HIV testing in national population-based surveys: experience from the Demographic and Health Surveys

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Objectives To describe the methods used in the Demographic and Health Surveys (DHS) to collect nationally representative data on the prevalence of human immunodeficiency virus (HIV) and assess the value of such data to country HIV surveillance systems.
Methods During 2001–04, national samples of adult women and men in Burkina Faso, Cameroon, Dominican Republic, Ghana, Mali, Kenya, United Republic of Tanzania and Zambia were tested for HIV. Dried blood spot samples were collected for HIV testing, following internationally accepted ethical standards. The results for each country are presented by age, sex, and urban versus rural residence. To estimate the effects of non-response, HIV prevalence among non-responding males and females was predicted using multivariate statistical models for those who were tested, with a common set of predictor variables.
Results Rates of HIV testing varied from 70% among Kenyan men to 92% among women in Burkina Faso and Cameroon. Despite large differences in HIV prevalence between the surveys (1–16%), fairly consistent patterns of HIV infection were observed by age, sex and urban versus rural residence, with considerably higher rates in urban areas and in women, especially at younger ages. Analysis of non-response bias indicates that although predicted HIV prevalence tended to be higher in non-tested males and females than in those tested, the overall effects of non-response on the observed national estimates of HIV prevalence are insignificant.
Conclusions Population-based surveys can provide reliable, direct estimates of national and regional HIV seroprevalence among men and women irrespective of pregnancy status. Survey data greatly enhance surveillance systems and the accuracy of national estimates in generalized epidemics.

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Introduction

Reliable data on the spread of human immunodeficiency virus (HIV) and its risk factors in the general population are essential for an effective response to the epidemic and its consequences. In countries with generalized epidemics, national estimates of HIV prevalence and trends in the adult population are generally derived indirectly from HIV surveillance among pregnant women attending selected antenatal clinics.[1–4]

Facilitated by biomedical progress, such as the use of dried blood spot (DBS) samples on filter paper for HIV testing, the collection and testing of blood samples has become feasible in large-scale national surveys. In recent years, the Demographic and Health Surveys (DHS) programme has become a major source of data on HIV prevalence in many countries. Since 2001, 12 countries have completed a DHS or similar survey that has included HIV testing and more than a dozen are in various stages of implementation. The DHS are primarily health interviews with questions on maternal and child health, family planning, nutrition and related issues, but increasingly they include collection of other biological and clinical data such as anthropometric measurements and testing for anaemia. The surveys also include an acquired immunodeficiency syndrome (AIDS) module. In some countries, the survey has exclusively focused on the collection of information on HIV/AIDS (AIDS Indicator Survey).

This article describes the methods used in DHS to collect nationally representative data on HIV prevalence. Results from the first eight national surveys during 2001–04 are presented and evaluated for bias due to non-response. The potential role of national population-based surveys in national systems for HIV surveillance is discussed.

Methods

General survey methodology

The DHS programme has conducted more than 200 national household surveys in more than 70 developing countries worldwide since 1984. The challenges in designing and implementing DHS in developing countries, as well as the lessons learned from more than 20 years of experience, are discussed elsewhere.[5] It is well recognized that all aspects of survey planning and implementation, such as sample design, developing and field-testing survey instruments, training of survey personnel, and careful supervision of data collection and processing, are critical in collecting high-quality data in such surveys.[6]

Of particular importance for the interpretation of the results on HIV prevalence from the surveys is the sampling methodology. The DHS selects random sample clusters from a national sampling frame, usually from the national

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population census. Within the selected clusters, a full listing of all households is made before the survey and a systematic random sample of households is taken. During the main fieldwork, eligible women and men, usually aged 15–49 and 15–59 years, respectively, are selected for HIV testing. An individual is only considered absent after three callback visits.

To obtain reliable national estimates of HIV prevalence disaggregated by sex and urban versus rural residence, a representative sample of at least 3000 households is required. If, on average, there is one eligible male and one eligible female in each sample household and if 10% of those eligible do not participate in the survey, this yields a final sample of approximately 5400 tested adults. For a population with an estimated HIV prevalence of 5%, such a sample would provide a 95% confidence interval of 4.3–5.7% at the national level. Larger sample sizes are required if the prevalence of HIV is lower or if further disaggregation of HIV estimates is desired.

Specimen collection

In most surveys, HIV testing is done using DBS samples of capillary blood from a finger prick, collected on special filter paper. The only exceptions are the 2002 Dominican Republic DHS, which used oral mucosal transudate, and the 2001–02 Zambia DHS and the 2004–05 Uganda HIV/AIDS Sero-Behavioural Survey where venous blood was used (data from Uganda not yet available). Use of capillary blood for HIV testing is the preferred method in population-based surveys because obtaining samples from a finger prick is considered less painful and less invasive than drawing venous blood samples. Moreover, DBS specimens are easier to collect, store and transport than venous blood samples.

