

# AIDS epidemic update



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# AIDS epidemic update

## December 2009





## SUB-SAHARAN AFRICA

Photo: UNAIDS, P. Virost



## ASIA

Photo: UNAIDS



## EASTERN EUROPE AND CENTRAL ASIA

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## CARIBBEAN

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## NORTH AMERICA AND WESTERN AND CENTRAL EUROPE

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## MIDDLE EAST AND NORTH AFRICA

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## OCEANIA

Photo: UNAIDS

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# Global summary of the AIDS epidemic

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December 2008

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## Number of people living with HIV in 2008

<b>Total</b>	<b>33.4 million [31.1 million–35.8 million]</b>
Adults	31.3 million [29.2 million–33.7 million]
Women	15.7 million [14.2 million–17.2 million]
Children under 15 years	2.1 million [1.2 million–2.9 million]

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## People newly infected with HIV in 2008

<b>Total</b>	<b>2.7 million [2.4 million–3.0 million]</b>
Adults	2.3 million [2.0 million–2.5 million]
Children under 15 years	430 000 [240 000–610 000]

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## AIDS-related deaths in 2008

<b>Total</b>	<b>2.0 million [1.7 million–2.4 million]</b>
Adults	1.7 million [1.4 million–2.1 million]
Children under 15 years	280 000 [150 000–410 000]

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The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information.

# Introduction

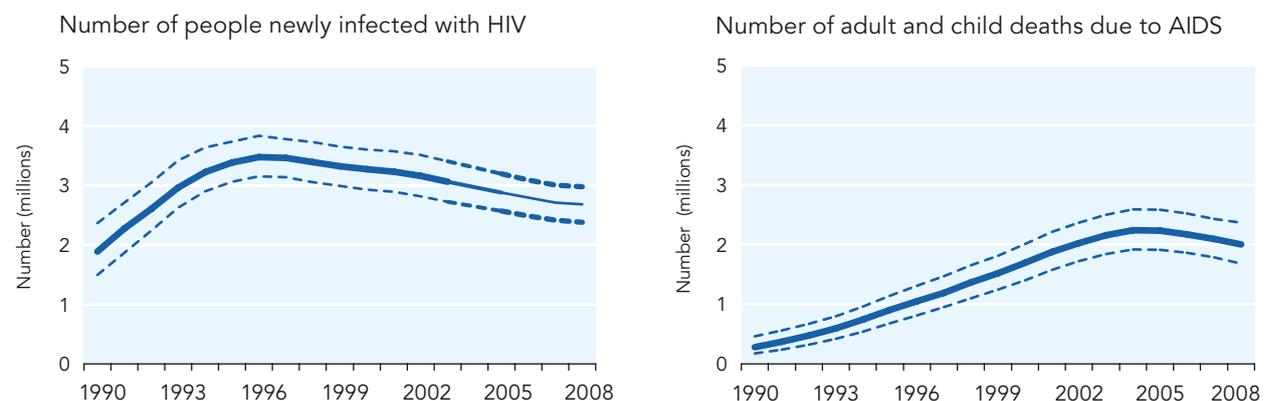
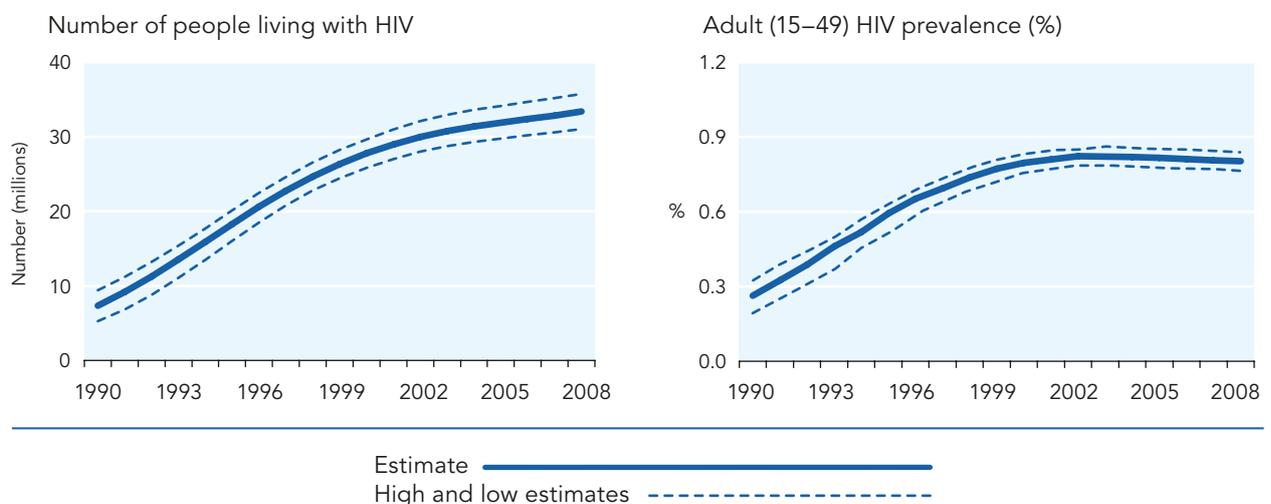
*The number of people living with HIV worldwide continued to grow in 2008, reaching an estimated 33.4 million [31.1 million–35.8 million]. The total number of people living with the virus in 2008 was more than 20% higher than the number in 2000, and the prevalence was roughly threefold higher than in 1990.*

The continuing rise in the population of people living with HIV reflects the combined effects of continued high rates of new HIV infections and the beneficial impact of antiretroviral therapy. As of December 2008, approximately 4 million people in low- and middle-income countries were receiving antiretroviral therapy—a 10-fold increase over five years (World Health Organization, United Nations Children’s Fund, UNAIDS, 2009). In 2008, an estimated 2.7 million [2.4 million–3.0 million]

new HIV infections occurred. It is estimated that 2 million [1.7 million–2.4 million] deaths due to AIDS-related illnesses occurred worldwide in 2008.

The latest epidemiological data indicate that globally the spread of HIV appears to have peaked in 1996, when 3.5 million [3.2 million–3.8 million] new HIV infections occurred. In 2008, the estimated number of new HIV infections was approximately 30% lower than at the epidemic’s peak 12 years earlier.

**Figure I**  
Global estimates 1990–2008



Source: UNAIDS/WHO.

Consistent with the long interval between HIV seroconversion and symptomatic disease, annual HIV-related mortality appears to have peaked in 2004, when 2.2 million [1.9 million–2.6 million] deaths occurred. The estimated number of AIDS-related deaths in 2008 is roughly 10% lower than in 2004.

An estimated 430 000 [240 000–610 000] new HIV infections occurred among children under the age of 15 in 2008. Most of these new infections are believed to stem from transmission in utero, during delivery or post-partum as a result of breastfeeding. The number of children newly infected with HIV in 2008 was roughly 18% lower than in 2001.

This report summarizes the latest data on the epidemiology of HIV. The epidemiological estimates in this report reflect continued improvement in national HIV surveillance systems and estimation methodology (see the box ‘Deriving HIV estimates’). In 2007–2008, national household surveys with anonymous HIV testing components were conducted in 11 countries, including nine in sub-Saharan Africa. Improvements in HIV surveillance and information systems not only provide a clearer, more reliable picture of the epidemic at the global, regional and country levels but are also helping national governments and other stakeholders to tailor AIDS responses in order to maximize the impact on public health.

The epidemic appears to have stabilized in most regions, although prevalence continues to increase in Eastern Europe and Central Asia and in other parts of Asia due to a high rate of new HIV infections. Sub-Saharan Africa remains the most heavily affected region, accounting for 71% of all new HIV infections in 2008. The resurgence of the epidemic among men who have sex with men in high-income countries is increasingly well-documented. Differences are apparent in all regions, with some national epidemics continuing to expand even as the overall regional HIV incidence stabilizes.

## Key themes of the 2009 AIDS epidemic update

This report is divided into separate chapters that summarize epidemiological trends in individual regions. While regional differences remain, several themes are discernible:

- ▶ *AIDS continues to be a major global health priority.* Although important progress has been achieved in preventing new HIV infections and in lowering the annual number of AIDS-related deaths, the number of people living with HIV continues to increase. AIDS-related illnesses remain one of the leading causes of death globally and are projected to continue as a significant global cause of premature mortality in the coming decades (World Health Organization, 2008). Although AIDS is no longer a new syndrome, global solidarity in the AIDS response will remain a necessity.
- ▶ *There is geographic variation between and within countries and regions.* Although this report focuses considerable attention on national trends, there are often large variations in HIV prevalence and epidemiological patterns within countries. The substantial diversity of national epidemics underscores not only the need to tailor prevention strategies to local needs but also the importance of decentralizing AIDS responses.
- ▶ *The epidemic is evolving.* Epidemic patterns can change over time. As the regional profiles in this report highlight, national epidemics throughout the world are experiencing important transitions. In Eastern Europe and Central Asia, epidemics that were once characterized primarily by transmission among injecting drug users are now increasingly characterized by significant sexual transmission, while in parts of Asia epidemics are becoming increasingly characterized by significant transmission among heterosexual couples.
- ▶ *There is evidence of successes in HIV prevention.* There is growing evidence of HIV prevention successes in diverse settings. In five countries where two recent national household surveys

were conducted, HIV incidence is on the decline, with the drop in new infections being statistically significant in two countries (Dominican Republic and United Republic of Tanzania) and statistically significant among women in a third (Zambia) (Hallett et al., in press). As previously discussed, the annual number of new HIV infections globally has declined, and HIV prevalence among young people has fallen in many countries (UNAIDS, 2008). Globally, coverage for services to prevent mother-to-child HIV transmission rose from 10% in 2004 to 45% in 2008 (World Health Organization, United Nations Children's Fund, UNAIDS, 2009), and the drop in new HIV infections among children in 2008 suggests that these efforts are saving lives (see the box 'The impact of antiretroviral prophylaxis to prevent mother-to-child transmission of HIV').

- ▶ *Improved access to treatment is having an impact.* Antiretroviral therapy coverage rose from 7% in 2003 to 42% in 2008, with especially high coverage achieved in eastern and southern Africa (48%) (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). While the rapid expansion of access to antiretroviral therapy is helping to lower AIDS-related death rates in multiple countries and regions, it is also contributing to increases in HIV prevalence (see the box 'Impact of increased access to treatment on epidemiological trends').
- ▶ *There is increased evidence of risk among key populations.* While high HIV prevalence has long been documented among sex workers in diverse countries worldwide, evidence was extremely limited regarding the contribution of men who have sex with men and injecting drug users to epidemics in sub-Saharan Africa and parts of Asia. In recent years, studies have documented elevated levels of infection in these populations in nearly all regions. In all settings and for diverse types of epidemics, it is clear that programmes to prevent new infections among these key populations must constitute an important part of national AIDS responses.

## What do the most recent data tell us?

UNAIDS recommends that countries ground their AIDS strategies in an understanding of their individual epidemics and their national responses. The data presented in this report indicate that this is often failing to occur. The failure to match national AIDS strategies to documented national needs has been vividly illustrated by recent modes of transmission studies and HIV prevention syntheses conducted in a number of countries.

