the disutility arising from foregoing additional opportunities. Thus, as marginal utility of children is a decreasing function, the marginal disutility of children is an increasing function (figure I). The net marginal utility function is, therefore, a declining function reaching zero at the level indicated by the point of intersection of the utility and disutility curves (figure II). This point gives the ideal number of children. Parents will not go beyond this point (without compensation) since any additional child will entail a net marginal disutility.[4]

The process of development involves a series of social and economic changes that affect both the utility and disutility of children. With regard to utility, the prestige and advantage associated with large families seems to wane with increased geographic mobility and the advent of nuclear families. Economic and political security is gradually taken over by Government and myths regarding the relationship between virility and procreation become increasingly clarified. Even the hold of religion on the individual as a determinant of reproductive behaviour tends to be weakened. As a result, a slow but continuous downward shift in the marginal utility function would tend to take place with development.

Much more important perhaps is the upward shift in the marginal disutility function. By definition, the process of development brings with it increasing opportunities to individuals, thus gradually expanding their horizons beyond the strict family-building endeavours. More education, better communication and greater mobility extend interests beyond the traditional confines of family and kin and higher income increasingly permits the satisfaction of the new demands. In this process, a conflict is created between the familial and the increasing extra-familial opportunities.

Decreasing utility and increasing disutility results, of course, in shifting the net marginal utility of children curve to the left, thus reducing the ideal number of children.

The cost of children

The changing cost associated with children that accompanies development may be analysed at two levels: the cost of a child and the cost of children, both in relation to household income (Tabbarah, 1992). With regard to the cost of the child two factors seem to be of particular importance. First, in the less developed setting, a child, particularly a male child, may be considered a net economic asset in the sense that, over his lifetime, he may be a net contributor to household income. In this case, there will be no income con-

[2] Leibenstein (1957 and 1974) includes in utility, the child as a source of future income. In this paper this aspect is included in the cost of children (as a negative cost) leaving only the socio-psychological considerations to utility and disutility.

[3] These are what Leibenstein called "opportunities forgone" by parents due to child-rearing.

[4] Ideal number of children differs from the desired number in that it is free of income constraint. In a survey, for example, the appropriate question is of the sort: "if you had the necessary income, how many children would you want to have?" For the desired number, the question would be of the sort: "given your present and expected income, how many children do you want to have?" No income constraint exists when the two answers are equal.

Figure I
Marginal utility and disutility function

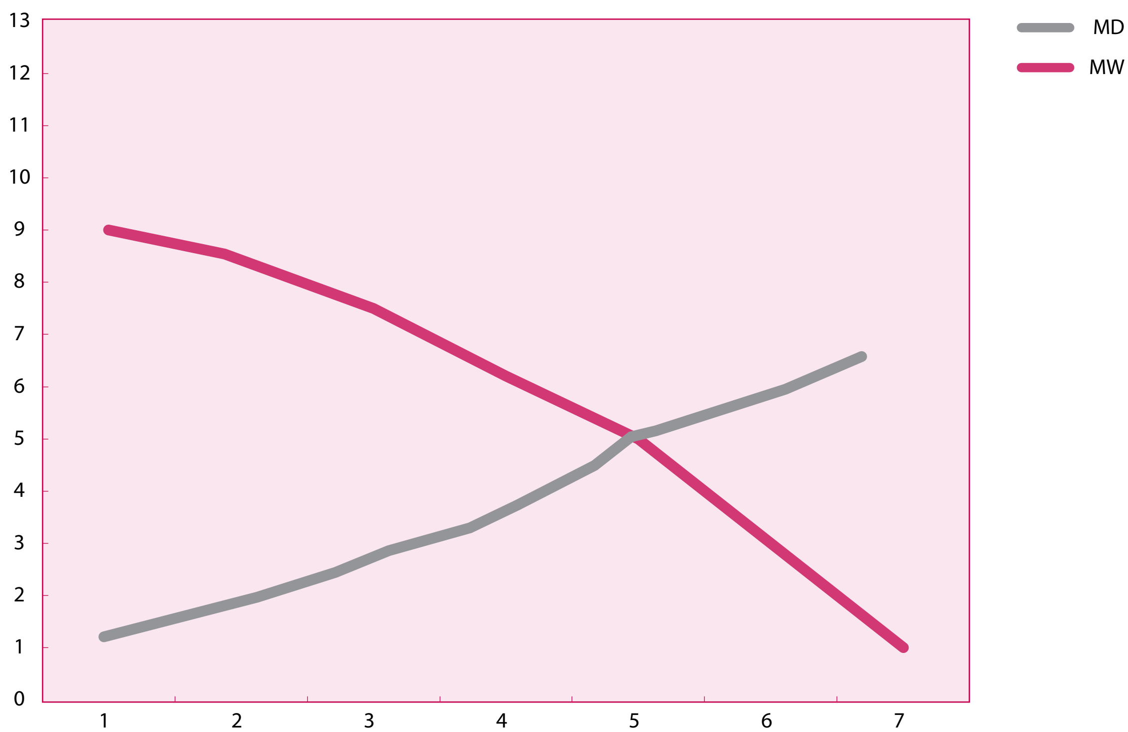

Figure II
Natural utility

straint associated with the child. With development and modernization, this "net wealth flow", to use Caldwell's expression, is reduced, halted and then reversed.

Beyond this phenomenon, the cost of the child in relation to income may reasonably be viewed as fairly constant over time at the early stages of development and, particularly, before extended child education. Thus, as the income of the family rises, expenditure on all its members, in terms of food, housing, clothing etc., is likely to rise in tandem. This is not true, however, when a new item, such as education of the child, is introduced in the family budget. Such a new item tends to increase the cost of the child in relation to household income.

A much more powerful pressure on household income arises from the extended period of family support due primarily to extended education because of its effect on the cost of children. Even when education is free and thus does not affect the cost of the child, the fact that it extends the period of support makes it affect the cost of children. In the less developed societies where education is minimal or non-existent, the child becomes economically independent at an early age, say, 9 years. In these circumstances, if a woman has a surviving child every 3 years, the total number of children being supported at the same time is three. If education were extended to secondary school, that is, to the age of 18, the number of children to be supported simultaneously would rise to six. If, as expected with development, the natural interval between surviving children were reduced because of improved health of mother and child to, say, 2 years, then this total number would rise to 9. In other words, even if the cost of a child remains constant with development (e.g., free education), the cost of children rises with the extended period of support of children due mainly to increasingly longer period of child education. This places a very powerful constraint on large families and reduces the desired number of children.

The adequacy of income

The adequacy of income is a measurable concept (Tabbarah, 1972). Simply stated, it is the ratio of an individual's income over his/her conventional standard. The fact that income adequacy is positively correlated with demand for children has been observed. Income and conventional standards don't always move together, especially in developing countries. Incomes grow with economic growth but conventional standards may be affected by an international demonstration effect. This demonstration effect increases with globalization through the movies, television, the internet and other communication means that characterize the globalization process. As openness to higher standards increases, conventional standards increase and income adequacy tends to decrease.

IMPLICATIONS FOR THE FUTURE OF FERTILITY

If the above is true, a number of implications for the future trends in fertility follow:

- First, education seems to be a most powerful factor in the reduction of fertility. This is so because education seems to affect all long-term factors in a significant manner. It reduces the utility of children, increase their disutility, it increases the cost of the child when it is not completely free, it increases significantly the cost of children and it tends to facilitate social globalization, thus exerting pressure on the adequacy of income. In the three Arab countries in question, Jordan, Lebanon and the Syrian Arab Republic, the spread of education has been spectacular in the past few decades but there is still some way to go to eliminate illiteracy completely and raise the average number of school years achieved by the adult population. Women's education has also risen spectacularly but, except for Lebanon, gender differences still exist in enrollment levels. Women's participation in the labour force has improved but gender differences at all ages are still quite significant. What all this means probably is that the fall in fertility that has taken place in the past few decades has still some way to go.

- Second, globalization is increasing and is expected to continue to do so in the future. It is progressively reaching more remote areas within the three countries through the modern means of communication. The economic benefits of globalization, in terms of increase in incomes, have certainly lagged behind the social and cultural penetration in the sense that expectations are rising faster than incomes and this will create additional pressures on the adequacy of income in the foreseeable future.
- Third, not only female celibacy is increasing, divorce rates are also rising although they are still at very low levels compared to western standards. With "modernization" and globalization, these rates are expected to rise in future. As a result, total fertility will decline even if marital fertility remains constant.
- Fourth, policies to increase fertility are generally ineffective. It is difficult to increase the utility or decrease the disutility of children given the nature of development and modernization. Education, particularly the education of women is irreversible. The cost of a policy aimed at couples to increase their number of children beyond the "ideal" level is prohibitive since it will need to compensate the couples not only for the entire cost of the additional child but also for the negative net utility associated with the additional child. A "patriotic" reaction initiated by the threat imposed by very low fertility may also be ruled out. In Germany, where the "native" population is declining rapidly and the "non-native" (Turks, Kurds etc.) is rising, no such reaction has been detected so far nor is it expected by local demographers.

The fact that fertility in the three countries in question will continue to fall in the near future is fairly certain. The question is what level will this fall reach. United Nations projections assume that the minimum to which total fertility will arrive is replacement. But there is no logical reason for this assumption. There is no magic attached to that number. Couples will not jointly act to achieve it. To determine this minimum level one must determine at least two major parameters: the minimum ideal family size for married couples and the lowering effect that celibacy, divorce (and sterility) will have on marital fertility. Among the more educated in the three societies in question, the two-child ideal seems to be predominant so this may be assumed to eventually be the level of marital fertility. If one assumes, additionally, that total fertility will be 20 to 30 per cent less than marital fertility, then the point of resistance of total fertility would be somewhere between 1.4 and 1.6 children, which is not very far from the situation prevailing at present in some of the European countries.

There are other, more global, implications to declining fertility. First, it is clear that the alarmists in this field are out of business, at least for the foreseeable future. The days of the Population Bomb, the Limits to Growth and Famine 1974 are over.

Second, the old concern among some Western demographers and governments, apparent since the international population conference in Rome in 1954, that the proportion of world population living in Western Europe, North America and Australia is quickly diminishing, will undoubtedly become increasingly serious. In the recent past the problem was due to differentials in positive rates of population growth between the first and the third worlds, now the differential is between negative rates of population growth in the first-world and positive rates of population growth in third-world countries, some of which still have very high total fertility rates. It is worth noting in this regard that, according to the latest United Nations projections (2000 revision) the proportion of total population living in Western Europe, North America and Australia has declined from 17 per cent in 1950 to 11 per cent in 2000 and will reach little over 8 per cent in 2050. In addition, an increasing proportion of these populations is of third-world origin.

Finally, as first world populations decline and age, the need for opening the doors of immigration will intensify. The dilemma facing these countries in the near future, therefore, will not only be to keep their world political influence in the face of their diminishing proportion of world population, but also how to maintain economic growth and keep the non-native population within their borders in check.

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Kenya's fertility transition: how low will it go?

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DATA SOURCES

The principal sources of information on the rapid fall in fertility in Kenya since 1980 are, first, the birth histories compiled in the Kenya Fertility Survey (KFS) of 1977-1978 and the three Demographic and Health Surveys (KDHS) of 1989, 1993 and 1998, and, second, the data on children ever born and on births in the last 12 months obtained in the population censuses of 1969, 1979, 1989 and 1999.

Birth histories enable us to reconstruct estimates of fertility rates by age and time periods up to 20 years prior to the surveys. The surveys, however, were restricted to women under the age of 50. Thus, as the estimates are taken further back in time, the fertility rates become increasingly truncated age-wise, and they have to be extrapolated up to the end of childbearing by "borrowing" the rates for the older age groups from the nearest subsequent time periods. When fertility is falling rapidly, this procedure introduces a progressive downward bias in the estimates. Furthermore, the estimates are vulnerable to errors in the dating of the births in the birth histories. There is a widespread tendency for recent births to be pushed back in time, thus depleting the numbers recorded for the last five years and inflating those for the periods 5-9 and 10-14 years prior to the survey, thus simulating a spurious decline in fertility. In the Demographfic and Health Surveys this feature may have been aggravated by the large amounts of additional information (including heights and weights) required of children born in the last three, or in some cases five, years before the survey. There may also be a tendency for births which had occurred more than fifteen years ago to be brought nearer to the survey date. Thus, this double "concertina" effect reinforces the inflation of the fertility rates for the period between 5 and 15 years before the survey. Methods of detecting and correcting these errors have been devised and will be discussed below.

The census data on lifetime and current births can be used in a variety of ways to examine fertility trends. Probably the simplest, and in some ways the most satisfactory, procedure is the construction of "hypothetical cohorts" for the intercensal periods from the differences in the average parities for the same cohorts of women in consecutive censuses (United Nations, 1983). The method uses only the average parities recorded in the censuses, and makes no assumptions about the nature or patterns of the possible errors in the data. However the census data on children ever born were not subject to the same detailed probing as in the birth history surveys, and errors, both of omission and faulty inclusions, undoubtedly occurred. There was generally a category of women who were "not stated" as to the numbers of children they had borne. Most of these women were probably childless, but some may have borne children who, for a variety of reasons, were not recorded. The El Badry correction for non-response (El Badry, 1961; United Nations, 1983) provides a possible method of handling this problem, and the average parities used for the construction of the hypothetical cohorts shown below were first adjusted by the El

Badry method. The estimates have also been refined by fitting fertility models to the average parities of the hypothetical cohorts, thus smoothing irregularities and reducing the vulnerability of the estimates to errors in the reports for older women. Brass's relational Gompertz fertility model (Brass, 1981) was used for this purpose.

The relational Gompertz model may also be used to derive fertility estimates from census data on births reported as occurring during the 12 months preceding the census, together with the average parities of younger women, in a variation of the "P/F ratio" technique devised by Brass in the 1960s (Brass and others, 1968; Brass, 1975).

RESULTS

Table 1 shows the estimates of the total fertility rate in Kenya derived from the sources described above, which have also been plotted graphically in figure I. The coherence of the estimates can be readily assessed from the discrepancies between the estimates for the same time periods from the different surveys and censuses.

The birth history data have clearly been distorted by the "concertina" effect described above. All four surveys show lower fertility rates for the period 15-19 years before the survey than for that 10-14 years before, and the rates for the latter were above the estimates derived for the same period from other sources. We have therefore attempted to redistribute the births across the time periods, using the procedure devised by Brass (Brass, 1981; Brass and Jolly, 1993) which involved the fitting of relational Gompertz fertility models to the backdated average parities. Brass himself made these adjustments to the 1977-1978 KFS and the 1989 KDHS; the writer has applied them both to the 1993 KDHS (Macrae, Bauni and Blacker, 2001) and to that of 1998. The main problem in the application of this procedure lies in the selection of the "best" models. If the models fit the observed data closely they will simply reproduce the original biases. The principal criterion which I have adopted is to ensure improved agreement between the average parities backdated to the times of preceding surveys and the average parities recorded in those surveys. Thus, the 1998 KDHS was back dated by five years and compared with those from the 1993 KDHS, and then by 20 years for comparison with the KFS. The parameters of the models used for the back-dating were manipulated, more or less by trial and error, so as to minimize the sums of the squared differences between the back dated and the observed values. The results are shown in table 2 and figure II.

Table 1
Recorded and extrapolated estimates of total fertility in Kenya

KFS 1977/1978		KDHS 1989		KDHS 1993		KDHS 1998		Census based estimates	
1958-1962	8.41	1969-1973	8.00	1973-1977	7.88	1978-1982	6.87	1969-1979	7.79
1963-1967	9.01	1974-1978	8.19	1978-1982	8.02	1983-1987	6.89	1979-1989	6.58
1968-1972	8.70	l979-1983	7.64	1983-1987	7.35	1988-1992	5.71	1989-1999	5.00
1973-1977	8.26	1984-1988	6.70	1988-1992	5.53	1993-1997	4.65		

Table 2
Adjusted and extrapolated estimates of total fertility in Kenya

KFS 1977/1978		KDHS 1989		KDHS 1993		KDHS 1998		Census based estimates	
1958-1962	7.84	1969-1973	7.89	1973-1977	7.24	1978-1982	6.62	1969-1979	7.79
1963-1967	8.12	1974-1978	7.72	1978-1982	6.89	1983-1987	6.15	1979-1989	6.58
1968-1972	8.05	l979-1983	7.27	1983-1987	6.45	1988-1992	5.54	1989-1999	5.00
1973-1977	7.91	1984-1988	6.71	1988-1992	5.79	1993-1997	4.89		

Figure I
Observed trends in total fertility

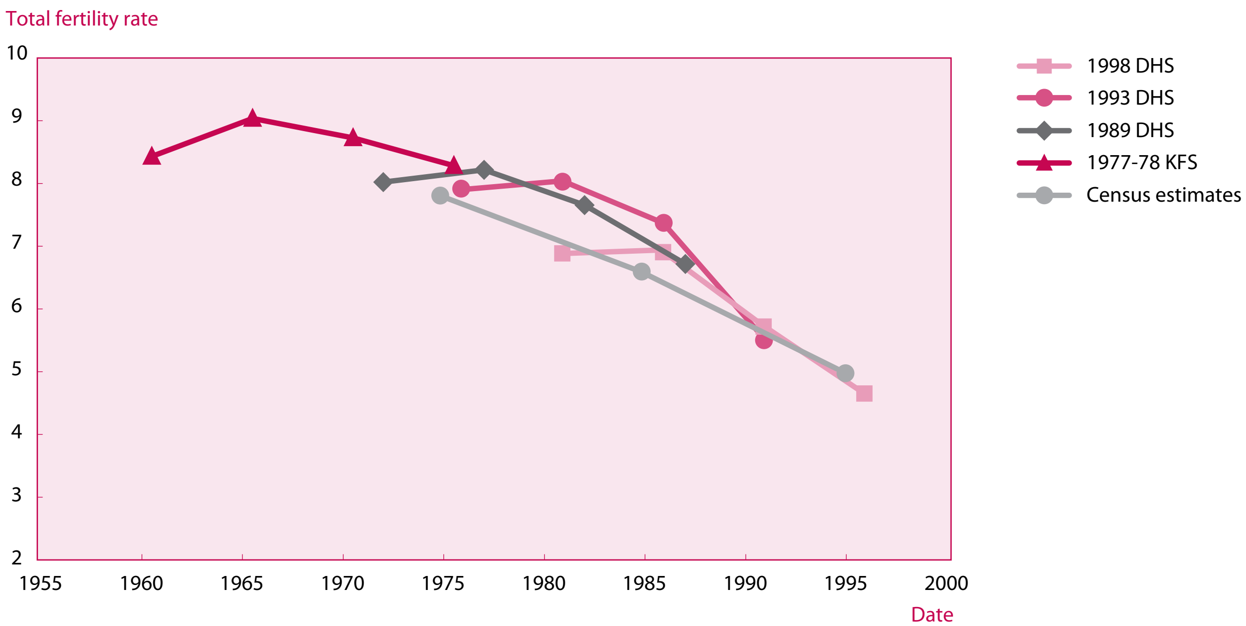
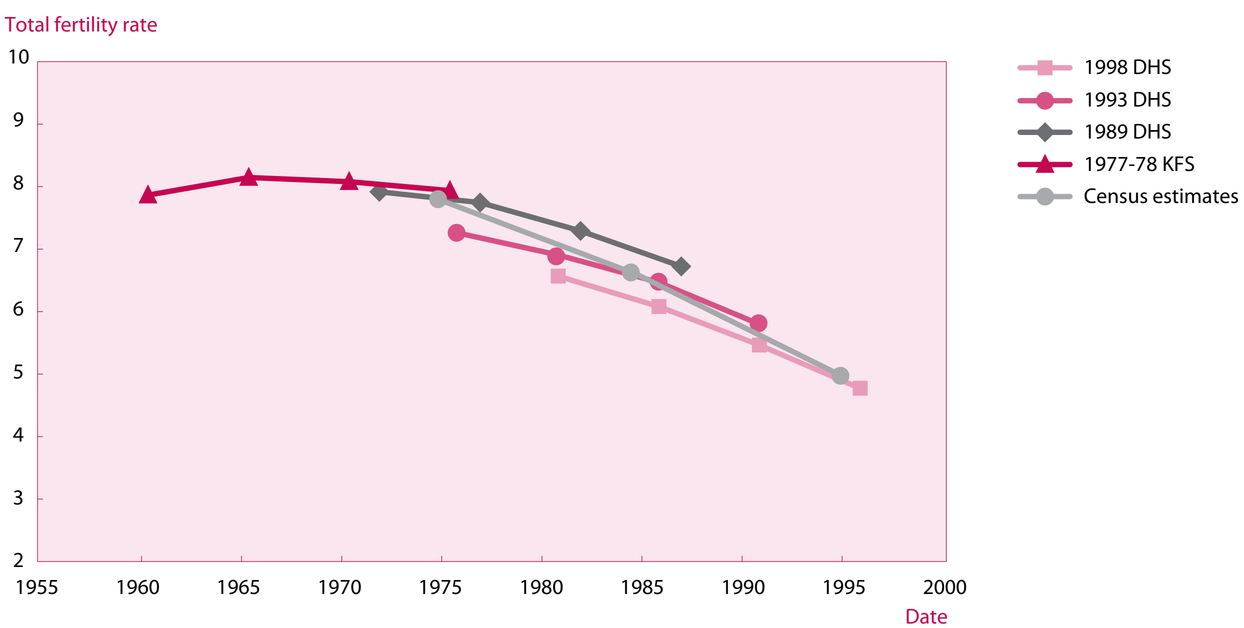


Figure II
Adjusted estimates of total fertility



It may be argued that in this exercise the data have been overcorrected. The adjusted rates from the 1993 and 1998 surveys for periods more than five years before the survey dates appear now to fall below the estimates from other sources. But the general coherence of the different estimates has undoubtedly been improved. In particular, those from the birth history surveys have been brought into better agreement with those based on the censuses.

Table 3
Projected completed family sizes for 1998 KDHS cohorts

Age group in 1998	Average parity in 1998	Projected completed family Size
15-19	0.21	3.58
20-24	1.28	3.85
25-29	2.70	4.44
30-34	4.03	5.02
35-39	5.32	5.75
40-44	6.38	6.47
45-49	6.93	6.93

The models may also be used to project the completed family sizes for the different cohorts of women in the surveys who were still of childbearing age. Although such projection is clearly unjustifiable where the younger women are concerned, the results may nevertheless provide an indication as to where Kenya's fertility is heading. They are shown in table 3. For what they are worth, they suggest that none of the cohorts will end up with less than 3 births per woman.

CONCLUSION ON FERTILITY TRENDS UP TO THE LATE 1990S

In the late 1970s, total fertility in Kenya was of the order of 8 births per woman. There is an abundance of data to that effect: the 1977-1978 KFS showed an average parity for women aged 45-49 of 7.88 and a total fertility rate of 8.065 for the three years prior to the survey; the changes in average parities between the 1969 and 1979 censuses implied a TFR of 7.79 for the intercensal period; the National Demographic Survey of 1977 gave a Gompertz-adjusted TFR of 8.10 for the year before the survey; the Contraceptive Prevalence Survey (KCPS) of 1984 showed an average parity for women aged 45-49 of 8.15.

Prior to the 1970s fertility had been rising steadily. The evidence for this, which is based on a study of cohort parity progression ratios, is conclusive and has been presented elsewhere (Brass and Jolly, 1993; Central Bureau of Statistics, 1996a; Macrae, Bauni and Blacker, 2001), so that it need not be repeated here.

Then at some time in the late 1970s or early 1980s—it cannot be pinpointed precisely—there was an abrupt and dramatic change and fertility began to fall with unforeseen rapidity. The first evidence of this decline at national level came from the 1989 KDHS, and was confirmed by the census done in the same year; the KDHS gave a total fertility of 6.7 births per women for the five-year period before the survey, which Brass, after a rigorous examination, saw no reason to amend (Brass and Jolly, 1983). The next DHS in 1993 gave a TFR of 5.4 for the last three years, and that of 1998 gave 4.7, also for a three-year period. These figures, taken at their face value, therefore suggest that the rate of fertility decline had been slowing up: reductions of 0.34 births per annum between 1989 and 1993, and 0.14 births per annum between 1993 and 1998.

PROXIMATE DETERMINANTS OF FERTILITY

Most of this fertility decline can be attributed to increased contraceptive use. The proportion of currently married women aged 15 to 49 currently using a modern method of contraception increased from 9.7 per cent as shown by the 1984 Contraceptive Prevalence Survey to 17.9 per cent in the 1989 KDHS, 27.3 per cent in the 1993 KDHS, and 33.7 per cent in the 1998 KDHS. On the basis of these figures, the rate of use appears to have slowed: it increased by 9.4 percentage points in the four years between 1989 and 1993, and by only 6.4 percentage points in the five years between 1993 and 1998.

Table 4
Singulate mean ages at marriage and mean ages at first birth

	SMAM	MAFB
1962 Census	18.5	19.8
1969 Census	19.2	19.8
1979 Census	20.3	20.0
1989 Census	21.9	20.9
1977-1978 KFS	20.0	19.5
1984 KCPS	20.1	19.7
1989 KDHS	21.1	20.0
1993 KDHS	21.3	21.1
1998 KDHS	21.7	20.7

Age at first marriage among women in Kenya rose during the last half of the twentieth century, but this rise was not accompanied by a commensurate one in age at first birth. The simplest way of calculating age at marriage is Hajnal's "singulate mean age at marriage" (SMAM) using the proportions of never-married women in each age group and assuming that they represent a cohort of women going through life. Exactly the same procedure can be used to calculate the mean age at first birth (MAFB), using proportions childless in place of proportions never married. Table 4 shows the indices derived from the censuses and surveys in Kenya in the past 40 years. It will be seen that according to the 1962 and 1969 censuses age at marriage was slightly lower than age at first birth (although premarital conceptions would appear to have been the norm); but between 1969 and 1979 there was a reversal with first births preceding marriage. The surveys show the same thing with age at first birth being consistently lower than age at marriage, and with the gap widening in the recent surveys. Although age at marriage may continue to rise in Kenya, we can clearly expect little further impact on fertility.

Proportions widowed and divorced showed little change in the 1990s—if anything, small declines. But in this respect some impact on fertility may be expected as widowhood rates increase in the wake of the AIDS epidemic.

Post-partum infecundability, although an important proximate determinant, has not contributed materially to the overall fertility decline. The median durations of post-partum amenorrhoea and abstinence fluctuated in an anomalous fashion across the surveys (Brass and Jolly, 1993; Macrae, Bauni and Blacker, 2001). Between the 1993 and 1998 KDHS's the median duration of postpartum insusceptibility fell from 12.9 months to 11.1 months. Clearly, no further fertility reductions can be expected on this score.

Information on abortion in Kenya is virtually non-existent. Although it may have made a material contribution to the fertility decline, we have no means of measuring it, and are not in a position to speculate as to the role it might play in the future.

Kenya has never been a country with a high prevalence of pathological sterility, with the possible exception of some coastal areas in the 1950s.[1] The 1987-1988 KFS showed only 3 per cent of women over 30 years of age to be childless, and the 1998 KDHS still showed similar figures in these age groups.

In summary, therefore, further reductions in fertility will be achieved principally as a result of further uptake of contraceptive use, and, as we have seen, this uptake has been slowing up. But the other proximate determinants may also be affected by the progress of the AIDS epidemic. It is well known that the fertility of HIV-positive women is lower than that of HIV-negative for a variety of reasons, both biological and behavioural: they are more likely to be widowed or divorced, and are less likely to get remarried; among those who are still married coital frequency is reduced, foetal mortality and menstrual disorders are increased, and, if their partners are also HIV-positive, there is a decreased production of spermatozoa. Zaba and Gregson (1998) have estimated that for every 10 per cent of the population which is HIV-positive, the national level of fertility is reduced

[1] The East African Medical Survey, conducted in the early 1950s, showed that in Msambweni, on the Indian Ocean coast, some 10 per cent of women aged 35 and over were childless (Brass, 1958).

by 4 per cent. On this basis the effect on the fertility rates in the late 1990s, when HIV prevalence was of the order of 10 per cent, was trivial. But if prevalence increases to 20 per cent, or even 40 per cent (as in Botswana), it will no longer be negligible. The epidemic is also likely to affect the fertility of the HIV-negative insofar as it reduces extramarital sexual activity, promotes condom use, and gives an added incentive to married couples to have fewer children when their families have already been enlarged by the adoption of orphans.

DIFFERENTIALS BY RESIDENCE, PROVINCE AND EDUCATION

All the Demographic and Health Surveys showed substantial differentials in fertility, both geographically and by educational categories of the women, all clearly associated with socio-economic development. They are shown in table 5. The total fertility rates, which are for the 3 years before each survey, are sometimes based on uncomfortably small numbers, so sampling errors, particularly in respect of the changes, will be high.

Except for Nairobi, which is a case apart, none of the categories showed TFRs of less than 3 births per woman in 1998. Central Province, which in terms of under-5 mortality, nutrition, education, housing amenities or any other index of socio-economic development which one might care to name, is well in advance of the other five provinces (Nairobi again excluded), showed a substantial fall in fertility between 1989 and 1993, but a relatively small one between 1993 and 1998. It is tempting to infer that the fertility decline there is levelling out. The same can be said of women with secondary or higher education.

As fertility continues to fall in Kenya, these differentials can be expected to narrow. But they are unlikely to disappear. The improvements in living standards which characterized the first quarter of a century after independence, and were reflected in such indices as infant and child mortality, school enrolment ratios, or GDP per capita, were clearly petering out in the 1990s. Poverty, far from being eliminated, is likely to increase, aggravated by the horrendous effects of the AIDS epidemic. Thus, unless the poorer, less educated sections of the community can be persuaded to espouse family planning on the same scale as their more affluent fellow countrymen, they will continue to have relatively large families.

IDEAL FAMILY SIZE

This somewhat nebulous concept has been claimed to reflect changing attitudes towards fertility. In Kenya, it has indeed fallen in parallel with fertility: 5.8 in the 1984 KCPS, 4.4 in the 1989 KDHS, and 3.7 in the 1993 KDHS. But then it levelled out and the 1998 KDHS gave a figure of 3.8. Furthermore, the breakdowns by age group enable us to examine the consistency of the answers given at different times for the same age cohorts of women (15-19 in 1993 and 20-24 in 1998; 20-24 in 1993 and 25-29 in 1998 . . . etc.), shown in table 6. Except for the youngest cohort (15-19 in 1993), they show small but systematic increases in ideal family size as the women aged, and such consistent changes are unlikely to have been the result of sampling errors. In part, the increases may reflect the real increases in family size experienced by the women, but it is noticeable that the biggest changes in ideal family size were in the older cohorts where the increments in the numbers of children actually born will have been smallest.

The breakdown of the 1998 figures by numbers of living children, by residence (urban/rural), province and education reveal few categories whose ideal family size was less than 3. Only the younger women in Nairobi and Central Province, and those with secondary or higher education aged under 25, showed figures of under 3, and even in these categories none went as low as 2.5. For those who believe that ideal family size may be taken as an indicator of future levels of fertility, these data lend weight to the belief that total fertility in Kenya is unlikely to fall below 3 births per woman.

Table 5
Total fertility rates by residence, province and education

	1989	1993	1998
Urban	4.5	3.4	3.1
Rural	7.1	5.8	5.2
Nairobi	4.2	3.4	2.6
Central	6.0	3.9	3.7
Coast	5.4	5.3	5.0
Eastern	7.2	5.9	4.7
Nyanza	6.9	5.8	5.0
Rift Valley	7.0	5.7	5.3
Western	8.1	6.4	5.6
No schooling	7.5	6.0	5.8
Incomplete primary	7.5	6.2	5.2
Completed primary	6.4	5.0	4.8
Secondary and higher	4.8	4.0	3.5

Table 6
Reported mean ideal family sizes 1993 and 1998

KDHS 1993		KDHS 1998	
15-19	3.5	15-19	3.5
20-24	3.4	20-24	3.4
25-29	3.6	25-29	3.6
30-34	4.0	30-34	3.9
35-39	4.1	35-39	4.4
40-44	4.1	40-44	4.8
45-49	4.5	45-49	4.9

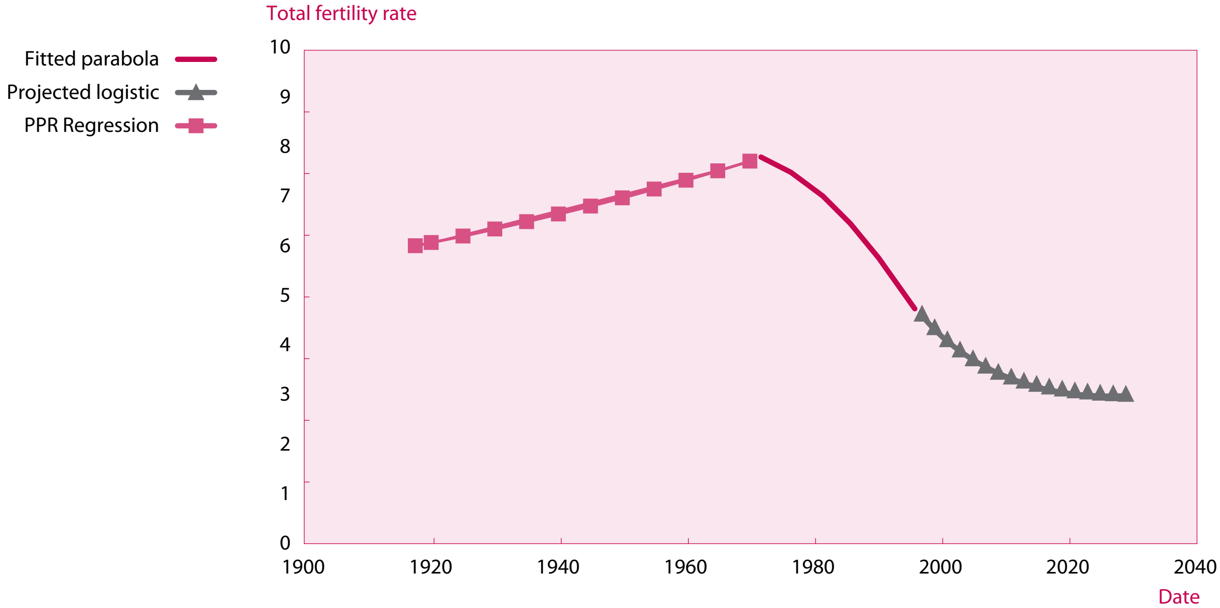
CONCLUSIONS

This paper concludes that total fertility in Kenya is unlikely to level out at less than 3 births per woman. This conclusion is based on a variety of somewhat tenuous evidence: projected completed family sizes for cohorts of women still of childbearing age in the 1998 KDHS; the slackening in the rise of contraceptive use; the trend in total fertility rates in Central Province and for women with secondary education; the downward trend and then stabilization of the ideal family sizes. But much may also depend on the future trend of the HIV/AIDS epidemic and its possible impact on fertility.

