

Vitamin A Supplementation

A DECADE OF PROGRESS



For every child
Health, Education, Equality, Protection
ADVANCE HUMANITY

unicef 

Vitamin A Supplementation

A DECADE OF PROGRESS

ACKNOWLEDGEMENTS

This report was prepared by Nita Dalmiya and Amanda Palmer and produced by UNICEF's Division of Communication. The following people provided valuable contributions: Alison Greig, Ian Darnton-Hill, Tessa Wardlaw and Peter Salama. Key data, information and materials were contributed by Alison Greig (who compiled the raw data on vitamin A supplementation coverage for *The State of the World's Children*), Nyein Nyein Lwin (who calculated the regional and global vitamin A coverage for *The State of the World's Children*), Amanda Palmer (who assembled the programme data and database, and drafted the report) and Josephine Rajasegera (who compiled the raw data on supplies, procurement and other relevant programme information from UNICEF supply orders). Additional inputs were provided by Xiaodong Cai.

Vitamin A Supplementation: A decade of progress
© The United Nations Children's Fund (UNICEF), 2007
ISBN: 978-92-806-4150-9

UNICEF, UNICEF House, 3 UN Plaza,
New York, NY 10017, USA

pubdoc@unicef.org
www.unicef.org

Cover photo: ©UNICEF/HQ05-2140/Giacomo Pirozzi

Contents

Glossary .....	.iv
Foreword .....	.v
Introduction .....	.1
Why supplementation matters .....	.3
Defining priority countries and indicators .....	.5
Vitamin A supplementation coverage .....	.7
Tracking progress .....	.9
Disparities in coverage .....	.13
Supplementation delivery strategies .....	.15
Post-partum supplementation .....	.19
Programme sustainability .....	.21
Managing vitamin A supplies .....	.23
High-impact countries .....	.25
Conclusion .....	.29
Monitoring supplementation coverage .....	.30
References .....	.32

Glossary

BCG	anti-tuberculosis vaccine (bacille Calmette-Guérin)
CEE/CIS	Central and Eastern Europe/Commonwealth of Independent States
CIDA	Canadian International Development Agency
EPI	Expanded Programme on Immunization
IEC	information, education and communication
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Surveys
NID	National Immunization Day
SOWC	<i>The State of the World's Children</i> report, published annually by UNICEF
U5MR	under-five mortality rate
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Foreword

All children have the right to adequate nutrition for a healthy life. Unfortunately, this fundamental right is often overlooked because the consequences of poor nutrition may not be immediately apparent. Vitamin A deficiency is one example of such hidden hunger. Although they may not always display visible signs, approximately 127 million preschool children worldwide are affected by underlying deficiency in vitamin A, putting them at greater risk of illness and death.

It is inexcusable that vitamin A deficiency is still contributing to the loss of children's lives. Effective and inexpensive means to fight this hidden hunger have existed for years, and the international community has made multiple commitments to its elimination. Just two annual doses of high-potency supplements, costing less than US \$0.04 per child, can prevent and correct the deficiency. However, it is critical that vitamin A is viewed not just in terms of eliminating its deficiency but in the larger context of child survival. Achieving and maintaining high coverage of vitamin A supplementation is crucial to attaining Millennium Development Goal 4: reduce by two thirds the mortality rate among children under five by 2015.

UNICEF plays a lead role in the effort to reach all children between the ages of 6 months and 59 months with life-saving supplements every 4–6 months. This includes providing technical assistance to countries, monitoring intervention coverage at the national and global scale and supplying nearly 100 per cent of supplements to countries through an in-kind donation from the Government of Canada and The Micronutrient Initiative.

This report tracks the progress of vitamin A supplementation programming following 10 years of global advocacy. It provides the most comprehensive review of efforts to date, including trends in coverage and innovations in delivering supplements. In areas of the world where vitamin A supplementation is not yet reaching all children under age five, this should serve as a call to action. For countries doing well, these findings should encourage a continued commitment to tackling hidden hunger and a desire to embark on making these programmes sustainable.



Alan Court
Director of Programme Division, UNICEF





Introduction

In September 2000, 189 United Nations Member States adopted the Millennium Declaration, reflecting their commitment to advance the most pressing development issues. Clear, time-bound targets for achieving these objectives subsequently came to be known as the Millennium Development Goals (MDGs). Goal 4 focuses on improving child survival, with the specific target of reducing by two thirds the mortality rate among children under five by 2015.

In its series on child survival, the medical journal *The Lancet* lists vitamin A supplementation among the key interventions achievable at a large scale that have proven potential to reduce the number of preventable child deaths each year.¹ Moreover, vitamin A supplementation is recognized as one of the most cost-effective interventions for improving child survival.² Thus, vitamin A programming is a prerequisite for achieving MDG 4, particularly in countries with high under-five mortality and/or vitamin A deficiency rates.

This report is a review of global advocacy efforts dating back to 1997, when experts met to discuss ways to rapidly increase the adoption by countries of vitamin A supplementation as a critical child survival intervention. This informal consultation, coupled with the receipt by UNICEF of a significant donation in kind of vitamin A capsules as well as grants from Canadian partners, provided the necessary push to accelerate national supplementation programming. This report provides an update on efforts to ensure the full protection of all children aged 6–59 months with preventive vitamin A supplements twice annually in 103 priority countries. Progress is tracked using an agreed-upon UNICEF indicator for vitamin A supplementation coverage: the percentage of children between the ages of 6 months and 59 months receiving at least one high-dose vitamin A supplement in the past six months. Coverage data are drawn from figures reported in UNICEF's *The State of the World's Children* report (SOWC) for 1999 through 2004. Although the scale-up of supplementation precedes these years, this period provides the most complete data on global and regional coverage trends. Communications and reports from UNICEF country offices during this same period were used to complement coverage estimates, providing a more complete picture of the current state of supplementation and food-fortification programmes. Progress in vitamin A programming is also presented here for the subset of 60 countries that UNICEF has designated 'high priorities' for the scale-up of child survival efforts.

This report comes at a crucial time, as UNICEF and partners strategize on how best to push forward with the child survival agenda and accelerate progress towards the achievement of MDG 4. It serves as a 'scorecard' for countries and the international community on progress to date in scaling up one of the most effective child survival interventions available and as a reference for where we need to go from here.



GLOBAL BURDEN OF VITAMIN A DEFICIENCY

An estimated 4 million children under age five are affected by xerophthalmia, a serious eye disorder that can be caused by moderate to severe deficiency and can lead to blindness.³ Far greater numbers of children show no external signs of vitamin A deficiency but live with dangerously low vitamin A stores, leaving them vulnerable to infection and with reduced immunity to fight common childhood diseases. Because of technical and financial constraints, such as limited ability to transport and store biological samples or lack of laboratory facilities, many countries have not been able to assess the true level of deficiency. But it is estimated that 127 million preschool children may be affected.⁴ Most of this burden is concentrated in South Asia and sub-Saharan Africa.

Why supplementation matters

Vitamin A deficiency is a major contributor to the mortality of children under five.⁵ Improving the vitamin A status of deficient children through supplementation enhances their resistance to disease and can reduce mortality from all causes by approximately 23 per cent.⁶ Guaranteeing high supplementation coverage is therefore critical, not only to eliminating vitamin A deficiency as a public-health problem, but also as a central element of the child survival agenda.

Delivery of high-dose supplements remains the principal strategy for controlling vitamin A deficiency. Food-based approaches, such as food fortification and consumption of foods rich in vitamin A, are becoming increasingly feasible but have not yet ensured coverage levels similar to supplementation in most affected areas.