Three to five preprinted circles on the blood-spot collection card are filled with blood drops. Samples collected on filter paper are allowed to dry overnight in a drying box with desiccant and a humidity indicator card, after which the field worker packs each sample in a low gas-permeable zipper-locked plastic bag with desiccant and a humidity indicator card. All individually-packed samples from a cluster are then packed in a larger zipper-locked plastic bag with desiccants and the necessary tracking information. Appropriately packed DBS samples are stored in an insulated box and transported to a central laboratory for HIV testing.[7]

Laboratory testing

A well-recognized central laboratory is identified to process the DBS samples for HIV testing after a careful assessment. Prior to the start of the survey field operations, the central laboratory is required to provide evidence of its ability to produce valid antibody test results from DBS samples with the two different assays chosen for the testing. The testing follows a standard laboratory algorithm designed to maximize the sensitivity and specificity of HIV test results.

The standard testing algorithm uses two different HIV antibody enzyme-linked immunosorbent assays (ELISAs), based on different antigens. All discordant samples that are positive in the first test and negative in the second test are retested using both ELISAs. Discordant samples from this second round of testing are classified as "indeterminate". The "indeterminate" samples are subjected to a western blot confirmatory test, the result of which is considered final for the indeterminate samples. These steps are repeated for a random selection of 5–10% of the samples that gave negative results in the first test.[8]

During sample processing, the laboratory adheres to an approved quality assurance and quality control plan with both internal and external components. For external quality assessment, a subset of DBS samples (usually about 5%) is submitted to an outside reference laboratory for retesting.

Ethical issues

The general health interview is conducted before collecting blood samples for HIV testing. The selected participant is asked to provide informed voluntary consent to the testing. A written statement describing the procedures to be used in testing and the potential benefits and risks is read to each respondent. The respondents are given an opportunity to ask any questions about the survey that may help them decide whether or not they want to participate. The interviewer records the respondent's decision on the questionnaire and signs it affirming that he or she has read the statement and that the decision recorded is that given by the respondent.[7]

To protect the confidentiality of the participants, the data are "anonymized" by scrambling the cluster and household numbers associated with each participant in such a way as to make it impossible to associate an individual data record with a particular place and household. The results of the HIV test are linked to data from the questionnaires using barcodes only after the identity codes have been scrambled and after the files containing the original identity codes have been destroyed. Because the test results cannot be linked to a respondent's identity, there is no possibility of inadvertent disclosure. Any paper records that might compromise the confidentiality of the respondents, such as the pages of the questionnaires containing barcodes, are also destroyed.

In the first three DHS surveys that included HIV testing — in the Dominican Republic, Mali and Zambia — only age, sex, urban versus rural residence, and geographical region of residence of the tested individuals were recorded on the blood samples. In these surveys, HIV test results cannot be linked to the information in the household and individual questionnaires.

All HIV testing procedures are reviewed by the ethical review boards of ORC Macro (a US-based company that provides technical assistance to DHS worldwide), the host country and any other implementing partners.

All survey participants are given country-specific information brochures on HIV/AIDS in their local language. Each respondent eligible for HIV testing, whether or not he or she accepts testing, is also given information on the nearest facility providing voluntary counselling and testing (VCT) and is encouraged to use these services. If VCT services are not free, eligible participants are given a voucher that entitles them to go to the closest VCT facility for free HIV counselling and testing if they so desire. In countries with inadequate VCT facilities, efforts are made to improve access to VCT services. For example, in the survey in Kenya in 2003, arrangements were made for mobile VCT teams to follow up after the survey interview to counsel and test willing survey respondents.

In addition to protecting confidentiality and providing information and VCT services, it is important to ensure the safety of both the respondents and survey teams. DHS has developed procedures and guidelines on safety in the collection and handling of biological specimens and for disposal of biohazards.[7]

Table 1. **Response rates for eight Demographic and Health Surveys with HIV testing, by sex and reasons for non-response**

