

## 5. SCALING UP HIV SERVICES FOR WOMEN AND CHILDREN

### Key findings

- *The proportion of pregnant women who received an HIV test increased slightly.* An estimated 26% of the estimated 125 million pregnant women<sup>1</sup> in low- and middle-income countries received an HIV test in 2009, up from 21% in 2008 and 7% in 2005. In the Eastern and Southern Africa region, the proportion of pregnant women who received an HIV test increased from 43% in 2008 up to 50% in 2009.
- Approximately 51% of pregnant women testing positive were reported to have been assessed for eligibility to receive antiretroviral therapy for their own health.
- *Over half of the 1.4 million pregnant women living with HIV are estimated to have received antiretroviral drugs to prevent transmission of HIV to their infants.* An estimated 53% [40–79%] of pregnant women living with HIV received antiretrovirals to reduce the risk of transmitting HIV to their infants, up from 45% [37–57%] in 2008 and 15% [12–18%] in 2005. A large proportion continued to receive the less efficacious single-dose nevirapine regimen.
- *Slightly more infants received antiretroviral prophylaxis to prevent acquisition of HIV from their mothers.* Thirty-five per cent [26–53%] of infants in need received antiretroviral prophylaxis for prevention of mother-to-child transmission in 2009, up from 32% [26–40%] in 2008.
- *Among infants and children exposed to HIV, access to early testing, care and treatment is insufficient.* In 2009, in 54 reporting countries, only 15% [10–28%] of children born to HIV-positive mothers received an HIV test within the two first two months of life.
- *The proportion of children in need who received antiretroviral therapy rose further in 2009.* The number of children below the age of 15 years on antiretroviral therapy rose from 275 300 in 2008 to 356 400 in 2009. This represents an estimated coverage of 28% [21–43%] of children in need of antiretroviral therapy, up from 22% [16–34%] in 2008, based on updated treatment needs.

<sup>1</sup> Pregnant women were proxied by the estimated number of births.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2009). World Population Prospects: The 2008 Revision, CD-ROM Edition.

## Introduction

In July 2010, WHO released updated guidelines on antiretrovirals for treating pregnant women living with HIV and preventing HIV infection in infants, infant-feeding in the context of maternal HIV, and antiretroviral therapy for HIV in infants and children (1). These new guidelines call for an earlier start and longer duration of antiretrovirals in women and children, which would require strategies and increased capacity to assess eligibility for antiretroviral therapy and undertake long-term monitoring, including of adherence to antiretrovirals. Scaling up interventions to reach more women and children in need also demands integrating, where appropriate, HIV interventions within routine maternal, child and other health services.

Successful implementation of the revised 2010 WHO guidelines will contribute to improving the health and survival of mothers living with HIV and children exposed to HIV and, ultimately, to the realization of Millennium Development Goals (MDGs) 4 and 5, as well as the goal

of eliminating mother-to-child transmission of HIV by 2015 (Box 5.1). This is a unique opportunity to harness the necessary political and financial resources to achieve an HIV-free generation.

In 2008,<sup>1</sup> an estimated 15.7 million women aged 15 years and above were living with HIV globally, of whom 12 million were in sub-Saharan Africa (6). The number of children less than 15 years of age living with HIV was 2.1 million, with an estimated 430 000 children below 15 years becoming newly infected. In sub-Saharan Africa, women accounted for approximately 60% of estimated HIV infections. In 2008, of all new infections among children, 91% occurred in this region (6).

More than 90% of children living with HIV are infected through mother-to-child transmission during pregnancy, around the time of birth or through breastfeeding (7). Children may also be infected with HIV through transfusion

<sup>1</sup> 2009 estimates are not yet available, and will be published in the forthcoming *AIDS Today: UNAIDS Global Report*.

### Box 5.1. International targets for mother-to-child transmission of HIV

In June 2001, Heads of State and Representatives of Governments adopted the Declaration of Commitment on HIV/AIDS at the United Nations General Assembly Special Session (UNGASS) on HIV/AIDS. Countries committed that by 2005, they would reduce by 20% and, by 2010, by 50%, the number of infants infected with HIV by ensuring that “80% of pregnant women in antenatal care receive HIV information, counselling and other HIV prevention services; increasing the availability of and providing access for HIV-infected women and babies to effective treatment to reduce mother-to-child transmission of HIV, as well as through effective interventions for HIV-infected women, including voluntary and confidential testing and counselling, access to treatment, especially antiretroviral therapy and, where appropriate, breast-milk substitutes and the provision of a continuum of care” (2).

In June 2006, a Political Declaration on HIV/AIDS was adopted at the United Nations General Assembly High-Level Meeting on AIDS, reaffirming the commitment of all Member States to fully implement the 2001 UNGASS Declaration as well as the MDGs, and to work towards universal access to HIV prevention, treatment, care and support (3).

In 2007, the Inter-Agency Task Team (IATT) on Prevention of HIV Infection in Pregnant Women, Mothers and their Children issued a *Guidance on global scale-up of prevention of mother-to-child transmission of HIV*, with recommended target coverage levels of at least 80% for key interventions at the national level (4).

Since then, several multilateral and bilateral agencies have prioritized the reduction of mother-to-child transmission of HIV, and have called for its effective elimination by 2015. In 2009, WHO released its *PMTCT strategic vision 2010–2015* to prevent mother-to-child transmission and improve maternal, newborn, and child health and survival in the context of HIV, to reach the UNGASS targets and MDGs (5). The Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria is reviewing and reprogramming existing grants to support increased coverage and quality of programmes to prevent mother-to-child transmission.

The UNAIDS Secretariat and its cosponsors have recently developed a Business Case towards the virtual elimination of mother-to-child-transmission of HIV (defined as less than 5% transmission of HIV from mother to child at a population level or 90% reduction of infections among young children by 2015, from a baseline of 2009). In order to spearhead action and facilitate progress in monitoring, three results, to be achieved by 2011, have been proposed; in 10 of the 22 countries with the greatest number of HIV-positive pregnant women:

1. to achieve at least 80% coverage with effective antiretrovirals for preventing mother-to-child transmission,
2. to provide antiretroviral coverage to at least 50% of HIV-positive pregnant women eligible for treatment for their own health.
3. Reduce by 50% the current unmet need for family planning among all women.

WHO, UNAIDS and UNICEF will organize a meeting in late 2010 with country representatives and international partners to further define “elimination” targets and discuss how they can be measured and supported.

with HIV-contaminated blood, injections with contaminated needles, and through early sexual debut and abuse. Effectively addressing mother-to-child transmission of HIV requires a comprehensive approach that includes the following four strategic components (8):

- primary prevention of HIV infection among women of childbearing age;
- preventing unintended pregnancies among women living with HIV;
- preventing HIV transmission from women living with HIV to their infants, and
- providing appropriate treatment, care and support to mothers living with HIV and their children and families.

This approach provides a continuum of interventions and care for women, children and their families which begins before pregnancy, continues through pregnancy, labour, delivery and postpartum, and subsequently as part of routine or specialized chronic care services for the mother, child and family after the child is born. In scaling up their national programmes, countries must ensure that all four components of the comprehensive approach are delivered to women and children in need.

This chapter focuses on components 3 (preventing HIV transmission from women living with HIV to their infants) and 4 (providing appropriate treatment, care and support to mothers living with HIV and their children and families), where new data have been reported by countries which allow for a comprehensive update of programmatic progress between 2008 and 2009. Other programmatic components are essential as well but routine reporting is complex: cross-country comparisons on component 1 require data collected from household surveys, which are updated only every few years; data on component 2 are currently still very limited. In this context, there is a need to place more emphasis on efforts to strengthen data collection in these areas.

Overall, 25 countries in sub-Saharan Africa and East, South and South-East Asia accounted for 91% of the 1.4 million pregnant women needing antiretrovirals to prevent vertical transmission (Table 5.1). The same countries are also home to 91% of the children less than 15 years in need of antiretroviral therapy.

### Box 5.2. Monitoring progress in preventing mother-to-child transmission and improving data quality

Programmes for preventing mother-to-child transmission are difficult to monitor at the national level for several reasons: (i) they comprise a cascade of multiple interventions; (ii) the interventions often occur across various service delivery points (for instance, they can be delivered in facilities providing antenatal care, labour and delivery services, child health services or HIV care and treatment services); and (iii) mother and child follow up is often poor, and records of interventions and outcomes are not linked, resulting in a lack of information on longitudinal follow up after pregnancy, including on final transmission and survival outcomes.

In some countries, a considerable number of women deliver at home and many services are provided by the private sector. Mechanisms to collect and report data from these sources are not always available. Furthermore, the key intervention – provision of antiretrovirals to a pregnant woman living with HIV and to the exposed infant to reduce the risk of transmission to the baby – is recorded at health facilities based on whether the drug was dispensed, and whether the drug was actually taken is often unknown. This may bias estimates of how the intervention affects HIV transmission from mother to child.

Double counting across multiple service delivery points is also a common issue when countries compile national statistics related to preventing mother-to-child transmission of HIV. For example, in settings in which the same pregnant woman living with HIV may receive antiretrovirals in antenatal care, in a maternity ward during labour and delivery, or in HIV care sites, double counting may happen if data are aggregated across all service delivery points. In addition, patient registers may be incomplete, and the lack of robust data systems may lead to inaccurate aggregation, recording and reporting from the facilities to the subnational and national levels. Some countries have been unable to report data on interventions such as the number of pregnant women living with HIV receiving antiretroviral therapy for their own health, since they have not yet established data collection mechanisms to capture this information. In other countries, HIV in pregnant women and children are rare events, and they are not captured properly in national surveillance systems. Countries are aware of these issues and are making efforts to improve their monitoring systems, and make necessary adjustments to the data reported for this report. This chapter attempts to summarize the available data.

WHO, UNICEF and the monitoring and evaluation working group of the IATT on prevention of HIV infection among pregnant women, mothers and their children, have developed a comprehensive guide for monitoring and evaluating interventions for prevention of mother-to-child transmission. Entitled *Monitoring and evaluating the prevention of mother-to-child transmission of HIV: a guide for national programmes* (9), this guide addresses the implementation of national monitoring and evaluation systems, including the issue of double-counting, and recommends core national indicators which are in line with WHO's latest guidelines on antiretrovirals for the prevention of mother-to-child transmission in women and infants, and paediatric antiretroviral therapy, described in Boxes 5.3 and 5.6, respectively.