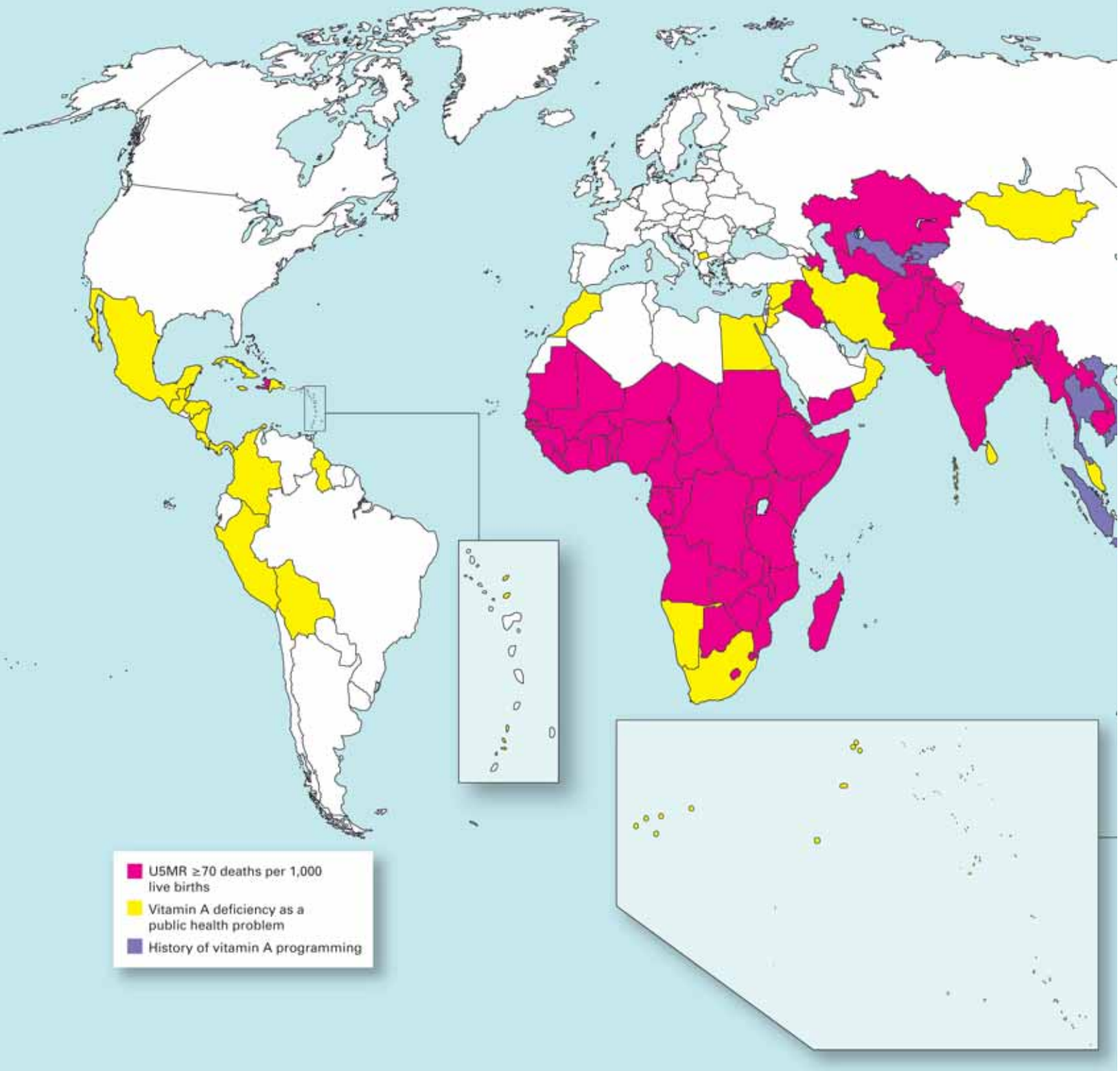
Achieving substantial reductions in child mortality means that all children 6–59 months old living in affected areas need to receive high-dose supplements every 4–6 months. While the goal is universal coverage, this report refers to a coverage threshold of 70 per cent, which represents the minimal coverage at which countries can expect to observe reductions in child mortality comparable to those measured in large-scale vitamin A supplementation trials in the community.

Monitoring of supplementation would ideally reveal the proportion of children receiving two annual doses of vitamin A, or what is considered 'effective coverage'. However, until health workers routinely mark children's health cards each time they receive a vitamin A supplement, it is only possible to collect information on the proportion of children receiving vitamin A from one distribution to the next. This report must therefore rely on the existing indicator published each year in SOWC: the percentage of children receiving at least one supplement in the previous six months.

To underscore the importance of effective two-dose coverage, all available coverage data have been compiled to generate a global estimate of the percentage of children fully protected with two annual doses. Although valid estimates of two-dose coverage at the regional and country levels could not be generated with existing data, countries reaching at least 70 per cent of children with two supplement distributions or 'rounds' are highlighted throughout this report. Past experience suggests the same children reached by one high-coverage vitamin A supplementation distribution are highly likely to be reached in a second round. These countries are therefore likely to be reaching substantial proportions of children with two annual doses, or providing effective coverage. Further information on how these estimates were derived and on coverage monitoring in general is provided on pages 30 and 31 of this report.

FIGURE 1 Priority countries for vitamin A supplementation

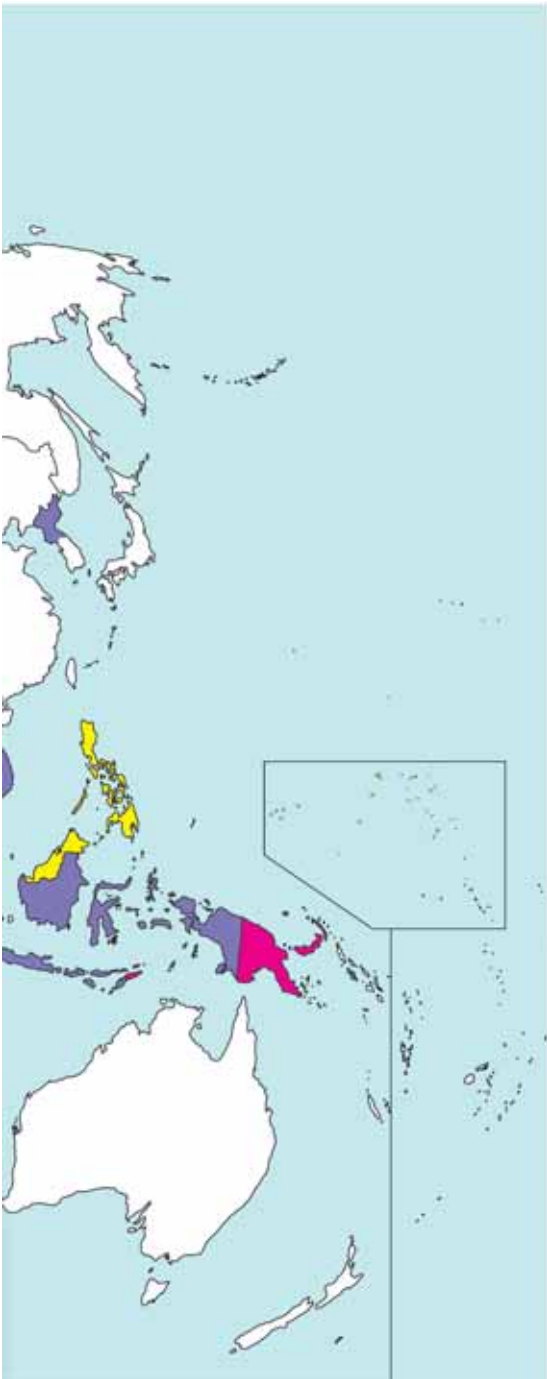
The global burden of deficiency is concentrated in South Asia and sub-Saharan Africa



Defining priority countries and indicators

This report focuses on vitamin A supplementation in 103 countries (considered 'priority countries for vitamin A supplementation') that meet at least one of the following criteria:

- **High under-five mortality rate (U5MR):** Supplementation with vitamin A is recommended in all countries where the U5MR exceeds 70 deaths per 1,000 live births, an internationally accepted proxy indicating a high risk of deficiency among children under five. Sixty-one countries in the developing world were included as priority countries for vitamin A supplementation using 2004 U5MR estimates.
- **Vitamin A deficiency as a public health problem:** Deficiency may also exist in countries with relatively low under-five mortality. Thirty-five additional priority countries were selected based on an elevated prevalence of vitamin A deficiency, which was determined using data from national-level assessments registered in the Micronutrient Deficiency Information System of the World Health Organization (WHO).
- **History of programming:** The Democratic People's Republic of Korea, Indonesia, Kyrgyzstan, the Occupied Palestinian Territory, Thailand, Uzbekistan, and Viet Nam did not meet the above criteria. Their governments have, however, recognized vitamin A deficiency as a public health problem and are committed to programming for vitamin A supplementation. Significant reductions in under-five mortality and vitamin A deficiency have been achieved by some of these governments, partly as a result of ongoing supplementation efforts – some dating back more than 25 years.