Country/sex (age range)	Year	Household response rate	Individual response rate	No. eligible for HIV testing	HIV response rate	Reasons for non-response to human immunodeficiency virus (HIV) testing		
						Refused	Absent	Other/ missing
Mali	2001	97.9						
Male (15–59)			83.8	4062	75.6	n/a	n/a	n/a
Female (15–49)			94.9	4556	85.2	n/a	n/a	n/a
Zambia	2001–02	98.2						
Male (15–59)			88.7	2418	73.3	14.9	8.1[a]	3.7[b]
Female (15–49)			96.4	2689	79.4	15.7	3.0[a]	1.9[b]
Dominican Republic	2002	97.9						
Male (15–59)			80.5	14456	80.9	n/a	n/a	n/a
Female (15–49)			92.8	12514	89.0	n/a	n/a	n/a
Kenya	2003	96.3						
Male (15–54)			85.5	4183	70.3	13.0	12.2	4.4
Female (15–49)			94.0	4303	76.3	14.4	6.0	3.3
Ghana	2003	98.7						
Male (15–59)			93.8	5345	80.0	10.7	7.2	2.2
Female (15–49)			95.7	5949	89.3	5.7	3.4	1.7
Burkina Faso	2003	99.4						
Male (15–59)			90.5	3984	85.8	6.6	4.8	2.8
Female (15–49)			96.3	4575	92.3	4.4	1.9	1.5
United Republic of Tanzania	2003–04	98.5						
Male (15–49)			91.3	6196	77.1	13.9	8.7[c]	0.4
Female (15–49)			95.9	7154	83.5	12.3	4.1[c]	0.2
Cameroon	2004	97.6						
Male (15–59)			93.0	5676	89.8	5.6	3.7	0.9
Female (15–49)			94.3	5703	92.1	5.4	1.7	0.7

[a] Absent and other categories combined.
[b] Includes only missing cases.
[c] Includes all non-interviewed.

Analysis

In five surveys — Burkina Faso, Cameroon, Ghana, Kenya and the United Republic of Tanzania — HIV test results can be linked anonymously to all the information on the respondent collected in the questionnaires after scrambling the household and cluster identification codes. To estimate the extent of non-response bias and its potential impact on the observed HIV prevalence in these five countries, all eligible respondents were divided into four groups: (1) interviewed and tested; (2) not interviewed, but tested; (3) interviewed, not tested; and (4) not interviewed, not tested.

To evaluate the effect of non-response bias on the survey estimates, HIV prevalence was predicted among the two non-responder groups (3 and 4) based on multivariate models of HIV for those who were tested, using a common set of predictor variables. A logistic regression model was used, after accounting for clustering in the survey design, to calculate predicted HIV prevalence separately for group 4 (not interviewed, not tested) and group 3 (interviewed, not tested). Predictions for group 4 were based on a limited set of variables (from the household questionnaire only), but predictions for group 3 also used information on several individual sociodemographic and behavioural characteristics of the respondents, collected in the survey.

Variables for predicting prevalence in group 4 included age, education, wealth index, urban versus rural residence and geographical region. Additional variables for predicting prevalence in group 3 included marital union, childbirth in last 5 years (women only), work status, media exposure, ethnicity, religion, circumcision, sexually transmitted infection (STI) or symptoms of STI in the last 12 months, alcohol use, cigarette smoking/tobacco use, age at sexual debut, number of sex partners in last 12 months, condom use at last sex in last 12 months, paid for sex (for men) or exchange of money, gifts or favours for sex (for women), higher-risk sex (i.e. sex with a non-marital, non-cohabiting partner) in last 12 months, perceived risk of contracting AIDS, willingness to care for a family member with AIDS, number of times slept away from home in last 12 months (men only), away for more than one month in last 12 months (men only), and participation in household decision-making (women only). Because data on all of these variables were not available for every country, the actual set of variables included in the models varies slightly from country to country.

Data processing was done using CSPro, a software package developed by DHS and the United States Bureau of the Census. For multivariate analyses, STATA version 8.0 was used. All analysis was carried out separately for males and females for each of the five countries with linked data. Adjusted HIV prevalence was calculated as a weighted average of observed prevalence among those who were tested, and predicted prevalence in the two groups of non-tested respondents. Sampling weights were applied in accordance with standard DHS procedures. We used HIV sampling weights for the tested groups (1 and 2), individual sampling weights for group 3 (interviewed, not-tested), and household sampling weights for group 4 (not interviewed, not tested). Further details of the analysis are available from the authors.

Results

Table 1 shows the response rates and reasons for non-response to HIV testing for eight completed national surveys. Household response rates were very high in all surveys, and individual response rates to the questionnaire were also over 90% in most surveys. Response rates for HIV testing for women ranged from 76% in Kenya to 92% in Burkina Faso and Cameroon. For men, the corresponding range was from 70% in Kenya to 90% in Cameroon. In all surveys, the response rates were lower for men than for women. Refusal was a more important reason for non-response than absence for both males and females. But absence was a more important reason for non-response for males than for females. Non-response rates were higher in urban areas than in rural areas (both due to absence and refusal), and there were substantial within-country regional variations in response rates (data not shown). Non-response rates were also higher among better educated and wealthier respondents, but there was no clear pattern by sexual risk behaviours (data not shown). This pattern of non-response is typical of most household surveys in developing countries.