**Table 5.1.** Twenty-five low- and middle-income countries with the highest estimated numbers of pregnant women living with HIV in need of antiretrovirals to prevent mother-to-child transmission of HIV and the corresponding number of children in need of antiretroviral therapy, 2009

Rank	Country	Estimated number of pregnant women in need of antiretrovirals in 2009 [range]	% of the total in low- and middle-income countries <sup>a</sup>	Estimated number of children in need of antiretroviral therapy in 2009 [range]	% of the total in low- and middle-income countries <sup>a</sup>
1	South Africa	210 000 [120 000–290 000]	15.6	160 000 [92 000–210 000]	12.5
2	Nigeria	210 000 [110 000–300 000]	15.0	180 000 [94 000–270 000]	14.5
3	Mozambique	97 000 [53 000–130 000]	7.1	66 000 [36 000–93 000]	5.2
4	Uganda	88 000 [48 000–130 000]	6.4	76 000 [41 000–110 000]	6.0
5	United Republic of Tanzania	84 000 [45 000–120 000]	6.1	75 000 [38 000–110 000]	5.9
6	Kenya	81 000 [41 000–120 000]	5.9	89 000 [48 000–130 000]	7.0
7	Zambia	68 000 [37 000–94 000]	5.0	59 000 [32 000–82 000]	4.7
8	Malawi	57 000 [31 000–83 000]	4.2	61 000 [34 000–84 000]	4.8
9	Zimbabwe	50 000 [28 000–69 000]	3.6	71 000 [43 000–95 000]	5.6
10	India	43 000 [23 000–65 000]	3.1	<sup>b</sup> [30 000–76 000]	4.1
11	Democratic Republic of the Congo	<sup>b</sup> [20 000–54 000]	2.6	<sup>b</sup> [17 000–46 000]	2.4
12	Cameroon	34 000 [18 000–50 000]	2.5	28 000 [15 000–41 000]	2.2
13	Ethiopia	<sup>b</sup> [17 000–51 000]	2.4	<sup>b</sup> [27 000–74 000]	3.9
14	Côte d'Ivoire	20 000 [10 000–31 000]	1.5	29 000 [14 000–42 000]	2.3
15	Chad	16 000 [8 300–29 000]	1.2	12 000 [6 600–19 000]	1.0
16	Angola	16 000 [8 400–25 000]	1.2	12 000 [6 300–18 000]	0.9
17	Burundi	15 000 [8 400–21 000]	1.1	14 000 [8 500–20 000]	1.1
18	Sudan	14 000 [7 300–22 000]	1.0	8 700 [4 400–13 000]	0.7
19	Lesotho	14 000 [8 400–18 000]	1.0	13 000 [7 800–18 000]	1.1
20	Ghana	13 000 [6 900–20 000]	1.0	13 000 [6 700–20 000]	1.0
21	Botswana	13 000 [6 900–17 000]	0.9	9 400 [8 200–11 000]	0.7
22	Rwanda	11 000 [5 400–16 000]	0.8	11 000 [7 000–17 000]	0.9
23	Swaziland	9 300 [5 700–12 000]	0.7	6 800 [4 400–9 000]	0.5
24	Namibia	7 700 [4 100–11 000]	0.6	9 200 [7 300–13 000]	0.7
25	Burkina Faso	6 500 [3 500–11 000]	0.5	8 000 [3 900–12 000]	0.6

a. Calculations are based on unrounded estimated numbers of pregnant women and children needing antiretroviral therapy.

b. No point estimate is provided as the estimated number of pregnant women living with HIV in need of antiretrovirals and/or the estimated number of children living with HIV in need of antiretroviral therapy are currently being reviewed and will be adjusted, as appropriate, based on ongoing data collection and analysis.

## 5.1. Preventing vertical transmission of HIV from mother to child

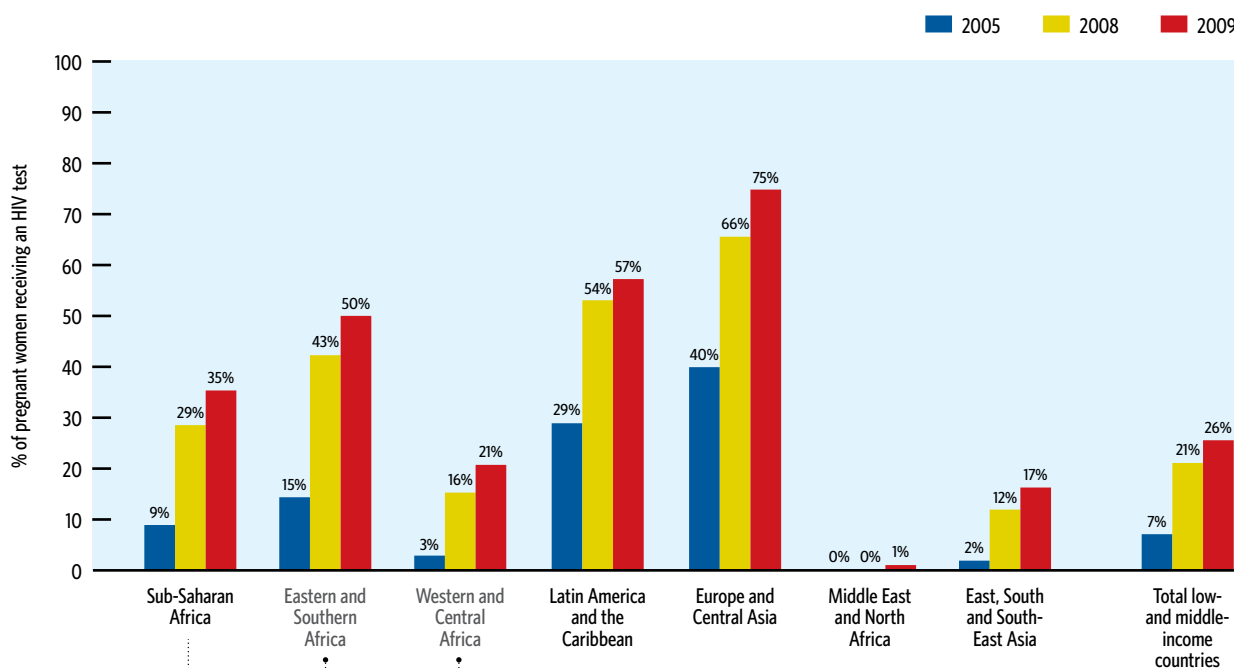
### 5.1.1. HIV testing and counselling among pregnant women

Expanding HIV testing and counselling among pregnant women is critical for identifying those in need of follow-up care and increasing coverage of subsequent interventions to reduce the risk of mother-to-child transmission of HIV. In 2009, an estimated 26% of the estimated 125 million pregnant women in low- and middle-income countries received an HIV test, up from 21% in 2008, and 7% in 2005.

As in previous years, important regional differences were observed in 2009 with respect to the proportion of women receiving HIV testing and counselling. Coverage of HIV testing and counselling among pregnant women remained highest in Europe and Central Asia, at 75%, followed by Latin America and the Caribbean at 57%, and sub-Saharan Africa, at 35%.

In East, South and South-East Asia, representing 55% of the estimated 125 million pregnant women in 2009, the coverage of HIV testing and counselling among pregnant women was much lower (17%). It was close to zero in the Middle East and North Africa.

**Fig. 5.1.** Percentage of pregnant women who received an HIV test in low- and middle-income countries by region, 2005, 2008, 2009



Steady progress was made within sub-Saharan Africa in 2009. In Eastern and Southern Africa, the region with the highest HIV prevalence, HIV testing and counselling among pregnant women reached over 50%, an increase from 43% in 2008. In Western and Central Africa, coverage increased from 16% to 21% between 2008 and 2009.

In the 25 countries with the highest burden of HIV among pregnant women, testing and counselling coverage varied substantially as well (Table 5.2). Seven countries provided HIV tests to less than one third of pregnant women: Nigeria (13%), the Democratic Republic of the Congo (9%), India (21%), Ethiopia (16%), Chad (6%), Angola (26%) and Sudan (3%). In these countries, considerably greater investments are needed to increase HIV testing and counselling among pregnant women in order to effectively prevent mother-to-child transmission of HIV and to enrol eligible women living with HIV in appropriate care and treatment. Four countries reported providing HIV testing and counselling to over 80% of pregnant women in their countries: South Africa (>95%), Zambia (>95%), Botswana (93%) and Namibia (88%).

Although the number of pregnant women receiving at least one HIV test during pregnancy has increased in some settings, more attention must be given to re-testing pregnant women in late pregnancy to identify HIV-negative women who might have seroconverted, as well as conducting HIV testing of their partners in generalized epidemic settings.

**Table 5.2.** Coverage of HIV testing and counselling among pregnant women in the top 25 high-burden countries ranked by the estimated number of pregnant women living with HIV, 2009<sup>a</sup>

Rank	Country	2009
1	South Africa	>95%
2	Nigeria	13%
3	Mozambique	77%
4	Uganda	64%
5	United Republic of Tanzania	66%
6	Kenya	63%
7	Zambia	>95%
8	Malawi	52%
9	Zimbabwe	46%
10	India	21%
11	Democratic Republic of the Congo	9%
12	Cameroon	41%
13	Ethiopia	16%
14	Côte d'Ivoire	47%
15	Chad	6%
16	Angola	26%
17	Burundi	40%
18	Sudan	3%
19	Lesotho	50%
20	Ghana	51%
21	Botswana	93%
22	Rwanda	71%
23	Swaziland	73%
24	Namibia	88%
25	Burkina Faso	42%

<sup>a</sup> Countries with the highest estimated numbers of pregnant women living with HIV in need of antiretrovirals to prevent mother-to-child transmission of HIV.



In settings with generalized epidemics, all pregnant women should be tested as early as possible in each pregnancy, with the health provider recommending testing as a part of routine antenatal care (provider-initiated testing and counselling). Because of the high incidence of HIV reported during the antenatal period (seroconversion during pregnancy) in generalized epidemics, women who test HIV negative in their first or second trimesters of pregnancy should be re-tested in their third trimester of pregnancy. If a woman does not return for testing during her third trimester, she should be recommended to test at labour or, if that is not possible, immediately after delivery (10).

A number of countries with concentrated or low-level epidemics, which are scaling up national prevention of mother-to-child transmission programmes, have implemented provider-initiated testing and counselling as well as re-testing during pregnancy for all pregnant women. Decisions on whether to make provider-initiated testing and counselling a part of antenatal and delivery care (either nationally or regionally) in low-level and concentrated epidemics must be based on an assessment of local resources, and the epidemiological and social contexts.