The common failure to prioritize focused HIV prevention programmes for key populations is especially apparent. Even though injecting drug users, men who have sex with men, sex workers, prisoners and mobile workers are at higher risk of HIV infection, the level of resources directed towards focused prevention programmes for these groups is typically quite low, even in concentrated epidemics (UNAIDS, 2008).

Gaps are also evident in basic prevention approaches in hyperendemic settings. As the chapter on sub-Saharan Africa explains, even though the largest share of new infections in many African countries occurs among older heterosexual couples, relatively few prevention programmes have specifically focused on older adults. Although serodiscordant couples account for a substantial percentage of new infections in some African countries, HIV testing and counselling programmes are seldom geared specifically for serodiscordant couples. Many programmes focused on young people fail to address some of the key determinants of vulnerability, such as the high prevalence of intergenerational partnerships in many countries.

Another important programmatic gap evident in recent HIV prevention syntheses is the typical shortage of programmes specifically designed for people living with HIV. UNAIDS recommends that urgent efforts to involve people living with HIV in the planning, implementation and monitoring of prevention efforts be grounded in human rights principles and be supported by strong legal protection.

## UNAIDS Outcome Framework 2009–2011: nine priority areas

- ▶ We can reduce sexual transmission of HIV.
- ▶ We can prevent mothers from dying and babies from becoming infected with HIV.
- ▶ We can ensure that people living with HIV receive treatment.
- ▶ We can prevent people living with HIV from dying of tuberculosis.
- ▶ We can protect drug users from becoming infected with HIV.
- ▶ We can remove punitive laws, policies, practices, stigma and discrimination that block effective responses to AIDS.
- ▶ We can stop violence against women and girls.
- ▶ We can empower young people to protect themselves from HIV.
- ▶ We can enhance social protection for people affected by HIV.

### Advancing the UNAIDS Outcome Framework 2009–2011

In 2009, the UNAIDS Secretariat and Cosponsors proposed—and the UNAIDS Programme Coordinating Board endorsed—a set of specific outcomes that the Joint Programme will aim to catalyse support for in 2009–2011 (UNAIDS, 2009). While continuing to work towards comprehensive national responses to AIDS throughout the world, the outcome framework sets out a limited number of specific aims to guide future investments and to mobilize focused, concerted action.

The evidence summarized in this report underscores both the urgency of the priority outcomes identified in the new UNAIDS framework and the feasibility of achieving concrete progress in specific areas. As the recent declines in HIV incidence in multiple countries demonstrate, it is possible to reduce sexual transmission of HIV. Likewise, the increasing coverage of services to prevent mother-

to-child transmission and the associated declines in new HIV infections among children highlight the feasibility of preventing mothers from dying and babies from becoming infected with HIV. The growing body of evidence regarding the salutary health effects of increased access to treatment underscores the importance of ensuring that all people living with HIV receive the treatment they need.

As this report describes, however, progress is not universally evident across the broad range of outcomes in the 2009–2011 framework, and where progress has been made it has sometimes been only partial or episodic. The data summarized in the subsequent regional profiles highlight areas where more intensified action is needed in order to achieve the desired impact across the breadth of the AIDS response.

## Regional HIV and AIDS statistics, 2001 and 2008

	Adults and children living with HIV	Adults and children newly infected with HIV	Adult prevalence (%)	Adult and child deaths due to AIDS
<b>Sub-Saharan Africa</b>				
2008	22.4 million [20.8 million–24.1 million]	1.9 million [1.6 million–2.2 million]	5.2 [4.9–5.4]	1.4 million [1.1 million–1.7 million]
2001	19.7 million [18.3 million–21.2 million]	2.3 million [2.0 million–2.5 million]	5.8 [5.5–6.0]	1.4 million [1.2 million–1.7 million]
<b>Middle East and North Africa</b>				
2008	310 000 [250 000–380 000]	35 000 [24 000–46 000]	0.2 [<0.2–0.3]	20 000 [15 000–25 000]
2001	200 000 [150 000–250 000]	30 000 [23 000–40 000]	0.2 [0.1–0.2]	11 000 [7800–14 000]
<b>South and South-East Asia</b>				
2008	3.8 million [3.4 million–4.3 million]	280 000 [240 000–320 000]	0.3 [0.2–0.3]	270 000 [220 000–310 000]
2001	4.0 million [3.5 million–4.5 million]	310 000 [270 000–350 000]	0.3 [<0.3–0.4]	260 000 [210 000–320 000]
<b>East Asia</b>				
2008	850 000 [700 000–1.0 million]	75 000 [58 000–88 000]	<0.1 [<0.1]	59 000 [46 000–71 000]
2001	560 000 [480 000–650 000]	99 000 [75 000–120 000]	<0.1 [<0.1]	22 000 [18 000–27 000]
<b>Oceania</b>				
2008	59 000 [51 000–68 000]	3900 [2900–5100]	0.3 [<0.3–0.4]	2000 [1100–3100]
2001	36 000 [29 000–45 000]	5900 [4800–7300]	0.2 [<0.2–0.3]	<1000 [<500–1200]
<b>Latin America</b>				
2008	2.0 million [1.8 million–2.2 million]	170 000 [150 000–200 000]	0.6 [0.5–0.6]	77 000 [66 000–89 000]
2001	1.6 million [1.5 million–1.8 million]	150 000 [140 000–170 000]	0.5 [<0.5–0.6]	66 000 [56 000–77 000]
<b>Caribbean</b>				
2008	240 000 [220 000–260 000]	20 000 [16 000–24 000]	1.0 [0.9–1.1]	12 000 [9300–14 000]
2001	220 000 [200 000–240 000]	21 000 [17 000–24 000]	1.1 [1.0–1.2]	20 000 [17 000–23 000]
<b>Eastern Europe and Central Asia</b>				
2008	1.5 million [1.4 million–1.7 million]	110 000 [100 000–130 000]	0.7 [0.6–0.8]	87 000 [72 000–110 000]
2001	900 000 [800 000–1.1 million]	280 000 [240 000–320 000]	0.5 [0.4–0.5]	26 000 [22 000–30 000]
<b>Western and Central Europe</b>				
2008	850 000 [710 000–970 000]	30 000 [23 000–35 000]	0.3 [0.2–0.3]	13 000 [10 000–15 000]
2001	660 000 [580 000–760 000]	40 000 [31 000–47 000]	0.3 [0.2–0.3]	7900 [6500–9700]
<b>North America</b>				
2008	1.4 million [1.2 million–1.6 million]	55 000 [36 000–61 000]	0.4 [0.3–0.5]	25 000 [20 000–31 000]
2001	1.2 million [1.1 million–1.4 million]	52 000 [42 000–60 000]	0.4 [<0.4–0.5]	19 000 [16 000–23 000]
<b>TOTAL</b>				
2008	33.4 million [31.1 million–35.8 million]	2.7 million [2.4 million–3.0 million]	0.8 [<0.8–0.8]	2.0 million [1.7 million–2.4 million]
2001	29.0 million [27.0 million–31.0 million]	3.2 million [2.9 million–3.6 million]	0.8 [<0.8–0.8]	1.9 million [1.6 million–2.2 million]

## Advances in characterizing HIV incidence

Knowing their epidemic and their response can help countries to craft an optimally effective national response (UNAIDS, 2007). A long-standing impediment to putting this advice into practice has been the difficulty of reliably estimating and characterizing new HIV infections. In the absence of a clear understanding of the rate of new infections and of the population and geographic distribution of incident infections, it has proven challenging for national authorities to maximize the impact of HIV prevention strategies.

The gold standard for the direct measurement of incidence is the cohort study, in which HIV-uninfected people are followed over time. However, due to the enormous costs, time requirements and complexities associated with cohort studies, these tend to be conducted in specific settings and not for national populations. In addition, cohort studies are subject to biases associated with recruitment and loss to follow-up.

In recent years, notable advances have been made in other approaches for gauging new HIV infections. These include indirect mathematical or statistical methods to estimate incidence and laboratory tests that help to measure directly the rate of new infections. Collectively, these methods are providing national planners with a more accurate and more timely understanding of the dynamics of national epidemics.

### Indirectly estimating HIV incidence

Indirect strategies for estimating HIV incidence include the combination of the Estimating and Projection Package (EPP) and Spectrum mathematical modelling software tools that 120 countries worldwide have used to generate the epidemiological estimates reported annually by UNAIDS. EPP/Spectrum combines available HIV surveillance data with data from programmes for antiretroviral therapy and prevention of mother-to-child HIV transmission to calculate HIV prevalence, HIV incidence, AIDS mortality, number of AIDS orphans and HIV treatment needs. In 2009, alterations were introduced to EPP and Spectrum to improve the model's ability to estimate HIV incidence (see [www.unaids.org](http://www.unaids.org) for the software, model description and user manual). Trends in incidence obtained by this method feature in the regional summaries of this report.

Another mathematical model developed by Hallett et al. uses successive rounds of national cross-sectional HIV prevalence data to estimate HIV incidence by age in the general population (Hallett et al., 2008). Still other dynamic models have been developed to generate HIV incidence estimates (Williams et al., 2001; Gregson et al., 1996).

Trends in HIV prevalence among young people are less subject to changes over time due to mortality and the effect of antiretroviral therapy than are the trends in prevalence among people of all ages. Therefore, trends in prevalence among antenatal clinic attendees aged 15–24 years old have been used to assess trends in incidence in countries with a high prevalence (UNAIDS, 2008). Similarly, differences in age-specific prevalence in national surveys have been used to assess trends in incidence (Shisana et al., 2009).

The 'incidence by modes of transmission' approach, developed by the UNAIDS Reference Group on Estimates, Modelling and Projections, estimates the number of new infections in a given year. Unlike the previously described methods, the modes of transmission analysis does not aim to identify incidence trends over time. The model assumes that the risk of infection for any individual is a function of the HIV prevalence among partners, the number of partners and the number of contacts with each partner, with additional weight given to the presence or absence of sexually transmitted infections and to circumcision status. The model allows for estimates of new infections to be developed by population and transmission source.

The 'incidence modes of transmission' model is already proving useful in detecting dissonance between national prevention programmes and epidemiological patterns. With the support of UNAIDS, 12 countries have undertaken modes of transmission analyses in the past two years.

These exercises identified critical epidemiological trends in different countries, such as the prominence of new infections among 'low-risk' heterosexual couples in Uganda or the notable number of new infections occurring among vulnerable populations in Kenya. Countries are now using this analysis of epidemiological dynamics to refine their surveillance approaches and to reformulate national prevention strategies to respond in a timely way to emerging trends.

### Laboratory assay-based measures of HIV incidence

Several assays and techniques have been developed to distinguish recent infections from long-standing infections. When applied to blood specimens collected from testing facilities, these tests can help to identify the rate at which new HIV infections are occurring.