On the basis of this conclusion, I have fitted a second-degree curve to the estimates from the late 1970s to the late 1990s shown in table 2 and extrapolated it into the future with a logistic curve with a lower asymptote of 3. These curves, together with the estimates for the period of rising fertility prior to 1970 reconstructed from the parity progression ratios (Central Bureau of Statistics, 1996a), are shown in figure III.

Would a TFR of 3 be above or below replacement level? This of course depends on the level of mortality, which in turn will be determined by the future course of the AIDS epidemic. Stable population models suggest that a TFR of 3 would be about enough to ensure replacement if life expectancy at birth does not fall below 45 years. After the 1989 census we made a new set of projections for Kenya which assumed rising mortality from AIDS, such that the overall life expectancy for both sexes after the turn of the century was just under 45 years (Central Bureau of Statistics, 1996b). But the models used for the construction of the projections rested on some unhappy assumptions. In particular, it had been assumed that HIV prevalence would level off at 9 per cent. It has done no such

Figure III
Long-term trend in Kenya TFR



thing, and reached 13.5 per cent in 2000, though there are indications that it may be approaching a plateau. A new set of projections is being constructed, but as yet we have no conclusions we can put before this meeting. But it is difficult to avoid the conclusion that a TFR of 3 may not be enough to ensure replacement, at least until the AIDS epidemic comes under control.

In suggesting that total fertility in Kenya will level out at about 3 births per woman, I am considering only the relatively short-term future—say the next 20 or 30 years. This conclusion is supported by the fact that in other countries in the intermediate fertility category, including Bangladesh[2] and Malaysia, fertility declines have apparently stalled at about this level. How long it will remain so in Kenya, and what will happen thereafter, is a subject on which I am not prepared to speculate.

[2] In the MCH-FP or treatment area of the Matlab Study Area in Bangladesh, where domiciliary visits by female health workers have achieved a contraceptive prevalence rate of between 65 and 70 per cent, total fertility has been fluctuating a round 3 births per woman for about a decade (ICDDR, B 2000).

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Following in the footsteps of southern Europe: fertility in the Maghreb

*Youssef Courbage**

"Forecasts call for fertility to continue to decline at a moderate pace such that the total fertility rate, which was reckoned as 2.09 in 1999, will fall to 1.5 in 2014 and then hold steady until 2029."

Institut National de Statistique
[National Bureau of Statistics]
Projections de la population totale
[Projections of the total population]
<http://www.ins.nat.tn>, Tunis, 2001

INTRODUCTION

Internet sites for four of the countries of the Maghreb (the Libyan Arab Jamahiriya being the exception) show, practically in real time, how fast fertility is falling. Sometimes their forecasts are breathtakingly bold. Tunisia is an extreme case, predicting that by 2014 its fertility rate will have fallen all the way to 1.50. This goes far beyond the Population Division's conservative forecast of 2.1 as the farthest that fertility will fall in the Maghreb.

Algeria and Tunisia measure their fertility transition using the births recorded with the vital statistics registry. Morocco, the Libyan Arab Jamahiriya (where virtually all births are registered) and Mauritania (where only half of all births are registered) prefer to use surveys. Still, whichever the country and whatever the data used, it is clear that the fertility transition is in its final phase, and in the case of Tunisia—with fertility having fallen below the level of 2.1 children per woman needed to replace the present parental generation—it has been completed.

The aim of this paper is not to validate the data obtained from surveys, registry offices or censuses; so far as the author has been able to determine, these data are clearly consistent for the five countries in question. Rather, this paper intends to show the unique character of the fertility transition in the Maghreb, for it has been one of the fastest in the world but has been largely overlooked, perhaps on account of stereotypes or faulty views taken for granted as common knowledge even by well-informed demographers. The reasons for this, some common to many countries of the South, others specific to the Maghreb, will then be examined. We shall then examine whether Tunisia's optimistic (or pessimistic?) forecasts of its decline in fertility are backed up by past experience and whether it is plausible that the experience of Southern Europe may be repeated in the Maghreb.

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Table 1
Fertility in the Arab Maghreb Union: its highest level, its current level, progress made in the fertility transition (*as a percentage*), annual decline, and comparison with Population Division estimates

	Highest	Date	Most recent	Date	Progress made in the transition (per cent)	Annual decline (per cent)	Population Division estimate	Overestimate (per cent)	2000 population (thousands)
Morocco	7.40	1972	2.97	1998	84	-3.5	3.40	14.5	28 548
Algeria	8.36	1962	2.70	2000	90	-3.0	3.02	11.9	30 388
Tunisia	7.25	1962	2.08	2000	100	-3.3	2.21	6.3	9 561
Libyan Arab Jamahiriya	7.62	1982	3.50	1994	75	-6.5	4.04	15.4	5 187
Mauritania	6.79	1987	4.68	1997	45	-3.7	6.00	28.2	2 548
Overall	**7.76**	**1962-1987**	**2.84**	**1994-2000**	**87**	**-3.5**	**3.23**	**13.6**	**76 232**

Sources: Morocco: Statistics Directorate, *Enquête Nationale sur les niveaux de vie des ménages 1998/1999* [National survey of household living standards, 1998-1999], Rabat, 2000. Algeria: Vital Statistics Registry, National Bureau of Statistics, *Population et démographie* [Population and demographics], 2002, <http://www.ons.dz>. Tunisia: Vital Statistics Registry, National Bureau of Statistics, *Statistiques économiques et sociales de la Tunisie* [Tunisian economic and social statistics], 2002, <http://www.ins.nat.tn>. Libyan Arab Jamahiriya: Pan Arab Project for Child Development (PAPCHILD), *Arab Libyan Maternal and Child Health Survey*, Cairo, 1996. Mauritania: DHS survey, *Enquête démographique et de santé 2000-2001* [Demographic and Health Survey, 2000/2001], Calverton, Maryland, 2001.

TOWARDS REPLACEMENT FERTILITY

Table 1 shows the fertility rates prior to the transition, the most recent actual rates based on survey data and not on projections, and estimates by the United Nations Population Division for the year in question.

Led by the heavyweights—Morocco, Algeria and Tunisia—overall fertility in the Arab Maghreb has fallen five points in a single generation, from 7.8 to 2.8 children per woman, representing 87 per cent of the decline necessary to reach the replacement level. Should a country fall behind, it seems to step up its efforts to make up lost ground. Thus Algeria, where the transition proceeded slowly at first, has caught up to and overtaken Morocco; and the Libyan Arab Jamahiriya and Mauritania, being on the periphery and having embarked on the transition process much later, are closing the gap with the centre.

This is the steepest decline in fertility in the world, apart from China and perhaps the Islamic Republic of Iran (see table 2). The contrast is striking with the Middle Eastern half of the Arab world (the Mashreq—Egypt, the Sudan, the Fertile Crescent and the Arabian Peninsula), where only 52 per cent of the transition has been accomplished and the yearly decline in the fertility rate is only 1.1 per cent. This distinctiveness of the Maghreb, the way in which the two parts of the Arab world clearly diverge in this area, is worth examining.

Table 2
The fertility transition in other countries or regions of the South

	Highest	Date	Most recent	Date	Progress made in the transition (per cent)	Annual decline (per cent)
Arab Middle East	7.12	1957	4.50	1997	52	-1.1
East Africa	7.03	1972	6.09	1997	19	-0.6
Central Africa	6.59	1982	6.10	1997	11	-0.5
Southern Africa	6.46	1962	3.29	1997	73	-1.9
West Africa	7.04	1977	5.95	1997	22	-0.8
Pakistan	6.28	1977	5.48	1997	19	-0.7
Bangladesh	7.10	1962	3.80	1997	66	-1.8
India	5.97	1952	3.32	1997	68	-1.3
China	6.06	1967	1.80	1997	100	-4.0
Far East	6.15	1957	2.83	1997	82	-1.9
Latin America	**5.97**	**1962**	**2.69**	**1997**	**85**	**-2.3**

Source: United Nations, *World Population Prospects. The 2000 Revision*, New York, 2001.

Since the subject has been extensively discussed, we shall not examine here in detail the proximate determinants of fertility, which have been closely measured including recently in Mauritania. The singulate mean age at marriage (SMAM) of women has risen considerably, and single status is more common. This trend is epitomized in the Libyan Arab Jamahiriya, where the SMAM is now 30 years, or three years older than in the other three large countries of the Maghreb. Contraception has spread more widely, in particular modern methods (58 per cent in Morocco, 60 per cent in Tunisia and no doubt in Algeria as well, 45 per cent in the Libyan Arab Jamahiriya in 1995, only 8 per cent in Mauritania). Breastfeeding is intense and continues for many months; it remains the most effective birth prevention method in Mauritania (where it continues for 21 months on average). Two other factors that have not received as much attention (except in Tunisia and Algeria, where 10 per cent of pregnancies are terminated) are abortion and separation of husband and wife due to emigration.

FALSE EXPLANATIONS

Religion and demographic policy are often suggested as two factors responsible for determining the pace of the fertility transition. In fact, these two factors have relatively little impact, and it may be mistaken to consider them particularly important.

Religion

Unlike the Arab Middle East, the entire population of the Maghreb was and still is Muslim. According to certain demographers (Kirk, 1966; Nagi, 1984; Caldwell, 1986; Cleland and Wilson, 1987; Lutz, 1987) the high fertility rates of the Maghreb were explained by Islam, which was assumed to be pronatalist. Islam and a burgeoning population went hand in hand. If the evolution from a religious society to a secular society is reflected ipso facto by the fertility transition, one should expect an evolution from a secular society to a religious society to impede the fertility transition. In principle, that is the direction that fertility in the Maghreb ought to have taken.

Curiously, the views of such demographers were in general accord with accepted notions amongst the general populace in Maghreb society. But the countries' level of development and people's growing awareness had their role to play. Thus, in Mauritania, the least developed country in the region, 25 per cent of women are opposed to contraception on the grounds that it is "forbidden" by their religion, whereas the proportion is only 6 per cent in Morocco where women are either better informed or more pragmatic and know that Islam does not forbid contraception (or even abortion).

There is no Government in the Maghreb that is an "Islamist" regime like that of the Islamic Republic of Iran, for example (where, it should be noted in passing, the fertility rate is now below the replacement level . . .). But between the two forms of religious fundamentalism—one from above, promoted by the Government, and one from below, sought by civil society—it is the latter and its return to traditional ways that one would expect to block demographic modernization. Civil society in the Maghreb would become increasingly fundamentalist. There would be clear external signs such as wearing of the veil, stricter observance of Ramadan, and avoidance of alcohol and pork; and beneath the surface, support for Islamist political parties would grow exponentially, to the point where they would win the votes of one third of the electorate.

Either the strengthening of Islam is a faulty view taken for granted as common knowledge, as some distinguished observers believe (Ansari, 1996; Tozy, 1997), or it is real. Either way, it is found wanting as an explanation, for not only is fertility dropping steadily, but the pattern is becoming entrenched. In spite of appearances, the religious context, whether at the Government or private level, is a neutral factor in determining fertility.

Demographic policy

Demographic policy is often cited as an explanation for the change in fertility rates. In the Maghreb, Tunisia is the country that has made the greatest progress and it was indeed the first country to establish an explicit demographic policy backed up by a modern family code. The exceptional personality of President Bourguiba, his legitimacy as an architect of independence, his charisma, and the rapport that he succeeded initially in establishing with his people, comparable to that of Nasser with the Egyptian people, made it possible to institute measures even though they were unpopular with the Tunisian general public.

Examples to the contrary abound, however. In Morocco, prior to 1975, in spite of the official demographic policy established in 1966, people continued to marry young, and both fertility within marriage and overall fertility increased from 7.20 to 7.40 from 1968 to 1972. Fertility within marriage, which was the main focus of the national family planning programme, rose from 6.73 in 1960-1964 to 6.91 in 1965-1969 and to 7.14 in 1970-1974 (in the 15-to-34-year age group). At the time, Moroccans did not heed the urgings of the Makhzen, and since they favoured large families they declined to practise contraception. Morocco's fertility fell later, and as a result of factors other than official demographic policy.

In a spectacular about-face in 1983, Algeria switched overnight from a policy that "development is the best pill" (World Population Conference, Bucharest, 1974) to a policy of bringing population growth under control. Although President Boumediene (1965 to 1978) paid lip service to the issues of a burgeoning population, overall his position was to encourage a high birth rate and large families. At the end of its war of independence, in 1962, Algeria was rich in gas but less so in men. In particular, its neighbour (and rival) Morocco had a larger population: 12.3 million people versus Algeria's 11 million. The country's size and strength were often expressed in numerical terms. Mr. Boumediene declared himself proud to be building "a new African dragon that could feed 50 million". Algeria's development strategy and its industrialization were based on the assumption that a large and growing population would promote market expansion and help achieve economies of scale. In the wake of such speeches, Algerians wound up having to care for families that were too big. By the time of the change in direction in 1983, Algeria had as many women as Morocco, where the use of contraception was officially authorized.

A further illustration of the split between official policy and reality is to be found in the Libyan Arab Jamahiriya. Having more in common with the oil-rich, underpopulated countries of the Arabian Peninsula than with the other countries of the Maghreb, the Libyan Arab Jamahiriya has always been part of the small group of countries where official policy favours a large population and high birth rates. The Government encourages population growth, promotes large families and favours its own citizens over immigrants (who find themselves alternately welcomed or turned away, as has been the case with Tunisians, Egyptians, Palestinians and people from elsewhere in Africa). In spite of its official stance, however, the Libyan Arab Jamahiriya has not managed to halt the decline in fertility or to stem the rise in the number of people who are single.

Finally, Mauritania adopted a demographic policy in 1995 which, even though it listed many objectives, did not include control of fertility or population growth among them. Having a large but underpopulated territory, it fears its powerful neighbours and wants to fill up the country through sustained population growth. It has not been fully successful in this endeavour, however, as its fertility has fallen considerably, much more than south of the Sahara (by its geographical location and ethnic make-up, Mauritania forms part of black Africa as well).

The fact that there is great disparity between different countries in the Maghreb as to their demographic policy, and the fact that different countries have established their policy in this area at widely differing times (or do not have one, as in the case of the Libyan Arab Jamahiriya), means that demographic policy cannot be the explanation for the demographic changes that have actually taken place.

PARTIAL EXPLANATIONS FOR THE DIFFERENCES IN FERTILITY RATES

Fertility and DHS surveys have shown to what extent fertility in the Maghreb (and elsewhere) is attributable to socio-economic factors. Women's level of schooling, the degree of urbanization and the type of work that women perform are often cited. It is excessive, however, to view these factors as the driving force of the demographic transition.

Advances in women's education are important in order for fertility to decline (as are urbanization and the fact of women being engaged in non-agricultural work or work outside the home); but they are not an absolute condition. Morocco provides an illustration. To be sure, fertility is associated with the level of schooling: in 1996, for example, the fertility rate was 3.7 children per woman for illiterate women, 2.3 children for women who had been enrolled in primary school, 1.9 children for women who had been enrolled in secondary school, and 1.6 children for women who had been enrolled in higher education. But the engine driving the fertility transition is not education. How does one explain the drop in fertility among illiterate women in Morocco and elsewhere in the Maghreb: a decline of 2.9 per cent a year in Morocco (from 6.4 to 3.7 children) from 1977 to 1996, a decline of 4.5 per cent a year in Algeria (from 7.3 to 5.6 children) from 1984 to 1990, a decline of 2.9 per cent a year in Tunisia from 1984 to 1990? The figures for illiterate women in the Libyan Arab Jamahiriya and Mauritania—5.2 children in the Libyan Arab Jamahiriya in 1993 and 5.3 children in Mauritania in 1997—suggest that those countries have seen similar declines. The fertility transition is something that relates to the whole of society, whether women are educated or illiterate, city-dwellers or rural-dwellers, working or at home: it is no longer something that concerns only the elite.

Similarly, traditional explanations for the transition offer little help in defining quantitative thresholds that trigger the onset of the fertility transition. In Morocco, for example, there was no threshold crossed in 1975 that can account for that country's early transition. When it began, the standard of living was low. The country was mostly rural and the cities and towns were still characterized by a rural mentality (as the people living in them had mostly been born in rural areas). Over half the adult population was illiterate, men and women alike. The cost of a child as measured by schooling was low: fewer than half the children were of school age. The status of women—leaving aside women's participation in the economically active population, not to mention the quality of that participation—was low regardless of the yardstick used to measure it: childhood mortality rates that were abnormally high for girls; the level of education attained by girls; conditions of marriage (age difference between husband and wife, divorce, repudiation, maintenance allowance); women's legal status; and women's opportunity to participate in political life or to hold senior Government posts. When fertility began to fall in 1975, infant mortality was still more than 100 per thousand and was at levels similar to previous years (e.g., 119 per thousand in 1960-1964); so it was not an epidemiological revolution that paved the way for the revolution in fertility.

GEOPOLITICS AND FERTILITY: FEATURES THAT SET THE MAGHREB APART IN THE ARAB WORLD

From one end of the Maghreb to the other, its origins, geography and history (under the Ottomans, then colonial and post-colonial) have made the Maghreb distinctive in a way that has had an impact on reproductive behaviour. Algeria shares 130 years of common history with Europe, Tunisia shares 75 years and Morocco shares 44 years; and since they gained independence (between 1956 and 1962) all three have had nearly a half-century of close interaction with Europe. This has not been without effect. In the Maghreb, women marry later and have fewer children than in the Mashreq, even though all the socio-economic factors would lead one to expect the opposite. Socio-economic and educational indicators are higher in the Mashreq than in the Maghreb, and yet it is in the Maghreb that fertility is lower: 2.8 children per woman versus 4.5 in the Mashreq. The difference did not exist in the 1970s, but has emerged since that time. The geographical variable of the Maghreb or the Mashreq is significant: using traditional variables, 56 per cent of fertility variations can be explained; but this figure rises to 77 per cent if one also takes the geographical variable into account.

Language

If living in the Maghreb is associated with marriage at a later age and lower fertility, it may be because western influences are strong there. Foreign communications media are readily accessible in the Maghreb. The French newspapers *Le Figaro* and *L'Équipe* are printed in Casablanca, *Le Monde* is distributed the same day it is published, and more people watch French television stations and Italy's RAI Uno than local stations. This saturation by the European media and the demographic messages they contain does not reach only an urban elite: television, particularly foreign television, reached rural households even before there was widespread rural electrification.

In the Maghreb, apart from the Libyan Arab Jamahiriya, the education sector (both public and private) closely follows the French model. Although the countries are officially unilingual, French continues to be used without there being any particular effort to promote it, and it remains not merely useful but indispensable for anyone seeking a job, even in the public sector. French-language manuals—sometimes written in France but more often written in the Maghreb—may reflect a different spirit from Arabic-language manuals, even if the two are supposed to be identical in substance. Language is not a neutral factor. Thus, the behaviour of Maghrebi women in regard to family matters is likely to bear the mark of subliminal messages contained in school textbooks. Islamist groups are not mistaken when they accuse the former colonial power of still being there, manipulating the national education system more than it did before independence (indeed, the number of French-speaking people in the Maghreb has increased tenfold since independence). It is a convincing explanation, but not the only one. These processes should also be acting in other countries where French holds an important place. In French-speaking Africa, the use of French is advancing by leaps and bounds; and yet, in spite of high levels of school enrolment in programmes taught in French, higher than in the Maghreb, African fertility has not declined by much. The use of French as the language of instruction, enabling it to serve as a vehicle for introducing modernizing influences, is therefore not the only explanation for the Maghreb's atypical decline in fertility.

The role of Maghrebi emigrants in transmitting culture

To some degree, the Maghreb owes this situation to the communications media and the fact that a foreign language is widely taught; but even more important is the role of Maghrebi emigrants living in Europe (Courbage, 1994). Willingly or not, they have become the waypoint between two cultures. As the twenty-first century dawns, cumulative population figures show a direct reduction of 5 per cent in the Maghrebi population (for the resident and expatriate population taken together). But the presence of emigrant communities in Europe also has an indirect impact that is important, even if it defies quantification in precise terms. Maghrebi emigrants in Europe have helped to speed up the pace of the fertility transition in their countries of origin. In matters of population, adopting values acquired elsewhere is particularly common. In the 1960s, only the pronatalist family model was embraced by those who emigrated. A generation later, a new society emerged that was born of immigration to Europe but whose values no longer conformed to those of its parents. People on either side of the Mediterranean were not entirely cut off from one another, however: distances were not that great, travel and communications costs were low and the need to keep in touch with family and friends gave rise to a system of ongoing exchanges between Europe and the Maghreb that is unique in migration annals. Both by sending funds home to their families (in Morocco, remittances from expatriates cover more than 10 per cent of private consumption each year) and by enabling their families to purchase durable goods or bringing them back with them when they visit, emigrants have helped to change consumption habits and encouraged a re-assessment of the costs and benefits of having children.

The choice of Maghrebi emigrants to move to Europe, rather than somewhere else such as the Arabian Gulf, is critical. It has helped promote a cultural transfer from the new society where they now live back to the society of their birth, and this transfer has grown stronger with the beur, the next generation of Maghrebi born abroad. Proximate or socio-economic determinants are used in ethnological studies to show the strong impact that migration across international borders has on fertility: the level of schooling of children, as material obstacles to attending school are removed, and especially moral obstacles (a factor that affects girls in particular); the moving of families to urban areas in order to take advantage of the remittances sent home to them; gender equity; female employment, as wives take jobs when their husbands leave, and their ensuing empowerment as they become decision makers; and, most important, the spreading from the emigrant community to their relatives in the home country of the notion that having a small family is the norm. Because the emigration of some family members results in remittances being sent back to the home country, this encourages farming to be carried on more intensively, and this in turn gives rise to more sophisticated economic calculations and changes in family strategy: having fewer children but better educated children, for instance. Moreover, international migration has a snowball effect. Families in which no one has emigrated, if they are not to lose their social standing, have to find viable alternatives and change as well.

Far from the conflicts of the Middle East

A final reason why fertility has been able to fall in the Maghreb further than elsewhere in the Arab world is that the Maghreb is much less deeply involved in the Arab-Israeli conflict, which is a key factor in the high fertility of the Mashreq. Although they give their support in principle, the people of the Maghreb are far removed from the centre of the conflict and are not called upon to exercise a sort of demographic nationalism in the way that Palestinians, Syrians and Jordanians are.

A POVERTY TRANSITION?

The specific features of the fertility transition and when it commenced are attributable to the fact that the economy of the Maghreb, more than anywhere else in the world, was based on resource income. In a society where the family structure has long been patriarchal, if a person is looked after from the cradle to the grave this helps to keep the fertility rate high. There is no satisfactory rationale to counter the preference for a large family (Boustani and Fargues, 1990). Looking beyond its specific cultural features, the decline in fertility in the Maghreb is akin to a process of emerging from an economy dependent on resource revenues and characterized by ongoing economic crisis. It is impossible to quantify the effect of the cultural and economic factors separately, however, as the two are intertwined and reinforce each other.

The exception is Tunisia, which entered the transition earlier and for which it is difficult to establish close linkages between demographic and economic trends. Using regional surveys, however, Gastineau (Gastineau, 2001) has shown the effect of poverty in the adoption of antinatalist practices in Tunisia. For the other four countries of the Maghreb, the linkage is even better established.

Morocco was the forerunner in emerging from an economy based on the redistribution of resource income. It may seem unreal to refer to entering or emerging from an economy based on resource income, considering that Morocco's phosphate riches recall an economy of another era; but it was not that long ago that the country's phosphate resources were still underpinning an economy that was anything but plagued by shortages. Revenue from the mines, redistributed by the Government, reinforced Moroccan society's preference for large families. When phosphate prices trebled in the early 1970s, that made it possible to finance equipment and infrastructure which in turn had significant multiplier effects. Civil servants received substantial pay increases. Basic goods were subsidized, and students were offered generous scholarships.

The year 1975, when the fertility transition began, was a turning point both economically and politically. In the space of just a few years, the Government had lost the phosphate revenues that were one of its main non-fiscal sources of income. Prices halved in a few months, just as the war in the Sahara was sending military expenditure spiralling skyward. Over a period of four years, the fertility rate plunged from 7.4 in 1973 to 5.9 in 1977, or 5.5 per cent a year, such a sudden decline that it could not be explained by such traditional factors as urbanization, education, infant survival rates or demographic policy. With its resource revenues in decline, the Government turned to the taxpayer: taxes and Government charges rose more than 50 per cent from 1972 to 1975. Households were now being forced to cover Government expenditures that had previously been funded out of phosphate revenues.

A decade ahead of other Maghreb countries, Morocco broke with tradition: where once women were expected to restrict their activities to the domestic sphere, they were now encouraged to join the workforce. The new pace of day-to-day life had a bearing on decisions about marriage and child-rearing, particularly in connection with time constraints and a decline in the family networks that had seen to childcare. Even among the illiterate, the opportunity cost of a birth had to be taken into account in determining family strategy. As women started to take jobs and become part of the economically active population, beginning at the onset of the crisis in 1975, this had a major impact on fertility. From 1960 to 1995, the proportion of women 20 to 34 years of age (who account for 85 per cent of births) that were part of the economically active population quadrupled from less than 10 per cent to 37 per cent. The turning point came in the mid-1970s, as women entered the workforce at the height of the economic crisis, offsetting the downturn in resource revenues. In Morocco's trade balance in the 1990s, phosphate exports amounted to only about one half the exports of the manufacturing sector (whose workforce is largely female).

Some 10 years later the path first traced by Morocco was followed by Algeria, long "eastward-looking" and dependent on resource income, and by the Libyan Arab Jamahiriya. In both of these countries, the oil counter-shock of 1985 wrought havoc on an economy where the bulk of GDP and all export earnings were derived from generous underground resources much richer than Morocco's. The brutal drop in Algeria's fertility in 1986 seemed to come as a direct response, just one year after the drop in oil and gas revenues (Fargues, 2000). Unlike Morocco, however, Algeria was unable to mobilize the female half of its population or did not know how to—and here one sees evidence of the strains that led to the outbreak of civil war in 1992—with the result that women have remained largely outside the workforce. As a result, poverty deepened more quickly than in Morocco, and the decline in fertility was even steeper.

In the Libyan Arab Jamahiriya, the catastrophe of the oil counter-shock, followed by the United Nations embargo placed on the country in 1992, resulted in essential goods becoming very hard to get and the economy becoming one characterized by shortages. In the affluent period of the early 1980s, the fertility rate was 7.62 children per woman; from there, it fell to 6.35 in 1987, two years after the oil counter-shock, then to 4.08 after the imposition of the United Nations embargo in 1992, and then to 3.5 in 1995. In the Libyan Arab Jamahiriya, clearly, it is difficult to account for this by saying that western influences or bilingualism were factors in the fertility transition. It was the price of oil and decisions by the "international community" that slowed the country's economy, and as a result pulled down its fertility rate.

Table 3
Trends in Maghreb fertility rates, by level of education

Year	No schooling	Primary school education	Secondary school and higher education
		Morocco	
1977	6.36	4.63	4.15
1982	5.84	3.83	2.24
1985	5.20	3.15	2.34
1987	5.08	3.08	2.27
1991	4.86	2.36	2.03
1993	4.04	2.36	1.89
1996	3.70	2.30	1.80 (1.90 with secondary school, 1.60 with university)
		Algeria	
1984	7.34	4.95	3.39
1990	5.57	3.67	2.94
		Tunisia	
1975	6.60	4.30	3.00
1985	5.10	3.92	2.66
1993	3.90	2.72	2.05
		Libyan Arab Jamahiriya	
1993	5.18	3.86	3.33
		Mauritania	
1997	5.30	4.70	3.50

Sources: Fertility surveys, Demographic and Health Surveys, Pan Arab Project for Child Development (PAPCHILD). The years indicated refer to the middle of the survey period.

Is Mauritania a country dependent on resource income? To some extent, it is, given the generally declining price of iron ore, the uncertainties of the fishery (with price fluctuations of 100 per cent to 200 per cent), and especially the severe droughts of 1977 to 1984 that forced virtually the entire population to give up their nomadic ways and become settled. GDP per capita fell 30 per cent from 1980 to 1989, and this was the decisive factor in the fertility transition without the population or the Government having particularly singled out a lowering of the birth rate as a prime goal. With a slight time lag, the fertility rate responded by falling from its pre-transition level of 6.79 children per woman in 1985-1989 to 5.85 in 1990-1994 and to 4.68 in 1995-1999.

The elasticity of the fertility rate in the Maghreb in response to economic circumstances is such that one has to wonder whether it is reversible: what would happen if the price of oil, or gas, or phosphates, or iron, or fish should go up? Indeed, birthrates have recently begun to recover. Oil and gas prices have risen (affecting Algeria and the Libyan Arab Jamahiriya), and prices for phosphates and iron are somewhat higher as well (affecting Morocco and Mauritania, respectively). Algeria is excluded from this symmetry, however, as its fertility is continuing to drop in spite of strong oil and gas prices. Thanks to a ratcheting effect, the process of a declining fertility rate in Algeria is no longer linked to the factor that initiated the decline in the first place. Other components are taking up the slack, one of the most important being girls' education; but it is not the only component. The "globalization of minds" that is taking over the Maghreb and the pop culture being spread thanks to satellite dishes (Martine, 1996) are having a strong levelling effect on fertility behaviour (Barber, 1996; Cook, 1994).

NEW PROSPECTS

Could fertility in the Maghreb fall as far as it has in Southern Europe? Or could it fall as far as the level of 1.5 children per woman forecast for Tunisia (see the quotation at the beginning of this paper)? It could certainly fall further than the United Nations Population Division is forecasting in its latest projections (United Nations Population Division, 2001). To judge by the recent past, which offers the best guide to the future, neither changes in the strictness of religious observance nor the ups and downs in the economy are likely to play an important role over the next 25 years (and to make any projections beyond then would simply be a mechanical exercise in extrapolation).

Two factors appear to be critical, however: the continuing rise in the general educational level, and particularly the educational level of women of fertile age, combined with the rapid spread of more restrictive norms in regard to child-rearing, and the notion that two children represent the ideal family size, a view that is increasingly taking hold at all levels of society, from the better off (or better educated) to the poor (or illiterate). In the Maghreb, families plan for children and space their births in such a way that they can have two children and send them both to university, preferably abroad (which is a costly proposition).

Table 4
Predicted trends in the composition of the female population of fertile age in the Maghreb, and the corresponding fertility rates, 2000 to 2025

	2000	2005	2010	2015	2020	2025
Morocco						
Illiterate	47.9	44.1	40.6	37.4	34.4	31.7
Primary school education	20.1	20.9	21.1	20.7	19.8	18.2
Secondary school education and higher	32.0	35.0	38.3	41.9	45.8	50.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Illiterate	3.34	2.96	2.62	2.32	2.12	2.10
Primary school education	2.25	2.14	2.10	2.10	2.10	2.10
Secondary school education and higher	1.80	1.80	1.80	1.80	1.80	1.80
Overall	2.72	2.43	2.22	2.07	1.98	1.96
Algeria						
Illiterate	26.9	19.2	13.8	9.9	7.1	5.0
Primary school education	17.7	16.2	14.7	13.4	12.2	11.1
Secondary school education and higher	55.4	64.6	71.5	76.7	80.7	83.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Illiterate	3.35	2.54	2.10	2.10	2.10	2.10
Primary school education	2.13	2.10	2.10	2.10	2.10	2.10
Secondary school education and higher	2.12	2.10	2.10	2.10	2.10	2.10
Overall	2.66	2.22	2.10	2.10	2.10	2.10
Tunisia						
Illiterate	24.1	14.8	9.3	5.8	3.7	2.3
Primary school education	35.5	41.0	42.4	41.4	38.7	34.6
Secondary school education and higher	40.4	44.2	48.3	52.8	57.6	63.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Illiterate	2.65	2.06	2.06	2.06	2.06	2.06
Primary school education	1.91	1.7	1.7	1.7	1.7	1.7
Secondary school education and higher	1.72	1.6	1.6	1.6	1.6	1.6
Overall	2.06	1.74	1.71	1.68	1.67	1.65
Mauritania						
Illiterate	25.1	25.1	20.1	16.1	12.9	10.3
Primary school education	56.1	55.0	60.9	62.8	63.8	63.6
Secondary school education and higher	18.8	19.9	19.0	21.0	23.3	26.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Illiterate	4.85	4.36	3.93	3.54	3.18	2.87
Primary school education	4.24	3.76	3.32	2.94	2.61	2.31
Secondary school education and higher	3.2	2.83	2.51	2.22	2.1	2.1
Overall	4.28	3.77	3.31	2.91	2.58	2.32

The synergy between structural factors (the composition of the female population of fertile age) and attitudinal factors (the decline in women's fertility according to their educational level) will hasten the decline. Table 4 sets out our forecasts of the composition of the female population of fertile age and the corresponding decline in fertility rates by educational level, based on recent trends (for the detailed methodology see Courbage, 2002). Table 5 sets out our projections of fertility rates, compared with those of the United Nations Population Division. So as not to over complicate the table, only the medium scenario has been shown.

Using extremely conservative scenarios combined with an enhanced projection technique, we can say that fertility in the Maghreb is in fact lower now than the United Nations Population Division (UNPD) estimates—2.51 children per woman in 2000-2005, versus the UNPD's estimate of 2.94—and that it will decline more sharply—to 2.01 instead of the UNPD's projection of 2.17 in 2020-2025. The gap between the two sets of projections is evident everywhere, but nowhere more so than in Mauritania where the difference is connected to an external factor, namely, the recent publication of the results of the demographic and health survey conducted in 2000/2001. It is a useful example, for it shows that every time results are published from surveys, censuses or vital statistics records in any of the countries of the Maghreb, they indicate that the speed of the decline in fertility has been significantly underestimated.

This re-evaluation of the present and medium-term fertility rates indicates that the future population of the Maghreb will be lower: 103 million people in 2025 rather than the UNPD's forecast of 111 million. The difference is due chiefly to the different fertility rates considered, but it reflects as well the difference in the population figures used as the basis for the projection, a difference that is significant in the cases of Morocco and Mauritania. This lowering of the population projections is not trivial, in view of the inescapable demographic pressure to which the Maghreb will be subject over the next 25 years as a result of demographic momentum. From 2000 to 2025, the region will gain 26 million additional inhabitants, or 22 per cent fewer than the 33 million forecast by the UNPD in 2000. There will be no growth in the younger age groups, while the ageing of the population, which remains a distant prospect, will still be contained. The Arab Maghreb—more

Table 5
Comparison of our projections of fertility rates in the Maghreb with those of the United Nations Population Division (*2000 to 2025*)

	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025
Morocco					
Our projections	2.57	2.32	2.14	2.02	1.97
Population Division projections	3.03	2.66	2.29	2.10	2.10
Algeria					
Our projections	2.44	2.16	2.11	2.10	2.10
Population Division projections	2.79	2.33	2.10	2.10	2.10
Tunisia					
Our projections	1.90	1.72	1.69	1.68	1.66
Population Division projections	2.10	2.10	2.10	2.10	2.10
Libyan Arab Jamahiriya					
Our projections	3.03	2.68	2.38	2.17	2.10
Population Division projections	3.31	2.83	2.34	2.10	2.10
Mauritania					
Our projections	4.02	3.54	3.11	2.74	2.45
Population Division projections	6.00	5.76	5.27	4.78	4.29
Overall					
Our projections	2.51	2.25	2.12	2.04	2.01
Population Division projections	2.94	2.57	2.29	2.19	2.17

Sources: Y. Courbage, 2002; United Nations Population Division, 2001.

than the Middle East, which has made less progress in the fertility transition—will be well placed to take advantage of the demographic dividend, the demographic window of opportunity.