Even if testing coverage is over 50% in about half of the 25 countries with the largest number of pregnant women living with HIV, global testing coverage remains below 30%, partly because some large countries, including some with concentrated or low-level epidemics, do not test all pregnant

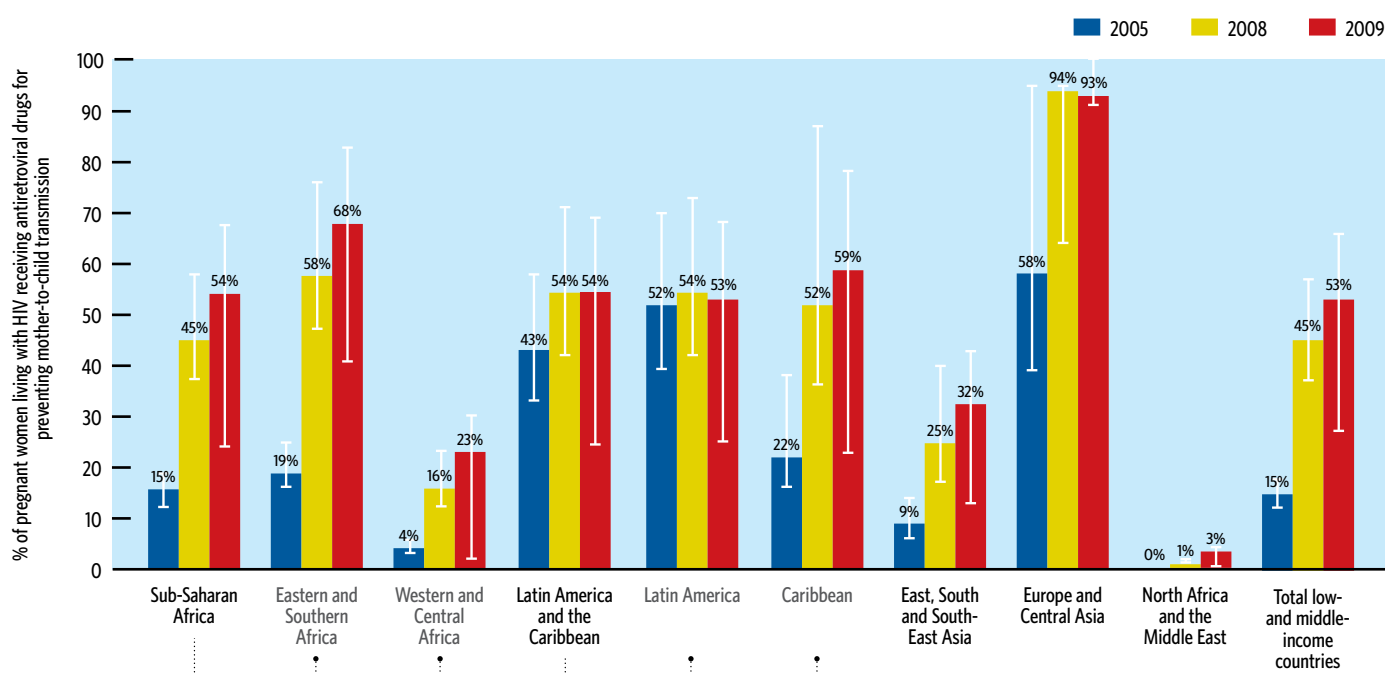
women for HIV. For example, the majority of countries in the East, South and South-East Asia region have low and concentrated epidemics, with HIV infections occurring among men who have sex with men, injecting drug users, sex workers and their clients. In these cases, HIV testing may not necessarily be targeted at pregnant women. Many countries in Asia have also opted to prioritize selected cities, regions and districts.

The benefits of testing heterosexual couples have also been highlighted by research, which showed rates of serodiscordance of over 50% among women and their partners attending antenatal clinics (11). While this is only one example, testing couples together facilitates mutual disclosure, can increase uptake of and adherence to antiretroviral interventions for prevention of mother-to-child transmission (12) and links to care, and can increase the preventive benefits of testing.

### 5.1.2. Antiretrovirals to prevent mother-to-child transmission of HIV

In 2009, 53% [40–79%] of pregnant women living with HIV in low and middle-income countries (727 600 of 1.4 million) received antiretrovirals to reduce the risk of HIV transmission to their infants, including antiretroviral therapy for their own health. This represents an increase in coverage of antiretrovirals for the prevention of mother-to-child transmission from 45% [37–57%] in 2008 and 15% [12–18%] in 2005 (Figure 5.2).

**Fig. 5.2. Percentage of pregnant women living with HIV receiving antiretrovirals for preventing mother-to-child transmission of HIV in low- and middle-income countries by region, 2005, 2008 and 2009**



I The bar indicates the uncertainty range around the estimate.

Coverage was highest in Eastern Europe and Central Asia, where nearly all pregnant women in need received antiretrovirals to prevent mother-to-child transmission (Table 5.3). Coverage remained lower in East, South and South-East Asia, and in North Africa and the Middle East, although progress was made in both regions, with coverage rates increasing, respectively, from 25% [17–40%] to 32% [22–52%], and from 1% [1–2%] to 3% [2–6%] between 2008 and 2009 (Figure 5.2).

In sub-Saharan Africa, coverage of antiretrovirals for preventing mother-to-child transmission reached 54% [40–84%], from 45% [37–58%] in 2008. However, there were considerable differences between subregions: whereas 68% [53–95%] of pregnant women in need received antiretrovirals for preventing mother-to-child transmission in Eastern and Southern Africa, in West and Central Africa the comparable figure was 23% [16–44%].

In Latin America and the Caribbean, coverage of antiretrovirals for preventing mother-to-child transmission stood at 54% [39–83%] in 2009, similar to the 54% [42–71%] estimated for 2008. Within the region, coverage also varied considerably, with some countries reaching rates close to or above 80%, with little incremental increases expected, and others with lower and stagnant coverage of antiretrovirals for preventing mother-to-child transmission. With growing political support for prevention of mother-to-child transmission, an important push is now being made to virtually eliminate mother-to-child transmission in the region by 2015. Specific, time-bound plans are currently being developed and reviewed by countries to support this goal, as well as the goal of elimination of congenital syphilis.

Figure 5.3 shows the 25 countries estimated to have the largest numbers of women needing antiretrovirals to reduce mother-to-child transmission and the estimated

### Box 5.3. 2010 WHO guidelines on antiretrovirals to treat HIV in pregnant women and prevent HIV infection in infants (7)

The revised 2010 WHO guidelines for prevention of mother-to-child transmission of HIV are based on two key approaches: (i) lifelong antiretroviral therapy for those pregnant women in need of treatment for their own health, which is also safe and highly effective in reducing mother-to-child transmission; and (ii) new options for antiretroviral prophylaxis to prevent mother-to-child transmission during pregnancy, delivery and breastfeeding for those who do not require treatment. A major change is that prophylaxis is now recommended during breastfeeding, in settings where breastfeeding is judged to be the safest infant-feeding option (see Box 5.4).

HIV-positive pregnant women should undergo immunological (CD4 testing) and clinical assessment to determine eligibility for antiretroviral therapy. As with all HIV-infected adults, initiation of antiretroviral therapy is now recommended for all HIV-infected pregnant women with CD4 counts at or below 350 cells/mm<sup>3</sup>, irrespective of WHO clinical staging, and in all pregnant women in WHO clinical stage 3 or 4, irrespective of CD4 cell count. Early treatment, beginning during pregnancy, will help improve the mother's health and provide optimal prevention of transmission during the perinatal period and while breastfeeding.

For pregnant women living with HIV who do not need antiretroviral therapy for their own health, WHO recommends two equally efficacious options to reduce transmission during the perinatal period and while breastfeeding. The two options have different advantages and disadvantages; the preferred option should be decided at country level after considering local capacity as well as feasibility and implementation issues. Each of the two prophylaxis options includes a maternal regimen beginning as early as 14 weeks of pregnancy, and continued during the antenatal and intrapartum periods. After delivery, the mother or infant will continue taking drugs for a variable amount of time depending on whether the country chooses option A or B, and whether the mother is breastfeeding or not.

For option A, zidovudine, starting from as early as 14 weeks of pregnancy, is given to the mother during the antenatal period. A single dose of nevirapine and lamivudine is added during labour, and zidovudine and lamivudine are continued for 7 days after delivery as a "tail" to decrease the risk of nevirapine resistance. If the infant is breastfed, the baby will receive nevirapine syrup from birth until one week after all exposure to breast milk has ended. If the baby is on replacement feeding, it will only get either nevirapine or zidovudine from birth until 4–6 weeks of age.

For option B, a prophylaxis regimen consisting of three antiretrovirals is provided to the mother during pregnancy, labour and after delivery until one week after all exposure to breast milk has ended. Infants born to mothers on option B will receive either nevirapine or zidovudine from birth until 4–6 weeks of age, regardless of their feeding method. WHO recommends four possible triple prophylaxis regimens for option B, with the choice of regimen to be made at country level.

These revised recommendations emphasize the need to have a unified approach to preventing mother-to-child transmission throughout pregnancy, labour and delivery, postpartum and during the breastfeeding period, if breastfeeding is chosen as the safest infant-feeding option in resource-limited settings. Successful implementation will require integration and coordination with HIV care and antiretroviral therapy programmes, integration of interventions for prevention of mother-to-child transmission as a basic part of maternal and child health care, and strengthened postpartum follow up of both mothers and infants. Currently, one of the main barriers to implementing this strategy is the proper identification of women in need of lifelong antiretroviral therapy (access to CD4 testing).

**Table 5.3.** Estimated number of women living with HIV needing and receiving antiretrovirals for PMTCT in low- and middle-income countries, 2009<sup>a</sup>

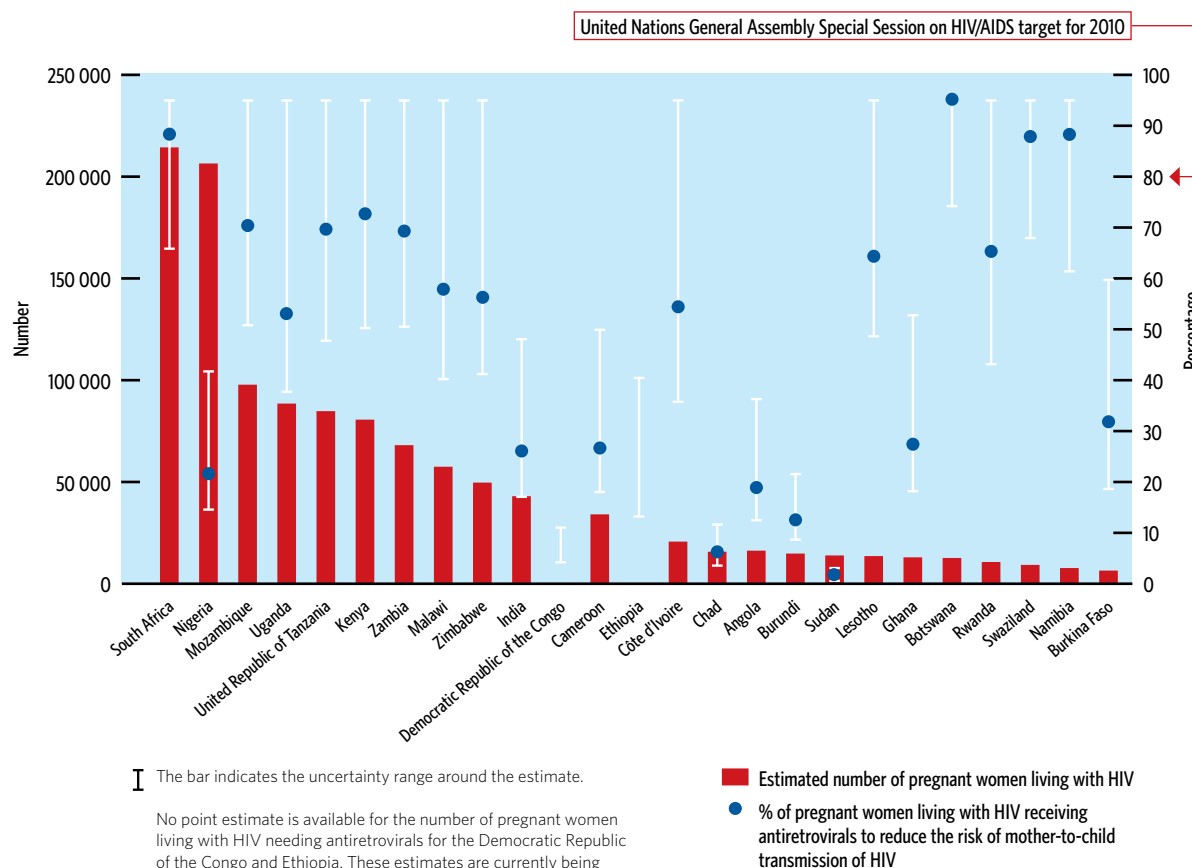
Geographical region	Number of pregnant women living with HIV receiving antiretrovirals for PMTCT	Estimated number of pregnant women living with HIV in need of antiretrovirals for PMTCT	Estimated coverage <sup>b</sup>
Sub-Saharan Africa	672 800	1 240 000 [800 000-1 700 000]	54% [40%-84%]
Eastern and Southern Africa	584 700	860 000 [600 000-1 100 000]	68% [53%-95%]
Western and Central Africa	88 100	380 000 [200 000-560 000]	23% [16%-44%]
Latin America and the Caribbean	16 200	29 900 [19 000-41 000]	54% [39%-83%]
Latin America	11 800	22 400 [15 000-32 000]	53% [37%-81%]
Caribbean	4 400	7 400 [3 900-11 000]	59% [39%-95%]
East, South and South-East Asia	23 800	73 800 [46 000-110 000]	32% [22%-52%]
Europe and Central Asia	14 300	15 300 [7 900-23 000]	93% [63%-95%]
North Africa and the Middle East	500	15 700 [8 300-24 000]	3% [2%-6%]
<b>All low and middle income</b>	<b>727 600</b>	<b>1 380 000 [920 000-1 800 000]</b>	<b>53% [40%-79%]</b>

Note: some numbers do not add up to rounding.

a Annex 5 provides country-specific data.

b The coverage estimate is based on the unrounded estimates of pregnant women receiving and needing antiretrovirals for preventing mother-to-child transmission.