Most of the laboratory incidence measures are in the serologic testing algorithm for recent HIV seroconversion, or STARHS, category. STARHS tests detect various properties associated with early HIV-1 antibodies following seroconversion. In 2008, the US Centers for Disease Control and Prevention (CDC) used a STARHS-like assay to produce the first-ever direct estimate of annual HIV incidence in the USA (Hall et al., 2008). The approach used by CDC to develop its incidence estimate depends on the existence of additional clinical and epidemiological information on individuals (including antiretroviral status and CD4 count) and on the modelling of testing behaviour. The national epidemiological picture developed by CDC included the first-ever estimates of incident infections by race/ethnicity, age, gender and mode of transmission. In recent years, epidemiologists have applied various laboratory tests to estimate HIV incidence in testing facility settings (Schüpbach et al., 2007; Suligoi et al., 2007).

Although these strategies are an important sign of progress, their application in survey settings in low- and middle-income countries has identified several challenges. In particular, they misclassified some individuals who had been infected for a long time and some people who were on antiretroviral therapy as recently infected (see Hargrove et al., 2008). Further development of new assays and of assay algorithms are needed, as well as an extensive validation in field settings, before these approaches can be confidently applied.

More information can be found at [http://www.who.int/diagnostics\\_laboratory/links/hiv\\_incidence\\_assay/en/index1.html](http://www.who.int/diagnostics_laboratory/links/hiv_incidence_assay/en/index1.html).

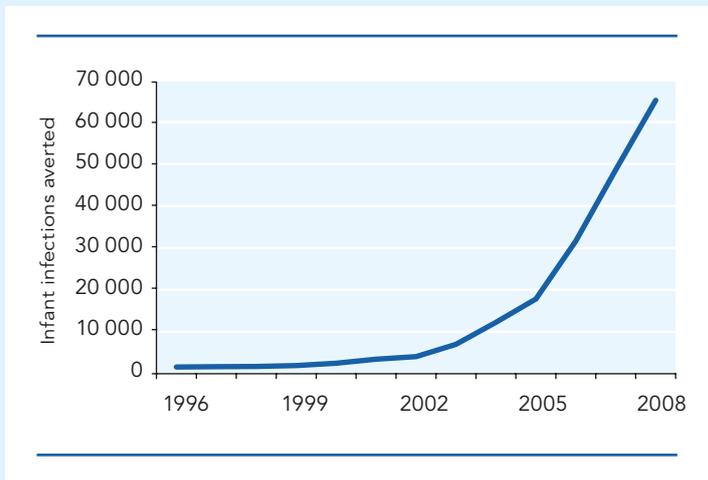
## The impact of antiretroviral prophylaxis to prevent mother-to-child transmission of HIV

Effective prevention of mother-to-child transmission involves simultaneous support for several strategies that work synergistically to reduce the odds that an infant will become infected as a result of exposure to the mother's virus. Through the reduction in overall HIV among reproductive-age women and men, the reduction of unwanted pregnancies among HIV-positive women, the provision of antiretroviral drugs to reduce the chance of infection during pregnancy and delivery and appropriate treatment, care and support to mothers living with HIV (including infant feeding), programmes are able to reduce the chance that infants will become infected. In ideal conditions, the provision of antiretroviral prophylaxis and replacement feeding can reduce transmission from an estimated 30% to 35% with no intervention to around 1% to 2%. Most countries have not yet reached all pregnant women with these services, let alone significantly reduced HIV prevalence among reproductive-age individuals or unwanted pregnancies among HIV-positive women.

It is challenging to measure the impact of the full range of services to prevent mother-to-child HIV transmission. Exclusively examining the provision of antiretroviral drugs for prophylaxis to HIV-positive pregnant women, UNAIDS estimates that 200 000 cumulative new HIV infections have been averted in the past 12 years (Figures II and III). This represents only a fraction of the overall infections among infants averted through prevention interventions, as the analysis focuses solely on a single prong of the broader package of services to prevent mother-to-child transmission.

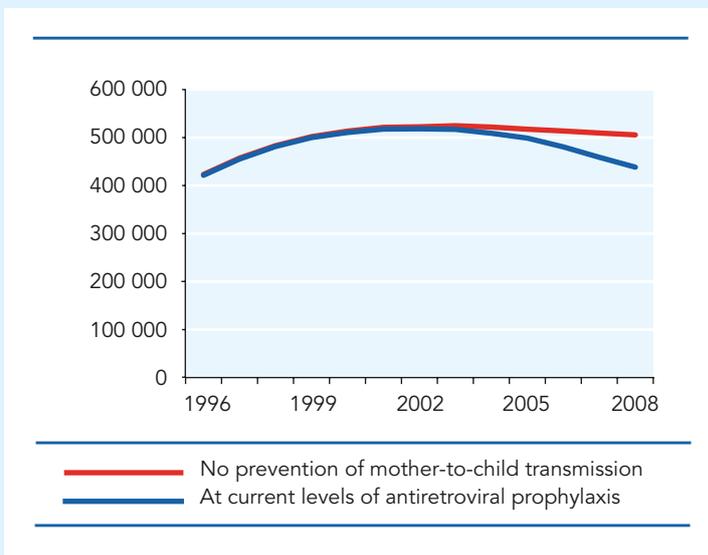
**Figure II**

Estimate of the annual number of infant infections averted through the provision of antiretroviral prophylaxis to HIV-positive pregnant women, globally, 1996–2008



**Figure III**

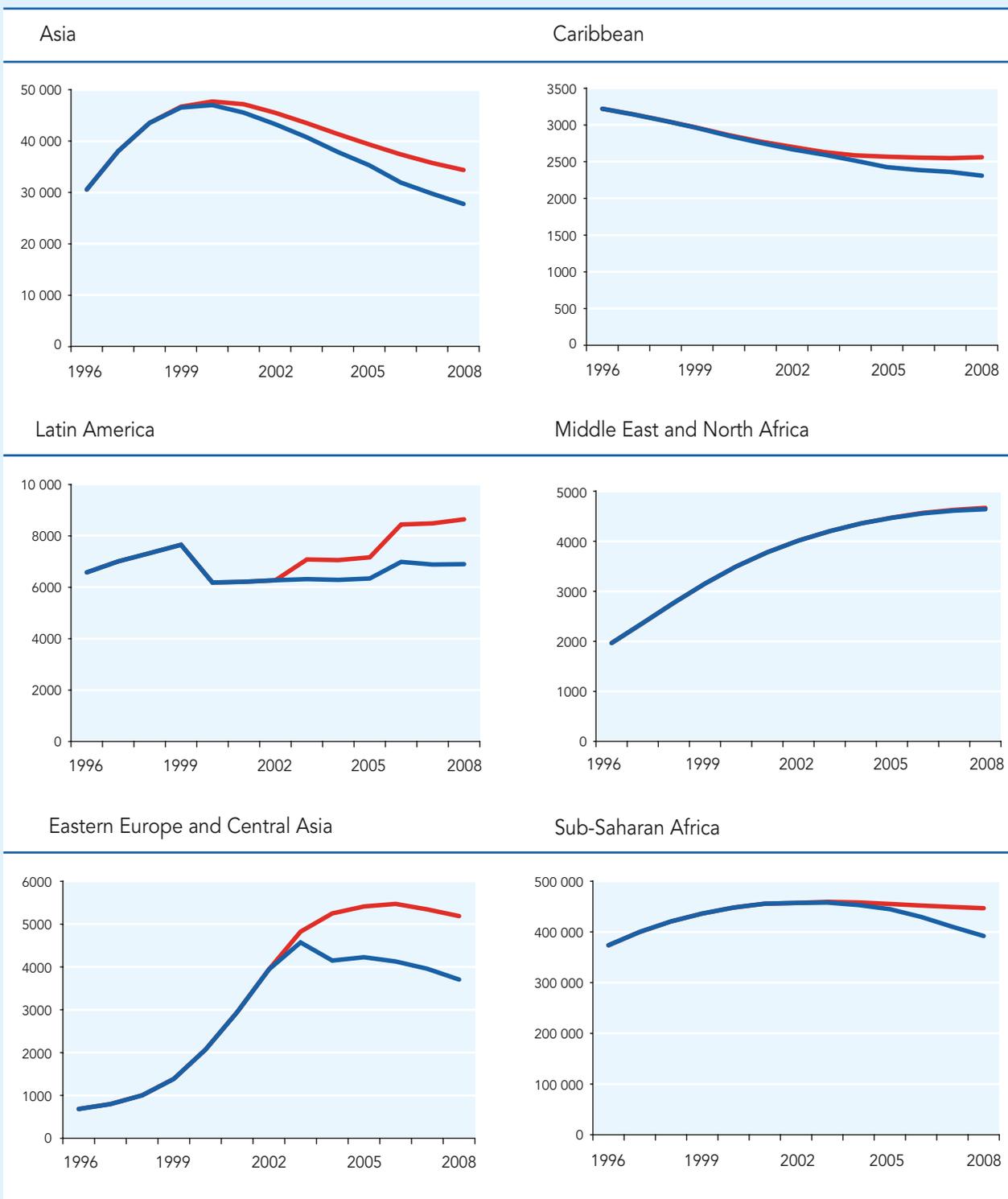
Estimated number of new child infections at current levels of antiretroviral prophylaxis and without antiretroviral prophylaxis, globally, 1996–2008



Regional estimates of the number of infant infections at current levels of antiretroviral prophylaxis and without antiretroviral prophylaxis are shown in Figure IV. The cumulative estimated numbers of infections averted in each region were: 134 000 in sub-Saharan Africa, 33 000 in Asia, 23 000 in Western Europe and North America (figure not shown), 7000 in South and Central America, 7000 in East Europe and Central Asia and 1000 in the Caribbean. The cumulative number of infections averted in Oceania (figure not shown) and the Middle East and North Africa were both less than 100.

**Figure IV**

Regional estimates of the number of infant infections at current levels of antiretroviral prophylaxis and without antiretroviral prophylaxis



— No prevention of mother-to-child transmission  
— At current levels of antiretroviral prophylaxis

## Impact of increased access to treatment on epidemiological trends

There has been an unprecedented increase in access to HIV treatment this decade in resource-limited settings where antiretroviral medications were previously unavailable. Between 2003 and 2008, access to antiretroviral drugs in low- and middle-income countries rose 10-fold (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

In high-income countries where antiretroviral drugs have long been widely available, access to treatment has had an extraordinary impact on HIV-related mortality. In a multicentre study in 12 high-income countries, the rate of excess mortality among people living with HIV in comparison with the HIV-uninfected population declined by 85% following the introduction of highly-active antiretroviral therapy (Bhaskaran et al., 2008). The pronounced declines in AIDS-related deaths as a result of advances in treatment have contributed to an increase in HIV prevalence in high-income countries (Centers for Disease Control and Prevention, 2008).