Table 2 presents HIV prevalences by sex and urban versus rural residence for the eight countries. Total HIV prevalence in these countries ranged from 1% in the Dominican Republic to 16% in Zambia. Among the sub-Saharan African countries, prevalence was lowest in the three West African countries of Burkina Faso, Ghana and Mali.

Table 2. **Observed human immunodeficiency virus (HIV) prevalence by sex and urban/rural residence in eight countries with HIV testing data**

Country/sex (age range)	Year	Urban	Rural	Total	Urban:rural ratio	Female:male ratio
Mali	2001					
Male (15–59)		1.9	1.1	1.3	1.7	
Female (15–49)		2.5	1.9	2.0	1.3	
Total (15–49)		2.3	1.5	1.8	1.5	1.5
Zambia	2001–02					
Male (15–59)		18.7	8.8	12.6	2.1	
Female (15–49)		26.3	12.4	17.8	2.1	
Total (15–49)		23.1	10.8	15.6	2.1	1.4
Dominican Republic	2002					
Male (15–59)		1.0	1.3	1.0	0.8	
Female (15–49)		0.9	1.0	0.9	0.9	
Total (15–49)		1.0	1.5	1.2	0.7	0.9
Kenya	2003					
Male (15–54)		7.8	3.7	4.7	2.1	
Female (15–49)		12.3	7.5	8.7	1.6	
Total (15–49)		10.2	5.6	6.8	1.8	1.8
Ghana	2003					
Male (15–59)		1.7	1.7	1.7	1.0	
Female (15–49)		2.9	2.5	2.7	1.1	
Total (15–49)		2.3	2.0	2.2	1.1	1.6
Burkina Faso	2003					
Male (15–59)		3.6	1.4	1.9	2.6	
Female (15–49)		4.0	1.2	1.8	3.3	
Total (15–49)		3.5	1.3	1.8	2.7	0.9
United Republic of Tanzania	2003–2004					
Male (15–49)		9.6	4.8	6.3	2.0	
Female (15–49)		12.0	5.8	7.7	2.1	
Total (15–49)		10.9	5.4	7.0	2.0	1.2
Cameroon	2004					
Male (15–59)		4.7	2.8	3.9	1.7	
Female (15–49)		8.4	4.8	6.8	1.8	
Total (15–49)		6.7	4.0	5.5	1.7	1.7

HIV prevalence was considerably higher among women than among men in all countries except Burkina Faso and the Dominican Republic where differences were negligible. The female: male HIV prevalence ratio was highest in Kenya where women were 1.8 times more likely to be infected than men.

HIV prevalence was much higher in urban areas than in rural areas except in the Dominican Republic and Ghana, for both sexes. In Burkina Faso, United Republic of Tanzania and Zambia, prevalence among adults aged 15–49 years was at least twice as high in urban areas as that in rural areas.

Fairly consistent age patterns of HIV infection were found (Fig. 1). In almost all countries, HIV prevalence was consistently higher among women than among men at younger ages, with a cross-over occurring when the respondents were in their late thirties or early forties.

Table 3 shows how the predicted prevalence of HIV among non-responders differed from the observed HIV prevalence among tested respondents, and what impact this non-response bias had on the adjusted prevalence estimate for all eligible respondents. On average, predicted HIV prevalence was about 15% higher among male non-responders and about 9%

Fig. 1. **Prevalence of HIV by age and sex in eight countries with HIV data from Demographic and Health Surveys**