**Fig. 5.3.** Percentage of pregnant women living with HIV receiving antiretrovirals to prevent mother-to-child transmission of HIV in 25 countries with the highest HIV disease burden among pregnant women, in descending order, 2009





coverage with antiretrovirals for preventing mother-to-child transmission in 2009.

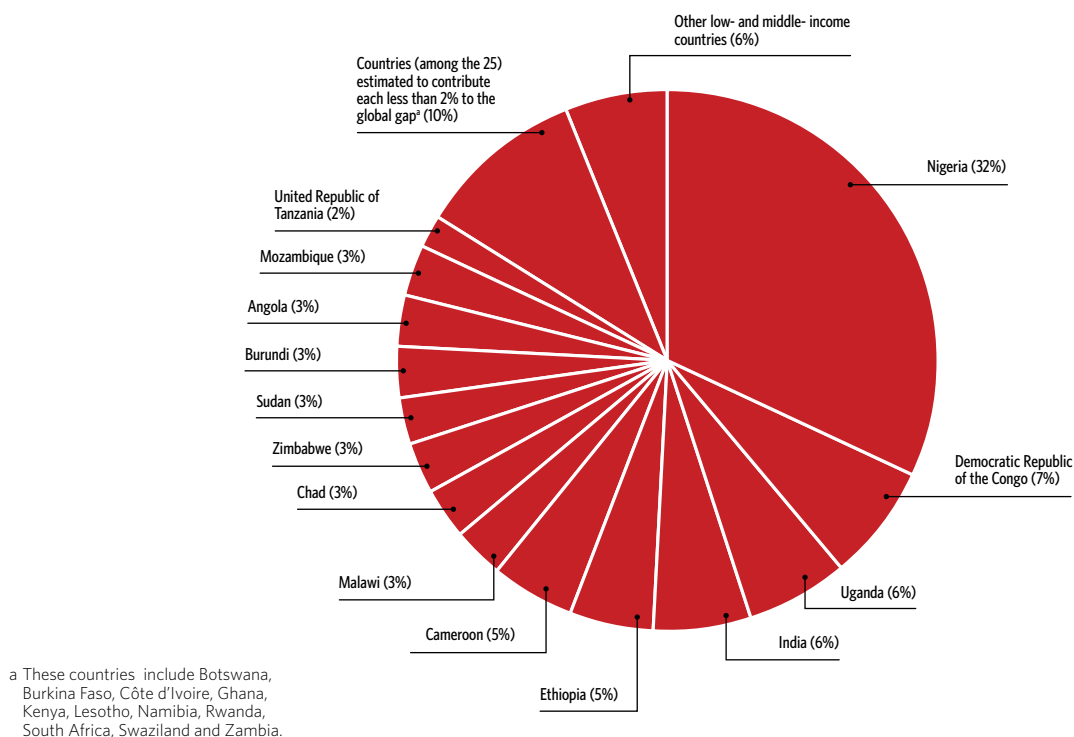
In 11 of the 25 countries, less than 50% of pregnant women in need received any antiretroviral intervention to prevent HIV transmission from mother to child. However, four countries – Botswana, Namibia, Swaziland and South Africa (the country with the largest number of pregnant women living with HIV) – have already reached the target set at the United Nations General Assembly Special Session (UNGASS) on HIV/AIDS of providing 80% of pregnant women in need with antiretrovirals for reducing the risk of mother-to-child transmission of HIV. In addition, 11 other low- and middle-income countries (Argentina, Belarus, Brazil, Ecuador, Guyana, Jamaica, Malaysia, Romania, Russian Federation, Thailand and Ukraine)<sup>1</sup> have also reached the 80% coverage

target of antiretrovirals for prevention of mother-to-child transmission (see Annex 5 for more country details).

These 25 countries with higher needs also collectively contributed to about 94% of the global gap in reaching the UNGASS target of 80% coverage with antiretrovirals to reduce mother-to-child transmission. The global gap is the difference between the current number of pregnant women in need who have access to antiretrovirals for preventing mother-to-child transmission and the estimated number who must be reached to achieve the UNGASS goal. Figure 5.4 shows the percentage distribution of the contribution of each country to closing this global gap. Four countries – Nigeria, Democratic Republic of Congo, Ethiopia and India – account for half of the gap (50%), with Nigeria alone accounting for almost one third (32%).

<sup>1</sup> Countries with at least 100 pregnant women in need of antiretroviral drugs for preventing mother-to-child-transmission.

**Fig. 5.4. Contribution of the 25 countries with the largest number of women needing antiretrovirals for preventing mother-to-child transmission of HIV to the global gap in reaching 80% of those in need, 2009**



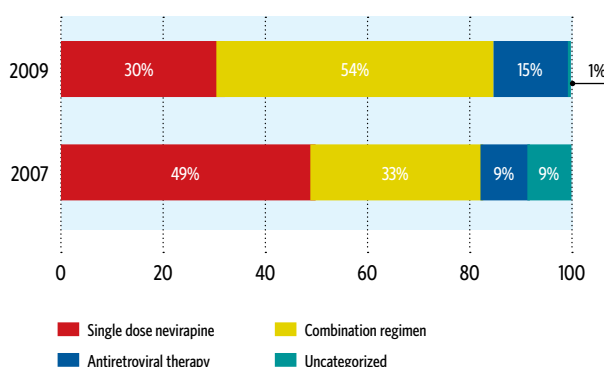
### Assessing the eligibility of pregnant women living with HIV to receive antiretroviral therapy for their own health

When a pregnant woman is identified as living with HIV, the clinical stage of her disease and, where available, her CD4 cell count should be assessed to determine whether she is eligible to receive antiretroviral therapy for her own health or should only receive antiretroviral prophylaxis to prevent mother-to-child transmission (Box 5.3). In 2009, an estimated 51% of pregnant women who tested positive for HIV were assessed for their eligibility to receive antiretroviral therapy either through clinical staging or CD4 cell count, up from 34% in 2008. About 37% were assessed through CD4 count, up from 24% reported in 2008. In the 49 countries reporting data in both 2008 and 2009, the proportion of pregnant women identified with HIV assessed for ART eligibility by CD4 cell count increased from 14% to 31%.

### Antiretroviral regimens

The efficacy of antiretrovirals in preventing mother-to-child transmission of HIV varies with the type of drug combination used and the duration of the regimen. It is recommended that pregnant women living with HIV and their exposed infants receive more efficacious regimens as opposed to single-dose nevirapine, and that all women needing antiretroviral therapy for their own health should receive it.

**Fig. 5.5. Percentage distribution of various antiretroviral regimens provided to pregnant women in low- and middle-income countries in 2007 (59 countries) and 2009 (86 countries)**



With the new 2010 guidelines, antiretroviral prophylaxis is now recommended during breastfeeding (Box 5.4) in settings where breastfeeding is judged to be the safest infant-feeding option. In these countries, special efforts are needed to monitor antiretroviral coverage during the breastfeeding period.

Analysing the global distribution of various antiretroviral regimens used for preventing mother-to-child transmission

### Box 5.4. Infant-feeding in the context of HIV (15)

The 2010 WHO revised guidelines on HIV and infant-feeding build on the updated recommendations on antiretroviral therapy for HIV infection in adults, adolescents and children, and the use of antiretrovirals for treating pregnant women and preventing HIV infection in infants. While the guidelines reinforce the principles and recommendations established in earlier versions such as feeding of infants already known to be HIV-infected and protecting and promoting optimal infant-feeding practices in the general population, two major revisions were adopted.

National health authorities should decide whether health services will principally counsel and support mothers known to be HIV-infected to either (i) breastfeed and receive antiretroviral interventions or (ii) avoid all breastfeeding. The choice between these strategies should be governed by which is most likely to result in HIV-free survival of HIV-exposed infants attending public health facilities. National authorities should make their decision based on national epidemiological trends, the state of coverage of prevention of mother-to-child transmission and antiretroviral therapy services, and the main causes of maternal and child undernutrition and mortality. This is a marked change from other approaches whereby health workers are expected to counsel HIV-infected pregnant women and mothers, and to individually determine which infant-feeding practice would be most appropriate for their particular circumstance. The strength of the evidence that antiretroviral interventions significantly reduce the risk of HIV transmission through breast milk and thereby improve the chance of HIV-exposed infants surviving while remaining HIV-uninfected has changed the way in which public health policy and approaches can be considered.

In addition, in settings where national authorities decide to promote breastfeeding while providing antiretroviral interventions, WHO strongly recommends that mothers known to be HIV-infected should exclusively breastfeed their infants for the first six months and continue to breastfeed up to 12 months while introducing complementary foods when the infant is six months old. Breastfeeding should then stop only when a nutritionally adequate and safe diet without breast milk can be provided. This approach enables infants of mothers living with HIV to benefit from the protection that breastfeeding offers against the serious morbidity and mortality normally associated with the use of commercial formula milk in unsafe settings, in spite of their low risk for HIV transmission. It also enables public health systems to better plan and provide services, since recommendations will be similar at the national level.

Many countries, especially those in Eastern and Southern Africa, have already decided to recommend breastfeeding of infants to HIV-infected mothers and to provide an antiretroviral intervention to prevent HIV transmission. International partners have been working with national teams to consider how these decisions should be implemented at the district health facility level and to project costs for future budgets.

remains difficult as many countries still do not possess fully functional national monitoring mechanisms to accurately report drug regimens used by HIV-positive pregnant women.

In 2009, 86 out of 120 (72%) countries reporting on the number of pregnant women living with HIV who received antiretrovirals to prevent mother-to-child transmission were able to provide disaggregated data on the distribution of antiretroviral regimens given to pregnant women. These countries covered around 70% of the total number of women receiving antiretrovirals to reduce the risk of mother-to-child transmission in 2009.