Our medium scenario is based on extrapolating from past trends, and therefore constitutes a conservative hypothesis. At the two extremes are Tunisia, with a fertility rate of 1.66 children per woman, and Mauritania with a rate of 2.45. Between those extremes, and close to the replacement threshold in 2020-2025, are Morocco with a rate of 1.97, and Algeria and the Libyan Arab Jamahiriya with rates of 2.10. But there is no absolute limit on how low the fertility rate can go, and it is possible that it could fall even more sharply to rates of 1.6 to 1.8 children per woman, which are the fertility rates for women with secondary school education or higher in Morocco, Algeria, Tunisia and, most likely, the Libyan Arab Jamahiriya. Such rates do not give cause for concern, and are compatible with an ultimate family size of two children or more on account of the increase in the age at marriage. However, there is no guarantee that the drop in fertility will stop there, and that it will not fall below the level of 1.5 children per woman forecast for Tunisia, or even fall as far as the Southern European rate of 1.1 to 1.2 children per woman.

It is already the case that at the age of 30 years—an age when it becomes more difficult for women to marry—more than 40 per cent of women are still single. With such a high proportion of women still single at the age of 30, it is unlikely that the proportion who remain unmarried throughout their lives will continue to be negligible (less than 3 per cent) as has been the case in the Maghreb countries for the past 10 years. Difficulties imposed on the marriage market by the economic recession explain why many Maghrebi women do not marry. A small but growing number of women are opting not to get married out of personal choice: they prefer to pursue a professional career, or they reject the notion of an arranged marriage or a marriage concluded to satisfy family pressures. Meanwhile, those who do get married do not want to leave the workforce and choose to keep their families very small so as not to hamper their careers.

The speed with which girls in Spain, Italy and Greece have foresaken the values of their mothers, who glorified marriage and family, could well be copied in the Maghreb—just a short distance from Europe's southern coast, and largely open to European images and influences—with the same devastating consequences for fertility.

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Fertility in Mexico: trends and forecast

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"When I cannot satisfy my reason,
I like to second it with my fantasy".
Thomas Browne

"At the moment, the destiny of the world depends,
in the first place, of the statistics and,
in second place, of the interpreters".
Trygve Lie

This document examines the levels, trends and differentials of fertility in Mexico during the last three decades, as well as its main determinants. Also, with the purpose of identifying some regularities of this process of change, the study explores the variety of regional experiences regarding the onset of fertility decline. The document also analyses briefly some of the determinants of fertility and identifies the characteristics of the population residing in the municipalities which are about to reach, that have already reached or that are below the replacement level.

Based on these elements, the document speculates about the future evolution of fertility in Mexico, trying to identify some preliminary conclusions regarding those factors that could determine if in the short and medium term the level of this demographic variable will continue its decrease below the replacement level or if, on the contrary, it will stabilize above it. The document concludes discussing the assumptions on the evolution of fertility on which the population projections of Mexico rest, as well as the results derived from alternative scenarios.

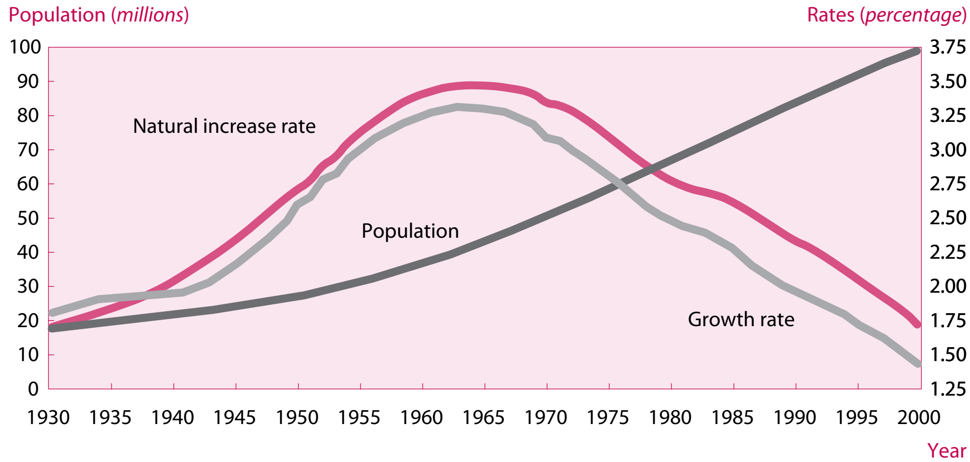
DEMOGRAPHIC TRANSITION IN MEXICO

In the new millennium, Mexico experiences an intense process of change that implies multiple transitions in the economic, social, political, urban, epidemiological and demographic spheres. The country is advancing in these transitions, although it will take some time to conclude each of them.

The demographic transition is a process that almost all the countries of the world have undergone, and it refers—in general terms—to the transit from a regime with high and uncontrolled rates of mortality and fertility to another with low and controlled rates. As it is well known, this process is far from being uniform, both among countries and within them. The study of patterns and modalities of the demographic transition in a wide variety of countries have shown important differences in the onset, pace, the duration of the process, as well as in the time elapsed from the decline in mortality to the decrease in fertility.

Mexico advanced significantly in this process of change during the twentieth century, a fact that was reflected in the intense population growth registered between 1930 and 1970, as well as in its significantly slower rate during the last three decades. It is estimated that the demographic dynamic grew from 1.7 per cent in 1930 to 2.7 per cent in 1950 and to 3.5 per cent in 1965. Since that year, as a consequence of the fertility and

Figure I
Population, natural increase rate and growth rate, Mexico, 1930-2000



Source: Estimates by the National Population Council, Mexico.

mortality decline, the demographic dynamics began to gradually decelerate, registering a rate of 3.3 per cent in 1970, of 2.6 per cent in 1985 and of 1.7 per cent in 2000 (see figure I). As can be seen, after a long period of demographic transformation, the Mexican population entered the new millennium with a natural increase rate similar to the one observed 70 years ago, but with a population six times bigger.

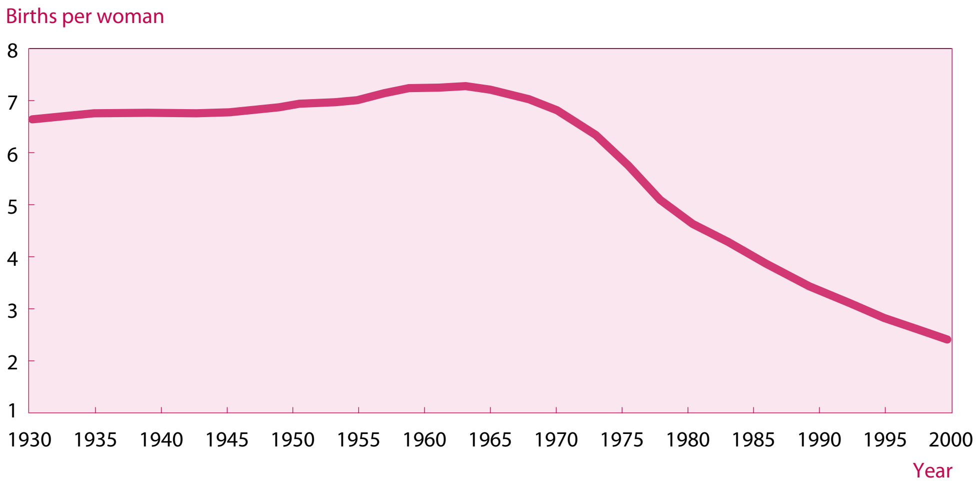
The demographic transition in Mexico had a notable impulse since the thirties—in a context of deep economic, political and social reforms—when a rapid and sustained decrease in mortality took place. In those years, life expectancy reached 36.2 years (35.5 for men and 37.0 for women), while at the present time almost 75 years (73.4 years for men and 77.9 for women). The fall in general mortality has been of such magnitude that the global reduction of the risk of dying, accumulated from 1930 to 2001, is equal to 83.7 per cent among men and 86.5 per cent among women.

FERTILITY DECLINE IN MEXICO

Fertility decline did not begin in the country until the mid-sixties. Levels stayed high and even rose before the onset. Let us remember that families had around 6 children at the beginning of the twentieth century, reaching a maximum of 7.2 children during the early sixties. The gradual spread of family planning practices contributed to impel the fertility transition in the country.

Three stages in the process of fertility decline in Mexico can be observed: (i) the first phase—of initial descent—that covers the period 1964-1973, when a fall in the total fertility rate (TFR) of almost one child (with an annual average decline of 0.09 children) took place; (ii) the second phase—of accelerated decline from 1974-1984, when the TFR decreased by almost two children (with an average yearly decline of 0.20), in a narrow chronological association with the establishment of a new population policy; and (iii) the third phase—of moderate decline—that spans from 1985 to the year 2001, when the TFR diminished to around 1.8 children (with an average yearly decrease of 0.10 children, equivalent to half the speed of the reduction observed in the 11 previous years). Thus, fertility registered an average of five children per woman in 1978; then fell to four children in 1985; afterwards decreasing to three children in 1993 until reaching around 2.4 children at the present time (see figure II). As can be seen, the Mexican experience, as well as that of other countries, shows that once the fertility transition begins, the rhythm of decline accelerates rapidly. As fertility reaches lower levels, the additional reductions per year are even lower.

Figure II
Total fertility rate, Mexico, 1930-2000



Source: Estimates by the National Population Council, Mexico.

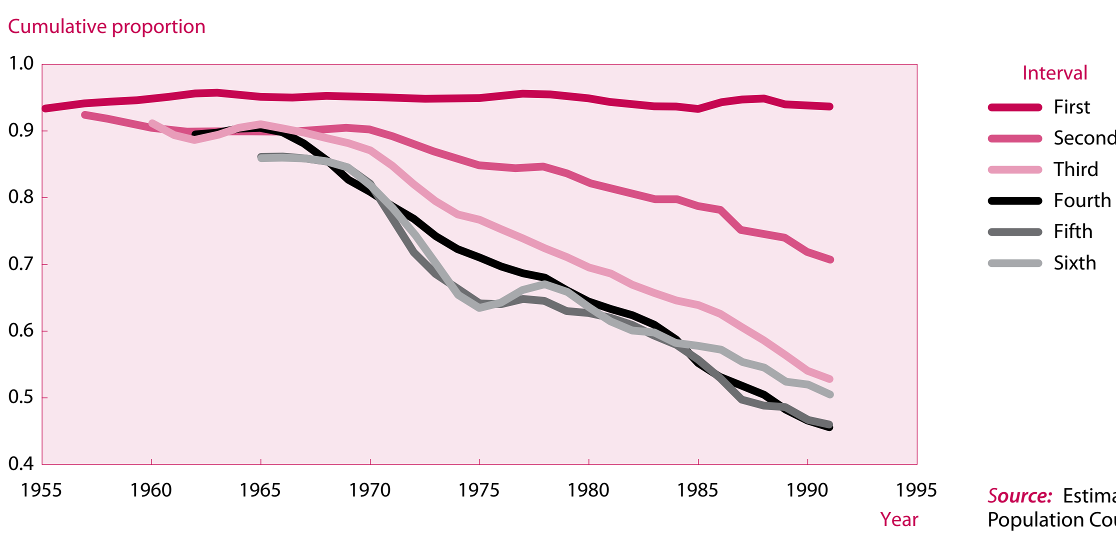
The fall in fertility has implied significant reductions in the intensity of the second birth interval onwards, especially among women that began their fertility during the mid-seventies.[1] The reductions initially involved women of high parities and were followed a few years later by women with lower parities.[2] Thus, it can be noticed that the proportion that closed the interval from the first to the second child changed from 92 per cent among women who began it in 1957, to almost 70 per cent among those who began that interval in 1992. More notorious variations can be found in the cohorts of women that completed the transition from the second to the third child in the following five years after the beginning of the interval (of 91 per cent in 1960 to 53 per cent in 1991). The largest reduction was registered in the fourth interval, that shifted from 90 per cent of women that began it in 1960 to 45 per cent among those who started in 1991 (see figure III).

Besides the rapid decline in the proportion of women with high parities, the "tempo" of fertility also registered some significant changes, except, once again, in the

[1] It must be said that the proportion of women that have one child before the first five years of a stable union has constantly maintained its level in the last decades (around 95 per cent of all women have their first children in the first five years of union).

[2] To elaborate this analysis we used the proportion of women that give birth within the first five years of the first marriage or birth of a child, spanning the full period of fertility transition.

Figure III
Quintum, all births interval, Mexico, 1955-1991



Source: Estimates by the National Population Council, Mexico.

first interval.[3] If the median is used as indicator of the time that it takes the members of a cohort to complete the transition from one birth to the next, it is possible to notice that the interval from the first to the second child increased from 21 to 27 months between the beginning of the seventies and the beginning of the nineties, while for the following intervals the increase was slightly lower.

As can be observed from this analysis, when fertility was at its highest level—during the sixties—it was frequent that a high proportion of women would move from one parity to the next. The relative parallelism in the reduction of the conditional probability of having an additional child after the first one, as well as the increase in the birth intervals, reflect the gradual generalization of family planning practices in all parities.

If the quintum of the six intervals shown in figure III are linked, it is possible to conclude that in 1965 more than half (52 per cent) of women had six children before being married for 30 years. Fertility decline cut this proportion to one third in 1977 (17.6 per cent), and to a little less than one fourteenth in 1991 (3.7 per cent).

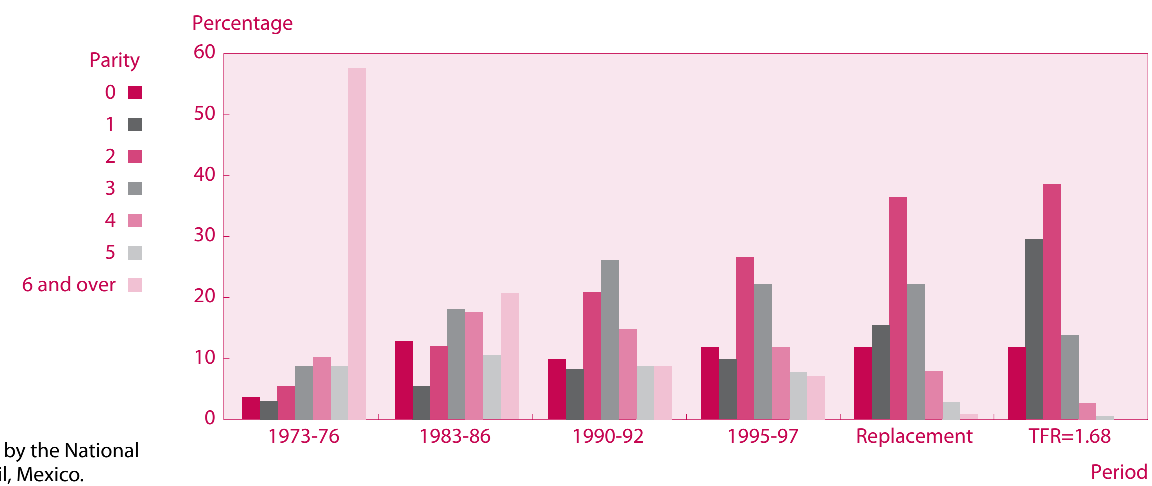
Another form of examining the changes in reproductive behaviour is looking at age. Based on the life tables and the specific fertility rates by parity during the reproductive period (15-49 years) for four different periods, in figures IV and V the final distribution is presented (up to 50 years of age) according to parity, as well as life expectancy at each parity for women aged 15 to 50.[4] The change in the fertility patterns is evident. In 1974, when population policy in Mexico gained importance, almost 60 per cent of all women finished their reproductive life with 6 children or more (the TFR of the period was of almost 6 children) and spent almost 40 per cent of their reproductive life raising children. Ten years later, a more uniform distribution is observed: practically the same proportion that concluded with 3 or 4 children did with 6 children or more; while almost 40 per cent of their reproductive lifespan would be spent without children.

As the fertility transition advances, a lower definitive number of children is more common and women dedicate less time to childbearing. Indeed, while in 1973-1976 a woman invested 22.2 years of her life in the upbringing of almost six children until the last one turned six years of age (a 3.9 year average per child), in 1995-1997 only 14.8 years were dedicated to the care of less than three children (a 5.6 year average per child). This way, while in the beginning of the family planning programmes, a child shared with his following sibling half of the time of upbringing from his/her birth until he or she turned six years old, 22 years later this time was dedicated, almost exclusively, to only one child.

[3] The interval between marriage and the birth of the first children has remained practically constant since the fifties among the different marriage cohorts (around 13 months).

[4] This scheme has the property that if the product of each proportion is multiplied by the corresponding parity, the TFR for the period is obtained.

Figure IV
Female distribution by parity at age 50 by period, Mexico, 1973-1997



Source: Estimates by the National Population Council, Mexico.

FERTILITY PROXIMATE DETERMINANTS

The diffusion of stopping and spacing behaviour and the significant increase in the use of contraceptive methods with high effective and continuation rates, has been the main proximate determinant of fertility decline. It is believed that the proportion of married women in fertile ages who use methods to regulate fertility rose from 30 per cent in 1976 to almost 71 per cent in 2000, while unmet demand decreased from 25 to nearly 10 per cent between 1987 and 2000. If the observed tendencies are maintained, we foresee that in the year 2005 a little less than three out of four married women of reproductive ages will use some contraceptive method, which would lead—according to the estimates of the National Population Council—to the replacement fertility level.

It must be said that the groups that lag behind in the fertility transition show high levels of unmet contraceptive demand. In 1997 this was the case of indigenous women (25.8 per cent of married women in fertile ages), of women that live in rural areas (22.2 per cent) and of the women without schooling (21.8 per cent), whose characteristics refer to social, cultural and geographical contexts that do not allow them the full exercise of their reproductive rights. With the purpose of attenuating the inequalities in this context, population policy has established the intention to reduce unmet demand in the short and medium terms. To accomplish this, it is necessary to increase the access to family planning services, while articulating their operation with wider strategies of social and human development, and alleviation of poverty.[5] It is estimated that a significant reduction in this lag would translate in to a national average fertility below replacement.

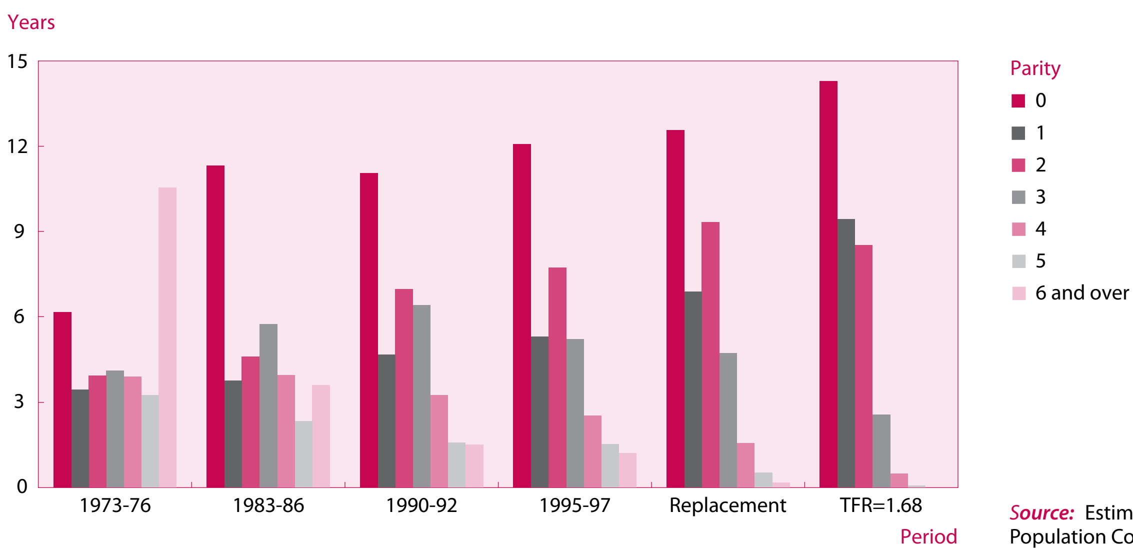
The changes in family formation and dissolution patterns have also contributed—although in a smaller measure—to impel fertility decline, mainly during the last years, when a gradual delay of the age at first marriage can be observed, as well as an increase in the number of consensual unions—which have a larger break-up probability—and an incipient increment of the separation and divorce rates,[6] which suggests that in the future this variable could have a higher weight on additional declines in the fertility levels.

The effect of abortions on fertility decline apparently has not been so significant. Although precise information about the incidence of this practice in the country is not available, it is estimated, based on information from hospital records of the main health institutions of the country, and from sociodemographic surveys, that the abortion rate

[5] To analyse the long-term impact of the rise in well-being of the female population, a logistic model with some socio-economic determinants for the use of contraceptives was built (with exploratory objectives only). Based on the results and the use of current projections urbanization, household services, education and participation in the labour force for 2030, the use of contraceptive methods could vary from 75.6 to 78.3 per cent, which, according to the Bongaarts' model, would translate to a TFR from 1.62 to 1.86 average children per women for that year.

[6] A more detailed analysis of the behaviour of women of diverse generations indicates that marriage has been delayed about one year: the medium age at first union for women born between 1953-1962 was of 20.2 years; for the 1963-1967 birth cohort this figure rose to 20.8 years; and for the 1968-1972 generation it reached 21.3 years.

Figure V
Number of years lived in each parity, between ages 15 to 50, per woman aged 15, Mexico, 1973-1997



Source: Estimates by the National Population Council, Mexico.

has declined in the last twenty-five years,[7] as a consequence of the decline in unwanted pregnancies stemming from the increase in contraceptive use. We foresee that the fostering of family planning services, together with education and communication campaigns, directed to foment informed decisions regarding sexual and reproductive health, will continue contributing to reduce the incidence of induced abortions.

Regarding post-partum infertility, derived from the duration of breastfeeding, enough evidence exists to sustain that this practice has not had significant effects on the evolution of fertility. Although its incidence has increased slightly, a reduction of its medium duration[8] is also observed.

[7] The percentage of pregnant women who declared having at least one abortion went from 22.7 per cent in 1987 to 19.6 in 1992 and 19 per cent in 1997. Also, the total abortion rate, that is, the average number of abortions a woman would have at the end of her reproductive life, has declined from 1.2 in 1976 to 0.1 in 1997. The reduction in the incidence of abortion is associated to the rapid increase in the use of contraceptive methods during the same period.

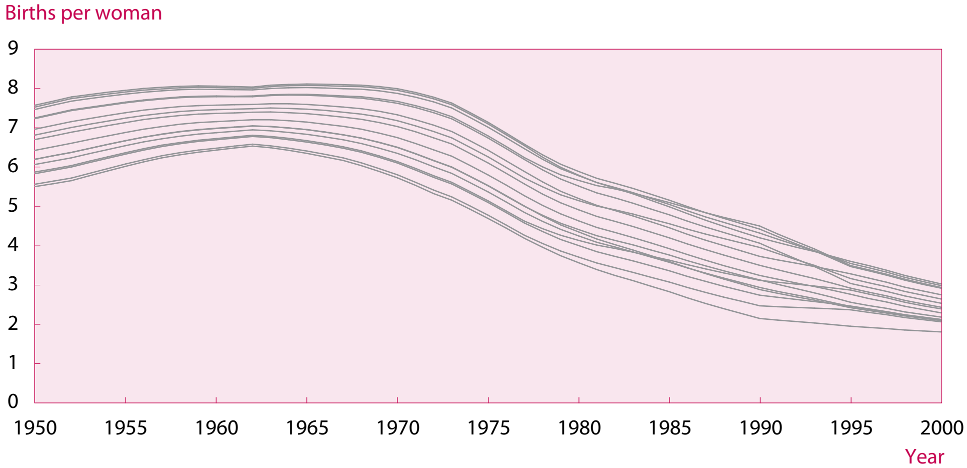
[8] The incidence of maternal breasfeeding increasec from 83 per cent in 1972-1976 to 85 per cent between 1982-1987 and to 90 per cent from 1994-1997. Nevertheless, the average duration of breastfeeding was reduced from 12.4 to 9.8 months between the first and the last period.

Table 1
Date in which the TFR at 1965 was reduced by 5 and 10 per cent by state, Mexico

Reduction by 5 per cent		**Reduction by 10 per cent**	
State	Year	State	Year
In 1968 and 1969		In 1970 and 1971	
Baja California	1968	Baja California	1970
Baja California Sur	1969	Baja California Sur	1971
Coahuila	1969	Coahuila	1971
Chihuahua	1969	Chihuahua	1971
Distrito Federal	1969	Distrito Federal	1971
Nuevo León	1969	Nuevo Leon	1971
Quintana Roo	1969	Sonora	1971
Sinaloa	1969	Tamaulipas	1971
Sonora	1969	In 1972 and 1973	
Tamaulipas	1969	Campeche	1972
In 1970 and 1971		Colima	1972
Campeche	1970	Mexico	1972
Colima	1970	Morelos	1972
Mexico	1970	Quintana Roo	1972
Morelos	1970	Sinaloa	1972
Veracruz	1970	Nayarit	1973
Yucatan	1970	Tabasco	1973
Aguascalientes	1971	Veracruz	1973
Durango	1971	Yucatan	1973
Guanajuato	1971	In 1974 and 1975	
Hidalgo	1971	Aguascalientes	1974
Jalisco	1971	Chiapas	1974
Nayarit	1971	Durango	1974
Tabasco	1971	Guanajuato	1974
Tlaxcala	1971	Hidalgo	1974
In 1972 and 1973		Jalisco	1974
Chiapas	1972	Michoacán	1974
Michoacan	1972	Querétaro	1974
Queretaro	1972	Tlaxcala	1974
Guerrero	1973	Guerrero	1975
Oaxaca	1973	Oaxaca	1975
Puebla	1973	Puebla	1975
San Luis Potosi	1973	San Luis Potosí	1975
Zacatecas	1973	Zacatecas	1975

Source: Estimates by the National Population Council, Mexico..

Figure VI
Total fertility rate for 16 states, Mexico, 1950-2000



Source: Estimates by the National Population Council, Mexico.

FERTILITY DECLINE AT THE STATE LEVEL

Fertility decline in Mexico began in the most developed states of the country, although it extended quickly towards the rest of the states of the Republic. In accordance with available evidence, these states reached, between 1962 and 1965, the maximum TFR, although with dissimilar levels that ranged from 6.3 children per woman in the Federal District and the Baja California state, to 8.1 children in Guerrero, Oaxaca and Zacatecas. The initial reduction of 5 per cent in the TFR took place, between 1968 and 1973, in all the states, while the decrease of 10 per cent took place from 1970 to 1975 (see table 1 and figure VI).

If the year in which the TFR in each state reached a level of around 6 children per woman is taken as reference, it is possible to conform five groups of states (see table 2):

- The first group crossed that threshold between 1967 and 1970, and it is integrated by the states with a higher relative development, located in the north (South Baja California, Baja California, Nuevo León, Coahuila, Sonora and Tamaulipas) and the center of the Republic (the Federal District).
- The second group reached the threshold between 1971 and 1972 and it is formed by two states of the north-west (Chihuahua and Sinaloa), one of the center (State of Mexico) and another of the south (Quintana Roo).
- The third group accomplished it from 1973 to 1974, and contains four states of the Gulf (Campeche, Tabasco, Veracruz and Yucatan), one of the center-west (Colima) and another of the centre (Morelos).
- The fourth group arrived at that level of fertility between 1975 and 1976, and is conformed by three states of the centre-west (Aguascalientes, Guanajuato and Jalisco), one of the centre-north (Durango), another of the north-west (Nayarit) and two of the center (Hidalgo and Tlaxcala).
- The fifth and last group crossed that threshold between 1977 and 1979, and it is formed by two states of the centre (Puebla and Querétaro), two of the centre-north (San Luis Potosí and Zacatecas), one of the centre-west (Michoacán) and three of the south (Chiapas, Guerrero and Oaxaca).

In table 2 and figure VI one can observe that approximately 12 years elapsed before all the states of the country reached the threshold, from 1967 when Baja California reached it, until 1979 when Oaxaca, Guerrero and Zacatecas did. The threshold was reached first in the capital city of the country and in the states located on the northern border of Mexico; not long afterwards it was reached by the states located in the Gulf of Mexico and in the north-west, and it extended gradually towards the states of the centre,

Table 2
Date in which the TFR reached the threshold of 6 and 3 children per woman in each state, Mexico

State	TFR in1965	Last year when TFR < 6		Last year when TFR < 3		Yearly average decrease	TFR in 2000
		Year	TFR	Year	TFR		
Mexico	7.22	1974	6.11	1993	3.04	0.16	2.40
1967-1970	6.44	1968	6.14	1985	3.10	0.18	2.02
Baja California	6.29	1967	6.10	1990	3.05	0.13	2.15
Distrito Federal	6.35	1968	6.04	1983	3.11	0.20	1.80
Nuevo León	6.41	1968	6.11	1985	3.07	0.18	2.06
Baja California Sur	6.57	1970	6.01	1987	3.09	0.17	2.10
Coahuila	6.67	1970	6.14	1992	3.02	0.14	2.39
Sonora	6.64	1970	6.10	1987	3.09	0.18	2.12
Tamaulipas	6.62	1970	6.07	1988	3.00	0.17	2.12
1971-1972	6.86	1972	6.06	1991	3.01	0.16	2.19
Chihuahua	6.72	1971	6.03	1991	3.04	0.15	2.20
Quintana Roo	6.79	1971	6.15	1994	3.01	0.14	2.41
State of Mexico	6.95	1972	6.16	1991	3.02	0.17	2.18
Sinaloa	6.83	1972	6.01	1989	3.06	0.17	2.12
1973-1974	7.13	1974	6.03	1992	3.07	0.16	2.29
Campeche	7.10	1973	6.22	1993	3.10	0.16	2.26
Colima	7.06	1973	6.15	1989	3.00	0.20	2.11
Morelos	6.95	1973	6.00	1989	3.02	0.19	2.10
Tabasco	7.25	1974	6.21	1995	3.05	0.15	2.55
Veracruz	7.14	1974	6.04	1992	3.05	0.17	2.29
Yucatan	7.16	1974	6.06	1993	3.04	0.16	2.21
1975-1976	7.58	1976	6.13	1995	3.10	0.16	2.59
Durango	7.48	1975	6.26	1996	3.06	0.15	2.65
Nayarit	7.36	1975	6.10	1994	3.05	0.16	2.43
Aguascalientes	7.50	1976	6.02	1996	3.02	0.15	2.61
Guanajuato	7.60	1976	6.16	1997	3.07	0.15	2.75
Hidalgo	7.64	1976	6.21	1996	3.01	0.16	2.60
Jalisco	7.61	1976	6.17	1995	3.01	0.17	2.51
Tlaxcala	7.61	1976	6.17	1993	3.20	0.17	2.31
1977-1979	8.00	1978	6.16	1998	3.10	0.15	2.89
Querétaro	7.83	1977	6.20	1995	3.04	0.18	2.54
Chiapas	7.85	1978	6.01	1999	3.04	0.14	2.94
Guerrero	8.08	1978	6.25	2000	3.03	0.15	3.03
Michoacán	7.91	1978	6.05	1997	3.12	0.15	2.80
Puebla	8.03	1978	6.20	1999	3.09	0.15	2.98
San Luis Potosí	7.96	1978	6.10	1999	3.04	0.15	2.94
Oaxaca	8.11	1979	6.07	1999	3.02	0.15	2.92
Zacatecas	8.11	1979	6.02	1996	3.10	0.17	2.68

Source: Estimates by the National Population Council, Mexico.

centre-north and centre-west, until it became generalized in the states located in the south of the country (see map 1).

It is possible to notice on table 2 that the pace of decline of the TFR took place faster in the states that began the fertility transition earlier. Taking into account that all the states of Mexico have already reached a TFR of around 3 children, it is possible to calculate the yearly average of decline starting from 6 children, and to determine the time lapse that it took them to move from one level to the other. This way, the states of the first group were able to change from 6 to 3 children per woman in a 17-year period (from 1968 to 1985), with a yearly average decrease of 0.18 children; the second group (from

Map 1
Period in which the TFR reached the threshold of 6 children per woman in each state, Mexico

Source: Estimates by the National Population Council, Mexico.

1972 to 1991), the third (from 1974 to 1992) and the fourth (from 1976 to 1995) group of states took 18 to 19 years, with an average decrease of 0.16 children; finally, the fifth group, required approximately 20 years (from 1978 to 1998).

On table 2 it is observed that, according with the estimates of the National Population Council, of the 17 states that integrate the first three groups, fourteen of them (Baja California, the Federal District, Nuevo León, Baja California Sur, Sonora, Tamaulipas, Chihuahua, Mexico, Sinaloa, Campeche, Colima, Morelos, Veracruz and Yucatan) have reached a TFR between 1.8 and 2.3 children per woman, that is to say, a level below, equal or slightly above that of replacement fertility, while in the three remaining states (Coahuila, Quintana Roo and Tabasco) it oscillates between 2.4 and 2.6 children. In the last two groups of states, the TFR have reached in levels that range from 2.3 to 3.0 children.

THE STRUCTURAL DETERMINANTS OF FERTILITY

The explanation for the fertility decline in Mexico has shown the role played by demographic and socio-economic variables, such as:

- Mortality, which has been identified as a key variable in the explanation of the fertility transition. Its decline causes an increase in the number of surviving children and thus contributes to propitiate favourable attitudes to fertility regulation and the planning of life course events, as well as to extend and strengthen long-term thought in the conscience of all individuals.
- Diverse forces of a macro-structural character, among which stand out the processes of economic and social development, urbanization,[9] industrialization, the expansion of the educational system, the process of generalization of mercantile relationships, the expansion of salaried work and the conformation of an ever growing consumption society.[10] According to the most conventional explanations, these processes—working through diverse mechanisms—have contributed, like in many other contexts, to increase the direct and opportunity costs of having children, as well as to diminish the economic benefits that parents derive from them, reducing in this manner the incentives for having a large offspring.

[9] The National Urban System today has 364 cities distributed in all the regions of the country, where around 65 million people live. The cities of the country have become cardinal axis of the economic activity, to the extent that they generate around 96 per cent of the aggregate value of manufacturing, commerce and services.

[10] The growing integration of ever more important segments of the population to the market of goods and services has modified direct and opportunity costs associated with reproduction, while it has made them more visible by strengthening the economic calculations as a pattern of orientation in the practices and conduct of people in very diverse environments.