As the number of people receiving antiretroviral drugs in resource-limited settings has increased, evidence has emerged to confirm comparable improvements in longevity among people living with HIV in low- and middle-income countries. In Brazil, where free antiretroviral therapy has been available since 1996, average survival following an AIDS diagnosis in São Paulo state rose from four months in 1992–1995 to 50 months in 1998–2001 (Kilsztajn et al., 2007). In a prospective cohort study in Uganda, a combination of antiretroviral drugs and co-trimoxazole reduced mortality by 95% in comparison with no intervention (Mermin et al., 2008). An estimated 79% of adults enrolled in the early stages of Botswana's antiretroviral therapy scale-up were alive five years later (Bussmann et al., 2008). With the largest antiretroviral therapy programme in the world, South Africa is experiencing substantial public health benefits associated with improved treatment access. In the Western Cape Province of South Africa, six-month mortality among patients at an HIV treatment centre fell by roughly half (from 12.7% to 6.6%) between the start of the antiretroviral therapy programme in 2001/2002 and 2005 as more patients with less severe immunosuppression enrolled (Boulle et al., 2008).

Although current estimates of coverage of antiretroviral therapy for children are close to those of adults (World Health Organization, United Nations Children's Fund, UNAIDS, 2009), the provision of antiretroviral therapy to children has specific challenges, including the faster progression to AIDS and death, the difficulty of diagnosing HIV in children and the challenges in developing affordable and appropriate antiretroviral regimens for children (UNAIDS, 2008). Advances in several components of HIV treatment for children are now being reflected in epidemiological data. Use of simplified assays on dried blood spots now offers a feasible, cost-effective means of diagnosing HIV in infants and young children (Ou et al., 2007). Early diagnosis and early antiretroviral therapy were found to reduce infant mortality by 76% and to slow HIV-related disease progression by 75% in two medical centres in South Africa (Violari et al., 2008). In Zambia, antiretroviral therapy and once-daily co-trimoxazole prophylaxis reduced mortality among HIV-infected children by sixfold, yielding results comparable with those recorded in high-income settings (Walker et al., 2007). However, even with the impressive medical outcomes achieved through diagnosis and treatment, mortality within the first months of therapy remains high for HIV-infected children in sub-Saharan Africa (Bolton-Moore et al., 2007; Bong et al., 2007).

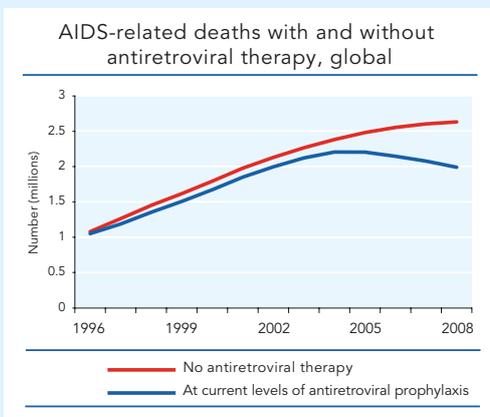
Evidence suggests that improved access to antiretroviral therapy is helping to drive a decline in HIV-related mortality. This has been conclusively documented in high-income countries, where the beneficial effects of antiretroviral therapy are clearly apparent at the population level (Phillips et al., 2007). Similar evidence is starting to emerge from low- and middle-income countries. In the first eight months of antiretroviral therapy scale-up in northern Malawi, a population-level reduction in mortality of 35% was observed among adults (Jahn et al., 2008). Between 2002–2003 and 2004–2006, during which time antiretroviral therapy was introduced in the Umkhanyakude district of KwaZulu-Natal province in South Africa, HIV-related mortality among women (aged 25–49) in the district fell by 22% (from 22.52 to 17.58 per 1000 person-years), while HIV-related death rates among men declined by 29% (from 26.46 to 18.68 per 1000 person-years) (Herbst et al., 2009). The epidemiological effect of people living with HIV for longer because of antiretroviral therapy is that prevalence will be higher compared with if antiretroviral therapy had not been available.

In Figures V and VI the red line represents the number of deaths due to AIDS in the scenario where no antiretroviral therapy was available; the blue line is the number of deaths estimated given the historical and current coverage of antiretroviral therapy. The difference in these values is the estimated number of people who are still alive because they had access to antiretroviral therapy between 1996 and 2008. As can be seen in Figure V, the global impact of antiretroviral therapy increased dramatically around 2004 and is still increasing.

Approximately 2.9 million lives have been saved because of access to antiretroviral therapy. Most of the lives saved before 2004 were in developed countries. Comparing the impact between regions suggests that the number of deaths averted in Western Europe and North America (1.1 million) is similar to the number in sub-Saharan Africa (1.2 million), despite the much larger epidemic in sub-Saharan Africa. This reflects the much longer time period that the drugs have been available in Western Europe and North America than in sub-Saharan Africa. Figure VI shows the effects in different regions.

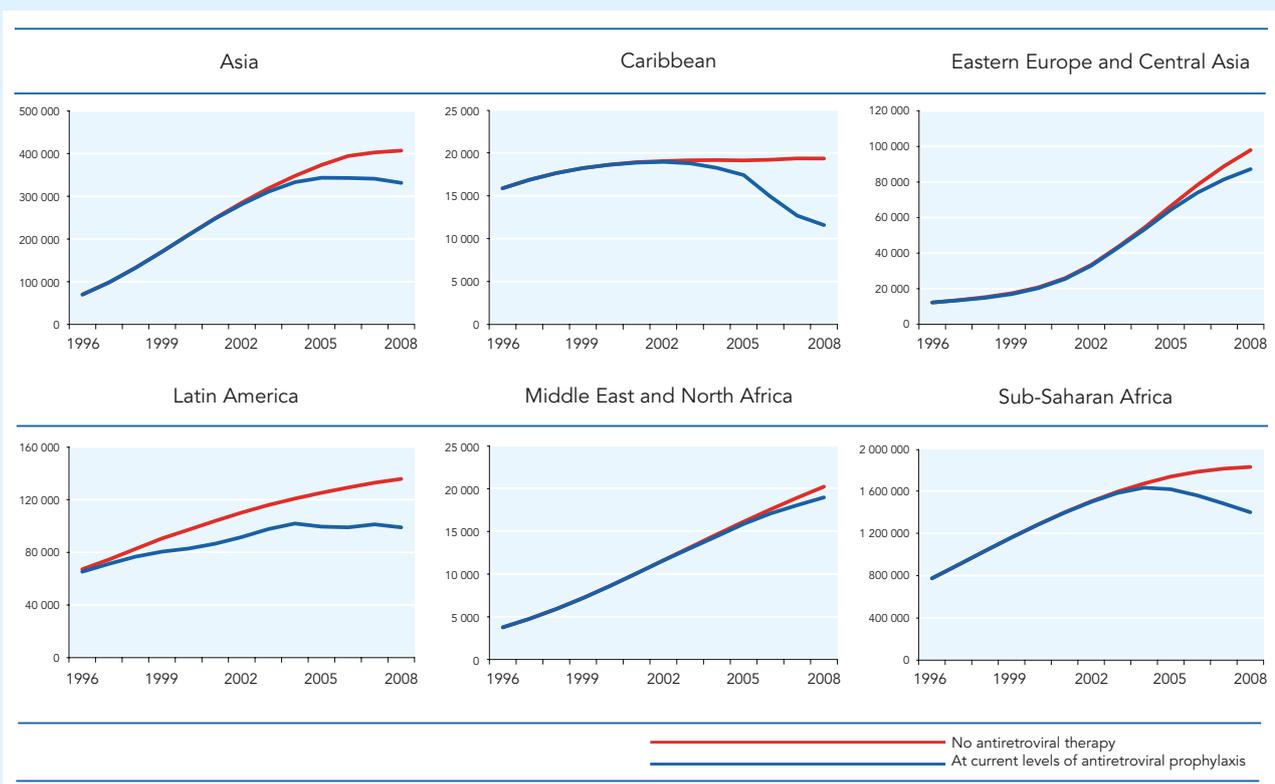
**Figure V**

Estimated number of AIDS-related deaths with and without antiretroviral therapy, globally, 1996–2008



**Figure VI**

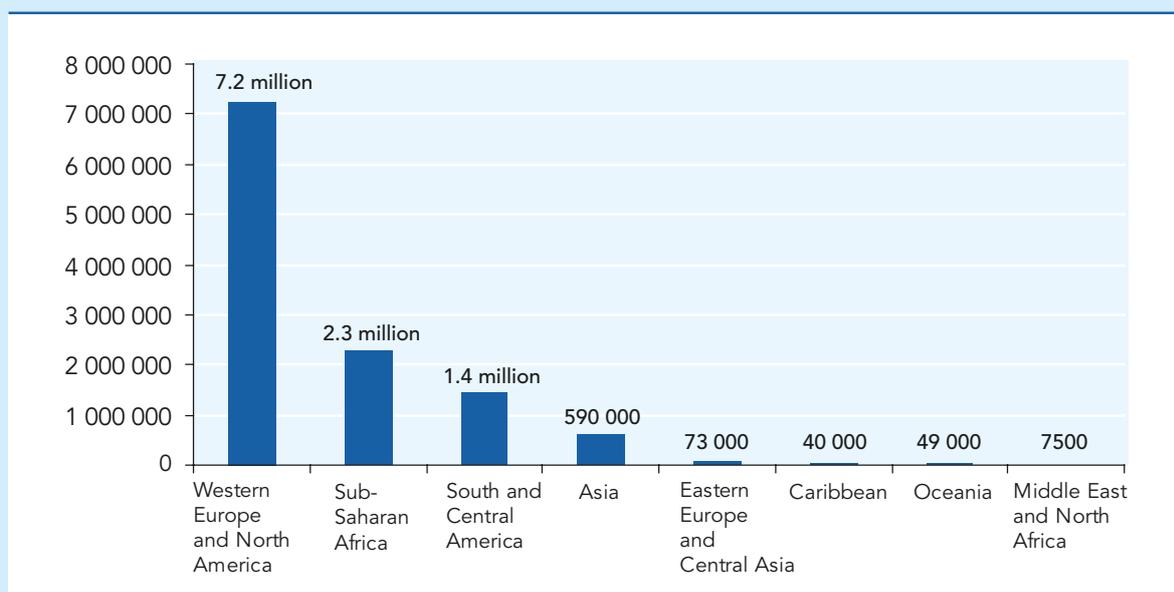
Estimated number of AIDS-related deaths with and without antiretroviral therapy, by region, 1996–2008



It is also useful to look at the number of life-years added due to antiretroviral therapy. Life-years added is a better measure of impact because it facilitates the comparison between programmes and allows analysts to assess cost-effectiveness. An estimated 11.7 million life-years were added globally between 1996 and 2008 as a result of antiretroviral therapy. This number will grow quickly in the coming years assuming antiretroviral programmes continue to expand at their current rate. Figure VII shows the number of life-years saved by region.