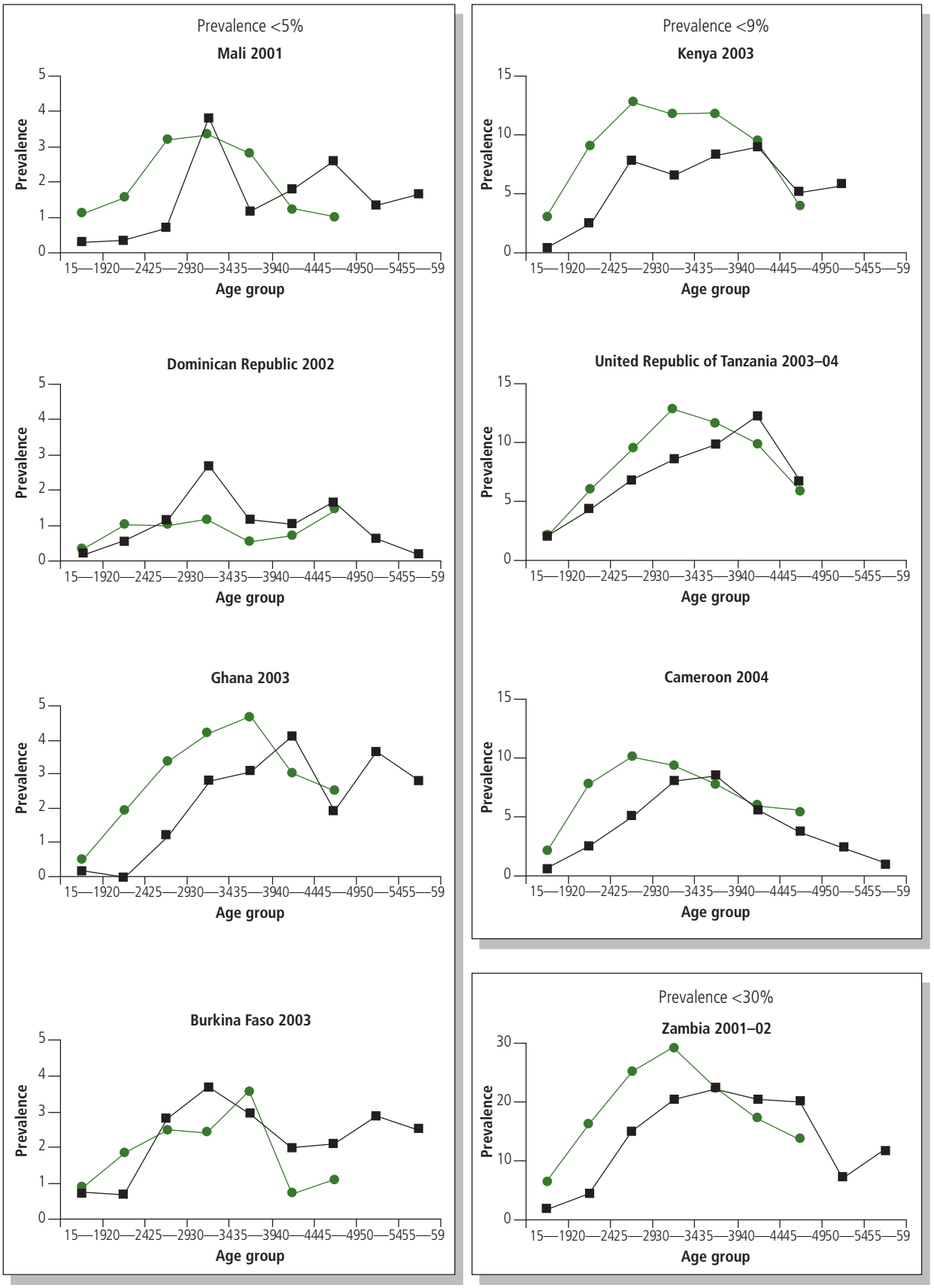

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Table 3. **Predicted HIV prevalence among non-respondents and adjusted human immunodeficiency virus (HIV) prevalence estimates for all eligible males and females in five countries with linked HIV testing data**

Country/sex (age range)	Year	Observed prevalence among those tested (95% CI[a])	Predicted prevalence among those not tested (95% CI)	Ratio of non-tested to tested	Adjusted prevalence among all eligible respondents (95% CI)	Ratio of adjusted to tested
Kenya	2003					
Male (15–54)		4.71 (3.94–5.47)	5.10 (4.70–5.50)	1.08	4.81 (4.25–5.38)	1.02
Female (15–49)		8.70 (7.73–9.66)	7.52 (7.05–7.99)	0.87[b]	8.44 (7.68–9.20)	0.97
Ghana	2003					
Male (15–59)		1.66 (1.28–2.05)	1.79 (1.62–1.95)	1.07	1.69 (1.38–2.00)	1.01
Female (15–49)		2.70 (2.26–3.13)	2.78 (2.52–3.03)	1.03	2.71 (2.32–3.10)	1.00
Burkina Faso	2003					
Male (15–59)		1.94 (1.48–2.40)	2.47 (2.18–2.76)	1.27	2.01 (1.61–2.41)	1.04
Female (15–49)		1.83 (1.43–2.23)	3.29 (2.73–3.84)	1.80[b]	1.95 (1.57–2.32)	1.06
United Republic of Tanzania	2003–04					
Male (15–49)		6.26 (5.58–6.95)	7.08 (6.77–7.40)	1.13[b]	6.45 (5.91–6.99)	1.03
Female (15–49)		7.70 (7.02–8.37)	8.22 (7.70–8.73)	1.07	7.79 (7.22–8.36)	1.01
Cameroon	2004					
Male (15–59)		3.91 (3.38–4.44)	5.16 (4.76–5.57)	1.32[b]	4.04 (3.56–4.52)	1.03
Female (15–49)		6.75 (6.07–7.43)	7.81 (6.91–8.71)	1.16	6.82 (6.17–7.46)	1.01