- The excluding and divergent[11] nature of the development pattern, which gives place to remarkable social inequalities and demographic contrasts, since the mortality and fertility decline speed depends on the society's capacity to distribute the benefits of development among the different sectors.[12] This is reflected by the coexistence side by side of groups integrated to the development process with marginalized ones. Thus, the former already showed, during the 1995-1997 period, a TFR equal or smaller to that of replacement level, whereas the other was a straggler in the demographic transition process. In the first case there were women who had twelve or more years of schooling (and a fertility of 1.85 children), as well as managers, professionals or artists, with 1.66 children per woman. In contrast, women without schooling had 4.7 children per woman during the same period, and that of women living in rural towns of less than 2,500 inhabitants had 3.5 children per woman.[13]

More recently, research in this field has contributed to identify some of the causal linkages between large macrostructural forces and other social transformation processes.[14] Their consideration contributes to explaining why fertility decline could spread throughout the national territory of Mexico in a few decades, and advance so rapidly in diverse socio-economic contexts, among which we can mention the following:

- The growing exposure of the Mexican population to medical culture and authority. This process of change has contributed to promote the secularization of diverse norms and practices that are within the sphere of influence of medical culture. It has also created the conditions to legitimate practices such as the conscious and planned intervention in biological processes. This has resulted in the increasing search by the population for medical attention during pregnancy, delivery and the post-delivery period.[15] This growing exposure has also allowed the diffusion of values and norms that establish, as desirable, the separation between sexual activity and procreation. It has also contributed to weaken the authority of diverse traditional agents who exert influence on the sexuality and reproductive fields. It has also aided to reduce the psychological and cultural costs of fertility regulation, as well as to socially legitimize modern methods of family planning.
- The expansion of the mass media sphere of influence and the diffusion of small family models. Massive media, particularly radio and television, has contributed to diffuse new ideas, concepts, technologies, lifestyles and behaviour models in spheres linked with the exercise of sexuality, reproduction, family organization and the sexual division of labour, leading at the same time the emergence and consolidation of favourable attitudes and values towards fertility regulation.[16]
- The growing access of the Mexican population to security and social protection networks. The strengthening of the Mexican social security institutions among the sectors integrated to national development has meant that the responsibility to provide millions of families with the means to face unforeseen events such as illness, disability or death, has been transferred to the Government.[17] In the same manner, more recently, the Government efforts to promote social development and to overcome poverty have enlarged the coverage of social protection nets. They have also strengthened human capital formation among traditionally excluded from development sectors of the population.[18] In all those cases, these types of transformations favour, among other things, a decrease in the economic utility of children.
- Improvement of the social conditions of women and the transformation of their domestic and non-domestic roles. Diverse studies have shown that the advancement of women in the fields of education, health, labour market participation and degree of control that they can exert on economic resources results in their autonomy and in their establishment of more egalitarian relations with men, as well as in the emergence of a new life-course structure for them.[19] All these transformations affect, through diverse mechanisms, decisions of women in re-

[11] *Excluding*, since it leaves outside its circuit an important number of people who are not favoured by accumulation; and *divergent*, because differences between the poorest and the richest are growing deeper.

[12] One of the variants of classic theory of transition (*Social Justice and Demographic Transition*) formulated by Ratcliffe, maintains, for example, that demographic behaviour in the different social groups reflects the degree to which economic, social and political institutions promote social justice.

[13] Notwithstanding the differences, a clear convergence in the fertility levels of different regions and groups of the country is recognized. In figure VII it can be observed that the gap of 2.4 children between 1974 between women resident in urban and non-urban areas decreased by half by 1996. With variables like schooling and labour force participation in similar levels can be observed.

[14] V. E. Faria "Government policy and fertility regulation: unintended consequences and perverse effects", *Brazilian Journal of Population Studies*, vol. 1, 1997/1998.

[15] In this respect, it can be said, for example, that the proportion of births attended by a doctor has increased considerably in the last decades, going from 55 per cent in the 1974-1976 period to 66 per cent between 1985-1987 and to 82 per cent in the 1994-1997 period. Efforts to address extending health services have reduced the difference between rural and urban zones. While in the 1985-1987 period, 37.8 per cent of rural women had their births addended by a physician, this proportion increased to 58.9 per cent for the 1994-1997 period. In urban areas, these percentages were 84 and 91, respectively.

gard to sexuality and reproduction and increase the opportunity costs linked to marriage and reproduction.

- The adoption and impulse of an explicit population policy. Fertility decline received a strong impulse in Mexico in 1974, when population policy changed. Starting that year, population policy in Mexico acknowledged every person's right to choose, in a free, responsible and informed manner, the number of children that he/she wants to have, and the timing to have them. It also establishes that every person must have access to information and the necessary means to crystallize his or her reproductive preferences. This change contributed to legitimate and to institutionalize the demand for fertility regulation means, and to enlarge the public's knowledge of and free access to family planning services, putting them within the reach of the majority of the Mexican people.

FERTILITY TRANSITION IN THE MUNICIPALITIES OF THE COUNTRY

The key question that we try to address is whether the Mexican population will initiate a fertility regime equal to, below or beneath the replacement level. In order to speculate on this question, it is convenient, first, to explore municipal level information, which allows us to differentiate municipalities according to their fertility levels, the size of their populations, and their main socio-economic traits (see figures VII, VIII and IX).

Map 2 presents the TFR Mexico's municipalities, stratified in five categories (by means of the Dalenius method). One can observe important geographical continuities and some regional patterns. On the one hand, the low and very low fertility areas are located in the North of Mexico, as well as in the region where Mexico City and other metropolitan areas are interconnected, as well as in the Gulf of Mexico and the Western municipalities. In contrast, the high and very high fertility municipalities are located in the huge corridor that harbors the main concentration areas in the country of indigenous people, and that runs from the south of the Pacific shore to the central-northern region.

The exploratory analysis of the available information at the municipal level shows that the 2,443 political-administrative units that integrate the country:

- 224 municipalities contain 43 per cent of the Mexican population and a TFR equal or below 2.2 children per woman. This group of municipalities is characterized by political-administrative units that: (i) are predominantly urban and metropolitan; (ii) they have low infant mortality with respect to national standards (of around 22 deaths for each thousand born alive); (iii) they often show high levels of human development; (iv) almost all the households (95 per cent) have a radio and/or TV; (v) literacy among women in reproductive age is almost universal (96 per cent) and they have on average 8.6 years of schooling; (vi) their rates of female participation in economic activities of around 40 per cent; (vii) half of the women aged between 20 and 24 years remain single; (viii) almost half (47 per cent) of their population is enrolled in the national social security system; (ix) less than one fifth of households (17 per cent) receives federal transfers; and (x) a vast proportion of the labour force (75 per cent) has higher incomes than one minimal wage.
- 1,036 municipalities, that contain around 38 per cent of the population of Mexico, have a TFR between 2.21 and less than 3.0 children. Those territorial units that form this group: (i) have diverse characteristics and conditions according to their size and degree of urbanization; (ii) infant mortality shows an average of 27 deaths for each thousand births; (iii) levels of human development are predominantly of medium-high degree; (iv) they show a high proportion of households (90 per cent) with radio and/or TV; (v) the female literacy rate is 92 per cent, and schooling levels are of almost 7 years; (vi) female participation in

16 The availability of goods such as radio and television was generalized in the country during the last three decades. In 1970, only 31 per cent of all households had a television and 76 per cent a radio. In contrast, these figures rose to 86 and 85 per cent in 2000.

17 Thus, for example, the population insured by the Mexican Social Security Institute (IMSS) increased from 9.8 million in 1970 to almost 47 million in the year 2000, an increase that represents from 19.3 to 46.7 per cent of the national population.

18 The Programa Nacional de Educación, Salud y Alimentación (PROGRESA) has extended its coverage from around 300 thousand families in 1997 to 3.2 million in 2001.

19 It is estimated that Mexican women, who had a life expectancy at birth of around 65 years to 1970-1974, dedicated around 4.2 years to school and 10 years to the labour force. Twenty years later, in 1990-1994, women with a life expectancy of 75 years, invested around 7.4 years to education and almost 20 years to labour activities. It is foreseen that these tendencies will continue their course in the following years, so that by 2005, with a life expectancy of 78.9 years, educational formation could account to 9.6 years and the corresponding participation in the labour force participation to 25.5 years.

Figure VII
Total fertility rate by marginalization index for all municipalities, 2000

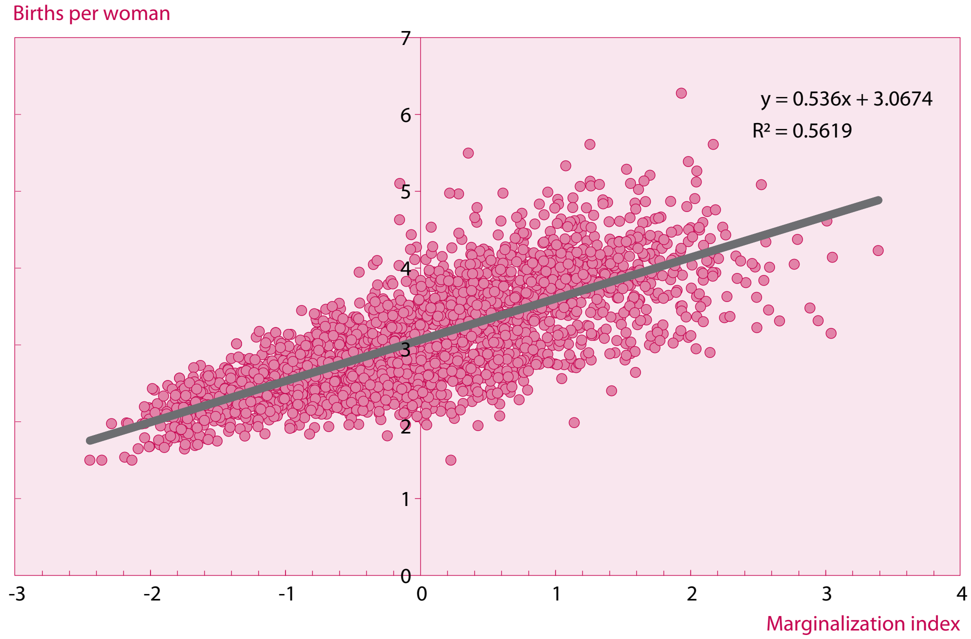
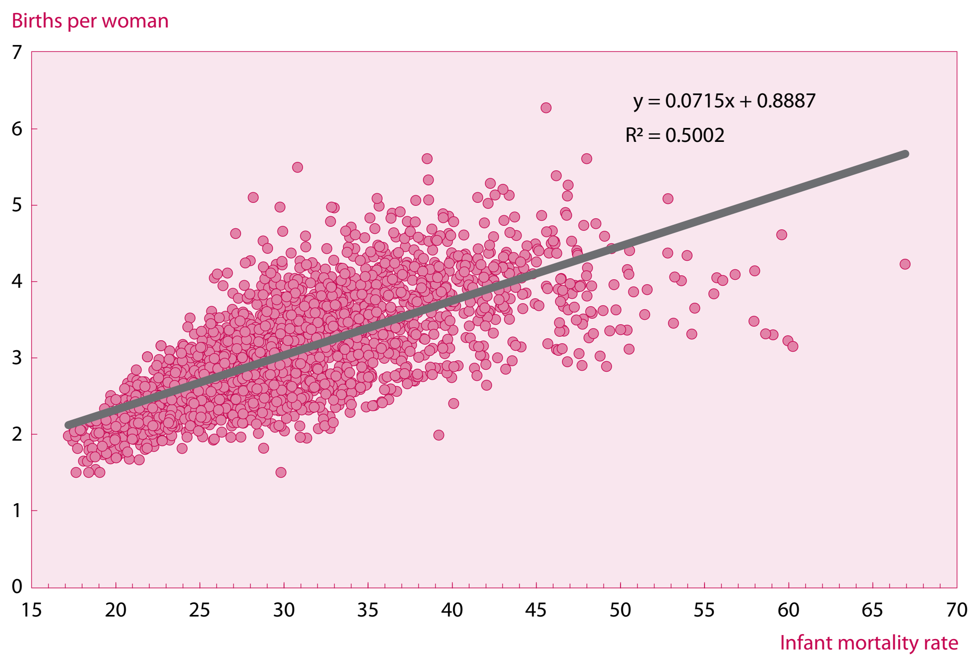
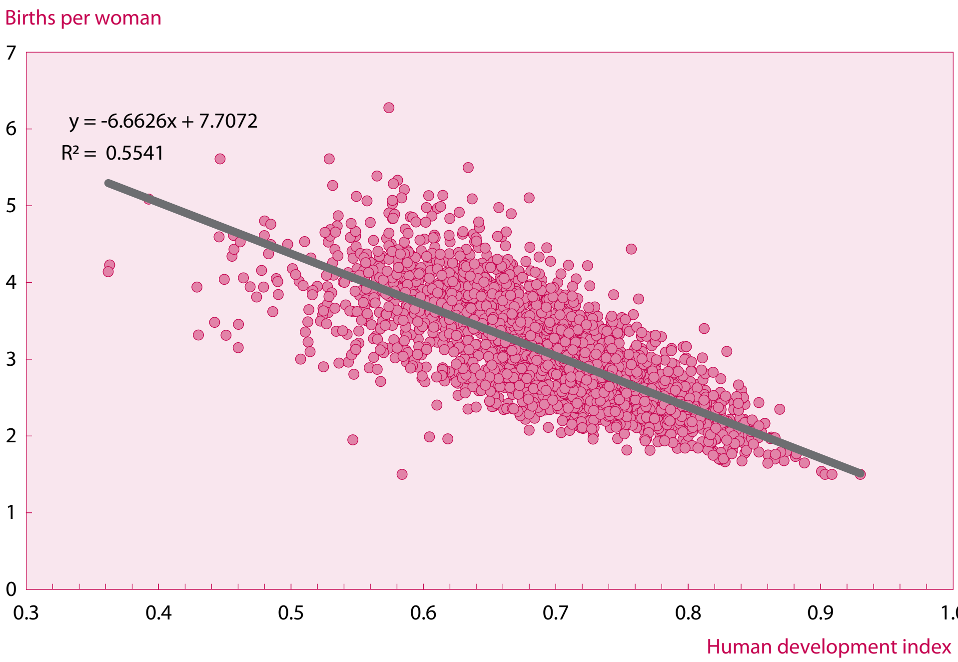


Figure VIII
Total fertility rate by infant mortality rate for all municipalities, 2000

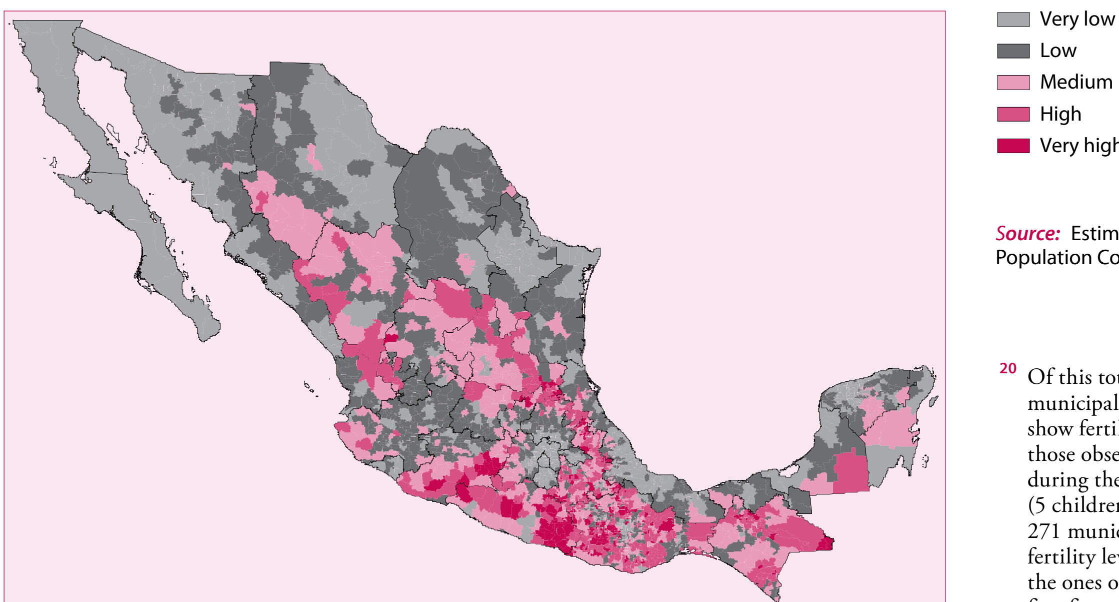


economic activities rates slightly lower than the national average (30 per cent); (vii) around 44 per cent of women between 20 and 24 years of age are single; (viii) more than one out of four individuals (27 per cent) have social security; (ix) one out of three households receives federal transfers; and (x) six out of ten employed workers earn more than one minimal wage.

Figure IX
Total fertility rate by human development index for all municipalities, 2000



Map 2
Total fertility rate by municipality, Mexico, 2000



Source: Estimates by the National Population Council, Mexico.

- 1,183 municipalities contain almost 19 per cent of all Mexicans and exhibit an equal or superior TFR to 3 children per woman.[20] The political-administrative units that form this group present the following features: (i) they are mainly small and rural; (ii) they register an infant mortality rate that is high above the national average (34.9 deaths for each thousand born alive); (iii) the predominant indexes of human development are of low- and medium-low degree;

20 Of this total, a few municipalities, mostly rural, show fertility levels similar to those observed in the country during the seventies (5 children or more); also, 271 municipalities have fertility levels similar to the ones observed during the first five years of the eighties (between 4 and less than 5 children); and finally, 893 municipalities have fertility levels similar to those prevailing in the country during the end of the eighties and the beginning of the nineties (between 3 and less than 4 children).

(iv) three of each four households have a radio and/or TV (74.9); (v) the literacy rate among the women of 15 to 44 years of age is 80 per cent, and the average years of schooling are 5.2; (vi) only one of each four women is economically active; (vii) around 38 per cent of the women between 20 and 24 years of age remain single; (viii) the access to social security is very limited (11 per cent); (ix) more than half of the households (55 per cent) receive federal transfers; and (x) only one of each three employed persons receives a higher income than the minimum wage.

As it can be observed, the socio-economic contexts of these three groups of municipalities show opportunity structures and levels of human development that are remarkably different among them. The two extremes exemplify the existence of two different worlds: the urban, modern and mestizo Mexico, on the one hand, and the rural, poor and predominantly indigenous Mexico on the other. The future demographic evolution of the country will depend to a large extent of the intensity and efficacy of the efforts directed to build bridges between both extremes and to narrow the existing gaps in regards to human development. It must be borne in mind, though, that half of all Mexicans live in the first group of municipalities, whereas only one of out of five lives in the second group.

The data presented show that the Mexican population is moving rapidly in a demographic transition process. Even in the municipalities that lag behind (with a TFR of 3 or more children) fertility is declining quickly: the TFR decreased by 22 per cent between 1990 and 2000 (from 4.8 to 3.6 children per woman), which implies a fall of around 0.11 children in average per year. The speed of this decline has been very significant in the rest of the country: around 30 per cent in the municipalities with lower fertility (from 2.9 to 2.0 children, which means a decrease of 0.09 children per year); and 28 per cent in municipalities with intermediate fertility—from 3.7 to 2.6 children, which represents a decline of around 0.11 per year).

In the municipalities that lag behind in the fertility transition process, current social programmes destined to strengthen human capital formation and to support and provide social protection to marginalized groups who live in extreme poverty (through direct transfers and the encouragement of productive activities) constitute investments that, besides fighting the symptoms and causes of social backwardness, can contribute to accelerating demographic change. These efforts, if they are held during subsequent years, could contribute to eliminating many of the socio-economic obstacles that limit additional fertility decreases in the most backward municipalities, and produce an acceleration in the pace of the decline in subsequent years, similar to that registered by municipalities with medium levels.

Municipalities with intermediate-fertility levels show favourable socio-economic conditions to impel fertility decline (low mortality, high literacy and schooling rates among women, high exposure to mass media, and an advanced urbanization process). In addition, the processes of diffusion of lifestyles and movement of women to the performance of non-traditional roles are being quickly incorporated in many municipalities. Proof of this is the high percentage of single women from 20 to 24 years of age (44 per cent), as well as the fact that more than one fifth of all women between 25 and 29 years of age remain without children. It is expected that fertility in these municipalities will continue to decrease, although maybe at a slower pace than in the recent past. If this occurs, the TFR of these municipalities could go from an average of 2.6 at present to 2.2 in the next 10 years.

In the municipalities with a TFR close to or below the replacement level, socio-economic factors that favour low fertility levels have generalized, promoting an improvement of women's social condition and the emergency of a life-course structure in which marriage and maternity do not constitute the only destiny for women.

It must be pointed out that the diffusion of family planning through media campaigns and the activities of health-system agents have contributed to spread and generalize the knowledge of contraceptive methods among all the Mexican regions and groups.

It is estimated also that in urban areas almost all women of reproductive age (98 per cent) know at least one contraceptive method, whereas in rural areas the proportion is 90 per cent. There is evidence as well that institutional campaigns through the mass media have contributed not only to spread information about the characteristics and advantages of family planning but also to form and reinforce attitudes that are favourable to this practice.

In this context, it is not surprising to find that whereas the unmet demand for fertility regulation methods at the national level is almost 10 per cent of women of reproductive age, for various other groups, such as peasant women, the poorest ones, the least educated, the youngest and the indigenous ones, unmet demand fluctuates between 20 and 25 per cent.

MEXICO: TOWARDS A FERTILITY REPLACEMENT REGIME?

Mexico's population policy has the explicit goal of reaching, by the year 2005, the TFR replacement level.[21] It is estimated that currently, about 71.4 per cent of married women of reproductive age use contraceptive methods. In order to reach a replacement level, the use of contraceptive methods has to increase to approximately 73.5 per cent, something that requires an annual average increase of almost 0.5 per cent, which is less than 0.7 per cent registered in Mexico during the 1997-2001 period.[22] Hence, the required increase in the use of contraceptive methods is feasible. Mexico has a strong and consolidated family planning programme that is determined to take care of the unmet demand for contraceptive methods.

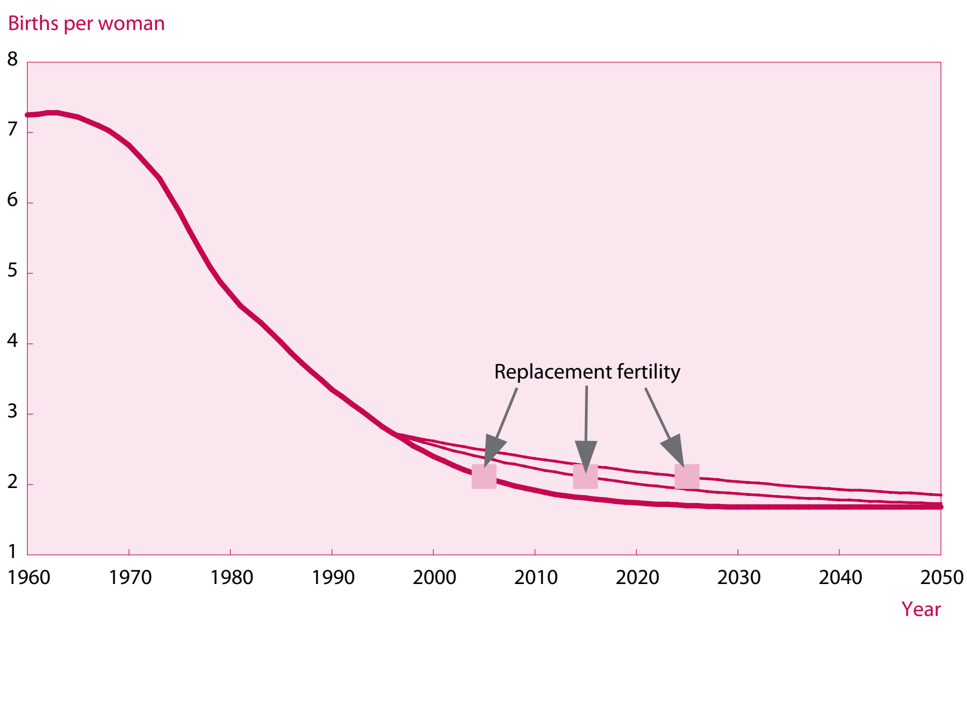
The effect on fertility decline exerted by the increase in the use of contraceptive methods could be reinforced by the changes that are taking place in family formation and dissolution patterns. Thus, after many years of being left unchanged, a gradual delay of the age at marriage can be observed in Mexico. To this, it must be added an increase in the proportion of consensual and rates of divorce and splitting ups.

In figure X three scenarios of the future evolution of the TFR, according to the year in which fertility replacement is reached, are presented. Under a long-term perspective, the forecast assumes that replacement level will be reached in 2005 coincides more with

[21] The goal was proposed in 1995, when the *National Population Programme 1995-2000* was presented. This goal has also been sustained by the National Population Programme 2001-2006.

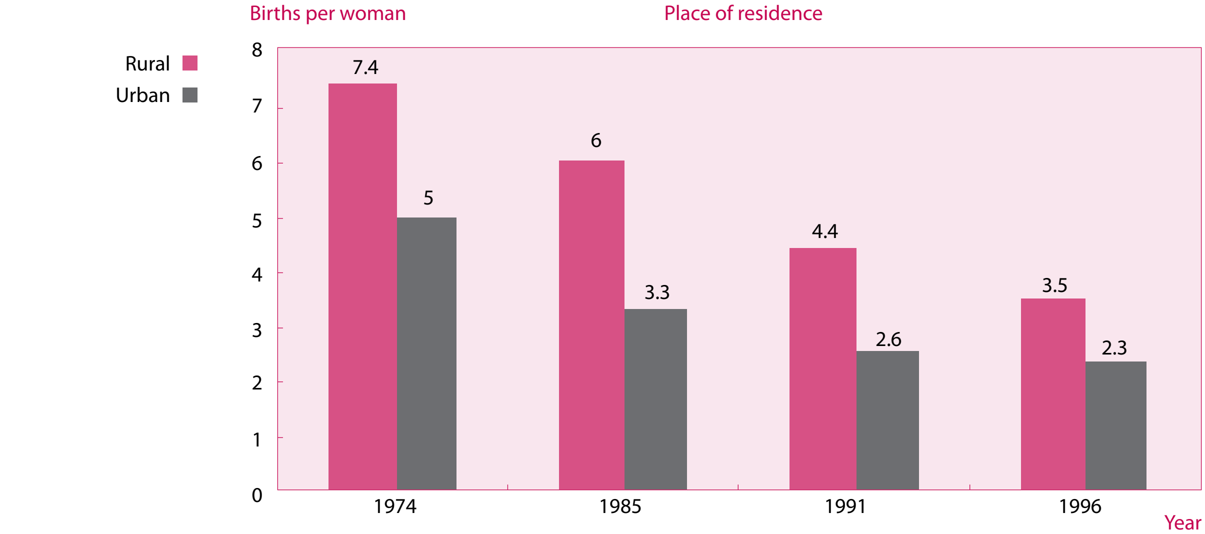
[22] It is estimated that between 1996 and 2001 the TFR declined approximately 0.39 children, corresponding to an annual decrease of 0.08 children. Reaching replacement in 2005 will imply a slower annual decrease of the TFR (0.06 children).

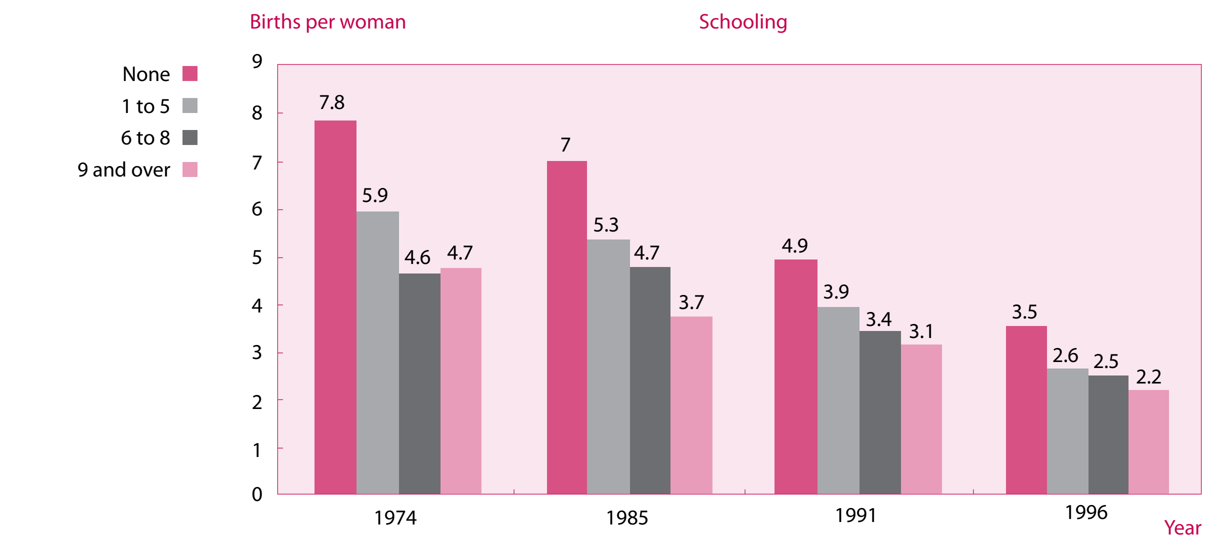
Figure X
Total fertility rate projected by year in which replacement fertility is attained, Mexico, 1960-2005

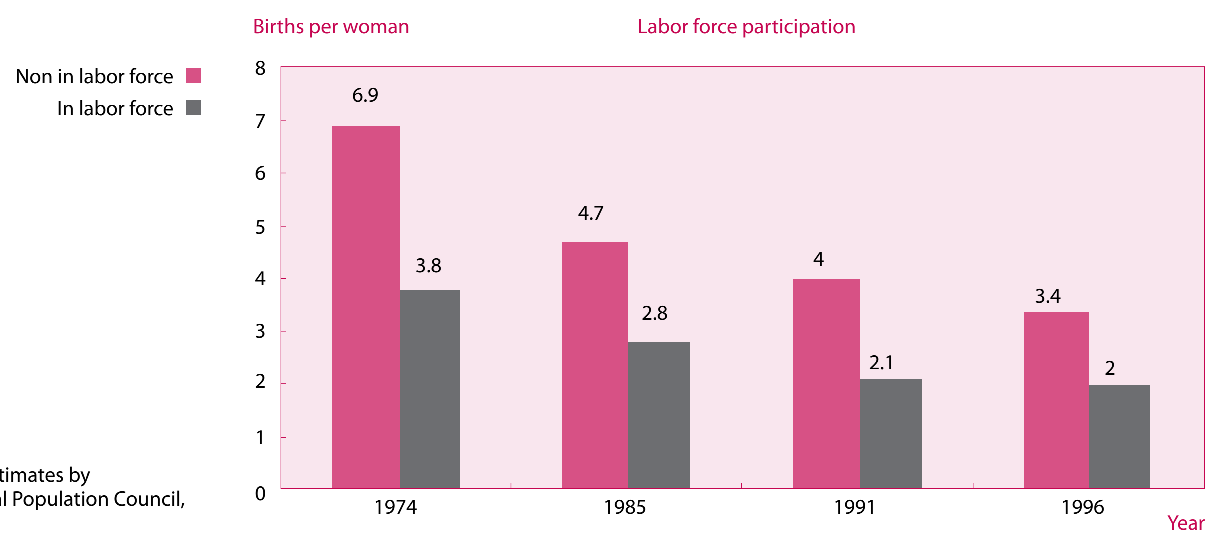


Source: Estimates by the National Population Council, Mexico.

Figure XI
Total fertility rate by place of residence, schooling and labour force participation, 1974-1996







Source: Estimates by the National Population Council, Mexico.

past trends that the alternatives which move it to 2015 or 2025, which break abruptly the descending pattern.

In general, the procedures followed by Mexico's National Population Council and the Population Division of the United Nations to project fertility in Mexico are similar. The main difference resides in the assumption about the moment when replacement level could be reached. The Population Division of the United Nations supposes, in its medium hypothesis, that it would take place in 2020-2025. If this were so, the use of contraceptives would rise to 75.1 per cent by that time,[23] and this would imply an increase of only 0.3 per cent per year starting in 1997, which is a negligible slope compared with the trends of the last years.

What would be the changes in reproductive behaviour once the fertility replacement level is reached? In figures X and XI we present the parity distribution at the end of and during the reproductive period. At the time, when the new population policy started (1973-1976), almost 60 per cent of women ended their reproductive life having six or more children. However, once the replacement level is reached, an even larger proportion would conclude their reproductive life with two or less children. Only one in each eight women would end with a large offspring (4 or more children). The delay of the first marriage, and therefore of the birth of the firstborn, would favour that, on average, every woman spends more than a third of her reproductive age without children (35 per cent) and she dedicates 40 per cent to the upbringing of two children, with an interval between them of 6.7 years.

Contrary to the hypothesis that holds constant replacement level, once it is reached, the experience of many developed countries shows that fertility decline continues even below the replacement level. Likewise, among the developing countries that began their fertility transition in the sixties, eight out of a group of 39 have a TFR equal or inferior to the replacement level.[24] Due to this reason, in the projections for Mexico we incorporated that trajectory as feasible. Thus, according to the demographic forecasts for the country, the TFR could decline even to 1.68 children in 2030 (a rate that is similar to those registered recently in Western and Northern Europe) and remain at that level during the next 20 years.

This extreme situation would imply a scenario that is completely different to the one registered in 1973-1976 by Mexican women. In it, four of five women (82 per cent) would conclude their reproductive age with 2 children or less; families with one (30 per cent) and 2 children (40 per cent) would be common, and large families would be almost extinct (4 per cent). Women would spend 40 per cent of their reproductive age without children and they would devote only 12 years (35 per cent) to the upbringing period, with a birth space between children of 7.4 years on average (even though that spacing would not occur in the case of 42 per cent of women that would end their reproductive lives without children or with only one child).

[23] When applying the Bongaarts model, in this case we assume that the age at marriage, the average efficiency of contraception, observed abortion and breastfeeding practices remain constant from 1997 to 2020-2025.

[24] John Bongaarts, "The end of the fertility transition in the developing world". Document presented in the Expert Group Meeting on Completing the Fertility Transition, 11-14 March 2002.

Fertility transition in Nigeria: trends and prospect

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INTRODUCTION

This paper has three major objectives. The first is to demonstrate that a sustained fertility transition has begun in Nigeria. The second is to identify some factors that might have contributed to the decline and the third objective is to argue in favour of further declines in fertility and propose a level of fertility by the time the fertility transition is completed. None of the objectives is easy to achieve considering the dearth of comparable nationally representative data.