In 2007, 59 countries reported disaggregated data on antiretroviral regimens provided to HIV-positive pregnant women. In 2008, the number of countries reporting disaggregated regimen categories was 96, but one third of antiretroviral regimens provided to women living with HIV were reported as uncategorized. In 2009, the proportion of uncategorized regimens decreased substantially. Thus, comparisons focus on 2007 and 2009 data, years in which the proportion of uncategorized regimens was lowest.

The proportion of women receiving more efficacious regimens and antiretroviral therapy for their own health increased between 2007 and 2009 (Figure 5.5). In this period, the percentage of women receiving single-dose nevirapine decreased from 49% to 30%, whereas the percentage of women receiving more efficacious regimens increased from 33% to 54%, and the proportion of women receiving antiretroviral therapy for their own health increased from 9% to 15%.

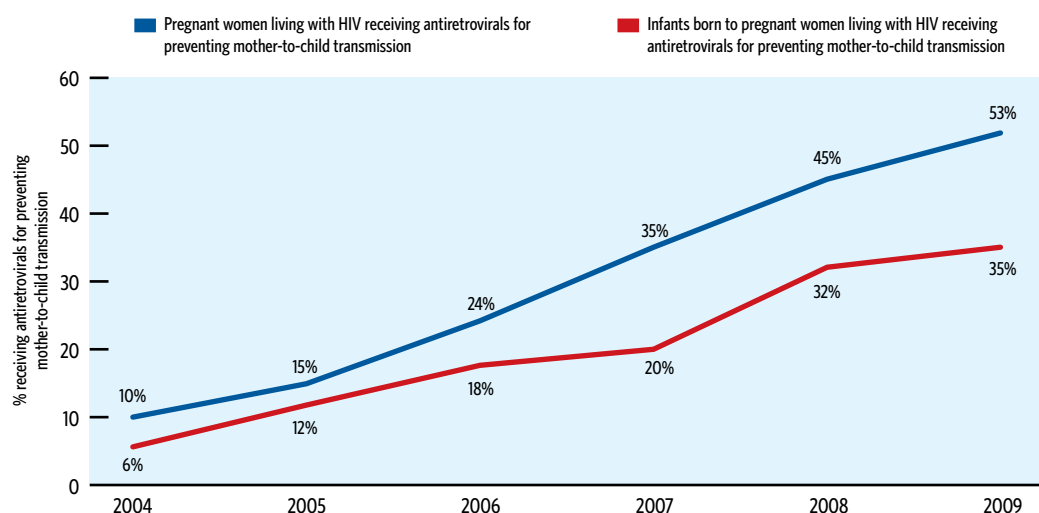
Currently there is no global estimate of the proportion of HIV-positive pregnant women needing antiretroviral therapy for their own health; however a recent analysis of around 6000 women attending clinics in 9 countries<sup>(13)</sup> found 48% of women eligible for ART based on new WHO guidelines, and other studies have reported around 40%<sup>(14)</sup> and even 68%<sup>(16)</sup> of women as eligible, suggesting that the majority of women in need are not accessing antiretroviral therapy.

### 5.1.3. Antiretroviral prophylaxis for infants born to mothers living with HIV

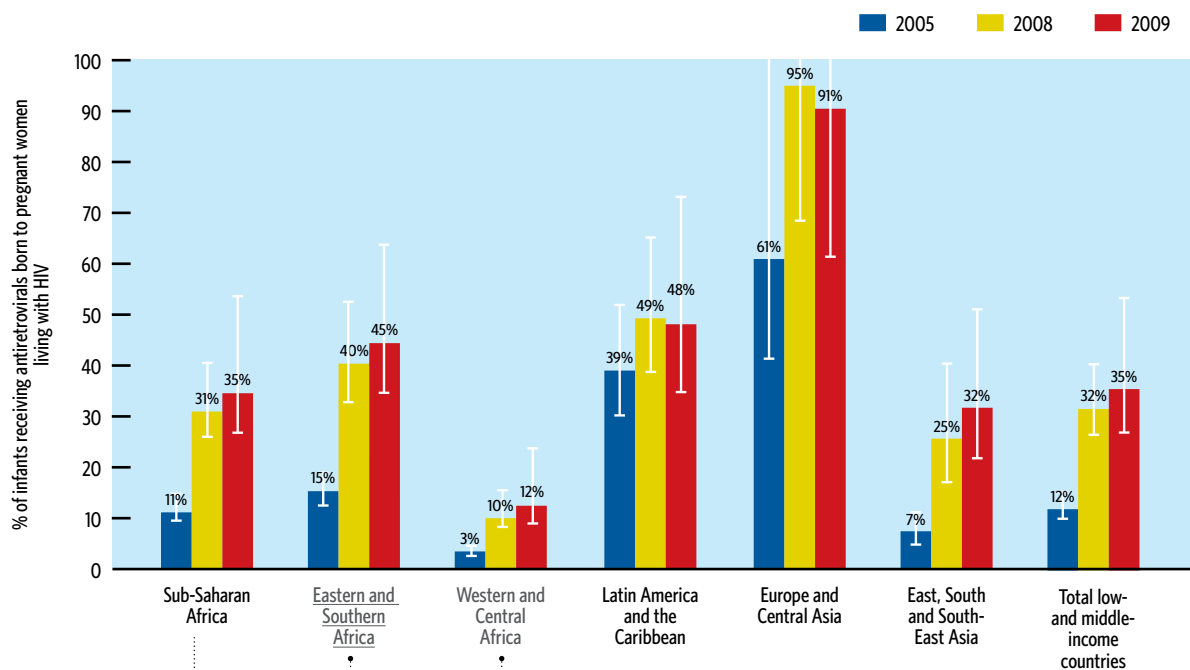
The 2010 WHO guidelines recommend that all infants born to HIV-positive mothers should receive antiretroviral prophylaxis<sup>(1)</sup>. Coverage slightly increased between 2008 and 2009, from 32% [26–53%] to 35% [26–53%] of the estimated 1.4 million infants born to mothers living with HIV. However, the gap between the uptake of infant and maternal antiretroviral regimens seems to have widened further (Figure 5.6).

Coverage rates varied widely between regions but remained relatively steady in 2009 (Figure 5.7). About a third of infants in sub-Saharan Africa were reached with antiretroviral prophylaxis (31% [26–40%] in 2008 and 35% [26–54%] in 2009). In Eastern and Southern Africa, 45% [35–64%] of infants received antiretroviral prophylaxis in 2009, while in West and Central Africa, only 12% [8–23%] did. In Latin America, almost half of children (48% [35–74%]) were given antiretroviral prophylaxis. In East, South, and South-East Asia, the region with the highest increase in coverage, it increased from 25% [17–40%] in 2008 to 32% [22–51%] in 2009.

**Fig. 5.6. Percentage of pregnant women living with HIV and infants born to them who received antiretrovirals for preventing mother-to-child transmission, 2004–2009**



**Fig. 5.7. Percentage of infants born to pregnant women living with HIV who received antiretroviral prophylaxis for preventing mother-to-child transmission, 2005, 2008 and 2009**



I The bar indicates the uncertainty range around the estimate.

## 5.2. Treatment, care and support for women living with HIV and their children

If a mother and her infant receive appropriate interventions for preventing mother-to-child transmission of HIV, including more efficacious antiretroviral regimens, children, even when carrying the virus, can live into adulthood if they can access treatment early (17). Although HIV care and treatment services for HIV-exposed and -infected children are rapidly expanding in resource-limited settings, they are still inadequate and relatively fewer treatment services are available than those for adults. Of the 1 270 000 [830 000–1 700 000] children estimated to be in need of antiretroviral therapy, only 28% [21–43%] had access to treatment, versus 37% of adults [35–41%] (see Chapter 4 for more details).

### 5.2.1. Infant diagnosis

Early diagnosis of HIV infection is critical to ensure optimal treatment outcomes among children. If properly diagnosed and then provided with treatment early, HIV-infected infants and children can survive to adolescence and adulthood. While progress has been made in identifying infants who become HIV-infected through mother-to-child transmission, many children living with HIV still go undiagnosed. Without diagnosis and effective treatment, one third of HIV-positive

infants will die before the age of one year and almost half by their second year of life.

WHO's revised treatment guidelines recommend that infants, if HIV-exposed, should be tested by four to six weeks of age using virological assays and those found positive should be started on antiretroviral therapy immediately upon diagnosis (22).

Access to early infant diagnosis is very limited. In 2009, 6% [5–10%] of infants were reported to have been tested for HIV within the first two months of birth in low- and middle-income countries. However, the data may underestimate this coverage as only 54 countries reported data on this indicator in 2009, up from 41 in 2008. In those 54 countries, representing 43% of the total number of pregnant women living with HIV, around 85 800 infants, or 15% [10–28%] of the estimated number of infants born to pregnant women living with HIV were reported to have received early infant HIV testing.

Greater efforts are needed to scale up early testing of HIV-exposed infants. Priority actions should include building technical competencies, developing laboratory capacity, and strengthening systems for transporting blood specimens and results, as well as scaling up routine offers of testing

### Box 5.5. Integrating HIV prevention, care and treatment interventions within maternal and child health services

Maternal and child health services, in addition to sexual and reproductive health programmes, provide critical platforms and infrastructure for effective and sustainable delivery of HIV interventions. The WHO IMAI/IMPAC (Integrated Management of Adult and Adolescent Illness/Integrated management of Pregnancy and Childbirth) clinical course for integrated prevention of mother-to-child transmission services guides health workers to integrate HIV prevention, care and treatment into maternal and child health services. In 2009, international trainings were organized for health workers from more than 30 countries.

A number of countries have decentralized HIV prevention, care and treatment to primary health centres (18,19). South Africa, for example, is currently decentralizing HIV prevention, care and antiretroviral therapy services to primary health centres, with nurses initiating and managing antiretroviral therapy, with a mentoring and referral back-up from the district hospital team.

Zambia is also moving towards decentralized and integrated service delivery. In order to improve service uptake, the prevention of mother-to-child transmission partnership of Zambia employed multiple strategies, including integration of services for prevention of mother-to-child transmission into outreach sites and maternal and child health public facilities. Other strategies include task-shifting to involve lay providers and people living with HIV in service delivery, training health workers to provide comprehensive prevention of mother-to-child transmission services, improving referral for CD4 counts, and promoting partner involvement (20). The integration of antiretroviral therapy into existing public sector maternal and child health clinics in Lusaka district doubled the proportion of eligible women initiating antiretroviral therapy (21).

in generalized epidemics to more sites where mothers and children access care, and improving cross-service referrals.

In addition, it is critical to reduce the rate of loss to follow up among HIV-exposed infants in the postnatal period, as many infants, even when tested, still do not receive their results or are ever enrolled on antiretroviral therapy when they test positive. Substantial investments must be made in health clinics and communities to improve data collection and service delivery along the continuum of care so that children who test positive are enrolled on treatment in a timely fashion. There is also a need to better understand and address the challenges faced by mothers to continue seeking health services for their infants, as well as for themselves.