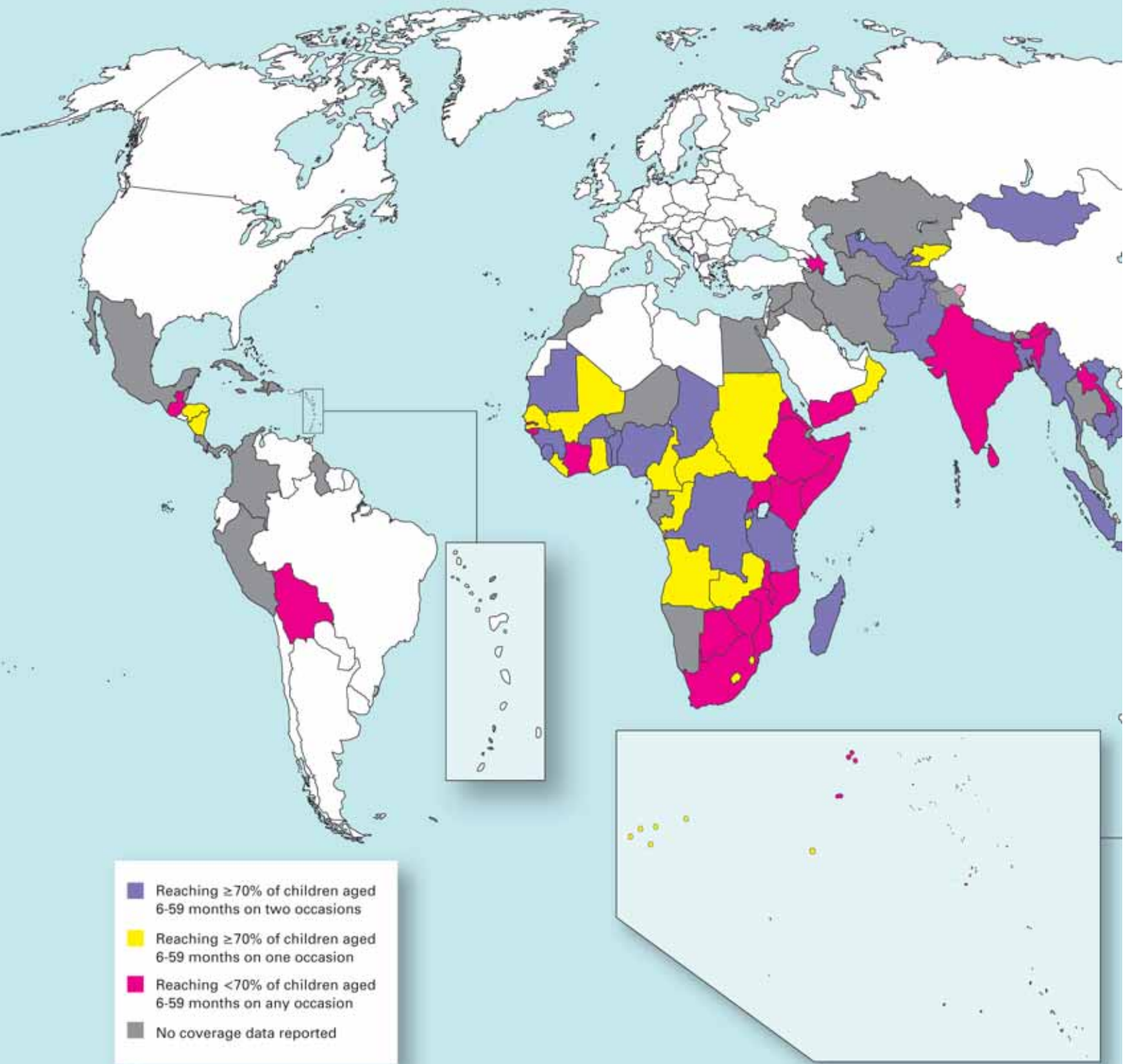


Note: This map does not reflect a position by UNICEF on the legal status of any country or territory or the delimitation of any frontiers. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Map insets are not to scale.

Sources: UNICEF Vitamin A Supplementation Database; WHO Micronutrient Deficiency Information System.

FIGURE 2 Country-level coverage, 2004

Twenty-six countries provide effective protection for young children



Vitamin A supplementation coverage

In 2004, approximately 190 million children aged 6–59 months received at least one high-dose vitamin A supplement, representing global coverage of 68 per cent. Children living in the least developed countries of the world benefited the most: Supplementation programmes in these countries reached approximately 75 per cent of targeted children with at least one capsule. However, even as affected areas of the world approach adequate levels of one-dose coverage, millions of children are still not fully protected with the recommended two annual doses. It is estimated that only 26 of the 103 priority countries attained effective coverage levels in 2004, meaning that they reached at least 70 per cent of children with two rounds of supplementation.

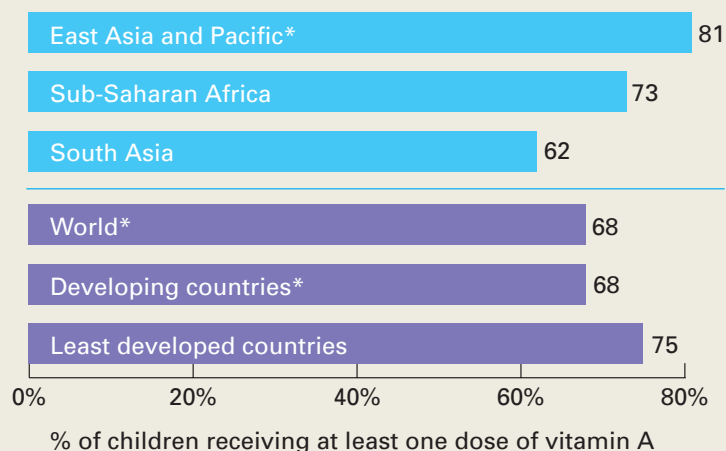


Note: This map does not reflect a position by UNICEF on the legal status of any country or territory or the delimitation of any frontiers. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Map insets are not to scale.

Source: UNICEF Vitamin A Supplementation Database.

FIGURE 3 Regional coverage, 2004

Least developed countries lead the way



* Calculations exclude China.

Source: SOWC 2007, p. 109.

Vitamin A and measles

Vitamin A deficiency is a well-established risk factor for measles-related mortality. Treating children with high-dose supplements during the course of a measles episode can reduce measles-related deaths and complications by about 66 per cent and is therefore the standard of care for managing the disease.⁷ Preventive supplementation programmes are also important for the control of vitamin A deficiency in populations with a high measles burden. As part of the global drive to reduce measles deaths, UNICEF and WHO are concentrating efforts on 47 countries in which more than 95 per cent of measles deaths occur – all of which are vitamin A supplementation priority countries.⁸

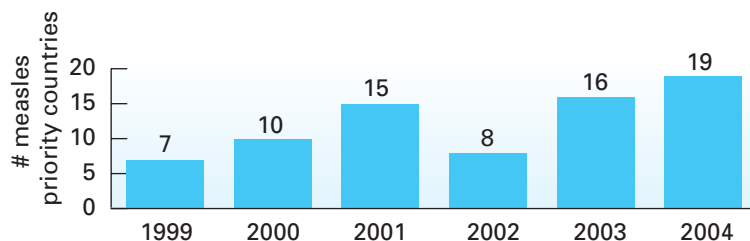
Opportunities exist to co-administer high-dose vitamin A supplements with the measles vaccine to infants at around nine months of age. For many infants at risk of vitamin A deficiency, this contact is often the first opportunity to receive a vitamin A supplement. Recent efforts to augment measles vaccine coverage through supplementary immunization activities have also proved effective for delivering vitamin A, enabling countries to reach approximately 70 per cent of targeted children with both interventions. Partly as a result of joint delivery strategies, the number of measles priority countries achieving effective coverage with vitamin A has more than doubled from 7 in 1999 to 19 in 2004 (see Figure 4). To ensure that both interventions reach the greatest proportion of at-risk children in all 47 measles/vitamin A supplementation priority countries, these efforts need to continue.



© UNICEF/HO04-0427/Christine Nesbitt

FIGURE 4 Number of measles priority countries reaching at least 70 per cent coverage on two occasions, 1999–2004

More than twice as many countries are achieving effective coverage



Source: UNICEF Vitamin A Supplementation Database.

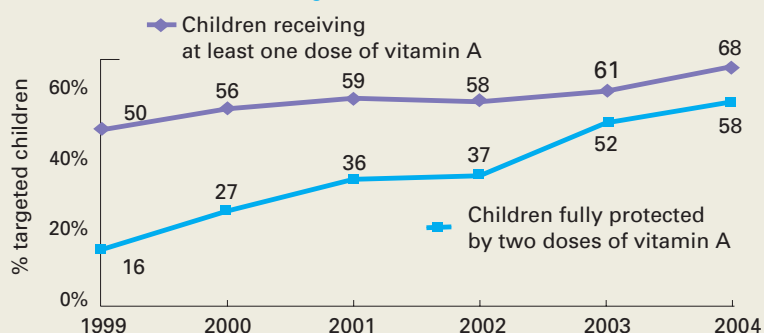
Tracking progress

While progress in reaching children with at least one dose may appear slow on a global scale, efforts to ensure that children receive two annual supplements have improved dramatically. In 1999, just 16 per cent of children in the 103 priority countries were fully protected with the recommended two doses. By 2004, this proportion had climbed to 58 per cent, representing more than a threefold increase (see Figure 5).