[a] CI = confidence interval.
[b] Significantly different at 5% from observed prevalence among those tested.

higher among female non-responders than the corresponding observed HIV prevalence among tested males and females. In all countries, predicted prevalence among male non-responders was higher than the observed prevalence among those who were tested. This bias was particularly large in Cameroon (32%) and Burkina Faso (27%). For women, this bias was most pronounced in Burkina Faso, where non-responding women had a predicted prevalence 80% higher than the observed prevalence among those tested. In Cameroon, predicted prevalence of HIV among non-responding women was 16% higher than among those tested, but in Kenya, non-responding women had a predicted HIV prevalence that was 13% lower than the prevalence in tested women, largely due to higher response rates in groups with higher HIV prevalence, for example among Luo women.

Adjusting the observed national estimates of HIV prevalence from tested men and women by accounting for the predicted rates among the non-responders generally made little difference to the observed estimates. Even in countries where predicted prevalence among the non-responders was substantially higher than the observed prevalence, the adjusted prevalence for all eligible respondents was about the same as the observed prevalence based only on the tested respondents. The small effects of the non-response bias on the observed national estimates are due to the proportion of non-responders being much smaller than the proportion who were tested. Even in Kenya, where the non-response rates were the highest of the five countries in this analysis and where predicted HIV prevalence among non-responding males was about 8% higher than the observed prevalence, the adjusted prevalence estimate of 4.8% for all eligible males was only slightly higher than the observed estimate of 4.7% for tested males.

Discussion

Inclusion of HIV testing (and other biomarkers, such as anaemia testing) has further complicated the planning and implementation of already complex national population-based surveys, and has given rise to a number of challenges. The major challenges in obtaining reliable estimates of HIV prevalence from population-based surveys are to obtain a representative sample of adults, keep non-response rates for HIV testing to a minimum, and employ sound laboratory testing procedures, while maintaining the highest ethical standards. The results from the first eight national surveys to include HIV testing provide important evidence that the additional costs and managerial challenges are a worthwhile investment.

What are the benefits? Most countries with generalized epidemics generate HIV prevalence data from surveillance systems based in antenatal clinics. The primary purpose of surveillance systems is to track trends, but they are also used extensively to estimate prevalence levels.[9] The limitations of such data are well known: they include the under-representation of remote rural populations in clinic-based systems, the lack of data on men and non-pregnant women and the limited ability to assess risk factors.[10] The added value of population-based surveys is primarily that they provide direct data on the distribution of HIV infection among the general adult population, remote rural populations (often a large part of the population), men, young non-pregnant women, and regions or provinces. A detailed comparison of the survey results with the Joint United Nations Programme on HIV/AIDS (UNAIDS)/WHO estimates of HIV prevalence based on surveillance data from antenatal clinics is beyond the scope of the present study, but in almost all countries, estimates of HIV prevalence are adjusted downwards following the survey.

In addition, the survey protocol allows HIV test results to be linked with all the information on sociodemographic and behavioural characteristics of the respondents collected in the survey. Finally, HIV prevalence data from population-based surveys can be used to calibrate estimates from clinic-based surveillance and may lead to adjustments in the number and location of surveillance sites.

How good are the data? First and foremost, high-quality survey procedures are necessary at all stages. DHS work with experienced survey organizations and invest considerably in survey design and implementation, which pays off in the high quality of data. The consistent high quality of DHS data has enabled the world to closely monitor key health indicators such as child mortality rates in developing countries. Data on HIV prevalence are subjected to the same thorough survey procedures, and additional investments are being made to ensure the high quality of biomarker data collection and analysis.

Minimizing non-response is a major challenge to all population-based surveys. The main reasons for non-response are refusal to participate and absence. There is evidence that absence may be related to higher risk of HIV infection.[11–14] The analysis of non-response in five countries with linked HIV data (Burkina Faso, Cameroon, Ghana, Kenya and the United Republic of Tanzania) indicates that non-response does not bias national HIV estimates from population-based surveys significantly. Although prevalence of HIV is predicted to be higher in men and women who are not tested than in those who are tested in all five countries studied (except for females in Kenya), the overall effects of non-response on observed national estimates of HIV prevalence tend to be small. Therefore, for non-response in the surveys to have any strong effect on observed estimates of national HIV prevalence (based on tested respondents), the non-response rate, the relative risk of HIV among non-responders, or both have to be substantial.