**Figure VII**

Estimated number of life-years added due to antiretroviral therapy, by region, 1996–2008



In addition to the effects on AIDS mortality and overall HIV prevalence, it is believed that improved treatment access could help to lower HIV incidence by reducing the viral load at the individual and community level. A recent meta-analysis suggests that the transmission rate from a person on antiretroviral therapy is approximately 0.5 per 100 person-years, while it is 5.6 per 100 person-years for persons not on antiretroviral therapy (Attia et al., 2009). Recent mathematical modelling exercises suggest that improved access to HIV testing and counselling and to antiretroviral therapy could significantly reduce infection rates (Granich et al., 2009; Lima et al., 2008). The applicability of such mathematical models to the real world remains uncertain. As reported in the chapter on North America and Western and Central Europe, HIV incidence appears to be either stable or on the rise in numerous countries where antiretroviral therapy has long been widely available. Further research, modelling and consultation are recommended regarding the feasibility and effects of the approach used in these models (Granich et al., 2009).

## Deriving HIV estimates

The epidemiological estimates summarized in this report are the result of a systematic process used by UNAIDS and WHO. Estimates for 2008 build on recent improvements in HIV surveillance and estimation methods.

HIV surveillance has historically focused on anonymous epidemiological monitoring in designated sites ('sentinel surveillance'). The number of sentinel surveillance sites has significantly increased in recent years. In a growing number of countries, sentinel surveillance has been complemented by national population-based surveys that include HIV testing. Since 2001, national HIV surveys have been conducted in 31 countries in sub-Saharan Africa, two countries in Asia, one province in each of two other countries in Asia and two Caribbean countries. In eight African countries and one Caribbean nation, more than one population-based HIV survey has been conducted since 2001, permitting an assessment of trends over time. The notable growth in the magnitude and quality of HIV epidemiological data has significantly strengthened the reliability of HIV estimates.

### Adult (aged 15–49) HIV prevalence in (sub-) national population-based surveys that included HIV testing, 2001–2008

Country	HIV prevalence (%) (year)	Country	HIV prevalence (%) (year)
<b>Sub-Saharan Africa</b>			
Benin	1.2 (2006)	Nigeria	3.6 (2007)
Botswana	25.0 (2008)	Rwanda	3.0 (2005)
	25.2 (2004)	Senegal	0.7 (2005)
Burkina Faso	1.8 (2003)	Sierra Leone	1.5 (2008)
Burundi	3.0 (2007)		1.5 (2005)
	3.6 (2002)	South Africa	16.9 (2008)
Cameroon	5.5 (2004)		16.2 (2005)
Central African Republic	6.2 (2006)		15.6 (2002)
Chad	3.3 (2005)	Swaziland	25.9 (2006–07)
Congo	3.2 (2009)	Uganda	6.4 (2004–05)
Côte d'Ivoire	4.7 (2005)	United Republic of Tanzania	5.7 (2007)
Democratic Republic of the Congo	1.3 (2007)		7.0 (2004)
Djibouti	2.9 (2002)	Zambia	14.3 (2007)
Equatorial Guinea	3.2 (2004)		15.6 (2001–02)
Ethiopia	1.4 (2005)	Zimbabwe	18.1 (2005–06)
Ghana	2.2 (2003)	<b>Asia</b>	
Guinea	1.5 (2005)	Cambodia	0.6 (2005)
Kenya	7.8 (2008)	India	0.3 (2005–06)
	6.7 (2003)	Papua province (Indonesia)	2.4 (2006)
Lesotho	23.4 (2004)	Hai Phong province (Viet Nam)	0.5 (2005)
Liberia	1.6 (2007)	<b>Caribbean</b>	
Malawi	12.7 (2004)	Dominican Republic	0.8 (2007)
Mali	1.3 (2006)		1.0 (2002)
	1.8 (2001)	Haiti	2.2 (2005–06)
Niger	0.7 (2006)		
	0.9 (2002)		

Sources: demographic health surveys and other national population-based surveys with HIV testing.

UNAIDS and WHO use three tools to generate HIV estimates for countries and regions: the Estimation and Projection Package (EPP), WORKBOOK and Spectrum.<sup>1</sup> These models generate estimates of HIV prevalence over time, the number of people living with HIV, new infections, deaths due to AIDS, children orphaned by AIDS, and treatment needs. These models use data from sentinel surveillance, surveys and special studies and are regularly updated on the basis of the latest available research. An important new feature of EPP is that it now takes into account the impact of treatment coverage on prevalence when estimating incidence. This incidence estimate is then used by Spectrum to estimate the numbers of people living with HIV, new infections and deaths. Incidence by age group is informed by age patterns of incidence derived from population-based surveys (Hallett et al., 2008). In addition, EPP now allows for the prevalence trend to be informed by multiple population-based surveys and a changing urban–rural ratio over time. As previously reported, the availability of more representative data from national population-based surveys led to a downward adjustment from previous estimates based solely on antenatal clinic surveillance (UNAIDS, 2007). In addition, the models were also adjusted in 2007 to reflect more reliable evidence on average survival time, in the absence of treatment, for people living with HIV (UNAIDS, 2007).

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<sup>1</sup> Additional information on these tools is available at <http://www.unaids.org/en/knowledgeCentre/HIVData/Methodology/>.



## SUB-SAHARAN AFRICA

Number of people living with HIV	2008: 22.4 million [20.8 million–24.1 million]	2001: 19.7 million [18.3 million–21.2 million]
Number of new HIV infections	2008: 1.9 million [1.6 million–2.2 million]	2001: 2.3 million [2.0 million–2.5 million]
Number of children newly infected	2008: 390 000 [210 000–570 000]	2001: 460 000 [260 000–640 000]
Number of AIDS-related deaths	2008: 1.4 million [1.1 million–1.7 million]	2001: 1.4 million [1.2 million–1.7 million]

*In 2008, an estimated 1.9 million [1.6 million–2.2 million] people living in sub-Saharan Africa became newly infected with HIV, bringing the total number of people living with HIV to 22.4 million [20.8 million–24.1 million]. While the rate of new HIV infections in sub-Saharan Africa has slowly declined—with the number of new infections in 2008 approximately 25% lower than at the epidemic’s peak in the region in 1995—the number of people living with HIV in sub-Saharan Africa slightly increased in 2008, in part due to increased longevity stemming from improved access to HIV treatment. Adult (15–49) HIV prevalence declined from 5.8% [5.5–6.0%] in 2001 to 5.2% [4.9–5.4%] in 2008.*

*In 2008, an estimated 1.4 million [1.1 million–1.7 million] AIDS-related deaths occurred in sub-Saharan Africa. This number represents an 18% decline in annual HIV-related mortality in the region since 2004.*

### Regional overview

Sub-Saharan Africa remains the region most heavily affected by HIV. In 2008, sub-Saharan Africa accounted for 67% of HIV infections worldwide, 68% of new HIV infections among adults and 91% of new HIV infections among children. The region also accounted for 72% of the world’s AIDS-related deaths in 2008.

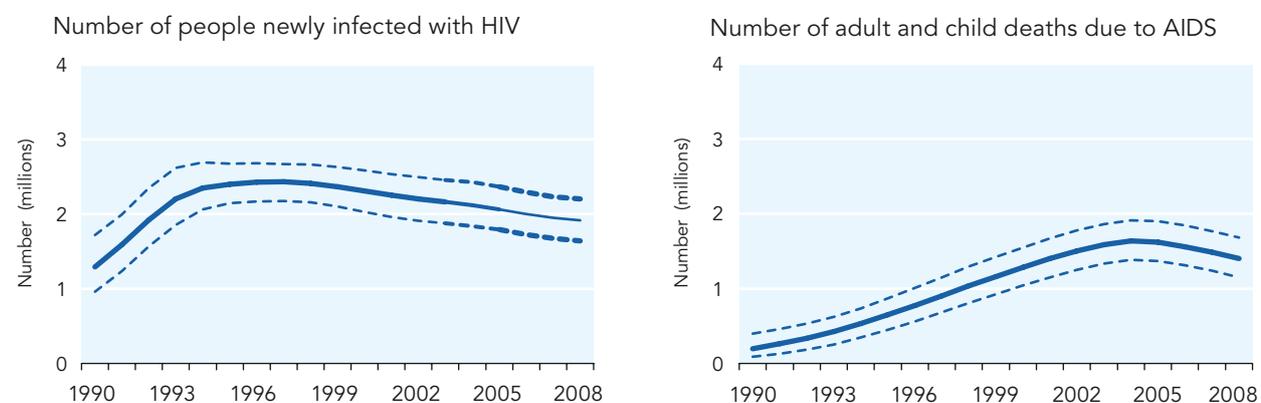
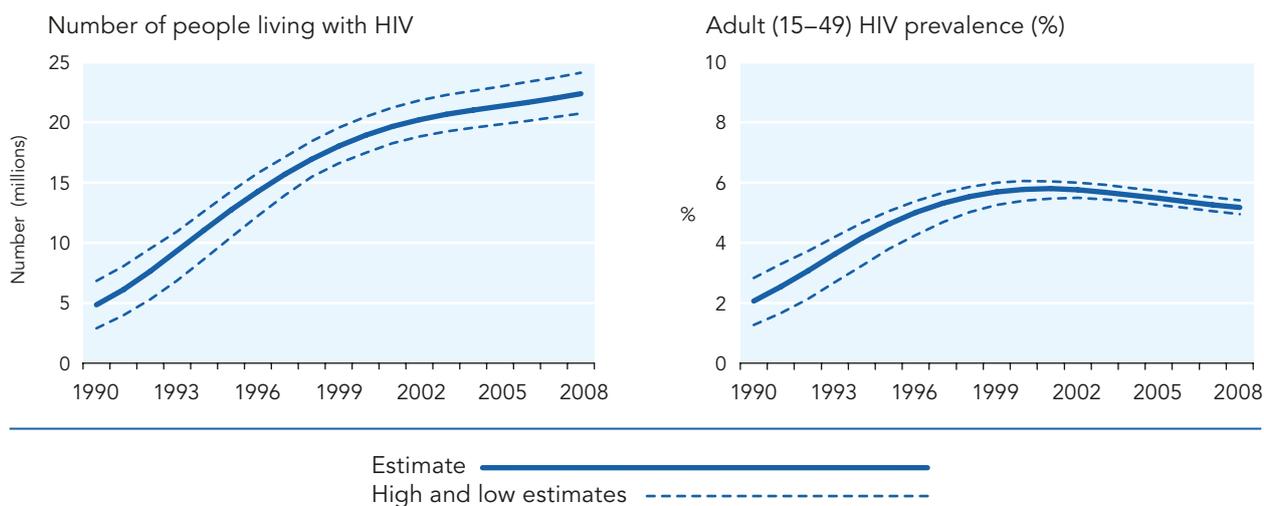
The epidemic continues to have an enormous impact on households, communities, businesses, public services and national economies in the region. In Swaziland, average life expectancy fell by half between 1990 and 2007, to 37 years

(United Nations Development Programme, 2008; Whiteside et al., 2006). In 2008, more than 14.1 million [11.5 million–17.1 million] children in sub-Saharan Africa were estimated to have lost one or both parents to AIDS.