Even with challenges to starting up and sustaining programming, regional coverage levels have remained stable or increased over the period of 1999 to 2004 (see Figure 6). Although many countries have now met the challenge of delivering two doses, only 15 nations have sustained effective coverage levels for at least three of the past six years. Successes are primarily the result of countries establishing dedicated mechanisms for vitamin A supplementation, often with other key child survival interventions. Large variations in coverage – from high levels one year to no vitamin A supplementation the next – are still quite common in the vast majority of priority countries.

FIGURE 5 Global one-dose and two-dose coverage trends, 1999–2004

The proportion of fully protected children has increased dramatically

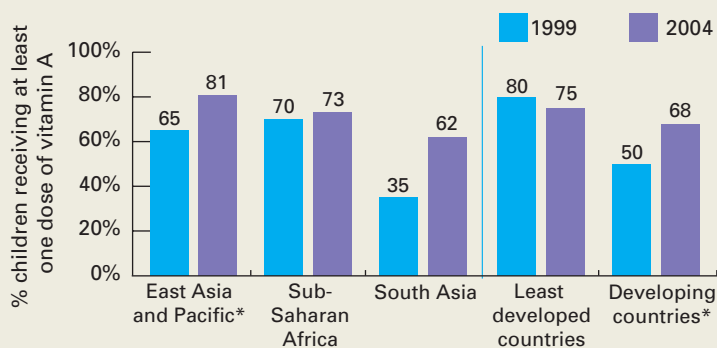


Note: Global coverage calculations exclude China.

Sources: SOWC 2002 to 2006; UNICEF Vitamin A Supplementation Database.

FIGURE 6 Regional coverage with at least one dose, 1999 and 2004

Coverage has been sustained despite challenges



*Calculations exclude China. Regional coverage not reported for CEE/CIS, the Middle East and North Africa, and the Americas and Caribbean as data were unavailable from more than 50% of countries in those regions.

Sources: SOWC 2002 Official Summary, p.19; SOWC 2007, p.109.

Regional report cards

- **East Asia and Pacific:** Vitamin A supplementation has been carried out for decades in some of this region's countries, including Indonesia, the Philippines and Viet Nam.⁹ Of the 15 East Asia and Pacific priority countries, only Malaysia does not have vitamin A supplementation, relying instead on food-based strategies. Since 2000, regional coverage with at least one dose has surpassed 70 per cent. Foods fortified with vitamin A are available in Malaysia and the Philippines, with some progress towards fortification in the Democratic People's Republic of Korea, Indonesia, Thailand and Viet Nam.
- **Sub-Saharan Africa:** Forty-one of the 45 priority countries in sub-Saharan Africa supplement all children aged 6–59 months. Three countries – Botswana, Cape Verde and South Africa – have targeted efforts. A fourth, Mauritius, employs a food-based strategy. Regional coverage has exceeded 70 per cent every year except 2003, when an interruption in Nigeria's supplementation contributed to a drop to 64 per cent. More than half of this region's countries report some progress towards supporting food fortification as a complementary strategy.
- **South Asia:** All eight countries in this region have national vitamin A supplementation programmes, although the age groups targeted for vitamin A supplementation vary in both India and Sri Lanka. While regional coverage remains relatively low, the increase in coverage from 35 per cent to 62 per cent from 1999–2004 translates into an additional 16 million children reached with at least one high dose. South Asia is also progressing in the scale-up of fortification of ghee and other oils.
- **Middle East and North Africa:** Vitamin A strategies in the Middle East and North Africa rely primarily on supplementation through Expanded Programme on Immunization (EPI) contacts, with a long-term focus on food fortification. In many of the countries facing emergencies, supplements are distributed with the measles vaccine. Oils fortified with vitamins A and D distributed as part of food aid are also helping to meet the needs of high-risk groups.¹⁰
- **Central and Eastern Europe/Commonwealth of Independent States (CEE/CIS):** Because vitamin A deficiency is just being identified as a public health problem in CEE/CIS, the region's supplementation programmes are in their infancy. Uzbekistan launched supplementation in 2002, followed by Azerbaijan, Kyrgyzstan and Tajikistan in 2004. While supplementation has been adopted as a short-term strategy for vitamin A deficiency control, countries in this region are simultaneously exploring opportunities for food fortification.
- **The Americas and Caribbean:** The food industry is relatively well developed and centralized in this region, making large-scale food fortification a feasible strategy. Sugar fortification exists in Guatemala, Honduras and Nicaragua, with several countries planning similar efforts. Vitamin A supplementation is carried out to a limited extent in the Americas and Caribbean, primarily through routine EPI contacts.



© UNICEF/HQ04-0534/Jeremy Horner

FOCUS ON FOOD FORTIFICATION

Food fortification is a highly effective strategy to correct underlying low intake of vitamin A and is widely used in developing countries to prevent deficiencies of multiple nutrients. However, effective food fortification generally requires adequate technical capacity, one or more centrally processed and widely distributed foods, public-private partnerships and a strong political commitment over the life of the programme.

Although fortification can take several years to initiate and longer still to penetrate poor markets and reach sufficient proportions of those at risk, some priority countries have made significant progress. Sugar fortification has been carried out in Latin America for several decades, initiated by a programme in Guatemala and aided in part by strong support from the private sugar industry.¹¹ Other large-scale fortification efforts have produced fortified oil, milk, margarine, infant foods and various types of flour.¹² It is estimated that vitamin A-fortified foods are available in approximately 40 of the vitamin A supplementation priority countries, although the extent of coverage with these foods is unknown.

Promising strides have been made in correcting low intakes of vitamin A through food fortification. However, even countries with highly successful fortification programmes may need to continue supplementation of high-risk groups to protect against deficiency.



Disparities in coverage

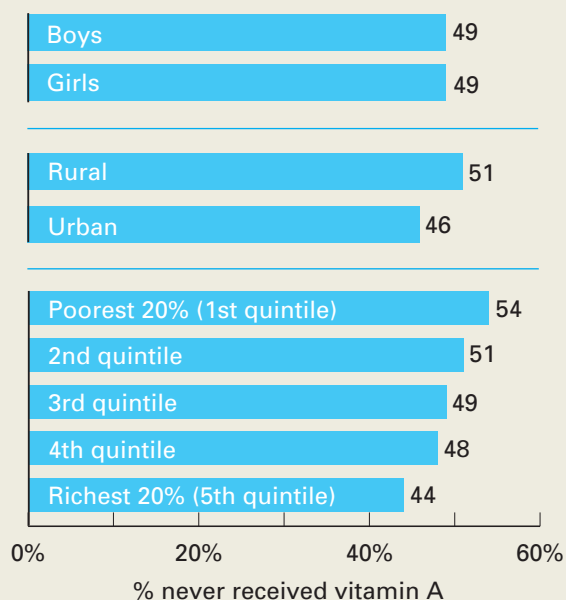
Global coverage figures for 2004 indicate that approximately 68 per cent of children 6–59 months old received at least one dose of vitamin A. Summary coverage estimates, however, often mask problems in reaching the most disadvantaged children and those most in need of the life-saving protection of vitamin A supplements. UNICEF’s Multiple Indicator Cluster Surveys (MICS), conducted every five years, allow the organization to monitor the progress of many child survival interventions. While MICS do not always provide accurate coverage figures for vitamin A supplementation – surveys are rarely carried out immediately following a distribution, limiting a mother’s ability to recall whether her child was reached – they are useful for exploring any systematic differences in which children were supplemented.

Based on a review of vitamin A supplementation coverage data gathered through MICS in 26 of the 103 target countries, there is no evidence of differential coverage between boys and girls. However, slight differences in coverage were apparent between children living in urban and rural areas. Rural children were approximately 10 per cent more likely never to have received a vitamin A supplement than their counterparts in urban locales. A similar pattern appeared for wealth: Children from poorer families were more likely never to have received vitamin A as compared to children from wealthier families.

All but 3 of the 26 MICS countries considered here were delivering vitamin A through campaign-style events at the time of the data collection. Campaigns are well-known to be great equalizers in health care, reaching the majority of children across all subgroups. That there is evidence of disparities with campaign-style approaches indicates that even these efforts can fail to reach some of the rural poor.

FIGURE 7 Children never reached by vitamin A supplementation

Children in poor, rural areas are more likely to be missed by supplementation



Source: Based on data from MICS for 26 developing countries, 1999–2001.