The adjustments only partially address non-response bias. The estimates can only be adjusted to the extent that the sociodemographic and behavioural characteristics included in the analysis are correlated with the risk of HIV infection in each country. The scope for adjustments was limited in countries with low prevalence (Burkina Faso and Ghana) given that these datasets had less power to find significant associations, as they did not adjust the sample size to the expected low HIV prevalence. Another limitation is that the adjustments for the "not interviewed, not tested" respondents (mostly absentees) were based on limited information. From the data available, it is not possible to fully adjust for bias due to absence. Future surveys should seek to obtain more information about sexual risk factors and mobility of absentees. But if the proportion of absentees is small (as in the surveys in Burkina Faso and Cameroon), bias due to absence should have little influence on the estimate of overall prevalence.

Moreover, our adjustments for non-response do not account for any bias due to exclusion of population members not living in households, such as those living on the street or in institutions (e.g. prisons, boarding schools, military barracks, refugee camps and brothels). The survey-based estimates of HIV prevalence are likely to be underestimates to the extent that the prevalence of HIV in these "non-household" populations is higher than that in household populations, but given that the proportion of non-household populations in the total population tends to be small, any effect of excluding these populations on the national estimates obtained from a household-based sample is likely to be small, except possibly in low-prevalence countries.

In conclusion, population-based surveys can provide high-quality, reliable, representative national estimates of HIV seroprevalence in countries with generalized epidemics, especially in countries with relatively high prevalence (at least 2–3%). These data can be useful for identifying geographical areas with elevated HIV infection rates; higher-risk and vulnerable populations; understanding risk behaviours; assessing availability and access to HIV-related health services; and planning for prevention, care and support, and treatment programmes. Furthermore, the population-based survey data can greatly enhance clinic-based surveillance systems and the accuracy of national estimates of HIV prevalence in generalized epidemics. ■

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Résumé

Dépistage du VIH dans le cadre des enquêtes nationales en population : expérience fournie par les enquêtes démographiques et de santé

Objectifs Décrire les méthodes utilisées dans les enquêtes démographiques et de santé (DHS) pour recueillir des données représentatives au plan national sur la prévalence du virus de l'immunodéficience humaine (VIH) et évaluer l'utilité de ces données pour les systèmes nationaux de surveillance du VIH.

Méthodes Entre 2001 et 2004, on a procédé à un dépistage du VIH sur des échantillons provenant d'hommes et de femmes adultes au Burkina Faso, au Cameroun, au Ghana, au Mali, au Kenya, en République dominicaine, en République-Unie de Tanzanie et en Zambie. Des échantillons de sang séché ont été prélevés sélectivement en vue de dépister le VIH conformément à des normes éthiques internationalement acceptées. Les résultats pour chaque pays sont présentés en fonction de l'âge, du sexe et du milieu (urbain ou rural). Pour estimer les effets des non-réponses, la prévalence du VIH chez les non-répondants hommes et femmes a été évaluée en appliquant aux sujets testés des modèles statistiques multivariés utilisant une série courante de variables prédictives.

Résultats Les taux de dépistage se situaient entre 70 % chez les hommes au Kenya et 92 % chez les femmes

au Burkina Faso et au Cameroun. Malgré les différences considérables de prévalence relevée par les enquêtes (1-16 %), des schémas d'infection par le VIH assez comparables ont été observés selon l'âge, le sexe et le milieu (urbain ou rural), les taux d'infection étant considérablement plus élevés en milieu urbain et chez les femmes, notamment les plus jeunes. L'analyse du biais lié aux non-réponses indique que malgré la prévision d'une prévalence plus élevée chez les personnes non testées comparativement aux personnes testées, l'effet global des non-réponses sur les estimations nationales étudiées de la prévalence du VIH est insignifiant.

Conclusions Les enquêtes en population peuvent fournir des estimations fiables et directes de la séroprévalence nationale et régionale du VIH chez les hommes et les femmes, que celles-ci soient enceintes ou non. Les données fournies par les enquêtes améliorent sensiblement les systèmes de surveillance et la fiabilité des estimations nationales en cas d'épidémies généralisées.

Resumen

Pruebas de detección del VIH en encuestas nacionales de base poblacional: experiencia de las encuestas sobre demografía y salud

Objetivos Describir los métodos utilizados en las encuestas sobre demografía y salud para recopilar datos sobre la prevalencia del virus de la inmunodeficiencia humana (VIH) que sean representativos a nivel nacional, y determinar el valor de esos datos para los sistemas nacionales de vigilancia del VIH.

Métodos Durante el periodo 2001–2004 se efectuaron pruebas de detección del VIH en muestras nacionales de mujeres y hombres adultos de Burkina Faso, Camerún, Ghana, Kenya, Malí, República Dominicana, República Unida de Tanzanía y Zambia. Las muestras de gotas de sangre secas para las pruebas de detección del VIH se obtuvieron siguiendo las normas éticas aceptadas internacionalmente. Los resultados de cada país se presentan estratificados en función de la edad, sexo y lugar de residencia (urbano o rural). Para estimar los efectos de la ausencia de respuestas, se calculó la prevalencia del VIH en los hombres y mujeres que no respondieron, utilizando para ello los modelos estadísticos multivariados obtenidos en aquellos que respondieron y que contenían un conjunto común de variables independientes.