### Continuing disproportionate impact on women and girls

Women and girls continue to be affected disproportionately by HIV in sub-Saharan Africa. For example, in Côte d’Ivoire, home to the most serious epidemic in West Africa, HIV prevalence among females (6.4%) was more than twice as high as

**Figure 1**  
**Sub-Saharan Africa estimates 1990–2008**



Source: UNAIDS/WHO.

among males (2.9%) in 2005 (Institut National de la Statistique et al., 2006). In sub-Saharan Africa as a whole, women account for approximately 60% of estimated HIV infections (UNAIDS, 2008; Garcia-Calleja, Gouws, Ghys, 2006).

Women’s vulnerability to HIV in sub-Saharan Africa stems not only from their greater physiological susceptibility to heterosexual transmission, but also to the severe social, legal and economic disadvantages they often confront. A recent comprehensive epidemiological review undertaken in connection with the modes of transmission study in Lesotho (see the box ‘Assessing HIV incidence, modes of transmission and HIV prevention efforts’) found that sexual and physical violence is a key determinant of the country’s severe HIV epidemic (Khobotlo et al., 2009). According to a recent survey, 47% of men and 40% of women in Lesotho say women have no right to refuse sex with their husbands or boyfriends (Andersson et al., 2007).

The risk of becoming infected is especially disproportionate for girls and young women. In Kenya, young women between 15 and 19 years are three

times more likely to be infected than their male counterparts, while 20–24-year-old women are 5.5 times more likely to be living with HIV than men in their age cohort (National AIDS/STI Control Programme, 2009). Among people aged 15–24 in the United Republic of Tanzania, females are four times more likely than males to be living with HIV (Tanzania Commission for AIDS et al., 2008). In the nine countries in southern Africa most affected by HIV, prevalence among young women aged 15–24 years was on average about three times higher than among men of the same age (Gouws et al., 2008).

Individuals who are divorced, separated or widowed tend to have significantly higher HIV prevalence than those who are single, married or cohabitating, with divorced or widowed women experiencing especially high prevalence. Often, divorce or widowhood stems directly from an individual’s HIV status, since many women are often divorced because they are diagnosed with HIV and many individuals in the region have lost their spouses to AIDS-related illnesses. In Guinea, widowed women are nearly seven times more likely to be living

### Assessing HIV incidence, modes of transmission and HIV prevention efforts

The UNAIDS Secretariat and Cosponsors collaborated in conducting modes of transmission analyses and HIV epidemiology and prevention syntheses in 12 countries in sub-Saharan Africa in 2008–2009. These studies used the UNAIDS Incidence Model described in Gouws et al. (2006). Developed by the UNAIDS Reference Group on Estimates, Modelling and Projections, the process and model use a variety of epidemiological data sources in a country to estimate the distribution of new HIV infections across various subgroups of the population in a single year. The model does not identify trends in HIV incidence over time. The results should be interpreted with caution as they are influenced by a number of assumptions and sometimes by uncertain input data. A particularly important feature of the model is its ability to estimate the relative number of new infections by different modes of exposure.

Estimates of HIV incidence derived by the UNAIDS model are coupled with an assessment of HIV prevention spending and programmatic patterns. This approach enables national decision-makers to identify any mismatch between programmatic priorities and epidemiological patterns and to identify programmatic or policy gaps in national prevention efforts.

with HIV than single women, while divorced or separated women are more than three times more likely to be infected than their single counterparts (Direction Nationale de la Statistique & ORC Macro, 2006). More than one in four (27%) of widowed Tanzanians are living with HIV, compared with 2% of those who have never been married and 6% of those who are married or cohabiting (National Bureau of Statistics & ORC Macro, 2005). Widowed individuals in Uganda are more than six times more likely to be infected than those who have never been married (Uganda Ministry of Health & ORC Macro, 2006).

The relationship between marriage and risk of HIV infection is often complex and may vary among settings and population groups (Figure 2). A national study of uniformed personnel in Burundi found that married men had HIV prevalence 2.7 times higher than reported for their never-married counterparts (Ndayirague et al., 2008a). However, never having been married is

not universally protective against HIV infection, especially among women; in Lesotho, 24.2% of never-married women who have had sex are living with HIV (Khobotlo et al., 2009).

HIV prevalence generally tends to peak at a younger age for women than for men (Gouws et al., 2008). According to household surveys in 28 countries—all but five in sub-Saharan Africa—peak HIV prevalence for women occurs between the ages of 30 and 34, while men experience the highest levels of HIV infection in their late 30s and early 40s (Macro International, 2008).

The very young are often at extremely high risk of infection through mother-to-child transmission. In Swaziland, 5% of children between the ages of 2 and 4 were HIV-infected in 2006–2007 (Macro International, 2008).

### Impact across diverse populations

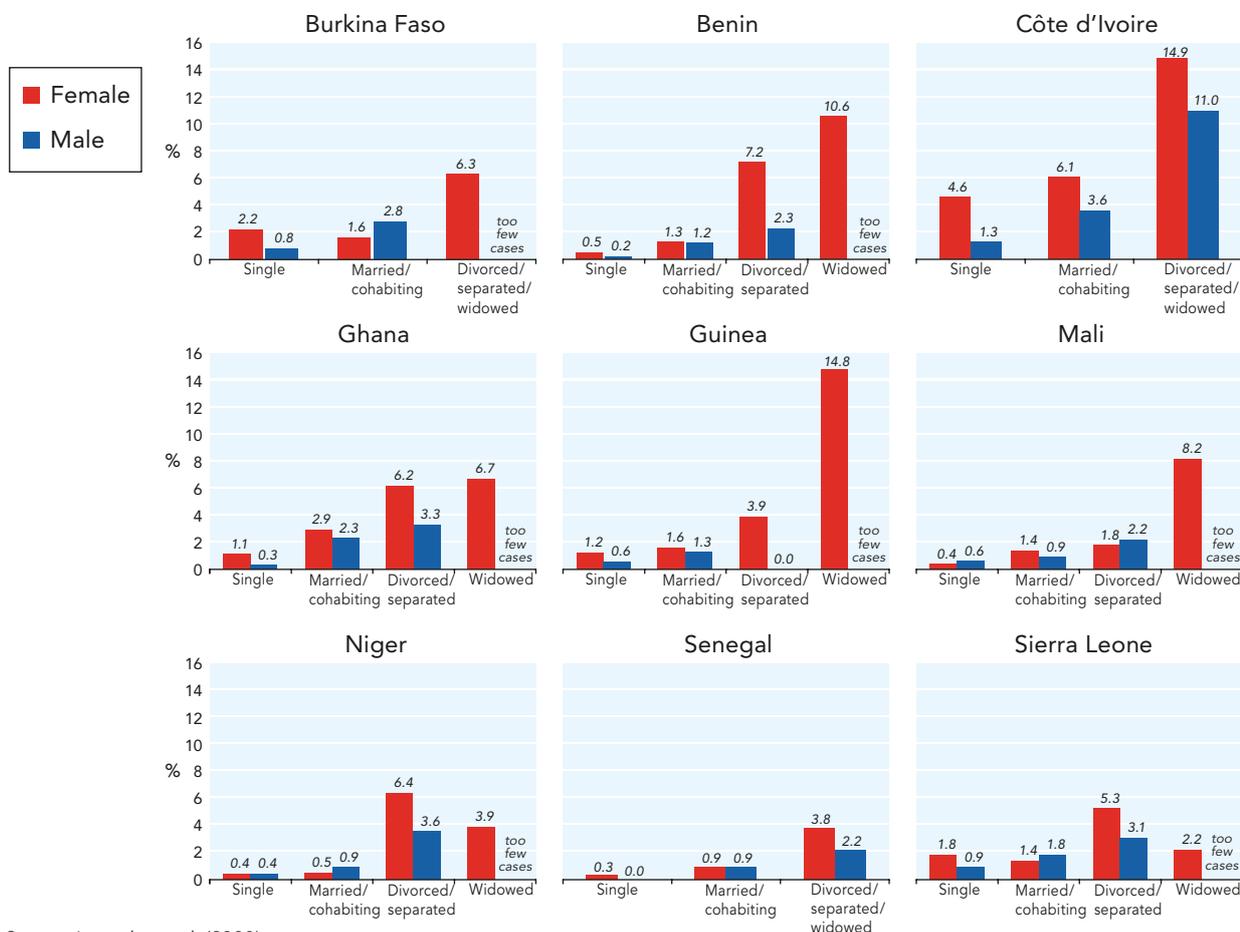
Consistent with the generalized nature of the region's epidemic, HIV affects all social and economic groups in sub-Saharan Africa. In Lesotho, women and men in every income, education and migration strata had an HIV prevalence of 15% or higher in 2004 (Khobotlo et al., 2009).

Surveys in different settings in sub-Saharan Africa have detected a wide variation in the relationship between HIV and income (Piot, Greener, Russell, 2007). In eight African countries where surveys have been conducted (Burkina Faso, Cameroon, Ghana, Kenya, Lesotho, Malawi, Uganda and the United Republic of Tanzania), HIV prevalence is higher among adults in the wealthiest quintile than among those in the poorest quintile (Mishra et al., 2007). In five of six West African countries where survey data are available, women living in the wealthiest households have higher HIV prevalence than other socioeconomic groups of women, but the relationship between wealth and HIV is less clear for men in the subregion (Lowndes et al., 2008).

As the epidemic has evolved in sub-Saharan Africa, the relationship between HIV infection and education has shifted, according to a recent meta-analysis of 36 studies carried out in 11 countries between 1987 and 2003. While studies prior to 1996 generally found either no association between educational status and HIV risk or found that the highest risk was among the most educated, data collected after 1996 have tended to find a lower risk among the most-educated people (Hargreaves et al., 2008).

Figure 2

HIV prevalence by marital status and gender in the general populations of nine West African countries



Source: Lowndes et al. (2008).

HIV prevalence tends to be higher in urban settings than in rural areas, with household surveys conducted in the region between 2001 and 2005 indicating that the median urban/rural ratio of HIV prevalence is 1.7:1.0 (Garcia-Calleja, Gouws, Ghys, 2006). In the sub-Saharan African countries where household surveys have been conducted, HIV prevalence is higher in rural areas only in Senegal (Macro International, 2008). The most pronounced difference in HIV prevalence is in Ethiopia, where urban dwellers are eight times more likely to be HIV-infected than people living in rural areas (Macro International, 2008).

Wide variation within subregional and national epidemics

Within countries and subregions, wide variations in HIV prevalence and epidemiological patterns are frequently apparent. For example, in Kenya there is a greater than 15-fold variation in HIV

prevalence among provinces, ranging from 0.8% in North Eastern province to 14.9% in Nyanza province (National AIDS/STI Control Programme, 2009), while the difference between the highest-prevalence and lowest-prevalence region in the United Republic of Tanzania is more than 16-fold (Tanzania Commission for AIDS et al., 2008). Although the Northwest and North Central provinces of Uganda border each other, HIV prevalence is nearly four times higher in the latter (8.2% versus 2.3%) (Uganda Ministry of Health & ORC Macro, 2006).

Adult HIV prevalence in Côte d'Ivoire (3.7%) is more than twice as high as in Liberia (1.7%) or Guinea (1.6%), even though these West African countries share national borders (UNAIDS, 2008). Within the relatively small nation of Benin, a more than 12-fold variation in HIV prevalence among pregnant women (ranging from 0.4% to 3.8%) has been documented among the country's departments (Bénin Ministère de la Santé, 2008).