©UNICEF/HO99-0040/Cedric Galbe

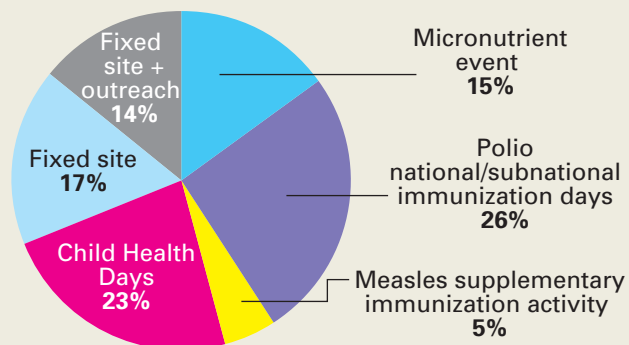
Supplementation delivery strategies

One of the greatest challenges for vitamin A supplementation has been finding sustainable mechanisms to deliver it. In the late 1990s, vitamin A supplementation was first linked with polio National Immunization Days (NIDs). Despite concerns about the phasing out of these campaigns, NIDs remained the most prominent strategy in 2004, accounting for 26 per cent of all delivery attempts. However, as polio eradication is gradually achieved and integration of vitamin A supplementation with NIDs becomes less of an option in some areas, countries are seizing on a more diverse set of delivery opportunities (see *Figure 8*).

Efforts continue to integrate vitamin A supplementation into routine health services. While immunization programmes have been a strong partner in reaching children under age one, the Expanded Programme on Immunization alone is insufficient to reach all targeted children aged 6–59 months twice annually. This is clearly reflected in mean coverage rates among countries relying solely on routine delivery

FIGURE 8 Proportion of total delivery attempts in 2004, by strategy

Vitamin A is being delivered through campaign-style events in most countries surveyed

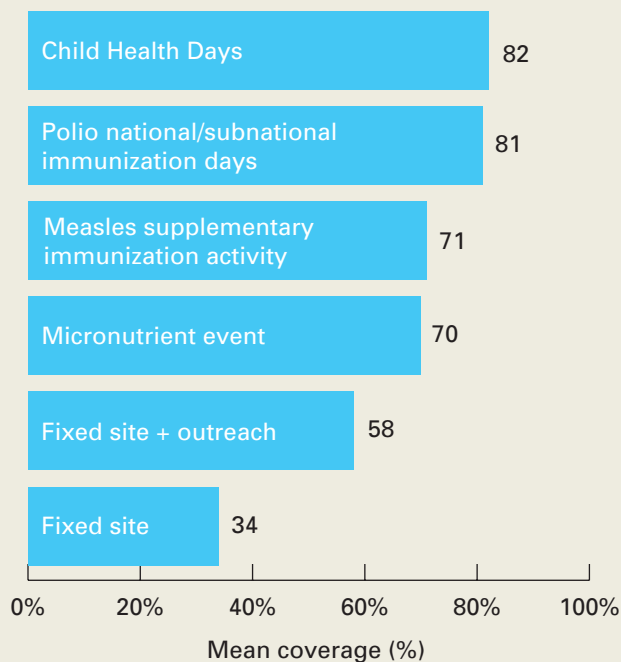


Source: UNICEF Vitamin A Supplementation Database.

(see Figure 9). Until routine health services can reach *all* targeted children on a regular basis, outreach and campaign-style events will be critical to protect children from the life-threatening effects of deficiency. Delivery of vitamin A with other child survival interventions – deworming, mosquito-net distribution or outreach efforts initiated by other programmes – has continuously achieved the highest coverage rates and may serve as a model for the integrated delivery of high-impact interventions.

FIGURE 9 Mean one-dose coverage achieved, by distribution strategy, 1999–2004

Opportunistic approach is key to delivering vitamin A supplements



Note: Estimates derived using coverage data from all vitamin A distributions carried out over the period 1999-2004, broken down by delivery strategy.

Source: UNICEF Vitamin A Supplementation Database.

Vitamin A ‘plus’: Integrated delivery of child survival interventions

Since its initial linkage with immunization in the 1990s, supplementation has almost always been delivered in combination with other health services, such as vaccines, anti-helminthics and insecticide-treated mosquito nets.¹³ Such joint initiatives have resulted in strong partnerships between programmes at the national level and among donors. As National Immunization Days (NIDs) are phased out, several countries are building on these successful partnerships to sustain and enhance supplementation programmes.

Health packages for children under five – termed ‘Child Health Days’ in some countries – involve the integrated delivery of two or more child survival interventions. Although such events require a significant amount of planning, strong logistical support and effective pooling of donor resources, they consistently reach the vast majority of children targeted. Some programmes have even cited greater government ownership of vitamin A supplementation when it is included in a child health package.

Table 1 summarizes child health packages carried out in recent years. There has been a concerted effort to build on these successful experiences. In sub-Saharan Africa, for example, child health packages are currently the strategic focus for countries phasing out NIDs, and many countries are considering adding deworming and/or insecticide-treated mosquito nets to existing supplementation campaigns.



© UNICEF/H004-0252/Mariella Furrer

TABLE 1 Components of Child Health Day packages in recent years

Country	Under-five supplementation	Deworming	Immunization	Mosquito nets	TT vaccination (mothers)	Growth monitoring	IEC	Iron supplementation (pregnant women)	Iron supplementation (low birthweight infants)	Ivermectin treatment (onchocerciasis)
Bangladesh	X	X								
Cambodia	X	X	X					X		
Congo, Dem. Rep. of the	X	X	X							
Ethiopia	X	X	X	X	X					
Ghana	X		X	X	X					
Korea, Dem. People's Rep. of	X	X					X			
Lao People's Dem. Rep.	X	X	X							
Nepal	X	X								
Nigeria	X		X							X
Philippines	X	X	X			X	X		X	
Swaziland	X	X	X			X		X		
Tanzania, United Rep. of	X	X	X	X						
Uganda	X	X	X		X					
Zambia	X	X	X	X		X	X			

Notes: TT = tetanus toxoid; IEC = information, education and communication; IEC focuses on infant and young child feeding and the promotion/testing of iodized salt in the cited countries. Bangladesh plans to pilot the inclusion of birth registration in upcoming child health packages. Mosquito net distribution in the Philippines is limited to remote areas where malaria is endemic.

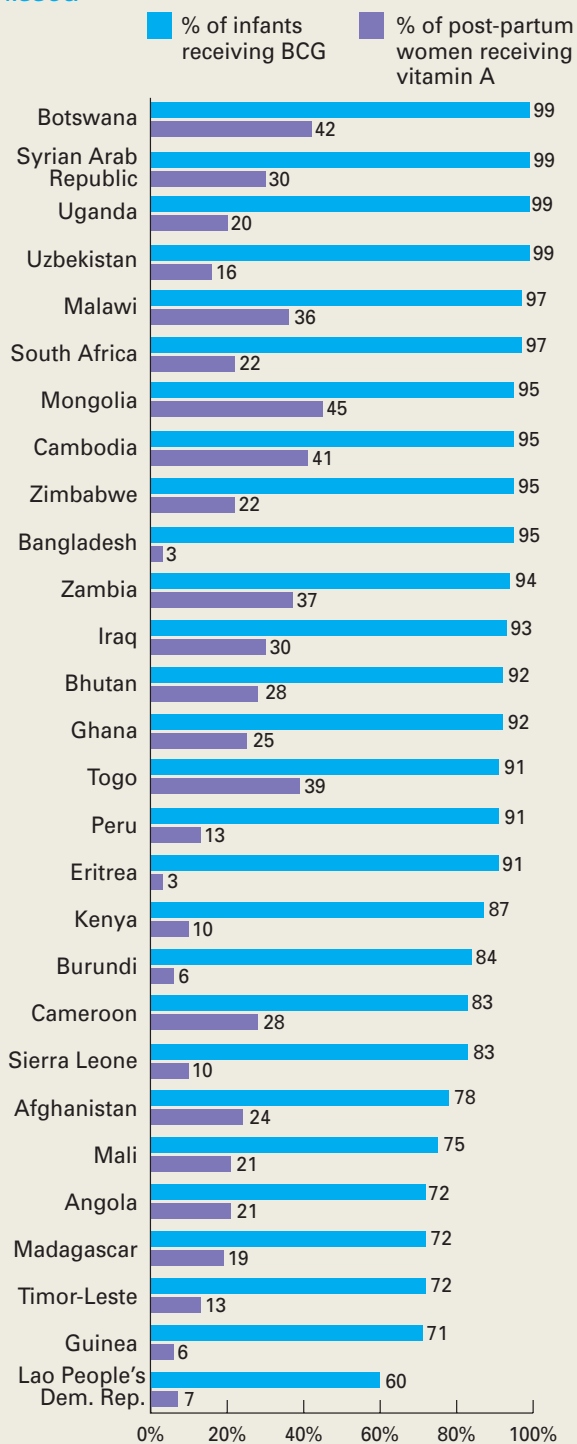
Source: UNICEF Vitamin A Supplementation Database.