#### 5.2.2. Co-trimoxazole prophylaxis in HIV-exposed children

An essential component of the care and treatment package for children living with HIV is the provision of co-trimoxazole prophylaxis, a highly efficacious, affordable, cost-effective and widely available antibiotic that has been shown to significantly reduce morbidity and mortality among infants and children who are living with or exposed to HIV. The use of co-trimoxazole prophylaxis increases the chances of survival of HIV-infected infants until antiretroviral therapy can be initiated. This is especially important in resource-constrained settings where there is limited access to effective services for prevention of mother-to-child transmission and antiretroviral therapy. WHO guidelines released in 2006 recommend that all HIV-exposed children born to HIV-positive mothers start co-trimoxazole prophylaxis between four and six weeks of age and continue until HIV infection has been excluded and the infant is no longer at risk of acquiring HIV through breastfeeding (23).

In 2009, 72 countries provided information on the number of infants born to pregnant women with HIV initiated on co-trimoxazole prophylaxis by two months of age, up from 67 countries in 2008. Even though several countries have developed and put in place policies to support access to co-trimoxazole prophylaxis for infants and children, only 14% [10–20%] of infants in need received co-trimoxazole in 2009, compared with 8% [6–10%] in 2008. Coverage in sub-Saharan Africa continued to expand, particularly in Eastern and Southern Africa, the subregion most affected by HIV, where coverage doubled from 9% [7–11%] in 2008 to 18% [14–26%] in 2009.

Forty-three countries reported data on co-trimoxazole coverage in both 2008 and 2009. In these countries, which accounted for about 50% of all HIV-positive pregnant women needing antiretrovirals in low- and middle-income countries, the reported proportion of infants receiving co-trimoxazole within two months of birth increased slightly to 18% in 2009 from 15% in 2008.

Expanding access to co-trimoxazole prophylaxis requires a set of interrelated interventions, including the development of stronger linkages between HIV testing and treatment, and the establishment of mechanisms to identify and follow up HIV-exposed infants at and after birth. In addition, health workers must be trained to consider HIV infection in infants at birth and at all clinic or health encounters, and delivery must be decentralized to the lowest appropriate, feasible and effective level of the health-care system. A consistent supply of co-trimoxazole must be available for infants, and monitoring and evaluation systems need to be strengthened to support the provision of co-trimoxazole prophylaxis to HIV-exposed or HIV-infected children (23).



### 5.2.3. Antiretroviral therapy for children

While the best strategy for preventing paediatric HIV-related mortality is the expansion of effective programmes for prevention of mother-to-child transmission to prevent new infant infections, many HIV-related deaths among infected children could be avoided through early HIV diagnosis and timely provision of effective care and treatment. In order to maximize the survival and well-being of children living with HIV, in 2010 WHO released updated treatment guidelines (24), markedly altering the recommended set of criteria for initiation of antiretroviral therapy in children (Box 5.6).

As of December 2009, data reported by countries show that almost 356 400 children were receiving antiretroviral therapy in low- and middle-income countries, up from 275 300 in 2008 and 75 000 in 2005, an increase of almost 30% in the past year. These children represent an estimated 28% [21–43%] of all children less than 15 years estimated to be in need of antiretroviral therapy in low- and middle-income countries, up from 22% [16–34%] in 2008 and 7% [5–11%] in 2005, using the new treatment criteria retrospectively.

Between 2008 and 2009, all regions experienced increases in the number of children in need of antiretroviral therapy and receiving it. Regional coverage varied, ranging from 6% [4–11%] in the Middle East and North Africa to 68% [52–87%] in Latin America (Figure 5.8).

In sub-Saharan Africa, the region with the highest burden of children in need, 296 000 (26% [19–42%]) of children were receiving antiretroviral therapy as of December 2009, up from 224 100 (20% [15–32%]) in 2008. Eastern and

Southern Africa had the highest number of children receiving antiretroviral therapy at 254 900 (32% [25–48%]), up from 194 600 (25% [19–37%]) in 2008. In Swaziland, Namibia and Botswana, coverage among children was 70% or higher. In West and Central Africa, 41 000 (12% [8–22%]) children were on antiretroviral therapy, up from 29 500 (8% [6–16%]) in 2008. Only Benin and Gambia reached over 40% of children in need with antiretroviral therapy.

Latin America and the Caribbean reported 18 600 (58% [45–80%]) children on antiretroviral therapy in 2009, up from 17 300 (54% [42–76%]) in 2008. Differences were observed between the Latin America and the Caribbean subregions. In Latin America, the reported number of children accessing antiretroviral therapy was 16 300 (68% [52–87%]), up from 15 400 (65% [50–84%]) in 2008. In the Caribbean, coverage increased, from 2000 (24% [16–48%]) in 2008 to 2400 (29% [19–57%]) in 2009.

East, South and South-East Asia reported 36 500 (44% [27–59%]) children on antiretroviral therapy in 2009, up from 29 300 (37% [21–50%]) in 2008. Thailand, Cambodia and Malaysia reached coverage rates of 80% or more.

Between 2008 and 2009, modest improvements were achieved in 25 high-burden countries accounting for 91% of children in need of antiretroviral therapy (Figure 5.9). The lowest coverage was found in Sudan at 2.2%, up from 1.8% in 2008, while the highest coverage was seen in Botswana at 90%, up from 78% a year earlier. The largest increases were observed in Cote d'Ivoire, Ghana, Zimbabwe and Angola, where the number of children receiving antiretroviral therapy rose by over 60% between 2008 and 2009.

#### Box 5.6. 2010 WHO revised paediatric antiretroviral therapy guidelines

In July 2010, WHO released new paediatric antiretroviral therapy guidelines, which are now harmonized with the treatment guidelines adopted for adults, pregnant women, and prevention of mother-to-child transmission. The major changes introduced in this version relate to the recommended criteria for treatment initiation. Now, it is recommended that all HIV-positive children less than 24 months of age be started on antiretroviral therapy. Overall recommendations on when to start antiretroviral therapy in infants and children are as follows:

1. for all HIV-infected infants diagnosed in the first year of life, irrespective of CD4 count or WHO clinical stage;
2. for all HIV-infected children less than two years of age irrespective of CD4 count or WHO clinical stage;
3. for all HIV-infected children between 24 and 59 months of age with a CD4 count of  $M750 \text{ cells/mm}^3$  or %CD4+  $M25\%$ , whichever is lower, irrespective of WHO clinical stage;
4. for all HIV-infected children more than 5 years of age with a CD4 count of  $M350 \text{ cells/mm}^3$  (as in adults), irrespective of WHO clinical stage;
5. for all HIV-infected children in WHO HIV clinical stages 3 and 4, irrespective of CD4 count;
6. for any child less than 18 months of age who has been given a presumptive clinical diagnosis of HIV infection.

In addition to new criteria for treatment initiation, the updated treatment guidelines include recommendations and guidance on (i) earlier, more accurate diagnosis of HIV, (ii) simplified antiretroviral drug regimens for use in first-line and second-line therapy, (iii) expected signs and symptoms in the first six months of therapy, (iv) promoting attention to nutrition for children on antiretroviral therapy, (v) more strategic monitoring for the efficacy and toxicity of antiretrovirals, and (vi) strengthening adherence. The new guidelines are part of WHO's commitment to achieve universal access to the prevention, care and treatment of HIV infection in infants and children.

**Table 5.4.** Estimated number of children living with HIV younger than 15 years receiving antiretroviral therapy, children needing antiretroviral therapy and percentage coverage in low- and middle-income countries according to region, December 2009<sup>a</sup>

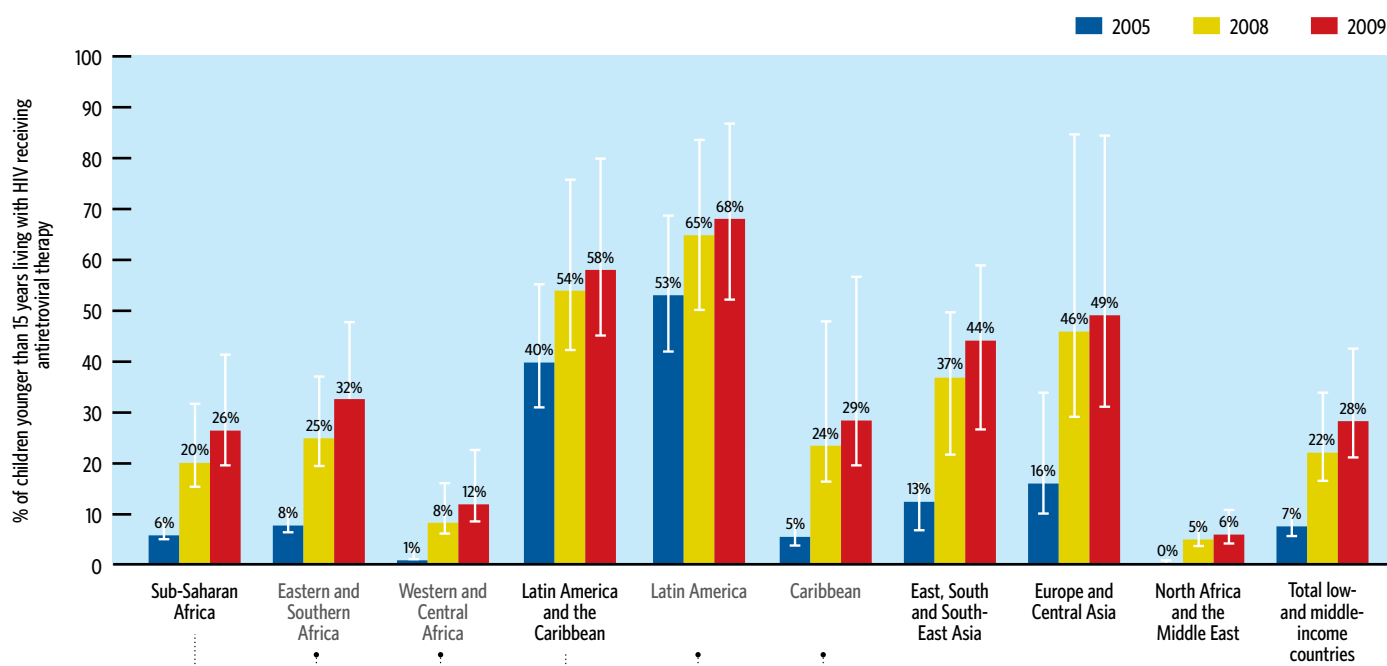
Geographical region	Reported number of children (0-14 years) living with HIV receiving antiretroviral therapy, December 2009	Estimated number of children living with HIV needing antiretroviral therapy, 2009 [range] <sup>a</sup>	Antiretroviral therapy coverage among children living with HIV, December 2009 [range] <sup>b</sup>
Sub-Saharan Africa	296 000	1 140 000 [710 000-1 500 000]	26% [19-42%]
Eastern and Southern Africa	254 900	790 000 [530 000-1 000 000]	32% [25-48%]
Western and Central Africa	41 000	350 000 [180 000- 510 000]	12% [8-22%]
Latin America and the Caribbean	18 600	32 200 [23 000-42 000]	58% [45-80%]
Latin America	16 300	24 100 [19 000-31 000]	68% [52-87%]
Caribbean	2 400	8 100 [4 100-12 000]	29% [19-57%]
East, South and South-East Asia	36 500	83 400 [61 000-140 000]	44% [27-59%]
Europe and Central Asia	4 800	9 700 [5 700-15 000]	49% [31-58%]
North Africa and the Middle East	560	10 000 [5 200-15 000]	6% [4-11%]
<b>All low and middle income</b>	<b>356 400</b>	<b>1 270 000 [830 000-1 700 000]</b>	<b>28% [21-43%]</b>

Note: some numbers do not add up to rounding.

a For an explanation of the methods used, see the explanatory notes to Annex 4.

b The coverage estimate is based on the estimated unrounded number of children receiving and needing antiretroviral therapy.