There is considerable genetic variability in the virus within sub-Saharan Africa. A majority of infections in the region (56%) in 2005 were estimated to be caused by subtype C, with smaller proportions caused by other subtypes (including 14% by subtype A, 10% by subtype G, 7% by CRF02\_AG and 9% by other recombinant subtypes (Hemelaar et al., 2006)).

Available data suggest that average survival of untreated individuals living with HIV in sub-Saharan Africa is similar to survival in high-income countries, but notably longer than survival in Haiti and Thailand (Todd et al., 2007). Recent studies in Uganda and Kenya found that individuals with subtype D appear to experience faster disease progression than those with subtype A or C (Kiwanuka et al., 2008; Baeten et al., 2007). This may have implications for vaccine development and for the future spread of HIV.

### Impact of treatment scale-up

The rapid scaling-up of antiretroviral therapy in sub-Saharan Africa is generating considerable public health gains. As of December 2008, 44% of adults and children (nearly 3 million people) in need of antiretroviral therapy in the region were estimated to be receiving such services. Five years earlier, the estimated regional treatment coverage was only 2% (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Antiretroviral therapy coverage is notably higher in eastern and southern Africa (48%) than in West and Central Africa (30%). Treatment coverage for adults (44%) remains higher than for children (35%) (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Children's access to antiretroviral therapy is especially limited in West and Central Africa—while 32% of adults in need of therapy in this sub-region were estimated to be receiving treatment in December 2008, treatment services were reaching only 15% of children in need. Early diagnosis of HIV infection and initiation of antiretroviral therapy in newborns are imperative, as data from Zimbabwe demonstrate that infants with perinatally acquired HIV are at particular risk of dying between two and six months after birth (Marinda et al., 2007).

Treatment scale-up is having a profound effect on HIV-related mortality in many countries. In Kenya, AIDS-related deaths have fallen by 29% since 2002 (National AIDS Control Council & National

AIDS/STI Control Programme, 2007). A study in Uganda found that timely initiation of antiretroviral therapy and co-trimoxazole prophylaxis reduced mortality by 95% and also produced a 93% reduction in HIV-related orphanhood (Mermin et al., 2008a). In Botswana, where antiretroviral therapy coverage exceeds 80%, the estimated annual number of AIDS-related deaths has declined by more than half—from 15 500 in 2003 to 7400 in 2007—while the estimated number of children newly orphaned by AIDS has fallen by 40% (Stover et al., 2008).

Important access gaps remain, as more than half of all people in need of treatment are still not receiving such services. While Kenya was offering antiretroviral therapy to roughly 190 000 adults in nearly 500 treatment sites in mid-2008, only 12% of the estimated 1.4 million HIV-infected adults who required daily co-trimoxazole were receiving it in 2007 (Kenya Ministry of Health, 2009).

### Increasing knowledge of HIV serostatus

Many countries have taken steps to increase utilization of HIV testing services. Among countries for which testing utilization data are available for 2008, the highest number of tests per 1000 population was reported in Botswana (210), Lesotho (186), Sao Tome and Principe (179), Uganda (146) and Swaziland (139). In Ethiopia, testing rates more than doubled between 2007 and 2008—from 51 tests per 1000 population to 121 tests per 1000 population (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

However, considerable gaps remain. While HIV testing more than doubled in Kenya between 2003 and 2007, an estimated 83% of Kenyans living with HIV remained undiagnosed in 2007 (Kenya Ministry of Health, 2009). Similarly, fewer than one in five people in Burundi know their HIV status (Ndayiragwe et al., 2008b). According to a household survey in Ethiopia, previously untested men and women were more likely to be infected than their counterparts who had previously accessed testing services (Mishra et al., 2008a).

Recent evidence suggests that inadequate testing rates impede national AIDS responses, contributing to late entry into medical care for people who are HIV-infected and unknowing HIV transmission, especially within serodiscordant couples. A household survey in Uganda indicated that HIV-infected individuals who knew their HIV status were more than three times more likely to use a condom during their last sexual encounter compared with

those who did not know their status (Bunnell et al., 2008). In rural Zimbabwe, women who tested HIV-positive reported increased consistent condom use with primary partners, although individuals testing negative reported an overall increase in risky sexual behaviours (Sherr et al., 2007), underscoring the need for intensified prevention services to accompany initiatives to promote knowledge of HIV serostatus.

## Continuing urgent need to strengthen HIV prevention

Even with the significant gains that have been achieved through treatment scale-up, sub-Saharan Africa's epidemic continues to outpace the response. Preserving the long-term viability of treatment programmes and mitigating the epidemic's impact in the region requires immediate steps to elevate the priority given to HIV prevention and to match prevention strategies with actual needs.

In Swaziland, the country with the highest HIV prevalence in the world, 17% of total expenditures in 2008 supported HIV prevention programmes (Mngadi et al., 2009). Between 2005 and 2007, prevention spending declined by 43.2% in Ghana (Bosu et al., 2009). Prevention spending in Lesotho fell by 24% between 2005–2006 and 2007–2008 (Khobotlo et al., 2009). However, in Uganda, prevention resources as a share of national HIV-related spending rose from 13% in 2003–2004 to 33.6% in 2006–2007 (Wabwire-Mangen et al., 2009).

Prevention strategies often fail to address the key drivers of national epidemics. While people over the age of 25 are estimated to account for more than two thirds of incident adult infections in Swaziland, few prevention programmes specifically focus on people aged over 25 (Mngadi et al., 2009). Likewise, while people in stable relationships are estimated to account for up to 62% of new HIV infections in Lesotho, virtually no programmes currently focus on adults, married couples or people in long-term relationships (Khobotlo et al., 2009). Although sex workers and their clients, men who have sex with men and injecting drug users together were estimated to account for roughly one in three new HIV infections in Kenya in 2006, only minimal funding has been provided for prevention initiatives focused on these populations (Gelmon et al., 2009). In Ghana,

prevention programmes focused on sex workers, men who have sex with men and injecting drug users consumed 9% of all prevention spending in 2007, even though these groups directly or indirectly were estimated to account for at least 38% of new HIV infections in 2008 (Bosu et al., 2009). In many countries where people in stable relationships are responsible for a large proportion of new HIV infections, couples testing and other prevention services for serodiscordant couples have received inadequate support (Gelmon et al., 2009).

## State of HIV surveillance

Since 2001, household surveys that include a component to assess HIV prevalence have been conducted in 28 African countries, including nine in 2007 and 2008. Although these surveys vary considerably in quality (Garcia-Calleja, Gouws, Ghys, 2006), they have provided more representative population-based estimates of HIV prevalence than were possible with previous extrapolations from sentinel surveillance of women attending antenatal clinics.

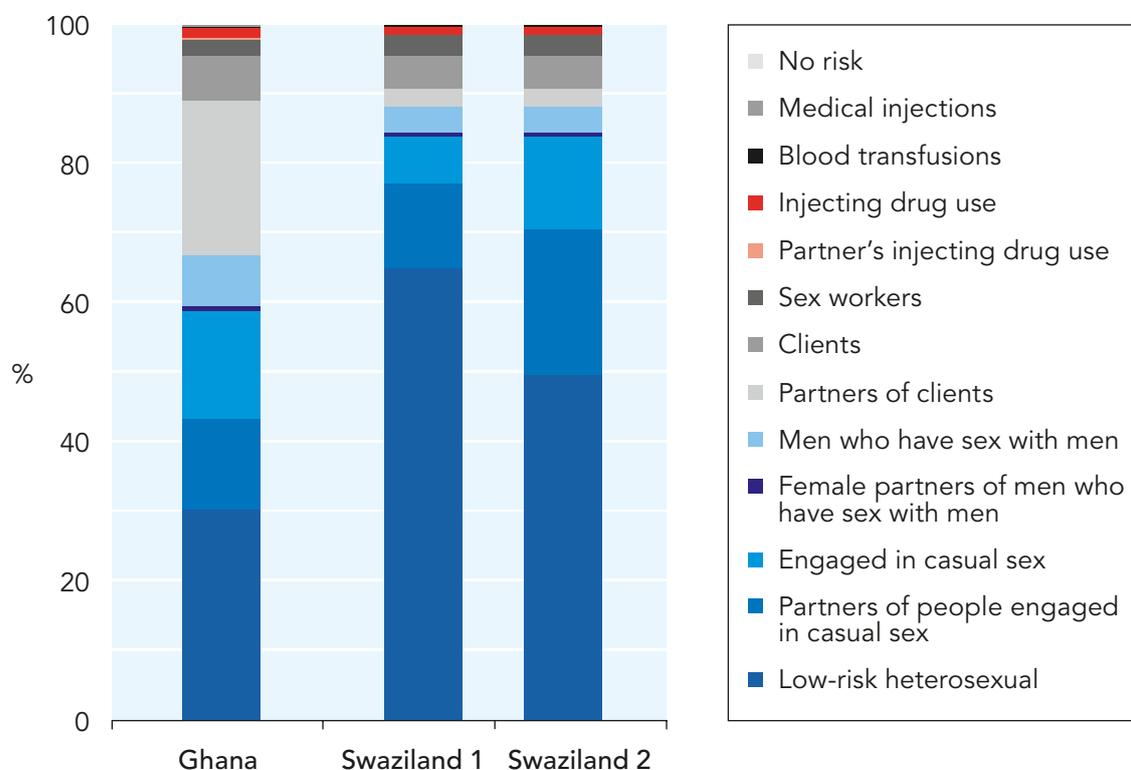
An assessment of the quality of serosurveillance in low- and middle-income countries between 2001 and 2007 (including sentinel surveillance and national surveys) showed that among 44 countries that were assessed in this region, 24 had fully functional surveillance systems (Lyerla, Gouws, Garcia-Calleja, 2008).

Over the past two years, a series of syntheses of epidemiological and programmatic data in 11 African countries has been undertaken. In addition to characterizing the modes of transmission associated with incident HIV infections (Figure 3), these analyses have also assessed national prevention strategies. As a result of these efforts, national decision-makers have obtained guidance on steps to bring national strategies into greater alignment with documented prevention needs.

Despite these improvements, substantial evidence gaps remain, which hinders efforts to devise evidence-informed AIDS strategies. While there has been an important increase in HIV-related research involving men who have sex with men and injecting drug users in sub-Saharan Africa, many countries lack reliable information on the size, behaviours and HIV prevalence of these populations (see Lowndes et al., 2008).

Figure 3

## Distribution of new infections by mode of exposure in Ghana and Swaziland, 2008



Note: sensitivity analysis for Swaziland used different data sources.

Sources: Bosu et al. (2009) and Mngadi et al. (2009).

## Subregional overview

While one in 20 adults in sub-Saharan Africa is estimated to be living with HIV, the severity and nature of the epidemic differ by subregion and by country.