© UNICEF/HCO5-2131/Giacomo Pirozzi

FIGURE 10 Post-partum vitamin A supplementation vs. BCG coverage, 2004

Opportunities for mother and child are being missed



Note: Infant BCG vaccination represents an opportunity to supplement new mothers with vitamin A. Co-delivery of these interventions could significantly improve post-partum coverage.

Sources: UNICEF Vitamin A Supplementation Database; SOWC 2006, pp. 106-109.

Post-partum supplementation

Infants are born with stores of vitamin A sufficient only for the first few days of life. Although newborns with healthy, well-nourished mothers can build up their stores through breastfeeding, infants born to deficient mothers do not receive sufficient vitamin A from breast milk to protect them from deficiency.¹⁴ UNICEF and WHO recommend high-dose supplementation for women in the immediate post-partum period, coupled with exclusive breastfeeding, so that all infants receive the necessary immune-boosting protection of vitamin A in the first six months of life.

Post-partum vitamin A supplementation lags behind efforts for young children. Programmes exist in only two thirds of priority countries, and most are limited in scope. In 2004, only 12 priority countries surpassed 50 per cent coverage: Azerbaijan, Benin, Cape Verde, Egypt, Honduras, Marshall Islands, Morocco, Myanmar, Oman, Sao Tome and Principe, Tajikistan and Viet Nam.

Opportunities currently exist to administer supplements to women at delivery. Alternatively, mothers can receive their post-partum dose at the time of the newborn's first immunization contact for BCG (bacille Calmette-Guérin, an anti-tuberculosis vaccine). *Figure 10* illustrates the gap between current levels of BCG coverage, which hover around 80 per cent in most countries, and post-partum vitamin A supplementation coverage. The BCG contact clearly represents a missed opportunity to replenish the vitamin A stores of deficient mothers, to ensure the adequate protection of infants and to reinforce messages about the importance of early and exclusive breastfeeding for child survival.



TABLE 2 Countries' proposals for vitamin A capsule procurement in national budgets

Country	Description of proposed contribution
Bangladesh	Is purchasing supplements and plans to cover operational costs through its 'Health, Nutrition and Population Sector Programme'
Cambodia	Funds to be allocated for partial procurement and for operational costs
India	Government funds are allocated for local procurement of syrup
Indonesia	Districts expected to cover 75%–80% of supplement costs; some unable to obtain local government support or to access funds in a timely manner
Jordan	Government has secured all capsules needed for 2006 distribution
Mongolia	Plans to cover 30% of the vitamin A supplementation budget in 2006, 60% in 2007, 90% in 2008 and the full costs of programming by 2009
Pakistan	Funding allocated to its Nutrition Wing, Ministry of Health, for operational costs and to purchase capsules for post-partum vitamin A supplementation
Philippines	Government funds are used to purchase 75% of all vitamin A capsules
South Africa	As of 2006, government is procuring vitamin A capsules, with each province ordering from government tenders
Thailand	Provincial Health Offices encouraged to pay for capsules, although adherence has not been evaluated

Source: UNICEF Vitamin A Supplementation Database.

Programme sustainability



© UNICEF/HQ00-0267/Giacomo Pirozzi

TABLE 3 Countries including vitamin A supplementation in poverty-reduction strategies or sector-wide approaches

Region	Vitamin A supplementation priority countries
Sub-Saharan Africa	Benin, Burkina Faso [†] , Cameroon, Ethiopia, the Gambia, Ghana*, Guinea, Madagascar, Malawi, Mauritania, Mozambique, Niger, Sierra Leone, Sao Tome and Principe, United Republic of Tanzania [†] , Uganda, Zambia [†]
South Asia	Afghanistan, Bangladesh [†] , Pakistan, Sri Lanka
East Asia and Pacific	Cambodia [†] , Lao People's Democratic Republic, Timor-Leste
Latin America and Caribbean	Bolivia, Honduras, Nicaragua

† Countries that propose to fund supplementation through poverty-reduction programmes.

* Vitamin A is included in country's sector-wide approach.

Sources: World Bank Poverty Reduction Strategies, <www.worldbank.org>, accessed February 2007; UNICEF Vitamin A Supplementation Database.

Donor support of vitamin A supplementation programmes has been critical to success achieved thus far. Additional resources will be needed, however, if progress is to be sustained and accelerated. Governments also need to assume responsibility and ownership of programming, as indicated by dedicated budgets for operational expenses and supplement supplies. Only one third of priority countries currently contribute to supplementation through national budgets – primarily for operational expenses. A subset of these countries has made initial plans to cover the full or partial costs of vitamin A supplements with national budgets, rather than relying on capsules donated via UNICEF (see *Table 2*). Follow-through on these pledges will be a critical first step towards sustainable vitamin A programmes.

Poverty-reduction strategies and sector-wide reforms present opportunities to increase national commitments to sustainable vitamin A supplementation programmes. Advocacy efforts have achieved significant progress in this area. *Table 3* lists the 26 countries that include vitamin A in their poverty-reduction strategies or sector-wide plans.

50003699

UNICEF MAPUTO
CAIXA POSTAL 4713
AV ZIMBABUE 1422
MAPUTO-MOZAMBIQUE

UNICEF/MISV/MUT DCP/MAPUTO

7-(0000)-(0)

VITAMINA - A

Março 2009

SARAMPO

Março 2009

TÉTANO

Março 2009

ROITE

Março 2009

UNICEF
COPENHAGEN
WGT. 21. KGS
CUB 0.062 M³

VACINA NECESSARIA PARA A AREA DE XAI-XAI POR CADA AREA DE ACOMODACAO

MASA

Distrito/Localidade (Populacao)	Vacina antitetano		Vacina contra sarampo		Mens
	0 Ano	Vacina	0 Ano	Vacina	
CHIMUSI					
Wemba					
Chimbalé					
Alto Chiara					
Mozuzere					
Senhora Madalena					
Coca Missoze					
2-X. GIBELÉ					
Centro Ext					
M. Gouassi					
Diposse					
P. Lenuimo					
greja					
2-X. GIBELÉ					
Manzoutse					
Chissulene					
TOTAL					



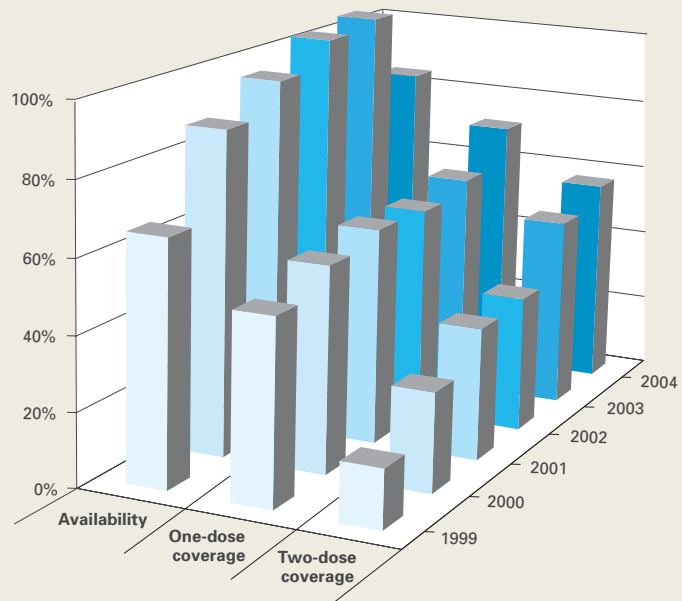
Managing vitamin A supplies

UNICEF supplies vitamin A capsules to most priority countries, either from its donated supplies or through direct country procurements. Based on the total number of capsules shipped from UNICEF's stores, and therefore the number of capsules available in priority countries, it is possible to estimate the maximum proportion of children who could be reached with two doses with available supplies. *Figure 11* illustrates significant gaps between capsules available to provide effective coverage and the actual one- and two-dose coverage achieved in the early years of the programme. These gaps were due primarily to inadequate inventory management and supply forecasting. However, estimates for the most recent reporting year illustrate a promising reduction in the gap between availability and effective two-dose coverage. UNICEF and its partners are planning a review in 2007 to identify challenges and solutions to efficient capsule procurement, storage and management.



FIGURE 11
Capsule availability vs. coverage achieved

A closing gap suggests rising efficiency in managing vitamin A



Note: Availability is the maximum two-dose coverage that could be achieved, given the estimated number of capsules available in priority countries.

Source: UNICEF Vitamin A Supplementation Database.



© UNICEF/HQ05-0149/Jim Holmes

Donor commitment to vitamin A programmes

Since the early 1990s, generous donor support – from the Governments of Canada and the United States in particular – has been critical in advocating for and funding global efforts to scale up supplementation and child survival programmes. The Canadian International Development Agency (CIDA) has donated close to 4 billion capsules to UNICEF through The Micronutrient Initiative since the inception of their partnership in 1997 (see Table 4). Other donor commitments have ensured technical support, advocacy, training, capsule freight and storage, quality assurance and programme monitoring.