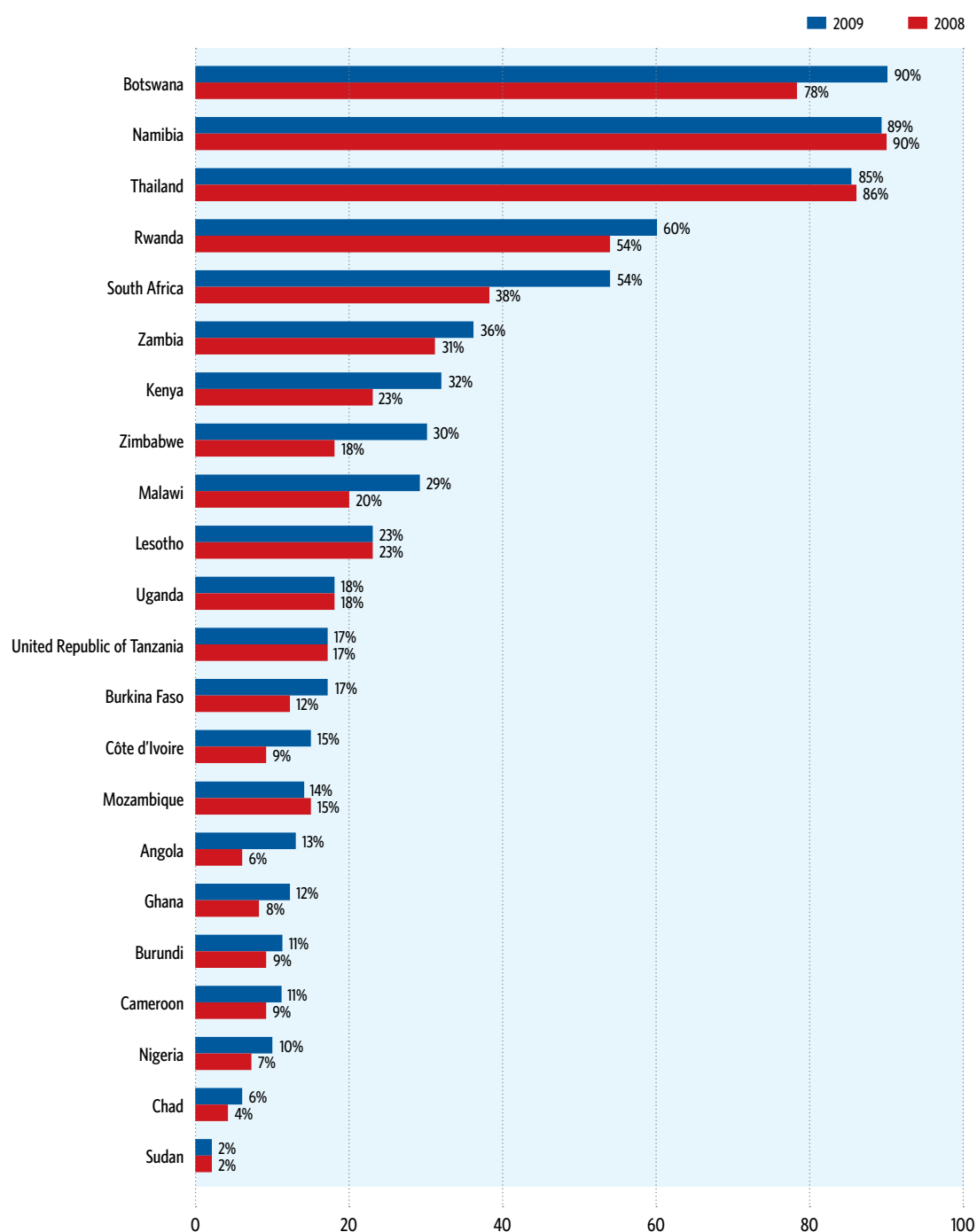
**Fig. 5.8.** Percentage of children living with HIV receiving antiretroviral therapy in low- and middle-income countries, 2005, 2008 and 2009



I The bar indicates the uncertainty range around the estimate.

Note: Data have been retroactively revised according to the revised methodology (see Box 5.7).

**Fig. 5.9.** Percentage of children living with HIV receiving antiretroviral therapy in 25 high-burden countries, 2008–2009<sup>a</sup>



Note: Data have been retroactively revised according to the revised methodology (see Box 5.6).

a The Democratic Republic of the Congo, Ethiopia and India, belong to the list of 25 countries with the highest need for antiretroviral therapy among children living with HIV, but no coverage can be provided at this stage as their need estimates are currently being reviewed.

### Box 5.7. Improving need and coverage estimates of antiretroviral therapy among children

The estimated proportion of children (ages 0-14 years) who received antiretroviral therapy in 2009 is 28%, lower than the estimated 2008 coverage (38%) published previously. This change in estimated coverage is not related to a decrease in the number of children in need of antiretroviral therapy receiving treatment, which actually increased, but is due to changes both in the estimation methodology and in the criteria for treatment eligibility that resulted in a substantial increase in the estimated number of children in need of antiretroviral therapy.

The definition of paediatric antiretroviral therapy coverage is the number of children on antiretroviral therapy collected from patient monitoring systems divided by the number of children estimated to be in need of treatment calculated using Spectrum. Spectrum is a computer package which estimates the impact of the HIV epidemic. Based on national HIV prevalence and incidence data, as well as the demographic characteristics of a country, Spectrum can estimate the number of children in need of antiretroviral therapy, among other variables. In December 2009, the UNAIDS Reference Group on HIV Estimates, Modelling and Projections convened a meeting to update and review the assumptions used in Spectrum to estimate the number of children living with HIV and the number of children in need of antiretroviral therapy (25).

Upon a review of the literature and available evidence, three key changes were made to the assumptions used in Spectrum to estimate paediatric needs:

*1. More accurate survival curves:* recent research revised the survival parameters using data from 12 sub-Saharan Africa sites, which included information on the timing of infection (26). Timing of infection is important because children infected during pregnancy and birth have considerably shorter survival times than children infected during breastfeeding (27). Based on these observations, two new survival curves were estimated, replicating the expected survival of children infected perinatally and those infected through breastfeeding. These revised survival curves point to a longer life expectancy than those previously in use, thereby increasing the number of children living with HIV in need of treatment.

*2. Improvements in determining progression from infection to treatment need:* parameters used in Spectrum related to disease progression patterns among infants were originally derived from the HIV Paediatric Prognostic Markers Collaborative Study (HPPMCS), which took place predominantly in high-income countries before antiretroviral therapy was available. New, improved information on disease progression marginally increased the estimated number of children in need of antiretroviral therapy (28).

*3. Revised WHO treatment guidelines for infants and children (Box 5.6).* The default settings in Spectrum have been updated to reflect the anticipated changes in treatment eligibility criteria included in the revised guidelines.

In sum, the use of regimen-specific HIV transmission rates, identification and updating of different survival curves according to the mode of infection, and the change in the eligibility criteria for antiretroviral therapy initiation in children have substantially increased the estimated number of children in need of antiretroviral therapy, consequently affecting antiretroviral therapy coverage rates. In light of these changes, 2009 coverage rates should not be compared with coverage figures published in previous versions of this annual progress report. Nevertheless, all estimates of paediatric antiretroviral therapy need for previous years have been back-calculated for this year's report.

At the end of 2009, 14 countries had reached more than 80% coverage of antiretroviral therapy for children: Argentina, Botswana, Brazil, Cambodia, Guyana, Jamaica, Kazakhstan, Malaysia, Namibia, Panama, Paraguay, Thailand, Ukraine, Uruguay<sup>1</sup> (see Annex 5).

Although progress is being made in expanding children's access to antiretroviral therapy, less than one third of children in need received it in 2009. With the new treatment guidelines, it is estimated that more children will be placed on therapy, and additional financial resources will be needed to cover the associated costs, and the requisite drug regimens will be more complex to implement. It is also essential that countries devise and reinforce advocacy plans and policies to ensure that stock-outs do not occur. Moreover, scaling up services will require large-scale planning, coordination, training of health-care workers and provision of information/

education materials. Adequate planning and management at all levels are also critical to ensure that these changes are appropriately incorporated into national policy and practice.

### 5.3. Outcomes and impact of interventions for prevention of mother-to-child transmission of HIV

Most countries are currently scaling up services and interventions to prevent mother-to-child transmission of HIV. Assessing the outcome and impact of programmes for the prevention of mother-to-child transmission on paediatric HIV infections averted, maternal health and survival, and child health and survival is essential for programme management and for monitoring progress towards MDGs 4, 5 and 6. However, systematically evaluating prevention of mother-to-child transmission programmes at the national level remains difficult. While the efficacy of various interventions to reduce the risk of mother-to-child

<sup>1</sup> Countries with at least an estimated 100 children in need of antiretroviral therapy.

transmission has been demonstrated in research settings, their national impact when operationalized within various health system constraints and implemented in different contexts under a range of service delivery scenarios remains largely undocumented. HIV-positive pregnant women can be provided with antiretrovirals to reduce the risk of mother-to-child transmission but the duration of and adherence to the antiretrovirals provided is often unknown nationally. Loss to follow up also negatively affects the accurate tracking of maternal and child outcomes at the national level. Improved methods to measure child mortality associated with HIV are needed. WHO, UNICEF and partners are working on guidance to measure the impact of prevention of mother-to-child transmission programmes which will hopefully facilitate better assessments of achieved impact in future reports.

Global assessments on the impact of prevention of mother-to-child transmission programmes are based on limited data and models assuming transmission efficacy parameters from clinical trials and limited programme settings, which may overestimate the actual impact and achievement of these programmes and international goals. Using the 2009 distribution of antiretroviral regimens, and a set of assumptions used to project the impact of prevention of mother-to-child transmission (29), in low- and middle-income countries, mother-to-child transmission has declined from approximately 34%, assuming that no interventions were provided to prevent mother-to-child transmission, to 21% (assuming a median breastfeeding period of 12 months). If the new WHO guidelines are implemented for 90% of women, and assuming the same breastfeeding practices, it would be possible to achieve around a 10% transmission rate in sub-Saharan Africa.

WHO, UNICEF, UNAIDS and partners are also planning a multistakeholder consultation on key issues to move towards eliminating mother-to-child transmission by 2015. This meeting will discuss, among other topics, indicators, coverage targets and technical definitions to measure and monitor progress toward elimination. Achieving this goal will ultimately require interventions to be scaled up to very high coverage levels and full implementation of the new guidelines on antiretrovirals to reduce mother-to-child transmission. Joint efforts to work closely and strategically with maternal and child health programmes will also be critical to optimize synergies to impact on MDGs 4, 5, 6.

#### 5.4. Looking ahead

Substantial progress has been made in the past decade in preventing transmission of HIV from mother to child, and providing paediatric treatment and care. However, a number of programmatic and policy challenges must be addressed

if elimination of mother-to-child transmission and universal access to care and treatment for mothers and their children are to be achieved in low- and middle-income countries.