Fertility behaviour is conditioned by both biological and social factors. And as in other traditional African societies, several factors have contributed to sustain relatively high levels of fertility in Nigeria. These factors include high level of infant and child mortality, early and universal marriage, early childbearing as well as childbearing within much of the reproductive life span, low use of contraception and high social values placed on child bearing. In the face of perceived high infant and child mortality, the fear of extinction encouraged high procreation with the hope that some of the births would survive to carry on the lineage. The traditionally high value placed on marriage ensured not only its universality but also its occurrence early in life with the consequence that childbearing started early in life and in most cases continued until late in the reproductive span. The institution of polygyny which sometimes promotes competition for childbearing among co-wives also contributed to sustain high fertility. Use of modern contraception was traditionally unacceptable as it violated the natural process of procreation. The traditional long period of breast-feeding and postpartum abstinence guaranteed adequate spacing between children. Available evidence suggests that there have been changes in these sociocultural factors over time. Age at marriage appears to have increased, though minimally when viewed at the national level. Use of modern contraception has increased, and improved education (especially of women) appears to have gradually eroded some of the traditional values placed on childbearing.

In this paper, data from national and sub-national surveys are used to demonstrate trends in fertility and its determinants. The national surveys are the 1981-1982 World Fertility Surveys (WFS) and the 1990 and 1999 National Demographic and Health Survey (NDHS). The sub-national surveys are those conducted by individual researchers in selected parts of the country. The quality of the data sets have been discussed elsewhere and hence shall not be discussed here.[1] However, we shall refer to some of the limitations as they relate to our analysis and conclusions.

The remaining part of this paper is divided into three sections. Immediately following the introduction, we present some empirical evidence to demonstrate that a sustained fertility decline has already begun in Nigeria. In the second section, we discuss some factors that might have accounted for the decline and examine how these factors relate to fertility in Nigeria. Once patterns of association are established, future trends in fertility can then be

[1] See Dudley Kirk and Bernard Pillet (1998) for recent discussions of the limitations of the WFS and the 1990 NDHS data and National Population Commission (2000) Nigeria Demographic and Health Survey, National Population, Abuja, Nigeria, for discussion of the quality of the 1999 NDHS. Some of these limitations were noted earlier by Makinwa-Adebusoye and Feyisetan (1994) and some steps were taken to minimize their impact on the analysis of changes in fertility.

predicted on the basis of future changes in these factors. In the last section, an assessment of the future course of fertility in Nigeria is undertaken. Our projections into the future are based on expected changes in the factors that have sustained fertility decline thus far.

FERTILITY TRENDS

Fertility has been relatively high in Nigeria for several years. The 1965-1966 National Rural Demographic Sample Survey gave a crude birth rate of 50 per 1,000 persons and an average completed family size of 5.6 children (Federal Office of Statistics (FOS), Lagos 1968). Estimates of TFR for the years 1965, 1970, 1971-1973 and 1975 are 6.6, 6.5, 7.3 and 7.0, respectively (table 1). These figures imply an increase between 1965 and 1975 or, at best, a stability of fertility at high levels. The rise in fertility in early to mid-1970s may be explained partly by the dramatic rise in revenue from oil export which leads to a sharp increase in food import as well as workers' salaries (Bankole and Bamisaye, 1985). The 1981-1982 Nigeria Fertility survey (NFS) found a TFR for Nigeria of 5.94 in 1980-1982 (National Population Bureau, Lagos/WFS, 1984) and the 1990 Nigeria Demographic and Health Survey put the TFR at 6.01 in the period 1988-1990 (FOS, Lagos and IRD/Macro International, 1992). Further decline in TFR was indicated for 1992-1994 by a 1994 sentinel survey (5.4) and for 1995-1999 by the 1999 Demographic and Health Survey (5.2). The decline is not only evident at the national level but also among different sub-groups (table 2).

Although comparison of TFRs for 1970 and 1988-1990 suggests a decline in fertility between the two dates, the TFRs for 1980-1982 and 1988-1990 suggest stagnation in fertility levels in the eighties. However, there are three reasons to argue that the TFR for 1980-1982 reflects a gross underestimation of births in the period and hence could not be used as a valid base for determining fertility trends in the eighties. First, the sudden decline in TFR from 7 in 1975 to 6.34 in 1980-1982 cannot be justified in a population where desired fertility in 1981-1982 was higher than the achieved fertility in 1975.[2] Two, it is impossible to achieve about 15 per cent reduction in fertility in five years with only 2.6 per cent of women as ever-users of efficient contraception.[3] Three, there were neither strong population control activities nor socio-economic policies[4] in the late seventies that would have engendered such a drastic decline in fertility between 1975 and 1980. The TFR for 1981-1982 appeared to be an underestimation, thus accounting for the lack of observable change in fertility in the eighties. We argue here that an onset of a sus-

[2] It appears illogical for fertility to decline so much when desired family size has not been achieved. There was no motivation for the decline.

[3] Only 0.7 per cent of women exposed to childbearing were using efficient methods at the time of the 1981/1982 survey.

[4] If anything, the free universal primary education embarked upon at this time and the increasing national prosperity brought about by the rising revenue from oil export favoured procreation.

Table 1
Estimates of fertility of Nigeria, 1965-1999

Period covered	TFR[a]	Data source and methodology	Source
1965–1966	CBR = 50/1000 CFS[b] = 5.6	National Rural Demographic Survey	Federal Office of Statistics, Lagos, Nigeria, 1968
1965[c]	6.60	World Fertility Survey, 1981-1982	Cochrane and Farid, 1989
1970	6.50	World Fertility Survey, 1981-1982	Cochrane and Farid, 1989
1971–1973	7.30	National Fertility Survey, 1981-1982	U.S. Department of Commerce, 1979
1975	7.00	World Fertility Survey, 1981-1982	Cochrane and Farid, 1989
1978–1982	6.43	World Fertility Survey, 1981-1982	National Population Bureau, Lagos, Nigeria, and WFS, 1984
1983–1986	7.40	Nigeria Demographic and Health Survey, 1990	Makinwa-Adebusoye and Feyisetan, 1994
1987–1990	6.20	Nigeria Demographic and Health Survey, 1990	Makinwa-Adebusoye and Feyisetan, 1994
1986–1990	6.30	Nigeria Demographic and Health Survey, 1990	National Population Commission, Abuja, 2000
1992–1994	5.40	Sentinel Survey	National Population Commission, Nigeria, 1994
1995–1999	5.20	Nigeria Demographic and Health Survey, 1999	National Population Commission, Abuja, Nigeria, 2000

[a] Unless otherwise specified.
[b] Completed family size.
[c] Estimates by Cochrane were obtained from Foote, Hill, and Martin, eds, 1993. *Demographic Change in Sub-Saharan Africa*.

Table 2
Total fertility rates for women 15-49 in the five years preceding the 1981/1982 Nigeria Fertility Survey (*NFS*) and the 1990 and 1999 Nigeria Demographic and Health Survey (NDHS) by background characteristics

Background characteristics	NFS	NDHS 1990	NDHS 1999
Place of residence			
Urban	6.2	5.3	4.5
Rural	6.4	6.6	5.4
Region			
South-east	6.0	6.8	4.6
South-west	6.6	6.5	4.5
North-east	6.4	6.0	6.8
North-west	6.8	5.9	6.5
Education			
No education		6.7	6.1
Primary		6.8	5.5
Secondary and higher		4.6	4.1
Total	6.3	6.3	5.2

tained fertility decline appeared to have begun after the mid-eighties when policymakers started to give population control issues some serious considerations which culminated in the formulation of a national population policy in 1988 (Federal Republic of Nigeria, 1988).[5] This argument is being supported with an investigation of trends using data from the 1990 and 1999 NDHS.

Estimates of fertility obtained for 1983-1986 and 1987-1990 from the 1990 NDHS and for periods after 1990 from other surveys particularly the 1999 NDHS suggest that fertility has been declining since after the mid-eighties, at least among some sub-population groups. In the analysis of the quantum and tempo of fertility in Nigeria, Makinwa-Adebusoye and Feyisetan (op. cit.) obtained TFRs of 5.8 and 6.9 for women aged 15-44 in 1987-1990 and 1983-1986, respectively. For women 15-49, the corresponding figures for 1987-1990 and 1983-1986 are 6.2 and 7.4 respectively.[6] These figures imply almost a 17 per cent decline among women aged 15-49 and 16 per cent among women aged 15-44 during a four-year period. We also recognize that the amount of decline within the four-year period is unrealistically large, reflecting probably an overestimation of births for 1983-1986 and an underestimation for 1987-1990. However, there are reasons to believe that the TFRs for the two periods did not differ significantly from their real values and that there was a real decline in fertility shortly before 1990. First, the TFRs are highly consistent with desired fertility in the two periods. The TFR of 7.42 estimated for 1983-1986 is more consistent with the desired family size of 8.25 in 1981-1982 than the 1980-1982 TFR of 5.94 and the 1987-1990 TFR of 6.02 is highly consistent with the desired family size of 5.82 in 1990. Two, the decline in desired family size between 1981-1982 and 1990 support the argument in favour of a real decline in TFR; a decline in desired family size is usually an indication of a motivation to reduce child bearing propensities.[7] Three, the structural adjustment programme, introduced in 1986, was associated with economic conditions that increase the cost of child-rearing borne by the family. Thus, it is possible that part of the fall in the period-specific fertility rate reflects an adjustment of reproductive behaviour to sudden changes in the favourableeconomic climate.

Comparing evidence from the 1990 and 1999 NDHS indicates that the declining trend in fertility continued in the 1990s (table 3). According to the 1990 NDHS, the TFR for women aged 15-49 in the five-year period before the survey (1986-1990) is 6.3. The 1999 NDHS shows that the TFR for women of the same age group for the five-year period prior to the survey (1995-1999) is 5.2. This implies a decline of 17.5 per cent between the two periods. The decline occurred, however, in varying degrees among sub-population

5 The policy aims to achieve the following targets, among others; reduce the proportion of women who get married before the age of 18 years by 50 per cent by 1995 and by 80 per cent by the year 2000; extend the coverage of family planning service to 50 per cent of women of childbearing age by 1995 and 80 per cent by year 2000; and reduce the TFR from 6 to 4 children per woman by year 2000. Unfortunately, there were no measures to ensure the attainment of certain policy goals that have direct bearing on fertility or related factors, for example age at marriage and the number of children per woman.

6 A four-year reference period was adopted to minimize the impact of errors arising from shifting of birth dates, especially from 1985 to 1984. The four-year period adopted also minimizes the error of heaping on years ending with even digits by having equal number of years ending with even and odd digits. Reported and estimated births showed little difference for each four-year period adopted. The estimated births are three-year moving averages of reported births (see Makinwa-Adebusoye and Feyisetan, op. cit.).

7 Although the desired family size in 1990 may have been understated due to selection bias in the 1990 data, the difference in the desired family size between the two periods is too large to be totally accounted for by this factor.

Table 3
Age-specific fertility rates (per 1,000 women) and total fertility rates for the five-year period before the 1990 and 1999 NDHS

Background characteristic		Age of woman 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR 15-44	TFR 15-49
Place of residence										
Urban	1999	75	193	231	211	114	53	21	4.4	4.5
	1990	90	216	278	225	144	66	41	5.1	5.3
	Percentage change	-16.7	-10.6	-16.9	-6.2	-20.8	-19.7	-48.8	-13.7	-15.1
Rural	1999	126	233	243	233	150	78	25	5.3	5.4
	1990	167	285	280	235	174	103	74	6.2	6.6
	Percentage change	-24.6	-18.2	-13.2	-0.9	-13.8	-24.3	-66.2	-14.5	-18.2
Region										
South-East	1999	50	165	233	250	145	64	22	4.5	4.6
	1990	106	268	302	230	174	78	48	5.8	6.0
	Percentage change	-52.8	-38.4	-22.8	8.7	-16.7	-17.9	-54.2	-22.4	-23.3
South-West	1999	57	198	241	204	114	57	27	4.4	4.5
	1990	69	223	293	238	189	82	82	5.5	5.9
	Percentage change	-17.4	-11.2	-17.7	-14.3	-39.7	-30.5	-67.1	-20.0	-23.7
North-East	1999	204	282	277	272	182	117	27	6.7	6.8
	1990	202	299	277	242	156	120	61	6.5	6.8
	Percentage change	1.0	-5.7	0.0	12.4	16.7	-2.5	-55.7	3.1	0.0
North-West	1999	206	296	244	258	150	90	46	6.2	6.5
	1990	216	269	243	219	145	116	86	6.0	6.5
	Percentage change	-4.6	10.0	0.4	17.8	3.4	-22.4	-46.5	3.3	0.0
Education										
None	1999	222	292	251	222	143	74	23	6.0	6.1
	1990	213	283	270	225	172	102	68	6.3	6.7
	Percentage change	4.2	3.2	-7.0	-1.3	-16.9	-27.5	-66.2	-4.8	-9.0
Primary	1999	115	250	265	242	148	69	20	5.4	5.5
	1990	142	310	325	264	164	82	68	6.4	6.8
	Percentage change	-19.0	-19.4	-18.5	-8.3	-9.8	-15.9	-70.6	-15.6	-19.1
Secondary and higher	1999	37	146	209	220	112	54	38	3.9	4.1
	1990	65	187	250	204	104	27	79	4.2	4.6
	Percentage change	-43.1	-21.9	-16.4	7.8	7.7	100.0	-51.9	-7.1	-10.9
Contraceptive use										
Never used	1999	114	232	242	232	139	74	24	5.2	5.3
	1990	152	281	278	233	170	98	71	6.1	6.4
	Percentage change	-25.4	-17.4	-13.1	-0.6	-18.2	-25.2	-66.9	-14.8	-17.2
Ever used	1999	138	248	275	195	233	29	**	5.6	5.6
	1990	146	189	308	196	184	89	**	5.6	5.6
	Percentage change	-6.0	31.1	-10.8	-0.5	27.0	-67.9	**	0.0	0.0
Total	1999	111	220	239	226	138	71	24	5.0	5.1
	1990	145	267	279	232	167	96	68	5.9	6.3
	Percentage change	-23.4	-17.6	-14.3	-2.6	-17.4	-26.0	-64.7	-15.3	-19.0

groups. For example, 15.1 per cent and 18.2 per cent declines were recorded in urban and rural areas, respectively. When examined by region, the decline is clearly evident only in the two southern regions (south-east and south-west). With respect to education, the decline was about 9 per cent for women with no education, 19.1 per cent for women with primary education and 10.9 per cent for women with secondary or higher education. The same factors that account for the decline in the late 1980s continued to operate in the 1990s and are most probably responsible for most of the decline in the 1990s. That most sub-population groups experienced some decline in fertility tends to suggest the existence of some underlying stimuli for adjustment in reproductive behaviour to which people responded. As indicated above, because the onset of fertility decline coincided with the period of economic downturn in Nigeria (characterized by high unemployment rates, difficulties in meeting educational aspirations for own children as a result of an increase in the share of education costs that are borne by parents, devaluation of the currency which led to rising costs of essential goods, and partial withdrawal of subsidies on health and many social services), Makinwa-Adebusoye and Feyisetan (1994) concluded that economic crises at the societal and personal levels must have contributed to the decision to postpone or stop childbearing. In his study of the Yoruba in south-west Nigeria, Orubuloye (1998) also alluded to economic difficulties as the main factor underlying the decline in fertility. That the decline is more evident in the south than the north may be due to the fact that the pace of changes in the factors that elicit the decline or people's reactions to their impacts is more favourable to fertility decline in the former than in the latter.

In response to the stimuli, two things happened: the first is the postponement of the next birth, particularly by younger women, and the second is the reduction in the proportion of women making the transition from one parity to the next (table 4).[8] At the national level, fertility declined more rapidly among young women below age 20 and women aged 35 years and above. This pattern of decline by age supports the argument of a postponement of births by young women below age 20 and an increase in the proportion of women above 35 years who were stopping child bearing (or a reduction in the proportion of women transiting from one parity to the next within five years). That fertility declined among all age groups reinforces the assertion by Caldwell et al. (1992) that the African fertility transition will be characterized by fertility declines at all ages, both inside and outside marriage. This is because young adult attempts to avoid pregnancy and marriage and efforts at birth spacing by older women will continue to be important driving forces in the transition. The pace of fertility decline in the rural areas was almost equal to urban (table 3). Among the regions, the decline was most rapid in the south-west and lowest in the north-west and north-east. The reduction in fertility was positively associated with education. Of significance to this study is the observation that fertility is lower in the urban, among contraceptive users and more educated women at the two periods of time. The emergence of marked socio-economic differentials in fertility is perceived as

[8] Postponement of the next birth was deduced from a trend of an increase in median duration of birth intervals in the periods before the 1990 survey. Makinwa-Adebusoye and Feyisetan (op. cit.) noted that in the 16-20 and 11-15 years preceding the 1990 survey, the probability of moving from one birth order to another was high and the curves of the probabilities were fairly flat, reflecting a lack of deliberate fertility control. However, in the five years immediately preceding the survey, there was a reduction in the proportion of women making the transition from one parity to the next, especially after the fifth birth. The reduction in the proportion transiting from one birth to the next was higher in the urban, in the south, among more educated people and among contraceptive users.

Table 4
Median duration of birth intervals by age at birth and period before survey of birth of the preceding child, Nigeria, 1990[a]

Age in years at birth of preceding child	Period before survey of birth of preceding child	Parity transition 1-2	2-3	3-4	4-5	5-6
Below 15 years	0-3 years	31.82	**	**	**	**
	4-7 years	30.98	**	**	**	**
	8 years and above	28.10	**	**	**	**
15-19	0-3 years	31.42	32.80	31.29	**	**
	4-7 years	29.98	28.88	31.73	29.96	**
	8 years and above	27.02	26.87	26.02	26.04	**
20-24	0-3 years	29.18	31.57	32.03	32.44	29.73
	4-7 years	28.77	29.17	27.95	30.25	31.03
	8 years and above	27.44	27.46	26.91	27.29	25.86
25-29	0-3 years	34.60	42.13	33.83	35.87	32.92
	4-7 years	39.96	32.17	29.76	31.37	30.73
	8 years and above	28.86	28.33	28.07	28.78	27.39
30-34	0-3 years	**	32.98	31.83	35.26	36.62
	4-7 years	**	48.64	35.09	34.52	36.47
	8 years and above	**	26.62	29.85	28.72	30.18
35 years and above	0-3 years	**	**	45.00	39.75	42.63
	4-7 years	**	**	26.71	32.14	37.41
	8 years and above	**	**	32.15	25.25	34.48

Source: Makinwa-Adebusoye and Feyisetan.

[a] Median durations were obtained by fitting survival models to the NDHS data.

** Indicates cells with too few cases.

a catalyst (if not a precondition) for fertility decline. It must, however, be noted that the overall fertility decline reflects mostly the decline in the south.

FACTORS ASSOCIATED WITH FERTILITY DECLINE IN NIGERIA

In spite of the paucity of data, we have tried to demonstrate that an onset of a sustained fertility decline began, even if only among certain segments of the population, shortly before 1990. What factors contributed to the decline in fertility and what changes do we expect in these factors over time? What are the possible consequences of these changes on fertility in Nigeria? These are issues being addressed in this section.

Fertility desires

For declines in fertility to be sustained, there must be changes in fertility norms towards smaller family size. Fertility norms, usually reflected by the demand for children, are most often measured by the number of children desired under prevailing social and economic conditions. Although it is sometimes influenced by the number of living children, patterns of changes and differentials in desired fertility sometimes provide valuable insight into the probable future course of fertility. Consistent with the theory of the demographic transition, a future decline in fertility could be anticipated when fertility desires decline and become much lower than actual fertility. Changes in desired fertility reflect changes that would have occurred in achieved fertility had desires translated into behaviour. To make predictions about future course of fertility in Nigeria, there is the need to investigate patterns of change in fertility norms.

Table 5 shows the percentage of currently married women who wanted no more children together with the mean ideal number of children in 1981-1982, 1990 and 1999. Among three or more parity women, the parity-specific percentage of women wanting no more children increased between 1981-1982 and 1999. For instance, the percentage of women with four living children who wanted no more children increased from 5.4 in 1981-1982 to 16.9 in 1990 (an increase of about 300 per cent) and to 22.6 in 1999 (an increase of over 400 per cent).

The trend of a decline in the demand for children, portrayed by the percentages wanting no more children in 1981-1982 and 1990 was reinforced by data on mean

Table 5
Percentage of currently married women who want no more children and mean ideal number of children by number of living children

Number of living children	Percentage who want no more			Mean ideal number		
	1981-1982 WFS	1990 NDHS	1999 NDHS	1981-1982 WFS	1990 NDHS	1999 NDHS
0	3.6	1.4	2.2	7.7	5.5	6.6
1	2.5	3.3	1.0	7.9	5.6	6.2
2	2.2	5.1	5.1	7.6	5.7	6.2
3	4.4	8.8	11.0	8.1	6.1	6.2
4	5.4	16.9	22.6	8.3	6.0	6.5
5	6.7	24.0	32.5	9.0	7.1	7.1
6[a]	6.7	44.3	53.0	9.5	7.2	7.8
7	8.8			9.9		
8	23.0			10.6		
9+	24.4			12.6		
All	5.0	15.4	19.6	8.4	6.2	6.7

Sources: 1981-1982 data obtained from NPB/WFS, 1984, The Nigeria Fertility Survey, 1981-1982: Principal Report, vol. 1, Methodology and Findings, tables 6.3 and 6.8; 1990 data obtained from FOS/IRD/Macro, 1992, Nigeria Demographic and Health Survey, 1990, tables 6.3 and 6.5; 1999 data obtained from National Population Commission, 2000, Nigeria Demographic and Health Survey, 1999, tables 6.4 and 6.6

[a] Data for 1990 and 1999 NDHS is for 6 or more children.

ideal number of children (table 5), particularly if comparison was drawn between the 1981-1982 and 1999 data. Not only was the overall mean ideal number of children lower in 1999 (6.7 in 1999 as against 8.36 in 1981-1982), parity-specific mean ideal number of children was lower for all parities in 1990. With respect to the 1990 level, there is reason to believe that it is an artefact of data. Unlike in 1981-1982 and 1999, the overwhelming majority of women (61 per cent) in the 1990 NDHS gave non-numerical responses to the question on ideal number of children. On the other hand, only 18 per cent of women in the 1999 NDHS gave non-numerical responses to the question (NPC, 2000). Since the mean is calculated for women that gave numerical answers and since the desired family size of women who gave non-numerical responses is likely to exceed the average of the population (Bongaarts, 1992), the observed mean level in 1990 appeared an underestimation of the true value.

In the absence of the selection bias associated with the 1990 NDHS described above, it is very likely that the 1990 and 1999 data would have shown some decline in ideal number of children between the two periods. Two observations support the argument in favour of a continued decline in the demand for children between 1990 and 1999. The first is the consistency in the relationship between the percentage wanting no more children and the mean ideal number of children at the two points in time. The second is that wanted total fertility rates (WTFR) declined by one child or 17 per cent between the two periods—from 5.8 to 4.8 (table 6). The decline in WTFR is also evident for rural and urban residents and for all regions, with the exception of the north-east.

Support for a decline in desired family size after 1990, particularly in the south-west, is found in microstudies which show that the mean number was less than five between 1996 and 1997 (Orubuloye, op. cit.; Feyisetan, 1998). In Ado-Ekiti, Orubuloye found that the average number of children desired is 4.5 (2.4 boys and 2.1 girls). On what should be the ideal number of children per woman, Feyisetan found the average to be 4.3[9] for Ondo state and Orubuloye found the mean to be 4.6 for Ado-Ekiti. These figures are much lower than the mean number of children desired by women in the south-west in 1990.

Declines in desired fertility are expected to generate declines in actual fertility (Sathar and Casterline, 1998), especially if associated with increased contraceptive use. Even if there is yet no considerable decline in fertility, the observed trend of a decline in desired family size[10] provides some ground to predict further declines in Nigeria's fertility in the future.

[9] The mean ideal number stated by the husbands is 4.1.

[10] The observed trend of a decline in fertility is not likely to be reversed unless child mortality increases. Economic downturn in Nigeria has brought about the rationalization for smaller family size.

Table 6
The difference between total fertility rates and wanted total fertility rates in the 1990 and 1999 NDHS

	1990 NDHS				1999 NDHS			
Background characteristic	TFR	Wanted TFR	Absolute change	Percentage change	TFR	Wanted TFR	Absolute change	Percentage change
Residence								
Urban	5.0	4.8	−0.2	−4.0	4.5	4.2	−0.3	−6.7
Rural	6.3	6.1	−0.2	−3.2	5.4	5.1	−0.3	−5.6
Region								
South-East	5.6	5.2	−0.4	−7.1	4.6	4.2	−0.4	−8.7
South-West	5.5	5.2	−0.3	−5.5	4.5	4.2	−0.3	−6.7
North-East	6.5	6.2	−0.3	−4.6	6.8	6.4	−0.4	−5.9
North-West	6.6	6.6	0.0	0.0	6.5	6.0	−0.5	−7.7
Total	6.0	5.8	−0.2	−3.3	5.2	4.8	−0.4	−7.7

Marriage

The role of marriage in determining fertility levels in societies where most of child bearing is confined within marriage is well documented.[11] Changes in the proportion married as well as increases in age at marriage have been identified as one of the factors responsible for fertility decline in some North African countries (Fargues, 1989; National Research Council, 1982). In examining the factors responsible for differences in fertility among sub-population groups in Nigeria separately, Makinwa-Adebusoye and Feyisetan (1994), using Bongaarts framework (Bongaarts, 1978), found that marriage was the second most important factor. For the entire country, the fertility inhibiting effect of marriage is 25 per cent. Again, the national value masks the large differences among the regions (45 per cent in the south-west; 41 per cent in the Southeast; 9 per cent in the north-west and 8 per cent in the north-east), among education groups (9 per cent among non-educated women; 29 per cent among women with secondary education; and 54 per cent among women with secondary or higher education) and between rural and urban women (21 per cent rural and 36 per cent urban).[12] In spite of the increase in teenage pregnancy and fertility, the majority of births still occur within marriage.

But then, what have been the changes in marriage patterns in Nigeria? First, the proportion of women married is declining. For all women, this proportion declined by 10.6 per cent (from 78.4 per cent to 70.1 per cent) between 1990 and 1999. Second, the prevalence of polygynous[13] unions is declining and living arrangements are changing. The proportion of women in polygynous unions declined by 5.4 per cent for all women between 1990 and 1999. But, this difference is much greater for certain subgroups: 33.6 per cent for women in south-east and 18.9 per cent for women in the north-east. Unlike in the past, a considerable percentage of men with two or more wives no more keep the wives under the same roof. This is particularly true for men in the urban centres who house their wives in different locations within the city or in different cities. This living arrangement could lead to reduced coital frequency and consequently reduced fertility. Thirdly, age at marriage tends to be on the increase: among women aged 25-49 the median age at marriage increased by 1 year or 7 per cent between 1990 and 1999. Again, the national average masks the large differences among regions and between the urban and rural settings. Age at marriage is higher in the urban areas and among women in the southern regions. These patterns of differentials provide some grounds to expect further rises as the population becomes more urbanized[14] and more women attain higher education. The current economic condition in Nigeria, whose improvement may not immediately translate to improvement in the lives of a greater proportion of the population, has also been noted to favour increased age at marriage. The economic crises have made it more difficult (than it was in the seventies and eighties) for men to harness resources to meet marriage and childbearing obligations. Orubuloye (1998) noted that marriage is now generally delayed as many boys and girls postpone marriage in order to consolidate their careers and earning capacities. In addition, the strong desire for better education is aiding the postponement of marriage among many boys and girls.

Contraceptive use

The fertility inhibiting effect of contraception has been demonstrated by several studies (see Westoff and Bankole, 2001). Although somewhat small at present due to low prevalence and high use of less effective methods, in line with the experience of other countries (Westoff, 1990, Ross and Frankenberg, 1993, Cohen, 1998), the fertility inhibiting effect of contraception can be expected to increase as levels of contraceptive use increase,[15] especially if there is a shift to more effective methods.

Contraceptive use, particularly of modern methods, has increased in Nigeria since the early eighties. At the time of the 1981-1982 WFS, 6.2 per cent of women exposed to the risk of childbearing were using contraception and of these only 0.7 per cent were

[11] It has been observed that considerable percentages of childbearing take place outside the legal confines of marriage in African societies (Lesetedi et al., 1989) and that it is difficult sometimes to define when a marriage has actually been consummated (Feyisetan and Pebley, 1989; Meekers, 1992).

[12] The effect is higher among sub-population groups with higher age at marriage.

[13] As noted earlier, polygyny sometimes facilitates high fertility through competition for childbearing among co-wives. The competition tends to be greater where the proportion of husband's assets to be inherited by a spouse and her children depends on the number of children, especially of male children (Feyisetan and Togunde, 1988).

[14] The urban population of Nigeria has grown over the years and will continue to grow as a result of over-concentration of industrial establishments and social facilities in urban centres. The 1963 census of Nigeria indicated that 19 per cent of the population lived in urban areas and the 1990 NDHS gave the figure as 24.9 per cent, while the 1999 NDHS puts it at 31 per cent. Women in urban centres are generally more educated than their rural counterparts because the type of jobs available to them demands higher skills. Because they stay longer in school, they tend to marry later.

[15] This would be true if contraception was used for limiting and not merely as a substitute for other traditional means through which adequate birth intervals have been achieved.

using modern (efficient) methods. By 1990, 7.5 per cent of all women and 6 per cent of currently married women were using contraception. Of these 3.8 per cent of all women and 3.5 per cent of currently married women were using modern methods. By 1999, use of contraception has increased substantially: 15.7 per cent of all women were using any method and about 9 per cent were using modern methods. Among married women, use of contraception increased between 1990 and 1999 by 155 per cent, from 6 per cent to 15.3 per cent (table 7). Also, by 1999 about 9 per cent of married women were using modern methods. Contraceptive use has generally been higher in the south (especially south-west), in urban areas and among more educated women.[16] But an increase in contraceptive use has been experienced by most sub-groups between 1990 and 1999. For example, use of contraception increased by 233 per cent in the rural areas and by 76.6 per cent in urban areas. Similarly an increase of 55-167 per cent was recorded in the various regions (table 7).

Some developments in the provision of family planning services are expected to increase access to these services. First, the facility-based delivery of contraceptives is being complemented by the community-based distribution programme in order to reach more people. The community-based distribution programme is being implemented in many parts of Nigeria, including the north which has the greatest resistance to family planning services. Second, the participation of non-governmental organizations in the provision of family planning sensitization, education, counseling and delivery services has increased in recent years. In addition to meeting the already identified high unmet need for contraception in the country, these activities should be able to generate new demand for contraception. Several NGOs also offer reproductive health services to adolescents and these are expected to impact on adolescent pregnancies and fertility. Third, the integration of family planning and maternal and child health services under the primary health care system offers more opportunities to reach potential clients. Fourth, programmes have been designed and are still being designed, particularly by non-governmental organizations, to involve men in family planning activities. Fairly high levels of male participation in family planning have been documented for the south-west and Southeast (Feyisetan

[16] The patterns of differentials among sub-population groups show that contraceptive use in Nigeria is inversely related to desired family size. This finding has the implication that sustained decline in desired fertility will generate increased use of contraception, especially of the more efficient methods. Thus, the demand for contraception is becoming a function more of the demand for children (limiting) than for spacing.

Table 7
Proximate determinates of fertility and their indices, Nigeria 1990 and 1999

		Place of residence		Region of residence				
Background characteristic	Year	Urban	Rural	South-East	South-West	North-East	North-West	Total
Percentage married	1999	55.4	60.9	41.2	55.7	79.3	73.3	70.1
	1990	67.5	82.0	65.0	67.2	92.6	92.5	78.4
Percentage change		-17.9	-25.7	-36.6	-17.1	-14.4	-20.8	-10.6
Percentage polygynous	1999	30.9	37.7	20.2	34.6	40.3	41.0	38.7
	1990	33.6	42.9	30.4	38.4	49.7	43.6	40.9
Percentage change		-8.0	-12.1	-33.6	-9.9	-18.9	-6.0	-5.4
Median age at first marriage[a]	1999	19.4	17.3	20.2	20.2	14.7	15.1	18.3
	1990	19.0	16.3	18.3	19.7	15.4	15.2	17.1
Percentage change		2.1	6.1	10.4	2.5	-4.5	-0.7	7.0
Percentage using contraception	1999	23.4	12.0	23.5	26.2	3.2	3.1	15.3
	1990	14.8	3.6	8.8	15.0	1.2	2.0	6.0
Percentage change		58.1	233.3	167.0	74.7	166.7	55.0	155.0
Average duration of post-partum insusceptability	1999	12.4	16.7	12.9	13.8	17.2	16.1	15.5
	1990	15.1	19.9	15.9	17.0	19.9	21.2	19.0
Percentage change		-17.9	-16.1	-18.9	-18.8	-13.6	-24.1	-18.4
Index of post-partum amenorrhoea (C_i)[b]	1990	0.52	0.48	0.52	0.5	0.47	0.48	0.49
Index of contraception (C_c)[b]	1990	0.86	0.97	0.92	0.86	0.99	0.98	0.95
Index of marriage (C_m)[b]	1990	0.64	0.79		0.55	0.91	0.92	0.75

[a] Calculated for women aged 25-49.

[b] Obtained from Makinwa-Adebusoye and Feyisetan (1994).

et al., 1998). With increasing participation of men in family planning, a major barrier to contraceptive adoption would have been overcome and an increase in contraceptive use can be expected. Furthermore, the use of the mass media to promote family planning has been found to be effective in changing contraceptive behaviour in Nigeria (Bankole et al., 1999). Thus, the continued use of the mass media for IEC with respect to family planning is likely to lead to further increases in contraceptive use in the country.

Post-partum variables: breastfeeding, post-partum amenorrhoea and post-partum abstinence

Breastfeeding is universal in Nigeria and women traditionally breastfeed their children and abstain from sex for a fairly long period of time. Mothers usually abstain from sexual relations during breastfeeding.[17] Breastfeeding and the delay in the resumption of sex are known to lengthen the duration of amenorrhoea. An investigation of factors responsible for differences in fertility among sub-population groups in Nigeria reveals that postpartum infecundability has the greatest inhibiting effect on total fertility rate (Makinwa-Adebusoye and Feyisetan, op. cit.). Unfortunately, unlike marriage and contraception, duration of post-partum insusceptibility is negatively correlated with education and is lower in the urban areas. Thus, there is the assumption that the length of post-partum insusceptibility will decline in the face of modernization. So far, significant declines have not been observed and recent campaigns in favour of long periods of breastfeeding to secure better child health may even reverse any declining trend.[18] Between 1990 and 1999, the mean duration of post-partum insusceptibility declined by 3 months and this difference does not seem to vary much between rural and urban areas or by region (table 7). Moreover, increasing use of contraception for limiting (and not just as a substitute for traditional methods of spacing) may render insignificant the fertility-enhancing effect of decreasing post-partum insusceptibility period.[19]

Abortion

The impact of abortion on fertility has also been documented. An increase in abortion rate has usually been accompanied by a decline in fertility especially in high- to medium-fertility populations. Data on abortion are very scanty in Nigeria because the procedure is illegal. Henshaw et al. (1998) estimated the incidence of induced abortion in Nigeria in 1996. The results indicate that each year, Nigerian women obtain approximately 610,000 abortions, a rate of 25 abortions per 1,000 women aged 15-44. About 40 per cent of abortions are estimated to be performed by physicians in established health facilities, while the rest are performed by non-physician providers. Although it is difficult to determine precisely its incidence, evidence from health facility based studies suggest an increase in the incidence of abortion over time in Nigeria. Unfortunately, because it is illegal except under certain conditions, a high percentage of abortion in Nigeria is performed by unqualified personnel who only encourage their clients to seek modern medical care when there are complications. We have no reason to believe that the incidence of abortion will decline in Nigeria in the near future, whether it is made legal or not. Rather, continued decline in family size will generate higher demand for abortion services unless family planning services are greatly improved to meet demand.