Donors support the work of a consortium of partners in programmes on child survival and vitamin A deficiency control, including A2Z (the United States Agency for International Development's Micronutrient and Child Blindness Project), Helen Keller International, The Micronutrient Initiative, UNICEF, and WHO. Funding has also been crucial to advancing research on the role of vitamin A in reducing the global burden of morbidity and mortality, as well as providing guidance on the translation of public health research into global policy, led by the International Vitamin A Consultative Group.

TABLE 4 CIDA capsule donations

Year	Number of capsules donated
1997/1998	370 million
1999	460 million
2000	480 million
2001	530 million
2002	650 million
2003	330 million
2004	470 million
2005	520 million
Total	3.8 billion

Source: UNICEF donor reports, 1998–2005.

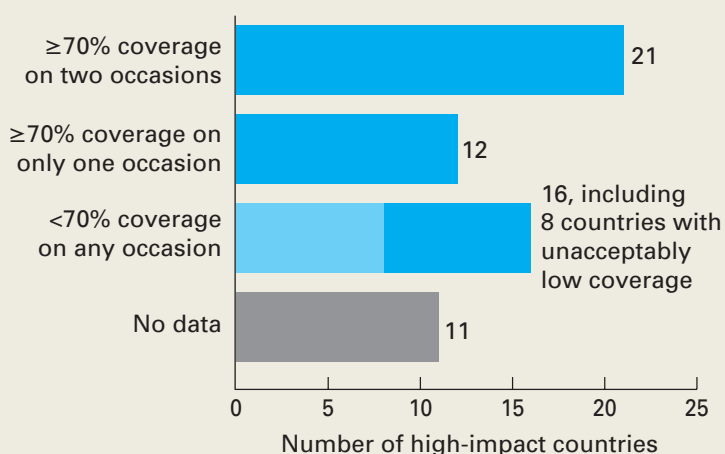
High-impact countries

A 2003 article in *The Lancet*, 'Where and why are 10 million children dying every year?', revealed that 90 per cent of preventable child deaths occur each year in a limited number of countries.¹⁵ Significant global progress towards MDG 4 could be achieved by reaching young children in these countries with a package of well-established child survival interventions, including supplementation with vitamin A. The 'Countdown to 2015' efforts, launched by UNICEF and its partners in 2005, will report on progress every two years in 60 'high-impact' countries representing the greatest burden of preventable child deaths.¹⁶

Table 5 calls attention to progress in vitamin A programmes in these countries. The vast majority of high-impact countries have adopted policies to supplement children aged 6–59 months, as well as post-partum women, in accordance with UNICEF/WHO recommendations. Several countries have also made some progress towards the fortification of staple foods with vitamin A. However, more work is needed if high-impact countries are going to achieve the full reductions in child mortality demonstrated by the large-scale, vitamin A supplementation trials in the community. Less than half of the 60 high-impact countries are currently attaining effective levels of coverage, and only 13 have sustained these levels for three or more of the past six reporting years (see Figure 12). It is important to draw attention to the fact that no data were available from a significant number of high-impact countries, which may be indicative of insufficient progress. As the MDG countdown advances, further efforts are needed to monitor and report on the effective implementation of critical child survival interventions to ensure accountability to the donors funding these efforts and, more importantly, to the programme beneficiaries.

FIGURE 12 Number of high-impact countries by coverage category, 2004

Less than half of high-impact countries attain effective coverage



Note: 'Unacceptably low coverage' refers to coverage <40%.

Source: UNICEF Vitamin A Supplementation Database.

TABLE 5 Vitamin A supplementation programming in 60 high-impact countries, 2004

Country	No. of under-five deaths annually	Supplementation		Vitamin A-fortified foods available	Country
		Under-five	Post-partum		
India	2,210,000	targeted		X	Rwanda
Nigeria	1,049,000	X	X	X**	South Africa
Congo, Democratic Republic of the	572,000	X	X		Sierra Leone
China*	539,000				Philippines
Ethiopia	509,000	X	X		Egypt
Pakistan	478,000	X	X	X	Burundi
Afghanistan	359,000	X	X		Mexico
Bangladesh	288,000	X	X		Nepal
Uganda	195,000	X	X	X	Cambodia
Angola	195,000	X	X	X	Guinea
Niger	190,000	X	X		Senegal
Tanzania, United Republic of	177,000	X	X	X	Benin
Indonesia	171,000	X	X	X	Zimbabwe
Kenya	159,000	X	X	X	Liberia
Mali	142,000	X	X		Togo
Côte d'Ivoire	128,000	X	X	X	Haiti
Brazil*	127,000				Central African Republic
Iraq	122,000	targeted	X	X	Tajikistan
Mozambique	117,000	X	X		Congo
Burkina Faso	115,000	X	X		Guinea-Bissau
Sudan	106,000	X	X		Papua New Guinea
Myanmar	105,000	X	X		Mauritania
Malawi	96,000	X	X	X**	Azerbaijan
Yemen	92,000	targeted		X	Turkmenistan
Chad	91,000	X	X		Gambia
Madagascar	87,000	X	X		Botswana
Zambia	85,000	X	X	X**	Swaziland
Cameroon	84,000	X	X	X	Equatorial Guinea
Somalia	81,000	X	X		Gabon
Ghana	76,000	X	X	X	Djibouti

* Brazil and China are not priority countries for vitamin A supplementation. Brazil has a subnational programme in north-eastern regions. China has a subnational programme for children aged 6–36 months in select provinces with poor health and nutrition indicators.

** Large-scale.

Sources: For number of under-five deaths annually, *SOWC 2006*, pp. 98-101; UNICEF Vitamin A Supplementation Database.

No. of child deaths annually	Supplementation		Vitamin A-fortified foods available
	Under-five	Post-partum	
74,000	X	X	
73,000	X	X	X
69,000	X	X	
69,000	X	X	X**
68,000	targeted	X	
63,000	X	X	
62,000			X
60,000	X	X	X
60,000	X	X	
59,000	X	X	
57,000	X	X	
52,000	X	X	
50,000	X	X	X
39,000	X	X	
33,000	X	X	
30,000	X	X	
29,000	X	X	
22,000	X	X	
19,000	X	X	
16,000	X		
16,000	X		
15,000	X		
12,000	X		
11,000			
6,000	X	X	
5,000	targeted	X	X
5,000	X	X	X
4,000	X	X	
4,000	X		
3,000	X	X	



© UNICEF/H002-0372/Giacomo Pirozzi



Conclusion

Providing children between the ages of 6 months and 59 months with vitamin A supplements can substantially reduce child mortality in the 103 priority countries. Significant progress has been achieved in scaling up this important intervention. When UNICEF first began monitoring global coverage in 1999, only 16 per cent of children were fully protected with two annual doses of vitamin A. Effective coverage has increased dramatically over the past decade, with approximately 58 per cent of children now receiving the recommended two annual doses. This gain can be attributed to innovations in vitamin A delivery that have originated from the least developed countries of the world, including such initiatives as integrated child health packages. Progress has also been achieved in building sustainable programmes: One third of countries are contributing to the operational costs of supplementation; a growing number are procuring capsules from national budgets; and capsule supply management is increasingly efficient. Furthermore, substantial advocacy efforts, particularly in countries in eastern and southern Africa, have led to the inclusion of vitamin A supplementation in poverty-reduction strategies and coordinated health-sector investment approaches.

While this report illustrates important gains over the past decade, there is still room for improvement. Millions of children are not fully protected with the recommended two annual doses because few countries have been able to establish the dedicated delivery strategies for vitamin A necessary for sustained effective coverage. Evidence from UNICEF's Multiple Indicator Cluster Surveys also suggests that children living in poor, rural areas – those likely to be at greatest risk – may be disproportionately missed by the intervention. Supplementation for women during the post-partum period lags far behind programmes for young children, even though opportunities – such as contacts during newborn immunizations – clearly exist to reach this target group, protecting both mothers and their newborns from inadequate vitamin A stores.

Although a great deal of progress has been achieved, further effort is required to accelerate and sustain the gains of vitamin A programmes. This effort is crucial to controlling vitamin A deficiency and its consequences and should be viewed as a central component of efforts to achieve the MDG child survival goal.