Further integration and improvement of linkages and referrals between HIV and maternal, newborn and child health services are essential to increase coverage levels and enhance the quality of interventions for prevention of mother-to-child transmission. This entails developing appropriate policies, equipping laboratories, providing both clinical and immunological assessment for HIV, and initiating antiretroviral therapy at services currently not providing these HIV interventions. In addition, it is also necessary to implement infant-feeding counselling, postpartum follow up and antiretrovirals to prevent transmission during breastfeeding, as well as follow up on HIV-exposed infants and their mothers with an integrated package of care and treatment. A linked approach based on a strong referral systems among health facilities, service delivery points and communities will be necessary to achieve universal coverage of prevention of mother-to-child transmission.

Over 80% of HIV transmissions occur in women with CD4 counts below 350 cells/mm<sup>3</sup>. Programmes must incorporate without delay CD4 screening as an integral part of prevention of mother-to-child transmission services. Additional efforts are needed (i) to allow CD4 screening to be performed at antenatal care services to ensure rapid identification of need and immediate initiation of treatment or follow up, and (ii) to replace single-dose nevirapine with more efficacious antiretroviral regimens for prevention of mother-to-child transmission, which must be readily available at all times. In order to ensure appropriate results, however, it is critical to monitor adherence to antiretrovirals during the breastfeeding period.

Eliminating mother-to-child transmission also requires the development of strategies to reach out to every woman and child, and address the specific needs of women, countering stigma and discrimination and the risk of violence in particular. Attention must be paid to ensuring that services are geographically located close to communities and clients in order to facilitate access and maximize coverage. Accelerating scale-up also requires a decentralized approach, in which national programmes transfer the planning and implementation of services to subnational levels and establish clear mechanisms for coordination, financing and accountability. By bringing management and decision-making closer to the end-users, decentralization considerably strengthens programmatic responsiveness and ensures that gaps in service delivery can more easily be identified and addressed in time.

Where coverage of interventions is limited, it is essential to develop effective mechanisms to engage communities as




partners in service delivery and establish better links between health facilities and local communities. It is also necessary to address socioeconomic factors that keep service utilization low, including financial barriers and user fees.

Early infant diagnosis must be scaled up and treatment initiated immediately during the postnatal period if universal access to paediatric treatment and care is to be achieved. Providing HIV services in maternal and child health clinics – the most common places where women and young children are seen – increases the likelihood that HIV-exposed and -infected children will receive both the HIV-related care and the routine child-survival interventions that are essential to their health.

Stronger follow-up systems are needed to monitor and ensure that identified needs are actually being met throughout the continuum of care. Even in places where early infant diagnosis is more widely available, many infants testing HIV-positive are not being started on antiretroviral therapy. Similarly, a considerable proportion of pregnant

women identified as being HIV-positive are also lost to follow up during the “cascade” of interventions required for effective prevention of HIV transmission to their infants.

A further challenge is to adequately implement WHO’s 2010 guidelines for treating pregnant women and preventing HIV infection in infants, especially in countries with weak health systems (1). Partners must step up efforts to assist countries in identifying the most appropriate option for antiretrovirals, taking into account local circumstances and preferences.

Finally, countries need to be supported to improve the quality, scope, completeness and reliability of data collected. This is essential for prevention of mother-to-child transmission, which incorporates a complex set of interlinked services that can be delivered at different entry points and facilities. Monitoring progress towards elimination of mother-to-child transmission and universal access needs the implementation of a robust information system that is able to identify gaps in service delivery and respond adequately. 

## References

1. *Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: recommendations for a public health approach, 2010 version*. Geneva, World Health Organization, 2010 ([http://whqlibdoc.who.int/publications/2010/9789241599818\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599818_eng.pdf), accessed on 10 September 2010).
2. United Nations General Assembly Special Session on HIV/AIDS. *Declaration of Commitment on HIV/AIDS*. ([http://data.unaids.org/publications/irc-pub03/aidsdeclaration\\_en.pdf](http://data.unaids.org/publications/irc-pub03/aidsdeclaration_en.pdf), accessed 18 Aug 2010).
3. *United Nations General Assembly Resolution 60/262*. New York, United Nations, 2006. ([http://data.unaids.org/pub/Report/2006/20060615\\_HLM\\_PoliticalDeclaration\\_ARES60262\\_en.pdf](http://data.unaids.org/pub/Report/2006/20060615_HLM_PoliticalDeclaration_ARES60262_en.pdf), accessed 31 August 2010).
4. *Guidance on global scale-up of prevention of mother-to-child transmission of HIV*. Geneva and New York, WHO, UNICEF, 2006. ([http://www.unicef.org/aids/files/PMTCT\\_enWEBNov26.pdf](http://www.unicef.org/aids/files/PMTCT_enWEBNov26.pdf), accessed 31 August 2010).
5. *PMTCT strategic vision 2010–2015*. Geneva, WHO, 2010. ([http://www.who.int/hiv/pub/mtct/strategic\\_vision.pdf](http://www.who.int/hiv/pub/mtct/strategic_vision.pdf), accessed 9 September 2010).
6. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). *AIDS epidemic update: November 2009*. Geneva, UNAIDS, WHO, 2009 ([http://data.unaids.org/pub/Report/2009/JC1700\\_Epi\\_Update\\_2009\\_en.pdf](http://data.unaids.org/pub/Report/2009/JC1700_Epi_Update_2009_en.pdf), accessed 22 July 2010).
7. *2008 report on the global AIDS epidemic*. Geneva, UNAIDS, 2008 ([http://whqlibdoc.who.int/unaid/2008/9789291737178\\_eng.pdf](http://whqlibdoc.who.int/unaid/2008/9789291737178_eng.pdf), accessed 22 July 2010).
8. *Strategic approaches to the prevention of HIV infection in infants: report of a WHO meeting, Morges, Switzerland, 20–22 March 2002*. Geneva, World Health Organization, 2003 (<http://www.who.int/hiv/pub/mtct/en/StrategicApproachesE.pdf>, accessed 22 July 2010).
9. WHO, UNICEF and the Inter-Agency Task Team (IATT) on Prevention of HIV Infection in Pregnant Women, Mothers and their Children. *Monitoring and evaluating the prevention of mother-to-child transmission of HIV: a guide for national programme*. Geneva, World Health Organization (in press).
10. *Delivering HIV test results and messages for re-testing and counselling in adults*. Geneva, World Health Organization, 2010 ([http://whqlibdoc.who.int/publications/2010/9789241599115\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599115_eng.pdf), accessed 22 July 2010).
11. Msuya SE et al. Low male partner participation in antenatal HIV counselling and testing in northern Tanzania: implications for preventive programs. *AIDS Care*, 2008, 20:700–709.
12. Farquhar C et al. Antenatal couple counselling increases uptake of interventions to prevent HIV-1 transmission. *Journal of Acquired Immune Deficiency Syndromes*, 2004, 37:1620–1626.
13. Carter, RJ et al. CD4+ Cell Count Testing More Effective Than HIV Disease Clinical Staging in Identifying Pregnant and Postpartum Women Eligible for Antiretroviral Therapy in Resource-Limited Settings. *Journal of Acquired Immune Deficiency Syndromes* (2010). doi: 10.1097/QAI.0b013e3181e73f4b
14. Kuhn, L et al. Potential impact of new WHO criteria for antiretroviral therapy for prevention of mother-to-child transmission, *AIDS*, 2010, 24: 1374–1377
15. WHO, UNICEF, UNAIDS, UNFPA. *Guidelines on HIV and infant feeding, 2010*. Geneva, WHO, 2010. ([http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf), accessed 22 August 2010).
16. Clinton Health Access Initiative. *Description of a 2008 Meta-Analysis of Mother to Child Transmission (MTCT) of HIV Rates in Resource-Limited Settings – discussion paper*. 2010 (unpublished).
17. *Taking stock: HIV in children*. Geneva, WHO, 2006 (WHO/HIV/2006.04).
18. Pfeiffer et al. Integration of HIV/AIDS services into African primary health care: lessons learned for health system strengthening in Mozambique – a case study. *Journal of the International AIDS Society*, 2010, 13:3.
19. Callaghan et al. A systematic review of task- shifting for HIV treatment and care in Africa. *Human Resources for Health*, 2010, 8:8.
20. Torpey K et al. Increasing the uptake of prevention of mother-to-child transmission of HIV services in a resource-limited setting. *BMC Health Services Research*, 2010, 10:29 (<http://www.biomedcentral.com/1472-6963/10/29>, accessed 30 July 2010).

21. Killam W et al. Antiretroviral therapy in antenatal care to increase treatment initiation in HIV-infected pregnant women: a stepped-wedge evaluation. *AIDS*, 2010, 24:856–891.
22. *Antiretroviral therapy for HIV infection in infants and children: towards universal access. Executive summary of recommendations: preliminary version for program planning 2010*. Geneva, World Health Organization, 2010 (<http://www.who.int/hiv/pub/paediatric/paed-prelim-summary.pdf>, accessed 22 July 2010).
23. *Co-trimoxazole prophylaxis for HIV-exposed and HIV-infected infants and children: practical approaches to implementation and scale up*. World Health Organization and United Nations Children's Fund, 2009 (<http://www.who.int/hiv/pub/paediatric/cotrimoxazole.pdf>, accessed 22 July 2010).
24. *Antiretroviral therapy for HIV infection in infants and children: towards universal access. Recommendations for a public health approach, 2010 revision*. Geneva, World Health Organization, 2010 ([http://whqlibdoc.who.int/publications/2010/9789241599801\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599801_eng.pdf), accessed on 10 September 2010).
25. *Paediatric estimation issues with a focus on ART need estimates – technical report and recommendations. Report of a meeting of the UNAIDS Reference Group on Estimates, Modelling and Projections held in Geneva, Switzerland, 4 December 2009*. Geneva, Joint United Nations Programme on HIV/AIDS (UNAIDS) Reference Group on Estimates, Modelling and Projections, 2009 ([http://www.epidem.org/Publications/Paediatric%20Estimates\\_Geneva%202009.pdf](http://www.epidem.org/Publications/Paediatric%20Estimates_Geneva%202009.pdf), accessed July 19 2010).
26. *Consultative meeting on data collection & estimation methods related to HIV infection in infants and children. Report of a consultative meeting with UNICEF, WHO and the UNAIDS Reference Group for Estimates, Modelling and Projections held in New York, USA, 8–10 July 2008*. Geneva, Joint United Nations Programme on HIV/AIDS (UNAIDS) Reference Group on Estimates, Modelling and Projections, 2009 ([http://www.epidem.org/Publications/UNAIDS\\_UNICEF\\_Paediatric%20HIV%20Report\\_9%20Dec%202008\\_Final.pdf](http://www.epidem.org/Publications/UNAIDS_UNICEF_Paediatric%20HIV%20Report_9%20Dec%202008_Final.pdf), accessed 10 September 2010).
27. Newell M-L et al. Mortality of infected and uninfected infants born to HIV-infected mothers in Africa: a pooled analysis. *Lancet*, 2004, 364:1236–1243.
28. Mahy M et al. Derivation of parameters used in Spectrum for eligibility for ART and survival on ART. *Sexually transmitted Infections, Supplement* (in press).
29. Stover J et al. The Spectrum projection package: improvements in estimating mortality, ART needs, PMTCT impact and uncertainty bounds. *Sexually Transmitted Infections*, 2008, 84(Suppl 1):i24–i30.