Resultados Las tasas de realización de pruebas de detección del VIH oscilaron entre el 70% en los varones de Kenya y el 92% en las mujeres de Burkina Faso y Camerún. Pese a las grandes diferencias entre las distintas encuestas con respecto a la prevalencia del VIH (1–16%), la distribución de la infección por VIH en función de la edad, sexo y lugar de residencia fue muy homogénea, registrándose tasas considerablemente mayores en las zonas urbanas y en las mujeres, sobre todo en las más jóvenes. El análisis del sesgo inducido por la ausencia de respuestas mostró que, a pesar de que la prevalencia prevista del VIH tendia a ser más elevada en los hombres y mujeres no sometidos a las pruebas que en los sometidos a ellas, los efectos generales de la ausencia de respuesta sobre las estimaciones nacionales de la prevalencia del VIH son insignificantes.

Conclusiones Las encuestas de base poblacional pueden proporcionar estimaciones directas y fiables de la seroprevalencia nacional y regional del VIH en hombres y mujeres, independientemente de que estén embarazadas o no. Los datos de las encuestas mejoran mucho los sistemas de vigilancia y la precisión de las estimaciones nacionales en las epidemias generalizadas.

ملخص

اختبارات فيروس العوز المناعي البشري في المسوحات الوطنية السكانية: الخبرة المستفادة من المسوحات الصحية الديموغرافية

الهدف: وصف الطرق المستعملة في المسوحات الصحية والديموغرافية لجمع المعطيات الممثِّلة على الصعيد الوطني لمعدلات انتشار فيروس العوز المناعي البشري، وتقييم حجم هذه المعطيات ضمن نظم ترصد فيروس العوز المناعي البشري في البلدان.

الطريقة: أجريت، في الأعوام 2001 – 2004، اختبارات على عينات وطنية من الرجال والنساء من كلٍّ من بوركينا فاسو، والكاميرون، وجمهورية الدومينيكان، وغانا، ومالي، وكينيا، وجمهورية تنـزانيا المتحدة، وزامبيا، لكشف فيروس العوز المناعي البشري. وقد جمعت العينات من نقاط الدم الجافة عند إجراء اختبار كشف فيروس العوز المناعي البشري وفقاً لمعايير أخلاقية مقبولة دولياً. وعرضت النتائج الخاصة بكل بلد موزعة وفق العمر والجنس والإقامة في المدن والأرياف. وللتعرف على تأثيرات عدم الاستجابة، تم التنبؤ بمعدلات انتشار فيروس العوز المناعي البشري بين الرجال والنساء غير المستجيبين، وذلك باستخدام نماذج إحصائية متعددة المتغيرات مستمدة ممن أجري لهم اختبارات، ومع مجموعة مشتركة من متغيرات التنبؤ.

النتائج: لقد تراوحت معدلات اختبارات الكشف عن فيروس العوز المناعي البشري بين 70% لدى الرجال في كينيا و92% لدى النساء في كلٍّ من الكاميرون وبوركينا فاسو. ورغم الفروقات الكبيرة في معدلات انتشار فيروس العوز المناعي البشري بين مسح وآخر (1 – 16%)، فقد لوحظ وجود نماذج تـتمتع بقدر جيد من الاتِّساق بالنسبة للعمر والجنس والإقامة في المدينة أو في الأرياف، مع معدلات أعلى بكثير لدى المناطق الحضرية لدى النساء ولاسيَّما من كان منهن في أعمار شابة، ويشير تحليل التحيز لعدم الاستجابة أنه بالرغم من ميل معدلات انتشار فيروس العوز المناعي البشري للازدياد لدى الرجال والنساء ممن لم تجر لهم الاختبارات أكثر مما لدى ممن أجريت لهم الاختبارات، فإن التأثيرات الإجمالية لعدم الاستجابة على التقديرات الوطنية لمعدلات انتشار فيروس العوز المناعي البشري لم تكن ذات أهمية كبيرة.

الاستنتاج: يمكن للمسوحات السكانية أن تقدِّم تقديرات مباشرة وموثوقة لمعدلات الانتشار المصلية الإقليمية لفيروس العوز المناعي البشري بين الرجال والنساء بغض النظر عن حالة الحمل لدى النساء. إن معطيات المسح تعزز إلى حد كبير من نظم الترصد ودقة التقديرات الوطنية أثناء الأوبئة المتعممة.

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