Other factors

What other factors are likely to shape the future course of fertility in Nigeria. Several socio-economic factors have been identified to have indirect effect on fertility. However, two of them are briefly highlighted here: women's education and female employment. Studies have shown that the influence of education on fertility varies greatly between

[17] See Feyisetan (1990) for more discussion on traditional beliefs about lactation and post-partum abstinence among the Yoruba of Nigeria.

[18] A return to the practice of long duration of breastfeeding may be inevitable as many mothers do not have the resources to purchase breast-milk substitutes.

[19] According to the two rounds of the NDHS, the proportion of currently married women who are using contraception for limiting increased from 2.7 per cent in 1990 to 4.6 per cent in 1999.

countries with different levels of schooling (Jejeebhoy, 1995; Ian Diamond et al., 1999). However, in most cases, the relationship between women's education and fertility has been negative and several channels have been identified through which women's education influences fertility. In Nigeria, studies have consistently indicated lower fertility among women with secondary and higher levels of education, implying that significant increases in women's education at these levels will be accompanied by a decline in fertility. Female enrollment at all levels of education has increased over the years (FOS, 1997), and there is no reason to anticipate a reversal in the trend. Significant regional variations exist, however, in the increase.

The participation of women in the labour force has also increased over the years in Nigeria. However, decreasing employment prospects are reducing the impact of employment. Women employed in the formal sector have usually been noted to have fewer children[20] but unemployment is also becoming associated with lower fertility. Like their male counterparts, being unemployed denies women the access to resources with which to prepare for marriage and child-rearing immediately after leaving school. Thus, they are forced to postpone marriage and child-rearing in order to consolidate their earnings capacity. Because men's resources are becoming increasingly inadequate to meet household needs, increasing proportions of men now look for employed women as partners, thus reducing marriage chances of unemployed women.

Where do we go from here? An extensive discussion of recent trends in fertility and its determinants has been undertaken in order to guide our assessment of the future course of fertility in Nigeria. Thus far, our discussion has pointed to one conclusion: a sustained decline in fertility has started in Nigeria and a further decline is imminent. But certain pertinent questions remain unanswered yet: At what rate is fertility going to decline, how far will it go before it stabilizes and how soon will it reach the stabilization point? To answer these questions, an assessment of two recent projections for Nigeria is undertaken.

Future course of fertility in Nigeria

When is a fertility transition completed? How long does it take to complete the transition? What determines the level at which fertility stabilizes at the end of the transition? Ordinarily, fertility transition would be perceived as completed when there is retardation in fertility decline or stabilization of fertility level after years of continuous decline. Although it is usually assumed that a replacement level of about 2.1 births per woman will prevail in the long run, demographic theories did not indicate what the level of fertility will be at the end of the transition.[21] Fertility levels reached replacement level of 2.1 births per woman in several developed countries by the time fertility transitions were completed. In fact in several of them, fertility levels are below replacement levels. On how long it takes to complete a fertility transition, the experience of the developed countries has shown that the duration is a function of the pace of fertility decline and the eventual level at which fertility stabilizes. While the pace of decline depends on the speed of change in the proximate and social factors discussed above, the eventual level of fertility is a function of societal and individual values for children in themselves determined by perceived relative costs and benefits of having children.

In determining the level at which we expect fertility in Nigeria to settle when the current transition is completed, we recognize that as in several African societies, fertility in Nigeria is rooted on cultural beliefs and practices. In addition, it is also influenced by mortality conditions. Several issues must be considered before an adequate assessment of future level can be done. The observation in Wolfgang (1996) that it is difficult to predict what the eventual fertility level will be at the time fertility transition is completed in developing countries is pertinent to Nigeria. Not only is it difficult to predict the eventual level, it is also difficult to predict the speed of decline with high level of accuracy.

[20] This is usually explained in terms of the incompatibility between their work and child-rearing.

[21] Since the number of births needed to attain replacement level also depends on the schedule of mortality, it appears more appropriate to think of replacement level as 2.1 surviving children per woman.

Projecting Nigeria's fertility into the future is not novel. Fertility projections have been carried out for Nigeria and revisions have been undertaken when necessary. No attempt is made here to provide new sets of fertility projections. Rather, we assess two recent fertility projections for Nigeria (table 8). The first one is the 1998 revision of the United Nations, and the second is the 1997 projections by the National Population Commission, Lagos, Nigeria. As usual, the United Nations projections assumed three fertility scenarios for Nigeria: high, medium and low. The three scenarios differ in levels of fertility at the beginning of projection periods and assumed pace of decline. From a TFR of 5.55 in 1995-2000, the United Nations high variant scenario projects that TFR will reach 2.6 by the year 2050, by which time a replacement level would not have been reached. The medium variant, usually assumed to approximate most closely the fertility experience of a country, predicts that fertility in Nigeria will reach a replacement level at a TFR of 2.20 by the year 2040. From an initial TFR of 5.00 in 1995-2000, the low fertility variant projects that fertility will reach replacement level at a TFR of 2.28 around 2030 and that fertility will go below replacement level before transition is completed (United Nations, 1998).

For the projections by the National Population Commission, the fertility inputs were based on Gross Reproduction Rates (GRR) obtained by applying a sex ratio of 1.002 to the TFRs estimated from the 1991 post-enumeration survey (NPC, 1997). Three fertility scenarios were also projected and projection started in the 1990-1995 period. In the high variant, TFR, estimated to be 5.73 in 1990-1995, was projected to reach 5.45 in 1995-2000 and a replacement level of 2.13 after 70 years (around the year 2060). The medium variant scenario predicts that TFR would be 5.39 in 1995-2000 and will reach a replacement level at 2.16 births per woman after 60 years (around the year 2050). With the low-variant projection, fertility is expected to reach a replacement level at a TFR of 2.19 after 50 years (around the year 2040). Projections were also made for each state of Nigeria.

Besides the difference in the initial projection period, the two projections differ mainly in their assumed pace of decline. For all scenarios, the projections by the NPC assumed a slower pace of decline, thus explaining why their target periods for attaining replacement levels were farther from the beginning of projection periods than for United Nations: the periods estimated by NPC for fertility to reach replacement levels were 10 years behind the United Nations.

Table 8
Projections of Nigeria's fertility

	United Nations, 1998			National Population Commission, 1997		
Period	High	Medium	Low	High	Medium	
1990-1995				5.73	5.71	5.68
1995-2000	5.55	5.15	5.00	5.45	5.39	5.29
2000-2005	5.16	4.74	4.55	5.18	5.07	4.91
2005-2010	4.76	4.34	4.09	4.91	4.74	4.52
2010-2015	4.37	3.93	3.64	4.63	4.42	4.13
2015-2020	3.98	3.52	3.19	4.35	4.09	3.74
2020-2025	3.58	3.12	2.73 (1.15)	4.07	3.77	3.35
2025-2030	3.19	2.71 (1.18)	2.28 (0.99)	3.80	3.45	2.97
2030-2035				3.52	3.13	2.54
2035-2040	2.70	2.20 (0.99)	1.71 (0.77)	3.24	2.80	2.19
2040-2045				2.97	2.48	
2045-2050	2.60 (1.20)	2.10 (0.97)	1.60 (0.74)	2.96	2.16	
2050-2055				2.41		
2055-2060				2.13		

These projections provide plausible ranges of fertility levels in the future. On the basis of the medium-variant projections, fertility in Nigeria will reach a replacement level by 2040-2050.[22] Support for continuing decline in fertility, as the two projections assumed, is strong. The three preconditions for fertility decline appear to have been met: couples now have knowledge of contraception; methods are becoming "increasingly" available; and the downturn in the economy with its associated increase in child-rearing costs has facilitated the rationalization of smaller family sizes. Future improvements in the economy are not likely to reverse the downward trend in desired family size as couples and individuals would have come to appreciate more the benefits of small family sizes. The downward trend in the demand for children together with the changes in the proximate and social determinants of fertility discussed above will continue to exert downward pressure on fertility. The proportion of couples desiring four or fewer children will, as our data have shown for the recent past, continue to grow.

But can we assume that the overall level of fertility in Nigeria will decline as rapidly as implied by the projections considering the sociocultural and political environment within which such declines are expected? Whereas the possibility of eventually reaching replacement level cannot be dismissed, it is, however, highly improbable that Nigeria will reach a replacement level by the target years implied by the two projections. It is more realistic to think of a TFR for the whole nation of between 2.6 and 3 by the year 2050 for reasons given below.

[22] We identify more with the medium variant projection of the National Population Commission as it appears most realistic, particularly because of its slower pace of decline. However, it is unrealistic to assume that fertility will decline by a constant proportion of a birth per projection period at every level of fertility. Considering the cultural value attached to procreation, it may be more difficult to experience further declines when TFR reaches 3 than it is now, except programmes are put in place to make personal freedom and satisfaction more important than group survival. Besides, the level of socio-economic disparity between the regions does not support the assumption that fertility will reach replacement level at the same time in all the regions.

Uncertainties about child survival

The theoretical linkages between infant and child mortality and fertility are well known. Increased child survival chances are expected to generate a decline in the propensity to "hoard" or "replace", two mechanisms by which families were perceived to have ensured the attainment of desired family size. Whereas the hoarding or insurance effect is conditioned by the general perception of mortality risks at the societal level, the replacement reflects the families' response to actual child mortality experience. The theoretical links have no doubt been difficult to support in empirical analysis; however, fertility declines which have accompanied reductions in infant and child mortality in several countries have lent credence to these hypotheses. In addition, the Working Group on Factors Affecting Contraceptive Use in sub-Saharan Africa (1993) noted among other things that:

> "Although positive correlations between child mortality and fertility do not prove a causal relationship, because of the possibility of a common cause, we think the uncertain survival of children in Africa remains one of the strong motivations for high fertility".

There is no doubt that several countries have achieved significant reductions in fertility levels without considerable improvements in child survival. In these countries, however, the two declined simultaneously. There is, however, no evidence of a country that reached a replacement level of about 2.1 births per woman with high levels of child mortality. All countries that reached replacement level (or below) brought child mortality risks under control and kept them at low levels. In these countries, families are convinced of high survival chances for their children, thus rendering the propensity to hoard meaningless.

Unfortunately, the situation in Nigeria is different. Some families in Nigeria still face high risks of infant and child death and recent data do not give much room to hope for considerable improvements in the future. Although projections by the United Nations indicate continuing decline in infant and child mortality, information from other sources does not support such optimism. As can be inferred from table 9, the initial decline in childhood mortality which appeared to have started in the sixties has been stalled at high levels. UNDP estimates show that under-five mortality has remained above 190 per thousand births since the early nineties. The UNDP estimates confirm the general

Table 9
Measures of mortality in Nigeria

Period covered	CDR	IMR	CMR	Under-five mortality rate	Source
1965-1966	26.9	178			FOS, Lagos, Nation Rural Demographic Sample Survey, 1965-1966
1965-1969		109.7	202.2		NPB, Lagos, Nigeria Fertility Survey, 1981-1982
1970-1974		96.6	178.7		NPB, Lagos, Nigeria Fertility Survey, 1981-1982
1975-1979		84.8	144.5		NPB, Lagos, Nigeria Fertility Survey, 1981-1982
1986-1990		87.2	115.2	192.4	FOS, Lagos and IRD/Macro International Nigeria Demographic and Health Survey, 1990
1990-1995		86		147	UN, World Population Prospects, 1998
1994		82		191[a]	UNDP, Human Development Report, 1997
1996		114		191	UNDP, Human Development Report, 1998
1995-1999		75.2	70.3	140.2	National Population Commission, Lagos

[a] From 1995.

suspicion of an increase in childhood mortality in Nigeria. Whereas the decline between the sixties and the eighties might have generated a reduction in the amount of hoarding families perceived as necessary to achieve desired family size, lack of further declines may stall further reductions in the amount of hoarding and consequently in fertility. High childhood mortality risks create a fear of extinction which is balanced by having many births. Until families perceive high survival chances for their children, they would continue to have excess births, thus delaying the process of attaining replacement level.

It is not clear the extent of improvements that could be expected in child survival in the next few years. Much depends on public health policies. With dwindling external sources of fund, the Government has to increase the percentage of its expenditure on health.

HIV/AIDS epidemic

The emergence of HIV/AIDS has added a new dimension to the equation. It is yet to be determined what impact the disease will have on fertility. Initial evidence from Uganda suggests that the infection may lead to lower fertility due to its impact on women of childbearing age (Ntozi et al., 2001). The argument is that death and sickness associated with HIV/AIDS among women may cause the birth rates to fall. It has also been suggested that the increasing adult and child mortality due to AIDS in some countries of sub-Saharan Africa could lead couples to be conscious of the need to limit childbearing. In a qualitative study among men and women in Zimbabwe "most respondents said that they would have fewer children as a result of the perceived increase in child mortality" (Grieser et al., 2001). Also, many of the respondents also said that they wanted to limit childbearing due to concern about their own mortality and its effect on the children. On the other hand, however, the argument can be made that fear of dying from AIDS or losing a child to the disease may increase fertility, at least on the short run. Therefore, young people who perceive that they may contract HIV or die of AIDS may decide to marry early and have children as soon as possible. Secondly, couples who fear that they may lose some of their children due to AIDS may decide to have more children as an insurance strategy in case some of them do die. According to the study in Zimbabwe mentioned above, this possibility was also expressed by the respondents. It also has been found in Zimbabwe and Uganda that some individuals may decide to have children to determine their HIV status (Ankrah, 1991). Although still relatively low compared to the situation in some sub-Saharan African countries, the prevalence of HIV in Nigeria seems to be on the increase. A recently review of estimates of the prevalence of HIV in Nigeria (Panchaud et al., (2000) indicated that the national prevalence increased from 1.4 per cent in 1991-1992 to 3.8 per cent in 1993-1994, 4.5 per cent in 1995-1996 and 5.4 per cent in

1999. Although not readily available, both the number of AIDS deaths and the number of AIDS orphans must have been rising steadily since early 1990 and are expected to continue to do so, at least in the foreseeable future. Although more remote than the other alternative, the fact that fertility and the expectation of having at least one surviving child are still high in the country may cause a stall or slow the process of the decline.

Inadequate Government support for family programme

That the magnitude of future decline in fertility depends on increases in contraceptive prevalence is not in doubt.[23] In almost all the countries that have experienced significant reduction in fertility levels (or have reached replacement levels), Government has demonstrated strong support for fertility control programmes. Unfortunately, the same cannot be said of Nigeria currently. Family planning delivery services in Nigeria have been heavily donor-dependent. Government participation has been limited to the provision of delivery points and technical staff (Feyisetan, 1998). The situation is compounded by the fact that non-governmental agencies involved in family planning service delivery also depend heavily on external funding with the result that their areas of operation may be influenced to some extent by the interests of their donor agencies.

A national programme cannot be sustained for long on external support. Unless drastic measures are adopted to source funds internally, particularly in the face of dwindling external support, it may be difficult to sustain the present momentum in family planning service delivery. With a downturn in the economy, it is doubtful if the Government will make adequate resources available to maintain the current tempo of activities. Unfortunately, increased participation of the private sector is also doubtful since the delivery of family planning services and commodities may not generate quick returns for investment, unless it is commercialized. And as Orubuloye (1998) noted, the use of family planning may be restricted in the future not by lack of acceptance but rather by inability to afford the cost of services. Thus, it is counter-productive to increase the cost of commodities significantly at this stage. To maintain current levels of use, much less to talk of increasing the levels, improved quality services must be made available at affordable cost. With the participation of the private sector being doubtful and the withdrawal (or inadequacy) of external funding inevitable, the pace of increase in contraceptive use may decline and its fertility-inhibiting effect will become smaller than has been anticipated in the current projections. The lack of concrete and targeted support by the Government for family planning may be a major reason why the national population policy released in 1988 failed to meet most of its targets. For example, the policy expected to "extend the coverage of family planning service to 50 per cent of women of childbearing age by 1995 and 80 per cent by year 2000" (Federal Republic of Nigeria, 1988). There is no doubt that accelerated increase in contraceptive use can speed up the pace of the decline in fertility. As implied from tables 5 and 6 there is latent demand for contraception and this demand is increasing. However, as table 6 also shows, the widening gap between the TFR and WTFR also suggests that women may be increasingly finding it difficult to achieve their desire for fewer children. This should be a motivation for the Government to play a more active role in supporting and financing family planning.

Regional disparities in fertility decline

The current decline in fertility observed at the national level reflects mostly the decline in the south, particularly the south-west. There has been little change in the north. The north is still characterized by high numbers of women transiting to higher parities (Makinwa-Adebusoye and Feyisetan, 1994). In order to reach a replacement level by the target years, the NPC projections assumed a higher pace of decline in the north. Support for this assumption is weak as the conditions for rapid fertility declines are currently absent in that

23 Again, it must be emphasized that the present pattern of using contraception as a substitute for traditional spacing methods in African countries (Bledsoe et al., 1998) must change. Contraception must be used more for limiting than for spacing.

region: education of the women, contraceptive use and the status of women (particularly with respect to childbearing decisions) are generally low.

With more than half of women of childbearing ages residing in the north, further declines in the south (particularly in the south-west where less than one-quarter of the women reside) without accelerated declines in the north will have little impact on the overall level over time. Overall level of fertility will show marked reduction only when fertility declines significantly among a majority of the population. Programmes must be designed to create an environment conducive to fertility decline, especially in the north. Education of the girl child must be intensified and programmes must be designed to encourage increased age at marriage and contraceptive use. The present pattern of regional disparity in fertility decline cannot be sustained for long for reasons that are discussed below.

Fear of domination by one ethnic group/ the political arrangement

Unlike the experience of several developed countries, Nigeria is composed of major ethnic groups that have struggled against one another for several years to control power at the centre. With populations that have strong affiliation to their ethnic groups and with a return to party politics, numerical strength thus plays a crucial role in the determination of which group controls power at the centre. As earlier indicated, the decline in fertility, observed at the national level, results mainly from the south, especially the south-west. Very soon, politicians are likely to be conscious of the impact of the regional differences in fertility on the populations of their regions as well as the implications for their ability to have access to power at the centre. Unless reduction in fertility becomes accelerated in other regions of the country and unless there is political re-orientation or restructuring that engenders national as against sectional thinking, politicians, especially from the south, may formulate policies that reduce child-rearing cost in order to stall further declines in fertility.

The possible impact of politics on the pace of decline is compounded by certain economic measures. Currently, population factor accounts for a significant component of the formula for revenue allocation to the states and by implication to the regions. The amount of national resources accruing to a region through the states and local governments depends partially on its population. As a major determinant of population growth, further declines in fertility may be stalled by regional Government policies in order to ensure that the populations of their regions compare favourable with those of others.

CONCLUSION

Asserting that an onset of a sustained fertility transition has begun in a country like Nigeria where comparable multiple national surveys are lacking is likely to generate a lot of debate. In addition, such an assertion is likely to be dismissed by several researchers on the ground that the decline in overall fertility level reflects mainly the experience of just one section of the country. However, we argue that, as in other societies that have gone through fertility transition, the situation in Nigeria is not unique. Fertility transition has always begun among some segments of the population from where it spread to others. Thus, women in the south, particularly in the south-west can be regarded as demographic innovators. It is hoped that the current transition which has begun, particularly in the south-west, will spread to other parts of the country to accelerate the speed of decline.

We have demonstrated in this paper that desired fertility has declined over time. In the south-west, where there are comparable multiple surveys, a consistent decline in desired family size has been observed. The decline in desired family size (which appeared to be a response to the downturn in the economy in the late eighties) was an important underlying force for the current fertility transition. Other factors which were associated with the decline in fertility include increased use of contraception, changes in nuptiality patterns, particularly in the proportion marrying before age 20, and increased education of women. Further declines in desired family size coupled with increased use of contraception for limiting, rather than as a substitute for traditional birth spacing methods, increases in age at marriage and education of women are expected to generate further declines in fertility.

Further declines in fertility are not in doubt and the possibility of fertility in Nigeria eventually reaching a replacement level can also not be dismissed. However, the speed of decline implied by the projections appears too rapid and hence unrealistic in the face of the socio-economic and political environment in which further fertility changes are expected. We have identified five issues which may slow down the pace of decline or even stall the decline before replacement level is reached. Those issues have to be addressed urgently if significant declines are expected in the future. It does not appear feasible to reach replacement level in the next 48 years under the existing socio-economic and political environment.

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Fertility decline in the Philippines: current status, future prospects

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Demographers have been closely monitoring the trend in fertility in the Philippines since the 1960s. The first national survey that included detailed measurement of reproductive behaviours and childbearing desires was the 1968 National Demographic Survey. Almost simultaneously, and by no means coincidentally, the reduction of the rate of population growth was articulated as national policy, followed soon thereafter by the provision of family planning services through Government outlets beginning in the early 1970s. Successive National Demographic Surveys (NDS) were conducted at five-year intervals, with the 1968 NDS followed by the 1973 NDS and continuing through the 1998 National Demographic and Health Survey, seven surveys in total. Few countries in any region of the world—developing or developed—have maintained periodic and comprehensive measurement of reproductive behaviour and its components over such an extended period of time. The trajectory of fertility decline is better understood, and with more precision, in the Philippines than in most countries.

The plethora of demographic data has by no means quelled the debates surrounding fertility levels and trends in the Philippines. In the early years, the demographic data provided some indications that the Philippines might follow the rapid fertility path of East Asian nations such as the Republic of Korea and Taiwan Province of China: fertility estimates from the 1978 national survey showed that fertility decline had accelerated during the 1970s, in step with the expanded availability of family planning services in the first half of the decade. But later surveys revealed that a rapid pace of decline was not maintained. Instead, brief bursts of rapid decline were followed by longer stretches of languid decline (Zablan, 2000). The overall picture is of a fertility transition that has proceeded far more slowly than most neighbouring countries in East and South-East Asia, and at the beginning of this decade the TFR was approximately 3.5 births per woman, a substantial distance above replacement level. A review of the past three decades shows that, when the Government policy has included explicit goals, the amount of fertility decline has consistently fallen short of those goals (Zablan, 2000). The related questions that have prompted a two-decades-old debate are: Why has fertility not declined more rapidly in the Philippines? What sets the Philippines' experience apart from neighbouring countries such as Indonesia, Malaysia, Thailand, the Republic of Korea and Viet Nam?

These questions are retrospective. In this paper, our concern is prospective: Where is fertility heading in the next few decades? When, if ever, is the Philippines likely to attain replacement-level fertility? As a pivoting point for this discussion, we note that the most recent projections by the United Nations Population Division—the 2000 Revision (United Nations, 2001)—show replacement-level fertility (TFR = 2.1) attained in the period 2015-2020, i.e., roughly 15 years from the present. Our aim in this paper is to evaluate the reasonableness of this projection and, more specifically, to consider what factors (social, economic, cultural, programmatic) might facilitate, or impede, the progression of fertility from its current level in excess of three births per woman to a national average of two births per woman.

FERTILITY TRENDS

Fertility in the Philippines has experienced continuous decline from the 1950s to the present. This is shown in table 1, which presents TFRs from the United Nations estimates and projections along with the direct estimates provided by the National Demographic Surveys. There is agreement that the TFR exceeded six births per woman in the 1960s, fell below five births per woman in the 1980s, and fell below four births per woman during the 1990s. While the decline in fertility has been monotonic (and relatively steady according to the United Nations, unevenly paced according to the unadjusted survey estimates), except for the mid-1980s it has rarely been rapid, averaging 1-2 per cent per annum during most of the three decades from 1970 to the present. As a result, while the Philippines' TFR was in excess of 3.5 births per woman in the mid-1990s, the TFRs at approximately the same time in Malaysia and Indonesia were 3.2 and 2.8, respectively, and in Viet Nam, Thailand and Singapore, 2.3, 2.0 and 1.7, respectively (United Nations, 2001).

Table 1 makes clear what must occur if the Philippines is to conform to the scenario described in the United Nations projections: in percentage terms, the pace of decline must quicken in the next 15 years. To the contrary, the unadjusted NDS estimates show, if anything, a slackening in the rate of decline in percentage terms during the 1990s as compared to the 1980s; this must be reversed if the United Nations projection is to prove correct. The remainder of the paper will consider whether this is plausible, given what is known about reproductive behaviour and its determinants in the Philippines.

A bit more comparative analysis of TFRs underscores the challenge of achieving replacement-level fertility in 15 years. The 1997 Indonesia DHS shows a TFR in urban areas of 2.4, i.e., not far above replacement. In contrast, the 1998 Philippines NDHS shows an urban TFR of 3.0—to be sure, a one-half birth decline from the 1993 estimate, but still almost one birth above replacement. That is, even in the segment of the population that one would expect to be more inclined towards small families, fertility remains substantially above replacement. The comparison of rural TFRs is even starker: 3.0 in the 1997 Indonesia DHS, as against 4.7 in the 1998 Philippines NDHS. Moreover, the rural TFR from the 1998 NDHS is but one tenth of a birth lower than the rural TFR from the 1993 NDHS; that is, rural fertility in the 1990s appears to be relatively stagnant at a high level. Finally, we note that there are significant differences in fertility levels by region. For example, fertility is more than twice as high in the Eastern Visayas and Bicol Regions (with total fertility rates well over five births per woman) than in Metro Manila (with a rate of 2.5 births per woman); the former two regions have relatively low levels of development.

Table 1
Total fertility rates: trends and estimates

	United Nations (2001)[a]		National Demographic Surveys		
Period	TFR	Percentage change	Period	TFR	Percentage change
1950-1955	7.29				
1955-1960	7.13	-2.2			
1960-1965	6.85	-3.9	1958-1962	6.49	—
1965-1970	6.50	-5.7	1963-1967	6.34	-2.3
1970-1975	6.00	-7.7	1968-1972	5.97	-5.8
1975-1980	5.50	-8.3	1973-1977	5.24	-12.2
1980-1985	4.95	-10.0	1978-1982	5.08	-3.0
1985-1990	4.55	-8.1	1983-1987	4.26	-16.1
1990-1995	4.14	-9.0	1990-1992	4.09	-4.0
1995-2000	3.64	-12.1	1995-1997	3.73	-8.8
2000-2005	3.24	-11.0			
2005-2010	2.79	-13.9			
2010-2015	2.33	-16.5			
2015-2020	2.10	-9.9			
2020-2025	2.10	0.0			

Source: United Nations, United Nations, 2001. NDS, de Guzman, 1994; World Bank, 1991; National Statistics Office and Macro International, 1994 and 1999.

[a] For 2000-2020, medium variant.

Before evaluating future prospects, for the purposes of documentation we also present estimates in table 2 of trends in two major proximate determinants of fertility: nuptiality and contraceptive practice. There has been surprisingly little change in the timing of entrance to first marriage. This is yet another respect in which the Philippines' experience in the past four decades differs from most other Asian societies. In the 1960s, average age at first marriage was rather late by Asian standards. However, because it has remained stable over time, age at first marriage is now lower on average in the Philippines than some neighbouring Asian societies, especially those to the north (China, the Republic of Korea), which suggests there is some scope for marriage delay during the next few decades to exert downward pressure on fertility, a point to which we return. Table 2 also shows the trend in contraceptive prevalence among married women ages 15-44 years over the period 1968 to 1998. The most important observation is that there has been a threefold increase in contraceptive prevalence over the span of three decades, most of this due to increased use of modern methods. Without doubt, this has been the primary direct cause of the fertility decline shown in table 1. A noteworthy feature of contraceptive practice in the Philippines is the heavy reliance on traditional methods (both periodic abstinence and withdrawal). In the 1998 NDHS, the total contraceptive prevalence rate is estimated at 46.5 per cent, and roughly 40 per cent of this can be attributed to the use of traditional methods.

The remainder of this paper considers future prospects, and in particular the likelihood of fertility falling to replacement level (i.e., roughly two births per woman on average) during the next few decades. We first discuss likely trends in desired fertility. This is followed by consideration of two factors that might act against the realization of desired levels of fertility: unwanted fertility, which will act to raise fertility above desired levels; and nuptiality changes, which could act to depress or elevate fertility but which seem most likely to depress fertility.

DESIRED FERTILITY

It is improbable that fertility in the Philippines would fall to replacement level unless desired fertility also approximated replacement level. In this section, we examine average fertility desires as revealed by the national surveys conducted in the 1990s, and then consider a set of factors that in our judgement are key determinants of future trends in desired fertility.

According to the 1998 NDHS, the wanted fertility rate for the country as a whole was 2.7 children per woman during the mid-1990s, more than one-half child above replacement. Even in the urban areas, where about one half of the currently married women were using a contraceptive method, the wanted fertility rate was slightly higher (2.3) than replacement but somewhat lower than in 1993 (2.6). The rate for college-educated women was estimated at 2.5 in 1998 and 2.4 in 1993. That is, to date the wanted fertility of neither urban nor college-educated Filipinas has fallen to replacement level. By way of comparison, the 1997 DHS in Indonesia shows a wanted fertility rate of 2.0 in urban areas and 2.2 for secondary or higher educated women. In rural areas in the Philippines, desired fertility remains some distance from replacement: the wanted fertility rate in 1998 was 3.3, exactly the same rate as in 1993.

Table 2
Trends in age at first marriage and contraceptive use, the Philippines, 1968-1998

	Nuptiality	Contraceptive prevalence[a]		
Survey	Averagerage at first marriage[b]	Modern methods	Traditional methods	Total
1968 NDHS	23.4	2.9	11.5	15.4
1973 NDHS	23.8	10.7	6.7	17.4
1978 RPFS	24.5	17.2	21.3	38.5
1983 NDHS	23.3	18.9	13.1	32.0
1988 NDHS	23.8	21.6	14.5	36.1
1993 NDHS[c]	23.4	24.9	15.1	40.0
1998 NDHS[c]	23.5	28.2	18.3	46.5

Source: World Bank, 1991; National Statistics Office and Macro International, 1994 and 1999.

[a] Currently married women aged 15-44.
[b] Singulate mean age at marriage.
[c] Currently married women aged 15-49.

Despite the persistence through the 1990s of wanted fertility rates well above two births per woman in most segments of the population, the possibility that wanted fertility might fall to replacement level during the next two decades cannot be dismissed out of hand. In our view, there are three sets of factors that bear most critically on trends in fertility desires. Although each merits extended analysis, space only permits brief commentary.

Economy

The complex relationship between population growth and economic development has been thoughtfully analysed by other scholars (Orbeta and Pernia, 1999). Undoubtedly the relationship works in both directions, with demographic parameters affecting economic change and economic factors affecting vital rates. Our more focused interest here is the effect of the economy on fertility. In general, economic conditions in the Philippines have compared unfavourably with many other Asian countries since the 1970s. GNP per capita has been subject to low, and at times negative, rates of growth. Income inequality, unemployment and underemployment, and urban-rural and regional disparities in economic opportunities have all led to the persistence of widespread poverty. These economic conditions, in our judgement, help explain the unchanged preference for an average of three children among rural women during the 1990s. One of the most widely accepted hypotheses concerning the relationship between economy and desired fertility is that increasing household income makes children less affordable, leading to a decreasing demand for children as well as an increasing demand for "higher quality" children—a "quality-quantity tradeoff". In major segments of the Philippines population, however, the desire for more than two children is linked to the prevailing cultural expectation of children as a means of financial assistance. Children are valued for their assistance in household chores, their contribution to family income (e.g., working on the farm), and as a source of financial security for parents in old age. Unless the Philippines economy offers substantially more opportunity and security, we expect major segments of the population to desire on average more than two children for some years to come. (In the same vein, Orbeta and Pernia (1999) conclude that further declines in desired family size may require well-targeted human capital investments along with employment-generating economic growth, especially formal-sector employment for women.)

One specific economic factor that bears particular attention is female labour force participation. Generally labour force participation of women has a depressing effect on desired fertility. In the Philippines, the percentage of women working, whether full-time or part-time, is relatively high (approximately 37 per cent according to the 1998 NDHS). However, a majority of these women work in the informal sector, where childbearing is less incompatible with work. Moreover, low-cost or free (e.g., near-kin) domestic help is available to an unusual extent in Philippine society, rendering the opportunity cost of childbearing for women comparatively low. In addition, because a relatively small fraction of women work in the formal sector, labour force participation does not have the empowering effects (with respect to reproductive and related decisions) that one might expect. Hence female labour force participation in the Philippines has not had the overall impact on fertility desires that the relatively high employment rates might lead one to expect.

Culture, values and ideas

A large majority of the Philippine population professes allegiance to the Roman Catholic faith. There is also a sizeable Muslim minority in the southern Philippines. A common explanation for the slow pace of fertility decline in the Philippines as compared to other Asian countries is the alleged pronatalism of these two religions. Our view is that religion does not exercise a strong direct influence on fertility desires, but that it is a major factor influencing population policy and programmes. Church opposition to contraception has been a major factor in preventing the Government—both national and local—from committing funds for population programmes. This in turn fosters a social climate that works against coalescence around an explicit two-child norm. Furthermore, in Philippine society there is a norm against having but one child, because most parents believe that it is not healthy to grow up alone without siblings. Newlyweds or couples who are without children are often objects of curiosity and jokes—it is assumed that something must be wrong with the relationship if marriage does not result in childbearing. There is no preference for sons or daughters, rather a strong preference for having both a son and a daughter, an outcome many couples will not achieve if they have just two children. All of these cultural factors work against a decline in wanted fertility and would need to weaken or disappear if a two-child norm is to take hold over the next few decades.

Perhaps more fundamentally, at present there is no widespread conviction that limiting childbearing to two children (or fewer) is a prerequisite for the achievement of a range of household needs (financial and otherwise) and for individual fulfillment. This conviction, which we suspect is essential if fertility desires are to fall to replacement level, can be found among the urban and the best educated, but even in these subgroups we sense a tenuous commitment to this view. And it is clear that this is not the dominant feeling about childbearing in most major subgroups of the Philippine population.

Institutional factors and policy instruments

The general policy of the Philippine Government is that couples should decide responsibly the number and spacing of their children. What does not exist are institutions that would encourage couples to wish to have just two children. At present few disincentives for childbearing exist in the Philippines, and many of these are rather weak and hardly felt by couples. Two that might be mentioned include the increase in the legal age of marriage without parental approval to age 21 and the lack of tax exemptions for children beyond the fourth child. Indeed, policies exist that provide incentives for large families, including maternity and paternity leave benefits for those in the formal sector, free elementary and high school education, and land reform and housing programmes. One might also see the absence of a comprehensive national health insurance policy and the lack of social security coverage as pronatalist in their effects. In short, key features of the current institutional environment do not nurture small-family norms.