© UNICEF/HO06-0195/Tomas Van Houtryve

Monitoring supplementation coverage

UNICEF relies on information from a variety of sources to monitor vitamin A supplementation coverage, including:

- **Campaign tally sheets:** For campaign activities, distributors record each child receiving vitamin A on a tally sheet. Tallies are aggregated at the centralized level and divided by an estimate of the targeted population to determine coverage. Although problems may occur with both numerators (ineligible children receive capsules) and denominators (due to inaccurate census data or migration), required reporting of numerator and denominator allows UNICEF to verify overall data quality.
- **Routine health data:** Statistics on coverage of vitamin A supplementation delivered on a routine basis are compiled from administrative records of health centres and national reports. The quality of data on routine reporting depends largely on each country's health information system and the extent to which vitamin A has been integrated into that system.
- **Population-based surveys:** Coverage estimates may be drawn from nationally representative surveys, such as MICS or Demographic and Health Surveys, during which mothers or caregivers are asked if their child has received vitamin A within the past six months. Due to problems of maternal recall and the timing of surveys, these data generally underestimate coverage and are used when other information is unavailable. Such estimates are, however, valuable to validate tally sheet coverage estimates and can inform improvements in routine coverage monitoring.
- **Rapid coverage assessments:** A limited number of countries carry out coverage surveys immediately following distribution, using methods similar to those developed to track immunization coverage. Although they require additional funding, such efforts provide the most accurate coverage estimates and can inform improvements in routine coverage monitoring.

Reports are received for approximately 80 countries each year, from which SOWC estimates are derived. Figures accepted for inclusion in SOWC must: (a) be nationally representative; (b) cover the full age range of children 6–59 months old, unless a country can provide justification for targeting a different group, e.g., deficiency prevalence patterns; and (c) represent the most recent distribution. Additional input and process indicators are collected via coverage reports for entry into UNICEF's Vitamin A Supplementation Programme Database. These qualitative data informed discussions of programme scope, supplement delivery strategies, sustainability and supply management in the present report.

Summary coverage figures: SOWC relies on a common methodology across all child health and nutrition indicators: Regional or global coverage estimates represent the mean coverage of reporting countries, weighted by the size of the under-five population

in those countries. To maintain consistency with previous reports, all summary coverage figures have been taken directly from SOWC estimates. Therefore, all tables and figures in the present report referencing SOWC as their source will include information on all countries reporting in that particular year, regardless of their status as a vitamin A supplementation priority country. Tables or figures noting UNICEF's Vitamin A Supplementation Database as the source include information on all 103 priority countries. All estimates of the number of children reached or fully protected by vitamin A supplementation were calculated using official UN Population Division estimates – irrespective of targeted populations reported by countries – and adjusted for targeted programmes.

Children fully protected: Current programme monitoring is unable to directly assess the proportion of children fully protected with two annual doses of vitamin A. Although the assumptions used to produce this report are currently under review and subject to change, past experience suggests the same children reached by one distribution are highly likely to be reached in a second round. Based on this assumption, the proportion of children fully protected with two doses would be equivalent to coverage for whichever distribution reached fewer children. In Ghana, for example, 50 per cent coverage was reported for the 2004 first round and 95 per cent for the second round. Assuming all the same children were reached by both distributions, 50 per cent of Ghanaian children were fully protected by two doses in 2004. When countries implemented only one round of vitamin A supplementation, it was assumed no children were fully protected in that year. UNICEF and its partners are working with countries to improve child-level documentation of vitamin A receipt, which will facilitate direct monitoring of two-dose coverage in the future.

Capsule availability: Availability is calculated as the total number of capsules shipped to countries reporting coverage in a given year – donated through The Micronutrient Initiative and from other sources – less 25 per cent to account for post-partum supplementation, capsules used for treatment purposes, and losses in shipping and handling. The remaining number of capsules is divided by two to estimate the maximum number of children who could receive two capsules, given the available supply. This number is then divided by the total population at risk in those countries. Supply-system monitoring during the period considered by this review did not capture information on capsule stores within countries (i.e., capsules remaining from the previous year and not yet expired), so availability is likely somewhat higher than projected. India was excluded from these calculations due to the country's reliance on syrup rather than capsules.

Efforts are under way to improve monitoring capabilities. For further information on the methods and assumptions used in the compilation of this report, as well as complete country-level data on vitamin A programming and supplementation coverage, visit UNICEF's monitoring website at <www.childinfo.org>.

REFERENCES

- 1 Jones, Gareth, et al., 'How Many Child Deaths can we Prevent this Year?', *The Lancet*, vol. 362, 5 July 2003, pp. 65-71.
- 2 Edejer, Tessa Tan-Torres, et al., 'Cost Effectiveness Analysis of Strategies for Child Health in Developing Countries', *British Medical Journal*, vol. 331, 2005, pp. 1177-1182; and World Bank, *World Development Report 1993: Investing in health*, Oxford University Press, New York, 1993, pp. 61 and 76.
- 3 West, Keith P., Jr., 'Extent of Vitamin A Deficiency among Preschool Children and Women of Reproductive Age,' *The Journal of Nutrition*, vol. 132, 2002, pp. 2857S-2866S.
- 4 Ibid.
- 5 World Health Organization, *The World Health Report 2002: Reducing risks, promoting healthy life*, WHO, Geneva, 2002, p. 55.
- 6 Beaton, George H., et al., 'Effectiveness of Vitamin A Supplementation in the Control of Young Child Morbidity and Mortality in Developing Countries', ACC/SCN State-of-the-Art Series, Nutrition Policy Paper No. 13, Geneva, 1993.
- 7 International Vitamin A Consultative Group, 'IVACG Policy Statement on Vitamin A, Diarrhea, and Measles', IVACG, Washington, D.C., 1996, <<http://ivacg.ilsa.org/publications/pubslst.cfm?publicationid=226>>, accessed 30 January 2007.
- 8 World Health Organization, Measles Fact Sheet No. 286, WHO, Geneva, Revised January 2007, available at <www.who.int/mediacentre/factsheets/fs286/en/>, accessed 30 January 2007.
- 9 Deitchler, Megan, et al., 'Lessons from Successful Micronutrient Programs – Part II: Program implementation', *Food and Nutrition Bulletin*, vol. 25, no. 1, 2004, pp. 30-52.
- 10 United Nations High Commissioner for Refugees, United Nations Children's Fund, World Food Programme and World Health Organization, *Food and Nutrition Needs in Emergencies*, WFP, Rome, November 2002, p. 12.
- 11 Mora, José O., et al., *Vitamin A Sugar Fortification in Central America: Experience and lessons learned*, MOST, the USAID Micronutrient Program, Arlington, Virginia, 2000, pp. 5-8, 24-25.
- 12 Allen, Lindsay, et al., eds., *Guidelines on Food Fortification with Micronutrients*, World Health Organization, Geneva, 2006, pp. 112-117.
- 13 Goodman, Tracey, et al., 'Polio as a Platform: Using national immunization days to deliver vitamin A supplements', *Bulletin of the World Health Organization*, vol. 78, no. 3, 2000, pp. 305-314.
- 14 Miller, Melissa, et al., 'Why do Children Become Vitamin A Deficient?', *The Journal of Nutrition*, vol. 132, 2002, pp. 2867S-2880S.
- 15 Black, Robert E., et al., 'Where and Why are 10 Million Children Dying Every Year?', *The Lancet*, vol. 361, 28 June 2003, pp. 2226-2234.
- 16 Bryce, Jennifer, et al., 'Countdown to 2015: Tracking intervention coverage for child survival', *The Lancet*, vol. 368, 23 September 2006, pp. 1067-1076.

VITAMIN A SUPPLEMENTATION KEY MESSAGES

Significant progress has been made

- Global coverage with at least one dose has climbed from 50 per cent in 1999 to 68 per cent in 2004.
- The proportion of children fully protected by two doses has increased more than threefold over the same period, because countries have found opportunities to ensure two rounds of supplementation.
- Vitamin A supplementation has sparked the innovative delivery of multiple interventions through child health packages.

Greatest gains in the least developed countries of the world

- Some of the most successful and exemplary programmes have emerged from these countries.
- The least developed countries have maintained an average coverage of greater than 70 per cent with at least one dose over the period 1999-2004, often reaching more than 90 per cent of targeted children.
- Opportunities exist for supplementation to be sustained through poverty reduction strategies, but advocacy is necessary to ensure continued support for vitamin A supplementation.

Acceleration needs to happen – soon!

- The full child survival benefit of vitamin A supplementation is still to be realized.
- Millions of children under five in the 103 priority countries are not benefiting from the full protection of vitamin A because they are not yet being reached by two rounds of supplementation.
- All children in the priority countries should receive high-dose vitamin A supplements every four to six months, in addition to any doses necessary for the treatment of severe malnutrition or measles.
- Supplementation of women in the post-partum period has not achieved significant gains. Opportunities are being missed to pair this intervention with an infant's first immunization contact.

United Nations Children's Fund
3 United Nations Plaza
New York, NY 10017, USA
pubdoc@unicef.org
www.unicef.org
ISBN: 978-92-806-4150-9

© The United Nations Children's Fund (UNICEF)
April 2007