This review of selected factors influencing fertility desires makes clear that there are many forces in Philippine society supporting the desire for three (or more) children. While it is hazardous to assert with any assurance that these factors will maintain their effects over the next two decades, we feel that their strength should not be underestimated, and a decline in desired fertility to replacement level is a larger step than outside observers might assume. Even more difficult would be a decline in desired fertility to sub-replacement levels, but this might well be a prerequisite for the attainment of replacement-level fertility rates if substantial unwanted fertility remains, the subject to which we now turn.

UNWANTED FERTILITY

Survey data on unwanted fertility show that the fraction of births that were unwanted increased during the 1990s, from 15.9 per cent in 1993 to 18.2 per cent in 1998. According to the 1998 NDHS, a further 27 per cent of births in the three years prior to the survey were mistimed (wanted later), resulting in a total of 45 per cent of unplanned births. The key component for this discussion is unwanted fertility. If these were eliminated and other aspects of reproduction were held constant, the TFR would have been about one birth less in the mid-1990s—yet still well above replacement—at 2.7 births per woman. Unless this substantial amount of unwanted fertility is largely eliminated, it is difficult to imagine how fertility in the Philippines could fall to replacement-level during the next few decades.

Induced abortion is both illegal and relatively unavailable in the Philippines, and we do not expect this to change in the foreseeable future. Therefore, the principal determinants of unwanted fertility are, first, the contraceptive prevalence among those who wish to avoid pregnancy and, secondly, the efficacy of that contraceptive use.

Contraceptive prevalence increased from 40.0 per cent in 1993 to 46.5 per cent in 1998 (see table 2), and during the same period unmet need declined from 26.2 per cent to 19.8 per cent. The increase in prevalence occurred in both urban and rural areas, although the increase was larger in urban areas. These figures indicate important progress towards contraceptive protection for those couples who do not want to conceive.

Nevertheless, there are significant programmatic, social, cultural and economic barriers to contraceptive use. In the first place, problems of inaccessible services continue to plague the Philippine population programme. The shift in the management of the family planning programme from the national Department of Health to the local government, as mandated by the Local Government Code of 1991, has created discontinuities in political commitment and localized weaknesses in the financial and technical support for the programme. Compounding the management problems created by devolution is the already noted Catholic Church opposition to contraceptive practice. One consequence of this opposition is a shortfall in the allocation of funds by some local government officials to family planning, compounded by declines in external donor support. For this and other reasons, problems of sustainability and logistics continue to plague the programme. There are reports of absence of contraceptive supplies, for example in remote areas of Mindanao. Although programmes such as the Philhealth Indigency Program that are designed to improve access to family planning have recently been initiated, these are still in pilot phases in only a few locations in the country. Finally, due to the bias of service providers, contraceptive services are largely unavailable to the young and unmarried.

One expression of these shortcomings in the provision of family planning supplies and services is that contraceptive discontinuation rates remain high, in fact increasing from 1993 to 1998. The major reasons for discontinuation cited in the 1998 NDHS are method failure and fear of side effects. In fact the fraction of contraceptive discontinuations due to method failure remained constant between 1993 and 1998, and this might be taken as a sign of greater attention to quality of care in the provision of family planning. Among the efforts in this direction is the recent development of the Sentrong Sigla (Centres of Wellness) programme of the Department of Health. Nevertheless, method failure remains among the most common causes of discontinuation, and this in turn directs attention to the problem of low contraceptive efficacy. Contraceptive practice in the Philippines is characterized by a method mix of modern and "traditional" (and less effective) methods, with traditional methods constituting a far higher portion of the mix than is found in most countries, on the order of 40 per cent according to the 1998 NDHS (see table 2). The two main traditional methods are periodic abstinence and withdrawal, both of which have relatively low use-effectiveness. The rising price of contraceptives and the decreased provision of contraceptives free of charge are incentives for continued heavy reliance on these two cost-free methods. A programme to introduce the standard days approach for the practice of natural family planning, which might serve to increase its use-effectiveness, has recently been implemented in pilot areas in the country. It is hoped that this new approach enjoys some success. Otherwise, significant reliance on natural family planning without an increase in its effectiveness means either a continued relatively high level of unwanted fertility and/or recourse to clandestine abortion, with the attendant risks to the health and well-being of women.

If desired fertility were indeed to fall to replacement level (or even further), then couples in the Philippines would be subjected to even longer periods of risk of unwanted pregnancies than is the case at present (provided that sexual exposure does not decline). While some unwanted pregnancies in the Philippines are intentionally aborted, this remains an inconvenient and health-threatening option for most women. We believe that it is highly unlikely that induced abortion will become a common means of avoiding unwanted births in the near future. Hence, the prevention of unwanted births depends on the use of effective means of family planning by couples who wish to avoid pregnancies. As briefly reviewed here, there are a variety of barriers—programmatic, social, cultural, economic—to effective contraceptive practice. Most of these barriers, moreover, have been widely-known features of the contraceptive decision-making environment in the Philippines for decades. If unwanted fertility is to fall to a level consistent with the attainment of replacement-level fertility, there will need to be radical changes in contraceptive practice. And these in turn will depend on sharp reduction in the current barriers to effective contraceptive practice.

CHANGES IN MARRIAGE PATTERNS

Changes in nuptiality in the Philippines during the next few decades could place downward pressure on fertility; indeed, if such changes were large enough, conceivably they could result in achieved fertility falling short of desired fertility, as has been observed in many low-fertility societies. We consider three aspects of nuptiality that reduce exposure to childbearing: permanent non-marriage, delayed age at entry in to first marriage, and marital dissolution and temporary separation.

Levels of permanent non-marriage

By Asian standards, a significant fraction of Philippine women remain unmarried, on the order of 6-8 per cent of women at the end of the reproductive years according to censuses from 1970 to the present. A corresponding relatively high fraction of women remain childless, on the order of 9-10 per cent (as against a maximum of 3-4 per cent in other Asian societies). It seems unlikely that permanent celibacy will increase in the next few decades in the Philippines. Census data, in fact, show a slight downward trend in the period since 1970.

Age at entry to first marriage

The average age at first marriage in the Philippines currently falls between that of countries to the north (China, the Republic of Korea, Japan—average age 25 years or older) and countries to the south (Indonesia, Viet Nam—average age 21 years or younger). As shown in table 2, average age at first marriage has been relatively stable in the Philippines for several decades. It is usually assumed that age at first marriage is especially sensitive to changes in school participation rates, but in the Philippines female educational attainment has been relatively high for some time and there seems little room for substantial increase on average. In short, it is difficult to evaluate the prospects for an increase in the age at first marriage—a two- or three-year increase to East Asian patterns is conceivable, but there is at present no evidence of a shift in this direction. Were such marriage postponement to occur, it seems likely that there would be attendant increases in premarital conceptions and births that would at least partially offset the fertility-depressing effect of marriage delay.

Marital dissolution and temporary spousal separation

Increased marital instability and spousal separation might act to reduce fertility. Data on marital dissolution suggest a slight increase during the 1990s, but the level remains too low to have much bearing on fertility. Far more important in our view is the potential impact of spousal separation, especially that due to the phenomenon of overseas Philippine workers (OFWs). To give a sense of the scale of the phenomenon, official statistics show that in the period from April to September 2000 there were 978,000 OFWs (NSO 2000) out of a total national population of approximately 75 million. While our expectation is that both marital dissolution and temporary spousal separation will increase during the next few decades, we do not foresee increases that would be substantial enough to leave a noticeable imprint on trends in fertility.

Concluding comments

Predictions of trends in fertility over a two-decade period—the period during which, according to United Nations projections, the Philippines will achieve replacement-level fertility—are by their very nature hazardous. Rather than making firm predictions, our principal aim in this paper has been to emphasize the large distance between the present reality and the fertility regime implicit in the United Nations projections for 2015-2020. In brief:

- The TFR is presently about 1.5 births above replacement. The pace of decline during the past decade has been slower than United Nations projections for the next 15 years.
- Desired fertility remains above replacement in all major segments of the population. More fundamentally, we see little evidence of widespread emergence of the conviction that restricting childbearing to two (or fewer) children is essential for household and personal well-being.

- Unwanted fertility is relatively high. Inadequate access to family planning supplies and services remains a problem for much of the population, exacerbated during the past decade by the devolution of responsibility for family planning services to local authorities. Moreover, Filipinos favour contraceptive methods with relatively low use-effectiveness. Finally, it is extremely unlikely that induced abortion will become a readily available option for couples with unwanted pregnancies.
- There is some prospect of nuptiality changes that might have a fertility-depressing impact, in particular postponement in the age at first marriage. Recent data do not indicate that such changes are under way, however.

We are led to the conclusion that a reduction in fertility to replacement levels during the next two decades—which if anything would entail an acceleration of the fertility decline of the past two decades—is unlikely. For this to occur, the next two decades must witness two crucial changes in Philippine reproductive attitudes and behaviours: first, the emergence of a firmly held two-child norm; and secondly, the implementation of fertility preferences through effective contraceptive practice. In fairness we should acknowledge that other observers find it more plausible that fertility might decline to replacement-level in the Philippines by 2020 (Zablan, 2002).

There is a further feature of fertility in the Philippines that we have noted in passing and that deserves some emphasis when one considers prospects for the next two decades. The Philippines is a highly diverse society, characterized by wide socio-economic and regional inequalities. This in turn is reflected in substantial subnational variation in the TFR and other facets of reproduction (fertility desires, contraceptive prevalence, nuptiality)—variation according to region, type of place (urban or rural), schooling, economic class, and so forth. We do not foresee any major subgroups of the population moving to sub-replacement fertility during the next two decades. From this it necessarily follows that achievement of replacement-level fertility for the population as a whole can only occur if the large differentials currently observed are sharply reduced or eliminated altogether. Of course this development cannot be ruled out, but it will be a very tall order in a period of merely 15-20 years. We have reported, for example, that both actual and desired fertility are relatively high in rural areas, and that both were essentially unchanging during the 1990s. Since then, economic recovery has been sluggish, and very significant social and economic problems continue to beset the country. Compounding the role of social and economic disparities in generating subnational variation in fertility is the lukewarm support offered by local leaders in many parts of the country for improvements in family planning services. Any assessment of future prospects must take account not only of national averages but also the heterogeneity of reproductive behaviour in the Philippines, itself reflecting the highly diverse and sometimes fragmented character of this society.

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Fertility transition in South Africa and its implications on the four major population groups

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INTRODUCTION

In general there seems to be widespread agreement that fertility began to decline among all major population groups in South Africa prior to the end of apartheid. It occurred at a much faster level for whites and Asians as compared to Africans and coloureds. This occurred amidst the impoverishment of millions (especially African women), stark inequalities and the disempowerment of women. Although South Africa has undergone a dramatic political transition in the last decade, many of the distortions and dynamics introduced by apartheid continue to reproduce poverty and perpetuate inequality. The South African population policy (Department of Welfare, 1998) argues that the basic demographic factors fertility, migration and mortality are an integral part of poverty prevalence in South Africa. These demographic factors cannot be seen in isolation from social factors such as education, unemployment, poor health and housing quality and their interrelationships with poverty. Thus, on the one hand, poverty persists, while on the other hand, fertility declines. This is in stark contrast to the experience in other parts of sub-Saharan Africa, where poverty usually goes hand in hand with high fertility. This paper investigates issues around lower fertility, factors contributing to it, its impact on the different population groups as well as policies to address its impact.

South Africa's fertility compared to sub-Saharan Africa

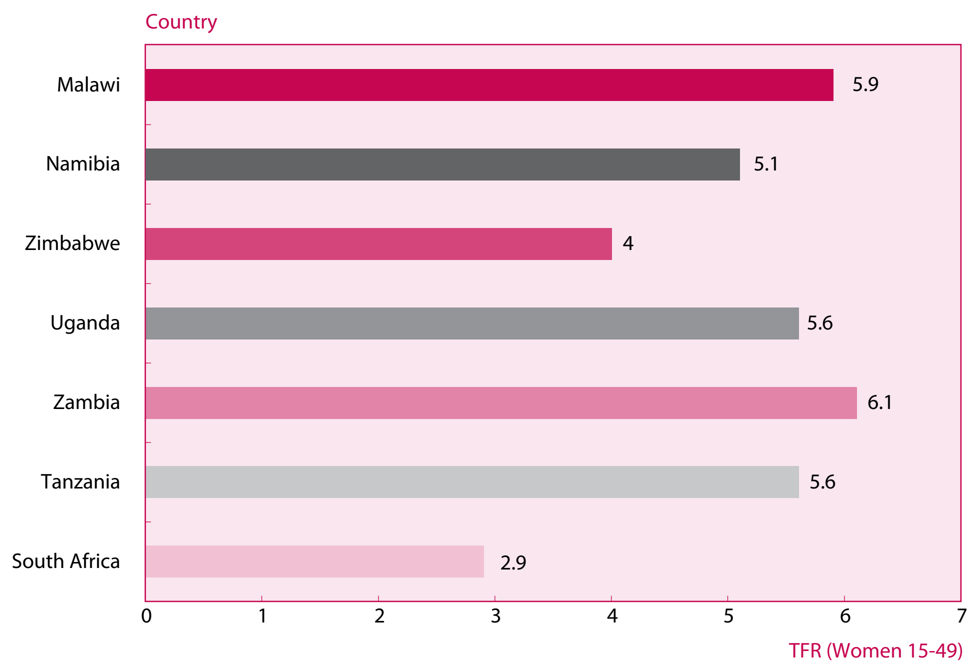
Figure I clearly illustrates that the South African fertility rate is significantly lower than that of other countries in Southern and East Africa. A steady decline in fertility in developing nations took place in the late 1980s and 1990s, especially in the regions of Asia and Latin America. In contrast, Africa and particularly sub-Saharan Africa still lag behind in fertility terms. Reasons for South Africa's low fertility compared to its neighbours is multifaceted, which will be explained later in more detail.

South Africa's fertility trends

South Africa's experience in the fertility transition is among the most advanced in sub-Saharan Africa. South Africa displays demographic regimes that are typical of both developed and developing worlds. These tend to be linked to socio-economic divisions along racial and urban-rural lines. Living standards are closely correlated with race in South Africa. While poverty is not confined to any one racial group in South Africa, it is concentrated among Africans in particular. Many of the apartheid measures, including the extensive welfare system available to white people, the higher quality of education available to white students, and the formal and informal job reservations for white workers, were specifically designed to prevent poverty among the white population. As shown in figure II, poverty among whites is close to zero. On the contrary, poverty among "Africans", the most disadvantaged group, stands at 60.7 per cent compared to 38.2 per cent, and 5.4 per cent for coloureds and Asians. It is interesting to note, however, that the very few poor Asians and whites also seem to be at a considerable distance below the poverty line.

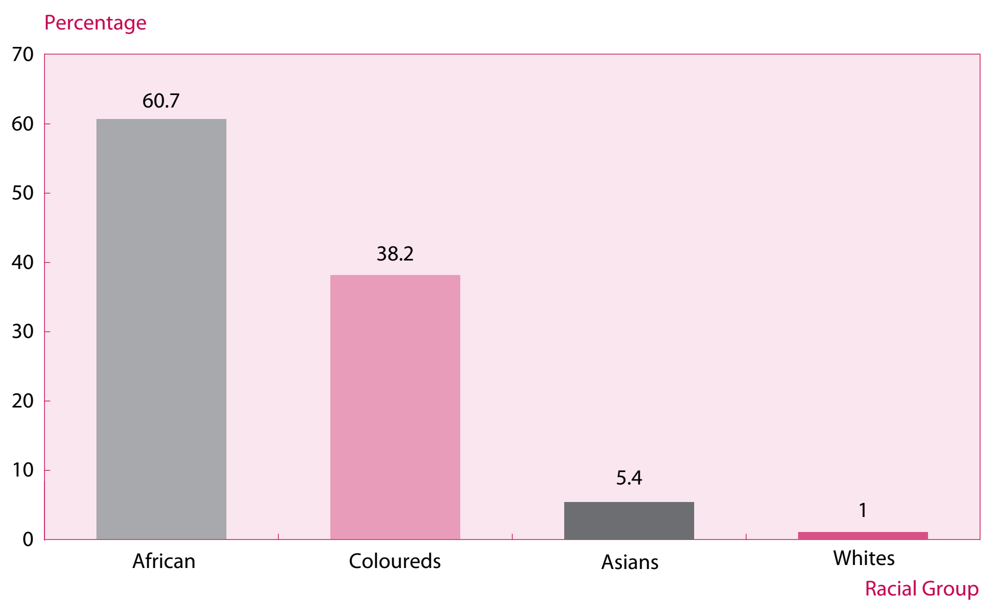
With Africans making up 77 per cent of the population, their high incidence and the severity of poverty among them ensure that they account for 95 per cent of the poverty gap,

Figure I
Comparative levels of fertility in Southern and East Africa



Source: Population Reference Bureau, World Population Data Sheet, 2000 (Washington D.C.,: PRB, 2000).

Figure II
Poverty rates among population groups

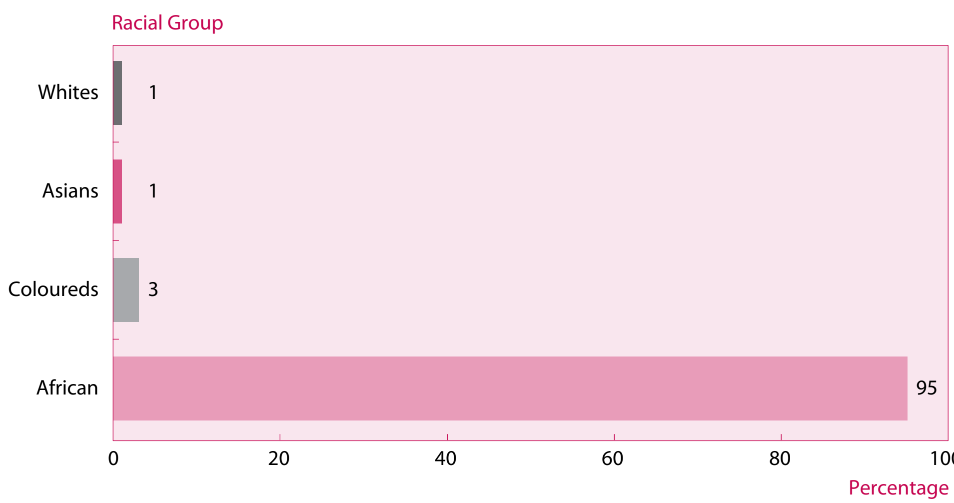


Source: Poverty and Inequality in South Africa (PISA). (Durban: Fishwicks, 1998).

with the remaining 3 per cent largely accounted for by the poverty among coloureds and 1 per cent each by Asians and whites, respectively, as shown in figure III.

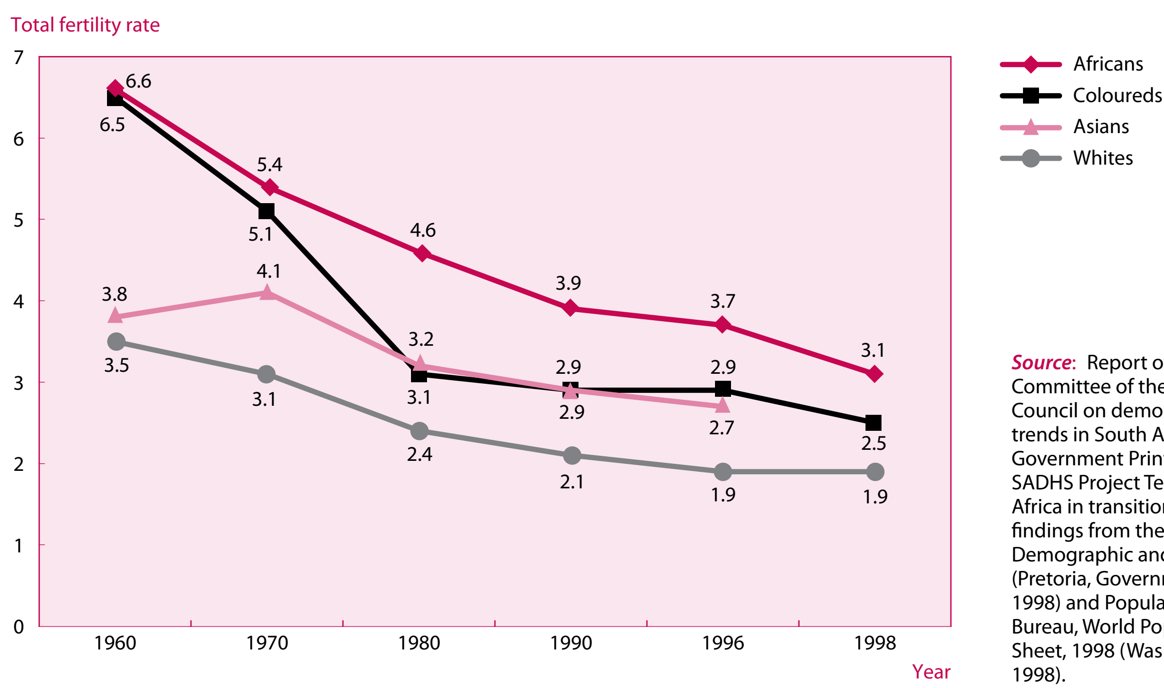
The differences in poverty by race also contribute to the distribution of poverty by location since the racial groups were unevenly distributed in the country. At the same time, among Africans, the group comprising nearly all the country's poor, the pattern of much higher poverty in rural areas and the concentration of poverty in the former homelands and some of the provinces still holds. The fertility trends among population groups in South Africa show the same patterns as that of poverty. The African component which is the poorest with regard to per capita income has the highest fertility rate, while the white population which has the highest per capita income has the lowest fertility rate as explained below.

Figure III
Poverty gap



Source: Poverty and Inequality in South Africa (PISA). (Durban: Fishwicks, 1998).

Figure IV
Differentials in total fertility rate by race, South Africa, 1960-1998



Source: Report of the Science Committee of the President's Council on demographic trends in South Africa (Pretoria, Government Printers, 1983). SADHS Project Team, " South Africa in transition: selected findings from the South African Demographic and Health Survey" (Pretoria, Government Printers, 1998) and Population Reference Bureau, World Population Data Sheet, 1998 (Washington: PRB, 1998).

Thus, among all the four major racial groups in South Africa a decline of fertility has been observed from as early as the 1960s. Figure IV shows that the swiftest decline occurred among the coloureds, followed by Africans.

For South Africa as a whole, fertility was high and stable between 1950 and 1970, estimated at an average of 6 to 7 children per woman. It dropped to an average of 4 to 5 children per woman in the period 1980 to 1995 (United Nations, 1995). The current total fertility rate of South Africa stands at 2.9 (SADHS, 1999).

Whites experienced a long and sustained fertility decline from the end of the nineteenth century until attaining below-replacement fertility by 1989, with a TFR of 1.9 (Chimere-Dan, 1993). Asian fertility also declined steadily, from a TFR of about 6 in the 1950s to 2.7 in the late 1980s. Coloured fertility declined remarkably rapidly from 6.5 in the late 1960s to about 3 by the late 1980s. African fertility is estimated to have decreased from a high of 6.8 to a low of about 3.9 between the mid-1950s and the early 1990s. Although it continues declining, African fertility is still substantially higher than that of the other racial groups.

REASONS FOR FERTILITY DECLINE?

Despite this dramatic decline in fertility, the majority of the African population, especially women, still live in poverty. The question that we, however, need to ask is, "How did this fertility transition come about"?

South African past population policies

This question will be answered by investigating the Government's past population policies. The Government began to provide strong support for family planning in the 1960s. This support was driven by the fear that rapid population growth would undermine South African prosperity and economic development, but also by concern among white political leaders and administrators that the fast-growing African population would overwhelm the much smaller number of whites. As early as 1963, the apartheid Government provided substantial funding for private and public family planning services and furnished free contraceptives. In 1974, the South African Government launched the well-funded National Family Planning Programme.

The results were impressive and unprecedented in sub-Saharan Africa. By 1983, over half the eligible women in the country were practising contraception. Despite the aim to lower the African population, the Government at the same time was encouraging an increase in the white population through immigration. The programme consequently came under much pressure, both for its ideological focus and the inadequacy of its services. By the mid-1980s, the programme's management had distanced itself from the demographic intent of the Population Development Programme (PDP). Instead, it promoted the programme's health benefits and started to integrate family planning into other primary health-care services.

The introduction of the Population and Development Programme (PDP) in 1984 aimed explicitly at lowering the national population growth rate because the country's resources (especially water) would not sustain the prevailing high rate of population growth. Ironically, the African population was either being denied access to well-water–resourced arable land, or being removed and relocated to poor water-resourced land. Thus the minority population owned, or was systematically taking ownership most of, of the well-water–resourced land in the country. The PDP included interventions in other areas that have an impact on fertility levels, namely education, primary health care, economic development, human resource development and housing. However, it did nothing to uplift the African population economically nor did it address the empowerment of woman.

It must also be said that, while it fell short of its original objectives, the programme substantially expanded family planning services. By the end of the decade about 61.2 per cent of women ages 15-49 (including about half of African married women) were using some form of contraceptive (see figure V).

Thus, ironically, while South Africa's family planning programme was conceived and implemented by a minority white government intent on slowing the growth of the majority African population and the African communities resisted this approach, it must, however, be made clear that many African women adopted family planning despite the political agenda of the programme.

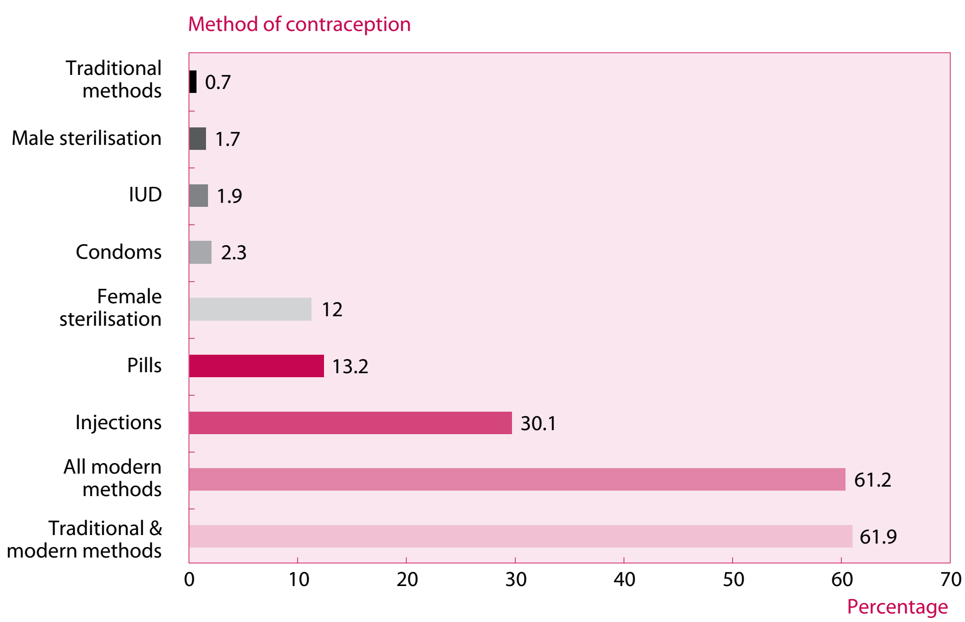
Most of these women were the only breadwinners and in this sense they were forced to adopt contraceptives. This can be seen in the context that African women assumed management of their fertility because they found themselves increasingly in precarious circumstances. Many factors—cultural, political and social—converged to deprive African women of financial and familial security. These circumstances compelled them to curtail childbearing and to practise family planning, with or without the consent of their husbands or partners. The high use of contraceptive injection indicates that many women are not free to discuss reproductive issues, including contraceptive use, with their husbands or partners. This suggests that the reproductive rights of a majority of South African women are still under siege.

Furthermore, many rural African women were without husbands for long periods, since the latter served as migrant labourers in cities. Their prolonged absence left the women to fend for themselves and their children. Many of these migrant husbands simply stopped sending money home or earned too little to be able to afford doing so. This, together with the landlessness and joblessness of the homeland system, forced many African women to make their own decisions about family maintenance and reproduction. The modern family planning programme introduced by the white apartheid regime in the early 1970s assured that their need for fertility control was met.

Non-marital fertility in South Africa

Marriage and contraceptive use are two of the most powerful determinants of fertility. In most populations, fertility is directly related to marriage; married women generally have more children than unmarried women of the same age. Traditionally, births to unmarried

Figure V
Current contraceptive use in sexually active women



Source: SADHS Project Team, "South Africa in transition: selected findings from the South African Demographic and Health Survey" (Pretoria: Government Printers, 1998).

women were not accepted in most societies, thus women began bearing children after marriage and continued throughout their reproductive lifetime as long as they remained married. In Africa, marriage used to be almost universal and marital fertility was high while non-marital fertility was very low.

In the South African context, marriage seems to have lost its value as a determinant of fertility. This can be seen, first, from the small and insignificant difference between marital and non-marital fertility of African women in South Africa: in 1996, the average TFR for African women who were never married or who were cohabiting was 3.9, while that of those who were married was 4.3 (Chimere-Dan, 1999). Secondly, it can be seen from the high rate of teenage pregnancies, mainly unmarried girls.

Although there is a general decline in fertility, teenage pregnancies are still a major concern as illustrated in table 1. The 1998 SADHS found that 35 per cent of all teenagers had been pregnant or had a child by the age of 19. This represents a very high level of teenage fertility and is a serious source of concern to the Government, communities and researchers. Teenage pregnancies are more prevalent among coloured and African girls particularly those with little or no education. The proportion of teenage girls who had experienced a pregnancy grew from 2.4 per cent to 35.1 per cent with each additional year of age, as shown in the third column of table 1.

The high rate of teenage pregnancies has far-reaching consequences, especially for the Africans and coloureds that are the poorest and most disadvantaged groups in the country. The majority of these pregnancies are neither planned nor wanted. The father of the child seldom acknowledges or takes responsibility for the financial, emotional and practical support of the child. The mother often leaves school, thus ending her opportunities for personal development, making her vulnerable to poverty, exploitative sexual relationships and violence as well as low self-esteem.

On the other hand, getting pregnant in African communities does not necessarily mean a loss of educational opportunities. When a school-going girl becomes pregnant, she may be forced to leave school, but often only for the rest of the academic year. So high a value is placed on schooling and post-school training, that pregnancy is not allowed to jeopardize it. Teenage pregnancies among Africans and coloureds do not seem

Table 1
Teenage pregnancy and motherhood
(***percentage of women aged 15 to 19 who are mothers or who have been pregnant by background characteristics, South Africa, 1998***)

Background characteristics	Percentage who are:	
	Mothers	Ever pregnant
Age		
15	2.0	2.4
16	5.2	7.9
17	10.7	14.2
18	19.8	24.6
19	30.2	35.1
Residence		
Urban	10.5	12.5
Rural	16.3	20.9
Race		
African	14.2	17.8
African: urban	11.6	13.7
African: non-urban	16.4	21.1
Coloured	15.7	19.3
White	2.2	2.2
Asian	2.9	4.3
Total	13.2	16.4

Source: SADHS Project Team, "South Africa in transition: selected findings from the South African Demographic and Health Survey" (Pretoria: Government Printers, 1998).

to be perceived in the same negative light as in the case of whites and Asians. In most cases the girl does not even marry the father of her first child. Both African women and men value fertility very highly in the African community. It is thus not surprising that, even for unmarried women and teenage girls, pregnancy has a positive value not generally experienced in white communities (Preston-White and others, 1990).

Nevertheless, teenage pregnancies remain one of our major population concerns, which affect mostly communities in the Western Cape, Gauteng and Kwazulu-Natal. This is a challenge to be addressed in a constructive manner, especially in the light of the HIV/AIDS pandemic, as well as the fact that the human rights of many teenage girls are infringed through acts of sexual abuse and rape.

It has been argued that a higher fertility rate among unmarried and single mothers is a rational response on the part of women, especially Africans and coloureds, to oppressive and disempowering patriarchal economic, social and cultural systems. Among Africans and to some extent coloureds, marriage is far from being an early and universal social institution. African women have consistently low marriage prevalence at all ages. High levels of male migration from rural to urban mining areas have affected lower marriage rates among Africans. Nevertheless, childbearing is almost universal among African women. As a result, female-headed households are a common feature in disadvantaged rural and urban fringe areas. Women's burden of carrying the sole responsibility for these children is awesome. The negative implications of this situation manifest themselves as unwanted pregnancies, abortions, abandoned and street children, child neglect and abuse.

A dominant issue in especially the African fertility pattern in South Africa is that of male responsibility in reproductive decision-making and health as well as in childbearing and rearing. Women have to take on the burden of caring for children and often also of earning the means to do so. This situation initially arose because of the migrant labour system in South Africa; it was entrenched by the creation of homelands without viable economic bases and influx control into cities and "white" areas. Men had to go away to work and earn money; women stayed home in rural areas where they had to care for children. Often, the absent fathers stopped sending money home and women had to take on the role of childrearing without the fathers' support. This situation eventually prevailed also in the African townships outside of the homelands, with women taking the main or even exclusive responsibility for children.

Marriage appears to have lost its role as the exclusive domain for socially legitimate childbearing in South Africa. Overall, non-marital fertility has been declining more than its marital counterpart in South Africa, both on the national level and across the major population groups in the country (Mencarini, 1999). This intensive control of non-marital fertility appears to be the dominant force in the fertility transition in South Africa. The decline in non-marital total fertility is more likely to be driven by contraceptive use. In addition, as the HIV/AIDS situation in South Africa worsens, the downward trend of fertility can be expected to continue at a much faster pace. The impact of HIV/AIDS on fertility is expected to be threefold: as more women die young before completion of their reproductive years, total fertility will decline; AIDS reduces fecundity of women who would otherwise have borne more children; and increased condom use as a result of public education about the prevention of HIV infection may further boost contraceptive use.

Contraceptive use

Because of South Africa's past history of widely accessible family planning services and health services that are well established relative to the situation in the rest of sub-Saharan Africa, the low fertility rate can also be explained by the high use of contraception. The SADHS found almost universal knowledge of at least one contraceptive method. Three-quarters of all women interviewed indicated that they had used a contraceptive method at some stage during their lives, while 61 per cent of sexually active women reported that they were currently using contraception (see figure V). The national average level of current contraceptive use is higher in urban areas at 66 per cent than in rural areas at 52.7 per cent.

Of the different methods used by sexually active women, 30 per cent comprise injectable contraceptives, 13 per cent the pill and 12 per cent female sterilization. Condom use is a low 2.3 per cent (SADHS, 1999). The very low prevalence of traditional methods (0.7 per cent) is highly significant, as modern methods of contraception are more effective in preventing pregnancy. At 98.8 per cent of all current contraceptive usage, the use of modern methods is very high compared to that in other sub-Saharan countries. This high use of modern contraception indicates that South African women generally have good access to family planning services and that they generally trust modern contraceptive methods to achieve their goals of either spacing or limiting the number of children they intend to have.

The comparison of contraceptive use by racial group depicted in figure VI shows clearly that there was a definite increase in contraceptive prevalence among all groups except the white population, which, at about 80 per cent, had in any case reached saturation level.

Contraceptive preference has changed dramatically: some women are more likely to use contraceptives than others and the types of contraceptives used differ. Contraceptive usage is very high among urban women, including urban African women (see table 2), and women with higher levels of education (see table 3).

Choice of contraceptive method in South Africa follows racial stratification. Whites, who make the least use of public family planning services, choose from a wider range of contraceptive methods. Africans and coloureds, which constitute the bulk of clients of organized public family planning services, tend to predominately use the contraceptive injection (35 per cent and 27 per cent, respectively). This raises questions about information sharing and the widening of reproductive choices, as well as the issue of women's control over their own bodies and their sexuality.

As illustrated in figure IV, African fertility declined from 6.6 in 1960 to 3.1 in 1998. This is exceptionally low compared to other sub-Saharan African countries. This can be seen in the context that African women assumed management of their fertility because they found themselves increasingly in precarious circumstances. Many factors—cultural, political and social—converged to deprive African women of financial and familial secu-

Table 2
Contraceptive use by residence, South Africa, 1998

Residence	All modern methods (per cent)
Urban	66.0
Rural	52.7
Total	61.2

Source: SADHS Project Team, "South Africa in transition: selected findings from the South African Demographic and Health Survey" (Pretoria: Government Printers, 1998).

Table 3
Contraceptive use by level of education, South Africa, 1998

Level of education	All modern methods (per cent)
No education	33.1
Grades 1 to 5	43.7
Grades 6 to 7	53.6
Grades 8 to 11	64.6
Grade 12	73.1
Higher	78.1
Total	61.2

Source: SADHS Project Team, "South Africa in transition: selected findings from the South African Demographic and Health Survey" (Pretoria: Government Printers, 1998).

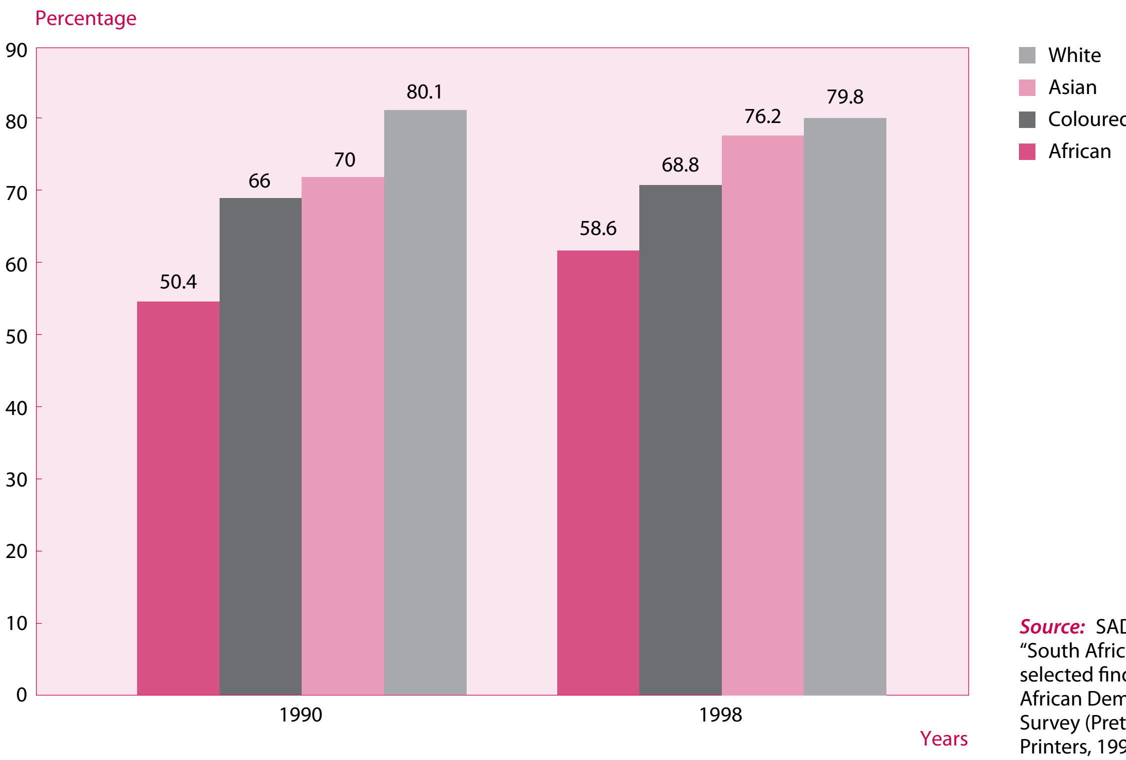
rity. These circumstances compelled them to curtail childbearing and to practise family planning, with or without the consent of their husbands or partners. The high use of contraceptive injection indicates that many women are not free to discuss reproductive issues, including contraceptive use, with their husbands or partners.

However, fertility control is far from ideal in South Africa, as evidenced by the fact that about 50 per cent of currently married women have an unmet need for family planning. Unmet need for family planning is inversely related to level of education: the percentage of women with no formal education who have an unmet need for family planning is six times higher than the percentage of women at the highest level of education who show such a need (Du Plessis, 1999). This further emphasises the fact that the majority of South African women have not yet achieved satisfactory control over their reproduction. Addressing the unmet need for family planning entails not merely greater access to contraceptive services, but also the enhancement of the status of women through education and employment as well as changes in social structures that influence female autonomy.

Birth spacing and abortion

Younger South Africa women prefer spacing their children, as compared to older women, who prefer limiting the number of births (Du Plessis, 1996). The general trend by age reveals that younger African, coloured and white women tend to view all their pregnancies as too closely spaced, while older women feel that only some of their births are closely spaced. This indicates the extent to which unplanned and mistimed pregnancies occur among young women in South Africa. The gap between stated fertility preferences and observed fertility levels further illustrate the constraints on women's autonomy in decision-making regarding reproduction. In this regard, the SADHS revealed that in most cases the ideal number of children a woman wanted was lower than the

Figure VI
Comparison of contraceptive use by racial group between 1990 and 1998



Source: SADHS Project Team, "South Africa in transition: selected findings from the South African Demographic Health Survey (Pretoria: Government Printers, 1998).

living number of children she actually had. Again this suggests that there is a fair amount of unwanted childbearing among South African women.

Abortion was legalized in South Africa on socio-economic grounds in 1996. Before the introduction of legal abortion, the termination of unwanted pregnancies often led to increased risk of death and complications arising from unsafe abortions. Although abortion is now legal, there are still moral and religious barriers in some sectors of our society that deter women from practising this right. The greatest need for access to legal abortion services exists among disadvantaged women.

With the increase in prevalence of HIV-infected women and the risks that the continuation of their pregnancies hold for themselves and their children, the number of women seeking abortion could increase considerably. At this stage it is unclear what effect legalized abortion will have on the total fertility rate, although literature in this regard suggests that, in countries where legal abortions are common, low fertility is generally associated with a high combined prevalence of abortion and contraceptive use. (Rossouw and Du Plessis, 1999).

POLICY AND INTERVENTIONS

The South African Population Policy

The South African Population Policy that was adopted by the 1994 democratic Government has shifted from family planning methods. It places population within the development paradigm, which was advocated by the ICPD in 1994. The focus is to fully integrate population concerns into all development strategies, planning, decision-making and resource allocation, with the goal of meeting the needs and improving the quality of life of the present and future generations.

Focus is especially placed on the status of women, specifically African and rural women, adolescent reproductive health and questions around poverty. The aim is to address these problems in an integrated manner.

The major thrust of the policy therefore is to ensure that birth, deaths and migration factors are taken into account with all planning. As such, a survey for policy implementation was conducted during 2000. The results of the survey show that most Government departments supported the strategies proposed in the policy and that there is a shift in policy planning. A programme to strengthen population development system in Government has been developed. This programme is a joint effort between Social Development, Statistics South Africa (Government Communications Information System (GCIS) and the United Nations Population Fund (UNFPA).

Flagship Programme for women and children under five

The Department of Social Development is concerned with the intersecting needs of women and children. In order to demonstrate its move to new priorities in developmental social welfare, a Flagship Programme entitled "Developmental Programmes for Unemployed Women with Children Under Five Years" has been launched. The idea is to develop and/or support developmental programmes that create self-reliance. Objectives include building women's capacity for economic independence and empowerment, as well as providing developmentally appropriate education for children aged 0-5 years old. Funding was made available for pilot programmes within each of the nine provinces and 1,448 women participated. In seven provinces, the programme reached 1,323 children. The Flagship Programme has also provided access to early childhood development (ECD) opportunities. The children are both placed in existing ECD centres or some of the women have been trained and they care for children at the project site.

Thus the main aim of the Flagship Programme is to reduce poverty through providing income-generating activities to women. The specific objectives are: to promote human capacity, ensure self-reliance and well-being among its target population, develop and support unemployed women and their children under five years and facilitate economic, educational and training opportunities for women and their children so that they can provide for the basic needs of their families, thereby breaking the cycle of vulnerability and poverty as well as dependence on the State.

Reproductive health

National Adolescent Friendly Clinic Initiative (NAFCI)

The NAFCI is a five-year project started in September 1999 and expected to be completed in 2004. It is led by the Reproductive Health Research Unit (RHRU) of the University of the Witwatersrand, which is based at the Chris Hani/Baragwanath Hospital. The project is a comprehensive service performance and quality improvement accreditation programme. Its initiatives include:

- Expanding access to youth-friendly health services including HIV and STD prevention, and reproductive health information to young people;
- HIV/AIDS testing and counselling; and
- Provision of care and support services.

As an integral component of Love Life, NAFCI will contribute to Love Life's goal to effect positive behaviour change among young South Africans to reduce teenage pregnancy, sexually transmitted diseases and HIV/AIDS.

The main objective is to contribute to making health care facilities more accessible and acceptable to adolescents.

It also aims:

- To promote a holistic approach to the management of adolescent health needs by health care providers;
- To set national norms and standards for adolescent health care in clinics throughout the country; and
- To promote an appropriate clinic environment for the provision of adolescent health services.

Water management

South Africa's experiences and lessons learned in implementing population, environment and development policies has demonstrated that community-based initiatives, which resonate with people's basic needs, can make a huge difference among poor communities. A community-based environmental and reproductive health programme in two rural districts was initiated in 1998 by the Government, together with UNFPA, the Planned Parenthood Association of South Africa and the Working for Water Programme. What is notable about the programme is the overt linkage of population interventions to an environment and development programme with beneficial effects to the communities through the provision of clean water, job creation and promotion of reproductive health information and services, including HIV/AIDS. The project, which was undertaken to restore original water flows to rivers and streams, created many jobs, especially for women, and then became linked to the provision of project based reproductive health services.

Food security

The Department of Health initiated the Integrated Nutritional Programme (INP) in 1995 to address and prevent malnutrition. A process of assessment, analysis and action (Triple A Cycle) is followed to assess the situation, analyse the causes of the problem and to implement services and interventions to address the problem. The mix of services and interventions depends on the findings of the assessment and analysis as well as the availability of resources. It usually combines direct and indirect nutrition interventions and includes service delivery as well as behaviour change aspects.

Examples of direct nutrition interventions include nutrition education and promotion; micronutrient supplementation; food fortification; and disease-specific nutrition counselling and support. Indirect nutrition interventions could include parasite control; steps to improve access to food; provision of health-care services; and provision of cleans safe water.

The Department of Health operates at national level with a Directorate for Nutrition and provincial level with 9 Sub-directorates/divisions. Structures for managing the INP at regional, district and community levels also exist and are supported by various task teams and committees.

To reduce malnutrition effectively, it is important to collaborate with sectors within the health department as well as other departments. The INP cooperates with a number of sectors which include the Departments of education, agriculture, welfare and public works; universities and technikons; research institutions; NGOs, CBOs, community project committees; professional associations, consumer organizations, industry and international agencies.

Integrated Plan of Children Affected and Infected with AIDS

This is a joint project of the departments of health, social development, education and agriculture. The aim is to make interventions around HIV/AIDS. The programme has four components, namely:

- Life skills
- Home community-based care and support
- Voluntary counselling and testing
- Community outreach

Although the focus states only children, it actually focuses on the most vulnerable sectors of society, namely, women, children and the aged. Life skills are focusing on sexuality in education as well as out-of-school youth.

National Youth Commission

This programme is aimed at involving youth in the reconstruction and development of our country. Services of young people are employed in order to educate other young people about dangers of unprotected sex. A sub-programme, the Young Positive Living Ambassadors, is an HIV/AIDS programme aimed at employing the services of young people to educate other young people about the danger of unprotected sex, especially HIV/AIDS.

CONCLUSION

The South African experience in fertility transition has been unique in sub-Saharan Africa, if not the world. Fertility has declined substantially during the apartheid era to a TFR of 2.9, which is unprecedented relative to the rest of Africa. The transition towards closing the gap between low fertility aspirations and small completed family sizes has moved much further in South Africa compared to the rest of sub-Saharan Africa. However, this occurred amidst great social upheaval of Africans, in particular; the impoverishment of millions, a large proportion of whom were African women and their children; stark inequalities, and the systematic disempowerment of women.

An attempt was made to explain the reasons for this dramatic fertility decline despite high levels of poverty and low levels of development among all four racial groups. The issues of high non-marital fertility in South Africa and high contraceptive use were discussed in order to understand better the singular manifestation of fertility decline in conditions of low status of women and abject poverty. We found evidence that various factors converged to create the situation where women had to accept virtually sole responsibility for child-rearing without access to productive resources. Their response was to control their fertility, not as a result of educational and career aspirations or affluent lifestyles, but as a survival strategy. The reproductive and sexual rights of South Africa's disadvantaged women were constantly disregarded and abused on the one hand, because of the total breakdown in family life caused by influx control and the homeland system, and their low status and lack of development on the other hand. Nevertheless, they accepted contraception as their way of exercising some control over their own bodies.

The basic difference between fertility patterns in South Africa and the rest of sub-Saharan Africa is not based on fertility being valued differently; fertility is still highly valued in South Africa. Rather, it was deprivation of access to land and the total breakdown of the traditional lifestyle, both socially and economically, that made fertility control a rational choice for South African women.

However, the high levels of unwanted and teenage pregnancies as well as the high unmet need for contraception are still of major concern. This shows clearly that women, especially Africans and coloureds, still lack control over their own reproductive choices and still experience emotional trauma with respect to fertility. They further lack the development opportunities to empower themselves in order to take full control over their reproductive lives, as propagated by the International Conference on Population and Development in Cairo, 1994. HIV/AIDS and its consequences will definitely lower the fertility rate in the near future and its full impact is still not clear.

While poverty, racial and gender inequality and fragmentation of society persist, we cannot pride ourselves as South Africans on our excellent gains in fertility decline. As long as South African women do not enjoy freedom to control their own bodies within supportive relationships with husbands or partners, population problems relating to fertility will remain a major national concern.

Specific focus needs to be put on empowerment programmes for teenagers as well as vulnerable African rural women in order for them to take control of their reproductive choices. The lack of male responsibility for childrearing that was emphasized as a crucial contributing factor to African women's need for fertility control holds significant implications for reproductive health programmes and services. Essential interventions include the upliftment of the status of women through education and employment, radical changes in the social structures that influence female autonomy and the eradication of poverty.

It is the author's belief that fertility will keep on declining for the African, Asian and coloured populations and will reach replacement level by 2020-2025. However, with the future impact of HIV/AIDS on our population growth, replacement level could even be obtained at a much earlier date than anticipated.

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On the prospects for endless fertility decline in South Asia

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In the demographic literature, the semantics of fertility decline have led to some interesting confusion. In particular, confusion has been caused by the tendency to use interchangeably the terms "global fertility decline" and "global convergence in fertility". But the two are not the same thing at all. While it is true that it now appears that the whole world has embarked on a process of fertility decline, it does not follow from this that the whole world is headed to exactly the same eventual fertility levels or that all societies do/will reach eventual low fertility by the same means. There is sufficient variation even within the countries currently in "post-transition" to belie this conclusion.

Two empirical findings have probably contributed to this confusion between "global decline" and "global convergence". First, there is now enough evidence that non-academic populations have never heard of something called "replacement-level fertility" and thus do not take this into consideration in planning their fertility at the family level. In country after country in the industrialized world, fertility declines have plummeted well below the replacement mark and thrown much planning based on past population projections out of gear. Population projectors of the past have by now received plenty of criticism for treating replacement-level fertility as some kind of sacrosanct end point in the fertility transition. By now, it is well accepted that the magical total fertility rate (TFR) of around 2.1 is little more than a convenient analytical device. With this recognition, population projections of recent times have been boldly assuming eventual fertility levels that would laugh at the forecasters of population doom of the last century.

Having discarded the logic of replacement-level fertility as a plausible end point in the fertility transition for the developed world, it naturally followed that there was nothing sacrosanct about this end point for the developing world either. This intuition has been strengthened by the second empirical finding in recent years. This finding is that the process of fertility decline is much better explained by theories of diffusion (which are essentially theories of copycat behaviour) than by theories built around structural factors that affect the costs and benefits of childbearing. The great range of conditions under which fertility has begun to fall all over the developing world, and the most potent correlates of such decline—education, exposure to the mass media, exposure to the ideologies (rather than the material trappings) of modernization—strongly suggests that the urge to control fertility and to have fewer children than one's parents comes largely from wanting to do what others do.

But do diffusion theories of fertility decline and the irrelevance of the concept of replacement fertility really imply that eventual stable fertility levels will be globally similar? Do the structural and cultural circumstances of individual societies not have any power to decide on the finer details of fertility change? My own feeling is that this might be the case "eventually", if "eventually" is defined lengthily enough; but that in the relative short term of a few decades, even as many as five decades, perhaps geographical and cultural variation will temper the move to global convergence.

This skepticism about global convergence is supported by the still significant differences in fertility in the developed world. Even if all these countries now have below-replacement fertility levels, they nevertheless exhibit a range of sub-replacement fertility levels; completed fertility for the 1960 birth cohort ranged from 2.10 in France in 1994 to 1.65 in Germany in 1992 and Italy in 1996 (Bongaarts, 2001). A difference of half a birth is not small, given the low base levels at which this difference occurs.

Skepticism about the prospects of global convergence is also supported by the wide range of measures on the proximate determinants of fertility in the developed world. Variations in marriage, contraceptive use, abortion are pervasive enough to suggest, even if faintly, that the eventual similarity of fertility levels might be something of a coincidence. Such a conclusion would be exaggerated to be sure (given that ideas about completed family size are an important determinant of completed family size), but it would not be wholly false.

In this paper, I want to use the lessons drawn from this variation in the proximate determinants to look at some of the plausible[1] ways in which future fertility in South Asia might not drop to levels as low as many parts of the developed world today. As already mentioned, it is a fairly short-term future that I am concerned with; at the end of this century, it may well be the case that we all inhabit a world that not only eats hamburgers and drinks coke, but also one in which all groups marry at exactly the same rate, use the same kind of contraception, and want and bear exactly the same number of children.

In the following sections I look at two of the proximate determinants of fertility—non-marriage and childlessness within and outside marriage. The proximate determinants framework was the standard tool to study fertility in the seventies and eighties, but with time, our interest in these determinants had narrowed down to focus almost exclusively on contraceptive use, the assumption being that this is the primary variable capable of explaining fertility differentials. But I want to suggest here that some modified notion of "natural fertility" can remain an important part of the explanation for below replacement fertility in many societies today. And finally, in a very small section, I speculate about the current stagnation in fertility declines in some parts of South Asia.

[1] It is important to specify the word "plausible"—given the way unexpected events have become an increasingly defining feature of the world in recent times, it may well be that all predictions of future behaviour deserve nothing but dismissal.

Non-marriage

Attempts to attribute fertility decline in the developing countries typically try to separate out the impact of increasing ages at marriage and falls in fertility within marriage. There is a large literature now on how a delay in the age at marriage can lead to declines in both natural fertility (because it reduces the length of exposure to the risk of pregnancy) as well as volitional fertility (because delayed marriage comes with a number of other things that reduce the demand for children).

But the experience of the developed countries suggests that where marriage is concerned, what might eventually have a greater impact on TFRs is not later marriage as much as non-marriage. Delayed marriage should merely, ceteris paribus, push up the mean age at childbearing and change period fertility rates.[2]

But in many parts of the below-replacement fertility world, and especially in those countries in which TFRs have fallen to unusually low levels even by sub-replacement standards (such as Italy and Spain), increased levels of non-marriage are an important reason for these low TFRs. That is, it is not so much that marital fertility levels have descended to unprecedented lows as the fact that fewer women are contributing to these TFRs because a larger number of women are not getting married at all. High levels of non-marriage are of course important in observed fertility declines primarily in societies which frown upon childbearing outside marriage; countries such as Italy and Spain. Indeed, recent data suggest that even cohabitation outside marriage (and not merely childbearing outside marriage) is rare in the Mediterranean countries (and Japan), for reasons which are partly economic and partly cultural.

2 But of course the world is not "ceteris paribus". Delayed marriage is associated, in most parts of the developing world, with lower fertility desires (Jejeebhoy, 1994); that is not our concern here, our concern is with delayed marriage as a factor in reducing first and second order births.

To illustrate, I look at some of the figures cited at an earlier meeting of the United Nations Population Division (United Nations, 1999) which discussed the fertility prospects of countries with below-replacement fertility. Both absolute levels of and trends in non-marriage in many of these countries are striking. In Germany, for example, over 90 per cent of the birth cohorts of the 1930s and 1940s got married at least once; this figure is expected to fall to 70-80 per cent for the 1960 cohort (Dorbritz and Hohn, 1999). In Spain, at least 80 per cent of women born in the 1940s and earlier were ever-married, compared to about 68 per cent of the 1961 birth cohort (Frejka and Ross, 2001). In Japan, the proportion of women aged 30-34 never married has risen from 7.2 in 1970 to 19.7 in 1995 (Kaneko, 1999).

However, there also continue to be wide variations in non-marriage in the developed world. Thus, we have the phenomenon of about 8 per cent of women aged 45 and over in Norway and Sweden being never-married in 1997, compared to 11 per cent in Italy and Spain and only 5 per cent in the United States (United Nations, 1997). Currently younger cohorts will probably push these figures upwards. The impact of these differences on TFRs gets magnified or reduced by their differences in extramarital fertility, so that the United States still continues to hover around replacement (as do Norway and Sweden, but in the opposite direction, i.e., a bit below replacement), while Spain, Italy and Japan have TFRs around 1.4.

I briefly discuss some of the reasons for these trends at the end of this paper. Here is it sufficient to stress that (in the absence of premarital childbearing) it is easy to see how sub-replacement fertility can occur in spite of little change in marital fertility rates and desired fertility levels.

What lessons do these non-marriage rates suggest for South Asia? The variations in this measure in the low fertility world suggest that there is little reason to expect non-marriage to become common in all parts of the developing world too. Even within South Asia, can one anticipate a similar "retreat from marriage" (Becker, 1981)? If this did occur, it would lead to a decline in TFRs faster than that anticipated merely by looking at changes in marital fertility.

Given the general proposition that any kind of prediction of social trends is a dangerous enterprise, and given the great enthusiasm so far for all things "western" in many parts of the developing world (it is no wonder that diffusion theories have become so much more popular in recent years), one's educated guess on this subject may be quite off, but is still worth making. And my educated guess is that significant levels of non-marriage are still very far off in the South Asian future. For one thing, there is no history of non-marriage in this region, unlike in Western Europe, for example, where a certain proportion of women remaining unmarried for life was an expected and acceptable feature of society (Hajnal, 1965). For the South Asian countries (as well as for China, incidentally) the joke has always been that there is no impediment to marriage—neither physical nor economic; whatever a woman's disadvantages, a "suitable" groom can and will always be found. And purely practical matters such as a shortage of housing or employment have not stood in the way of the South Asian system of marriage either.

Not only is there no real history of a significant amount of non-marriage, this region does not even show signs of such a history developing. In the latest rounds of the DHS and NFHS for example, a mere 1.4 per cent of women aged 30-49 in India in 1998/1999 were "never-married" and a mere 2 per cent of Pakistani women aged 35-39 in 1990/1991 were never-married. It is difficult to think of these low figures indicating any kind of "trend" in rising rates of non-marriage.

Voluntary childlessness

But of course it is true that non-marriage does not necessarily debar women from childbearing. And premarital fertility is not absent in many of these societies with high and increasing levels of non-marriage. But (*a*) non-marital fertility levels rarely reach levels of marital fertility even in the most industrialized societies, and (*b*) premarital fertility levels are extremely low in the countries of lowest TFRs. For instance, premarital births make up a relatively small proportion of total births in the lowest fertility countries of the industrialized world (8 per cent in Italy in 1995 (Golini, 1999) and 13.7 in Germany in 1996 (Dorbritz and Hohn, 1999)). These are high compared to say France and the United Kingdom (between 32-35 per cent in 1995 (Golini, 1999)) and Sweden (52 per cent in 1995 (Golini, 1999)), but still significantly higher than in a very low fertility country such as Japan (1.2 per cent in 1995 (Kaneko, 1999)).

That is, the contribution of non-marital childlessness to total fertility varies. In addition, there is certainly a case to be made for adding levels of and trends in childlessness in general (whether voluntary or involuntary, whether determined by proscriptions on premarital cohabitation and pregnancies, or over long delays in trying to begin childbearing, or desired childlessness within marriage) to forecasts of future fertility in other parts of the world. In any case, analytically it is usually best to look at childlessness in general; not by marital status. The latter is so fluid and changes so often with reproductive behaviour that it is difficult to really disentangle childbearing within and outside marriage.

Trends in childlessness across the developed world are striking. In West Germany for example, while 10 per cent of the 1940 birth cohort remained childless, this figure has risen to 23 per cent for the 1960 cohort (Dorbritz and Hohn, 1999). In Japan, given the virtual absence of any premarital childbearing, the proportions of women remaining childless are at least as high as the high proportions never married in the last section. In Italy, 18 per cent of the 1963 cohort remained childless (Golini, 1999). In Norway, for women aged 35 and over, the proportion childless increased from 11.6 per cent for the 1950 birth cohort to 16.5 per cent for the 1963 birth cohort (Lappagard, 2000). On the other hand, countries like the United States, in which fertility levels are closer to replacement, childlessness too is less common and probably declining.

One of the ways of looking at the contribution of childlessness to total fertility rates would be to look at the distribution of TFRs in different countries at the time of replacement-level fertility. If the move to replacement is fuelled primarily by the extinction of higher order births, then the long-term implications may be different from if it is caused by a substantial amount of childlessness. That is, if the long-term trend is towards a homogeneity in fertility rates the stabilization level will be different than if the trend is towards a break in country populations into groups with drastically different fertility levels (many childless and many with two or more births).

While it is true that the greater part of post-transitional fertility decline has been caused by the reduction of higher order births, it also appears from the Europe and Japan data that significant and sustained below-replacement total fertility requires a significant level of childlessness. Such childlessness is possible if marriage has to be indefinitely delayed for a number of economic or social reasons and premarital childbearing is not acceptable (as in Italy or Spain for example), but is also possible if there is an increasing trend towards complete childlessness within marriage.

All the evidence suggests that once childlessness is removed, TFRs of around 2 continue to be common; that is, the majority of women who bear one child go on to bear a second one, even in sub-replacement fertility societies, it is the proportion of third order births that has continued to fall steadily. For example, in Norway, for women who had a first child, as many as 80 per cent went on to have a second child (Ronson, 2001). Similarly, the current TFR of 1.77 in Australia is the result of 22 per cent of women remaining childless, 15 per cent having one child, 35 per cent, two children, 20 per cent, three and 7 per cent, 4 or more children (Caldwell and Caldwell, 1999). These childless women are an important source of Australia's low fertility and if they did not exist, the TFR would have been closer to 2.2 by my rough calculation.

I have already sounded skeptical about the immediate prospects for significant levels of non-marriage in South Asia. What about the immediate prospects for significant levels of voluntary childlessness within marriage in this region? The question becomes:

how is a given level of TFR more likely to be achieved in the South Asian countries? Will/does a TFR of 2 imply more often that there is little variation around this mean or is it more likely to be the result of different subgroups of the population exhibiting very different reproductive regimes?

Is the Australian example any guide to future behaviour in the developing world? Might childlessness become common in any subgroups of the population? One way of speculating on this issue would be to try and understand the motives for childlessness in the industrialized world. Is this a voluntary state or is it, as Caldwell and Caldwell (2000) suggest, a result of birth deferment until it is too late? If it is the latter, it is plausible that in the developing world (which has generally shown itself to be a fast learner once it decides to copy the developed country experience—the best example of this of course is the relative speed of mortality decline in the two regions), women will become more pragmatic about combining work with reproduction. So that not only will there be fewer childless women than currently in Australia, there may also be less of the gap between period and cohort fertility of the kind Bongaarts and Feeney (1998) caution against. Indeed, Australian fertility itself may eventually rise as this unwanted impact of birth deferment is more clearly anticipated.

But if childlessness represents a deliberate choice (as is also possible in a world of increasing sensitivity to what may be called a child-unfriendly world—that is, women may choose not to reproduce as often for their unborn children's sakes as for their own convenience), then one needs to make some educated guesses about the rise of voluntary childlessness in the developing world. And one's guess based on the cultural imperatives in most of the developed world is that voluntary childlessness is unlikely to become the defining feature of any significant subgroup of the developing world of today, at least over the next several decades. It is certainly not likely to be an important feature of fertility decline in South Asia. While the ideological change that accompanies the shift from high fertility to low fertility is often compatible with existing norms about family life and about the well-lived life in general, the cultural and normative shift required to move from wanting few children to wanting no children is too massive to be realistically expected to grow out of existing trajectories of development, education and modernization. We do not have the kind of data for South Asia that exist through the sets like the World Values Surveys in the developed world. But, intuitively, the findings on "post-modern" sensibilities in these surveys do not look as if they would apply to the South Asian developing world in the near future (see, for example, Van De Kaa, 2001).

These conclusions are also supported by the low levels of voluntary childlessness in the low fertility countries of Asia. For example, in Japan, even though childbearing begins later than in the United States, levels of childlessness are much lower than in the United States (Morgan, Rindfuss and Parnell, 1989). Similarly, even in urban China, which represents the Chinese region with the lowest fertility, this low fertility has been achieved by an increasing homogenization of the population—virtually "everyone" gets married and virtually "everyone" bears a first child. Low fertility is not a result of some couples remaining childless and others having two or more children (Zhao, 2001). Marriage may be delayed but it is still to be abandoned; and once entered into, automatically leads to a first birth—in the early 90s, some 98 per cent of women below the age of 30 were "ever-married" and 97 per cent of these went on to have a first child.

This Asian pattern of non-childlessness has its counterparts in the intermediate level fertility countries of South Asia as well. In the 1998/1999 round of the Indian NFHS, only 2.9 per cent of currently-married women aged 35-39 had borne no children, suggesting nothing more than involuntary infecundity. The corresponding figure for Pakistan in 1990/1991 was 2.7 per cent and Bangladesh 1.3 per cent, Nepal in 1996, 1.2 per cent, Sri Lanka in 1987, 4.2 per cent. And the few available studies on childlessness in this region find that heroic attempts are made to overcome it when it occurs (see, for example, Unisa, 1999).

When one is extrapolating from the experience of the developed world to forecast trends in developing country fertility, one thus needs to disaggregate the TFRs of contemporary low-fertility countries before drawing any lessons. In the particular kind of disaggregation just discussed, the lesson may well be that in fact we are being unduly optimistic in our predictions about future trends in fertility in the developing world and unduly pessimistic about the prospects for fertility remaining so much below replacement in many parts of the developed world. If childlessness is such a significant proportion of this sub-replacement fertility and if it gradually decreases, then so will sub-replacement fertility. The convergence that then arises may well bring us back to what early population projections assumed—a universal desire for and achievement of replacement-level fertility!

THE "SPEED" OF FERTILITY DECLINE

It is worth noting that even if fertility decline has been smooth and linear in the developed countries and in those developing countries which have begun a fertility transition, it need not remain smooth all the way to below-replacement or even replacement levels. Here again, we do not know enough about the assumptions put into our population projections. We accept that there has to be a drop in the TFR of about 10 per cent for the fall to be irreversible and to continue, but we do not explicitly acknowledge that the continued fall may experience another break or two along the way to replacement. This "hard core" of fertility which requires more time and effort to be overcome may need to be incorporated into population projections in different ways from the current method of positing three eventual fertility outcomes. It is not sufficiently captured by looking at the "speed" of decline. One presumes that even if two populations reach replacement-level fertility at the same point of time, their total sizes will differ if one reached it by a linear fall in fertility while the other reached halfway there and then spent several years at this halfway point before tumbling down to catch up with its neighbor's TFR. Whether this second population would end up smaller or larger than the first would depend on where in the transition it stopped to take a rest.

This point becomes particularly relevant for countries that have a core level of wanted fertility that is above replacement. India comes particularly to mind. There is some indication that while survey respondents in India are perfectly willing to not have 4-5 children as child mortality falls and contraceptive services become easily available, they are not willing to do this endlessly. In particular, they are not willing to forego the one (and preferably two) sons that they see as essential for economic, spiritual and social salvation. Thus, fertility may well stagnate at a TFR of around 3 for several years before the education and modernization needed to change this particular ideology of childbearing can have effect. The recent stagnation of fertility decline in Bangladesh (and perhaps in India as well) certainly suggests that this is not a far-fetched story.

What recommendations does one make about fertility assumptions to go into more realistic projections? Does one go for more disaggregated end points? Or more alternative speeds of decline? In particular, a case may be made for treating laggards as different in more than just the timing of onset and the speed of decline. Not only is there a hard core of resistance to fertility decline in some populations, once these resistant populations enter the fertility transition, at first they may be willing to go thus far and no further. One needs to give some thought to methods of factoring this "period of rest" into population projections.

DISCUSSION

This whole paper runs the serious risk of becoming a platform for "South Asian values". That is certainly not its intention, especially if such a platform means that South Asian values in demographic behaviour are something to be celebrated. If anything, much that is peculiarly South Asian in the demographic regimes that may eventually characterize this region may well be what will lead to conformity with the universal experience in terms of below-replacement fertility. For example, this paper suggests that South Asian patterns of patriarchy and gender inequality and cultural prescriptions about the need for women to become wives and mothers may lead to fertility stabilization at replacement or slightly above-replacement levels. But I am also conscious that these same factors may well be what will promote sub-replacement fertility; except that this sub-replacement fertility will not be strictly analogous to sub replacement fertility in the industrialized world. It might instead be sub-replacement fertility achieved by the medical technology that allows the fertility demands of South Asian patriarchy to be satisfied. That is, fertility declines may well turn out to be quick and easy and close to western levels because these techniques accommodate South Asian preferences by allowing a preponderance of sons to be born.

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