### Southern Africa

Southern Africa remains the area most heavily affected by the epidemic. The nine countries with the highest HIV prevalence worldwide are all located in the subregion, with each of these countries experiencing adult HIV prevalence greater than 10%. With an estimated adult HIV prevalence of 26% in 2007, Swaziland has the most severe level of infection in the world (UNAIDS, 2008). Botswana has an adult HIV prevalence of 24%, with some evidence of a decline in prevalence in urban areas (UNAIDS, 2008). Lesotho's epidemic also appears to have stabilized, with an adult HIV prevalence of 23.2% in 2008 (Khobotlo et al.,

2009). South Africa is home to the world's largest population of people living with HIV (5.7 million) (UNAIDS, 2008).

For southern Africa as a whole, HIV incidence appears to have peaked in the mid-1990s. In most countries, HIV prevalence has stabilized at extremely high levels, although evidence indicates that HIV incidence continues to rise in rural Angola. Two rounds of household surveys indicate that national HIV incidence significantly fell between 2004 and 2008 in the United Republic of Tanzania, and a significant drop in HIV incidence was also noted among women in Zambia between 2002 and 2007 (Hallett et al., in press). Zimbabwe has experienced a steady fall in HIV prevalence since the late 1990s; studies have linked this decline with population-level changes in sexual behaviours (Gregson et al., 2006). Promising data were also reported from Lusaka, where HIV prevalence among young pregnant

women (17 years or younger) declined from 12.1% in 2002 to 7.7% in 2006 (Stringer et al., 2008). Likewise, the percentage of 20–24-year-old antenatal clinic attendees who were HIV-infected in Botswana fell from 38.7% in 2001 to 27.9% in 2007 (Botswana Ministry of Health, 2008).

Antenatal surveillance in Swaziland found an increase in HIV prevalence, from 39.2% in 2006 to 42% in 2008, among female clinic attendees (Figure 4). There is still no evidence of a decline in infections among pregnant women in South Africa, where more than 29% of women accessing public health services tested HIV-positive in 2008 (Department of Health, 2009). However, while national adult HIV prevalence in South Africa has stabilized, prevalence among young people (aged 15–24) started to decline in 2005, as shown among antenatal clinic attendees (from about 25% in 2004–2005 to 21.7% in 2008) and young men and women included in the national population-based surveys (from 10.3% in 2005 to 8.6% in 2008) (Shisana et al., 2009).

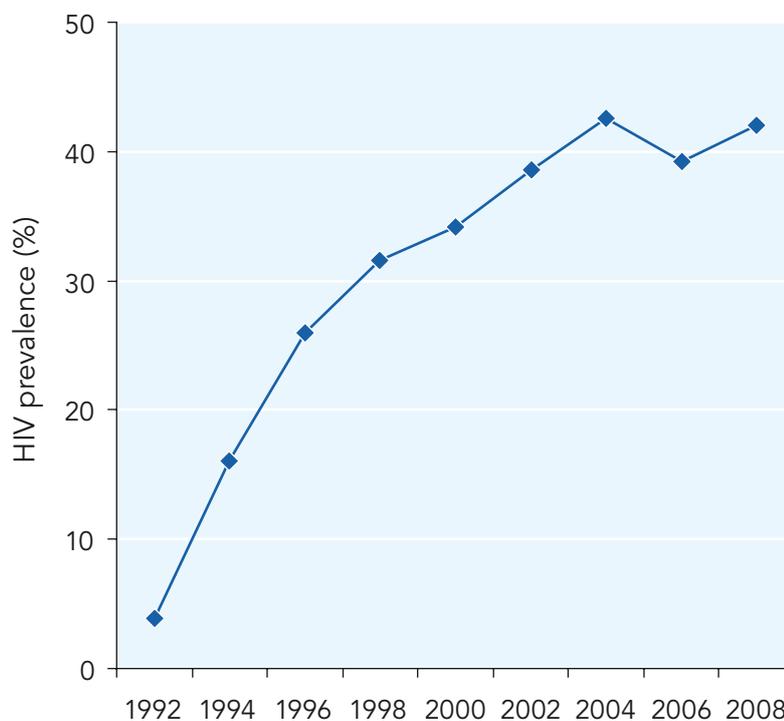
## East Africa

The available evidence suggests that HIV prevalence in East Africa has stabilized and in some settings may be declining. Declines in HIV prevalence reported in Uganda in the past decade appear to have reached a plateau (Wabwire-Mangen et al., 2009), although these trends may partly be related to the roll-out of antiretroviral therapy programmes.

Reported increases in sexual risk behaviours in Uganda remain a source of concern (Opio et al., 2008), especially as HIV prevalence has increased in some antenatal sites (Wabwire-Mangen et al., 2009). In Burundi, in population-based surveys among 15–24-year-olds between 2002 and 2008, HIV prevalence declined in urban areas (from 4.0% to 3.8%) and in semi-urban areas (from 6.6% to 4.0%), while HIV prevalence increased in rural areas from 2.2% to 2.9% (Ministère de la Santé Publique & Ministère à la Présidence Chargé de la Lutte contre le SIDA, 2002; Conseil National de Lutte contre le SIDA, 2008).

**Figure 4**

HIV prevalence among antenatal clinic clients in Swaziland, 1992–2008



Source: Ministry of Health and Social Welfare (2009).

According to a 2007 household survey in Kenya, HIV prevalence has increased since 2003—from 6.7% to 7.4% (although not statistically significant)—reversing the decline reported in previous studies. HIV prevalence among adults aged 15–49 years in urban areas decreased from 10.0% in 2003 to 8.7% in 2007, while HIV prevalence in rural areas increased from 5.6% to 7.0%. Interpretation of these findings remains challenging. An important factor in Kenya's increasing HIV prevalence is likely to be a decline in HIV-related mortality stemming from rapid treatment scale-up, although an increase in risky sexual behaviour may also be playing a key role in the apparent reversal of epidemiological trends, especially among rural men.

### West and Central Africa

Although HIV prevalence in West and Central Africa is much lower than in southern Africa, the subregion nevertheless is home to several serious national epidemics. While adult HIV prevalence is below 1% in three West African countries (Cape Verde, Niger and Senegal), nearly one in 25 adults (3.9%) in Côte d'Ivoire and 1.9% of the general population in Ghana are living with HIV (UNAIDS, 2008). A 2007 household survey found that HIV prevalence in the Democratic Republic of the Congo (1.3%) remains significantly lower than in several other neighbouring countries (Ministère du Plan & Macro International, 2008).

Some further favourable signs are apparent in the subregion. Multiple household surveys have detected declining HIV prevalence in Mali (from 1.7% in 2001 to 1.2% in 2006) and Niger (from 0.9% in 2002 to 0.7% in 2006). In Benin, the percentage of antenatal clinic attendees who tested HIV-positive fell by almost half between 2001 and 2007, from 4.1% to 2.1% (Bénin Ministère de la Santé, 2008). Declines in HIV prevalence among antenatal clinic attendees have also been documented in Burkina Faso, Côte d'Ivoire and Togo. While HIV prevalence in the general population in Ghana has remained stable, prevalence among 15–24-year-olds fell from 3.2% in 2002 to 2.5% in 2006 (Bosu et al., 2009). Other national epidemics also appear to have stabilized, including in Sierra Leone, where population-based surveys in 2005 and 2008 both found an overall HIV prevalence of 1.5%.

## Key regional dynamics

Heterosexual intercourse remains the primary mode of HIV transmission in sub-Saharan Africa, with extensive ongoing transmission to newborns and breastfed babies. However, as the following discussion indicates, recent evidence from epidemiological studies to estimate the distribution of new infections by mode of transmission in East, southern and West Africa has shown that epidemics in the region are much more varied than previously understood, with notable new infections occurring among men who have sex with men and injecting drug users in some countries. Emerging evidence confirms elevated HIV prevalence among sex workers, although the contribution of sex work to new HIV infections varies throughout the region.

### Heterosexual transmission

Heterosexual exposure is the primary mode of transmission in sub-Saharan Africa. In Swaziland, transmission during heterosexual contact (including sex within stable couples, casual sex and sex work) is estimated to account for 94% of incident infections (Mngadi et al., 2009).

As epidemics in sub-Saharan Africa have matured, models suggest that the proportion of new infections among people in stable, so-called 'low-risk', partnerships is often high. In Lesotho, between 35% and 62% of incident HIV infections in 2008 occurred among people who had a single sexual partner (Khobotlo et al., 2009). Heterosexual sex within a union or regular partnership accounted for an estimated 44% of incident HIV infections in Kenya in 2006, while casual heterosexual sex accounted for an additional 20% of new infections (Gelmon et al., 2009). In Uganda, people in serodiscordant monogamous relationships were estimated to account for 43% of incident infections in 2008 (Wabwire-Mangen et al., 2009). A similar proportion of new infections (50–65%) was estimated to occur among steady, long-term heterosexual partners in Swaziland (Mngadi et al., 2009). Low-risk heterosexual contact accounted for the largest proportion (30%) of estimated incident HIV infections in Ghana in 2008 (Bosu et al., 2009), and individuals with only one sexual partner are estimated to account for 27–53% of new infections in Rwanda (Asiimwe, Koleros, Chapman, 2009).

The significant contribution of low-risk heterosexual partnerships to epidemics in sub-Saharan Africa has underscored the high prevalence in many countries of serodiscordant partnerships. Among married or cohabiting Kenyans who were living with HIV in 2007, about 44% had a partner who was not infected (Kenya Ministry of Health, 2009). According to a household survey in Swaziland in 2006–2007, one in six cohabiting couples is serodiscordant (Central Statistical Office & Macro International, 2008).

Mathematical models have examined the potential role of concurrent sexual partnerships in facilitating the spread of HIV in sexual networks (Morris & Kretzschmar, 2000). However, a recent analysis of household survey data in 22 countries, including 18 in sub-Saharan Africa, found no significant correlation between prevalence of sexual concurrency and HIV prevalence at the country or community level (Mishra & Bignami-Van Assche, 2009). Given the severity of national epidemics in sub-Saharan Africa and the relative dearth of information on what might be an important factor in the continued spread of HIV, the UNAIDS Reference Group on Estimates, Modelling and Projections convened an expert consultation in April 2009 to identify a research agenda on sexual concurrency and HIV. In addition to recommending standardization of definitions, terminology and methodological approaches for measuring sexual concurrency, meeting attendees recommended the routine collection of pertinent data on sexual concurrency and the initiation of focused research studies to build the evidence base for an appropriate public health response (Garnett, 2009).

As in many other parts of the world, the high prevalence of regular non-marital partners among married individuals ('concurrency') is tacitly acknowledged and tolerated in some African countries (Mngadi et al., 2009). In Lesotho, 24% of adults have multiple sexual partners, often as a result of extensive labour migration (Khobotlo et al., 2009). In Swaziland, 17.9% of married or cohabiting individuals surveyed in 2006–2007 reported having had two or more sexual partners in the previous 12 months (Central Statistical Office & Macro International, 2008). However, questions

in national surveys regarding multiple partners in a given time period currently do not distinguish between concurrent and serial partnerships.

The 2008 modes of transmission study and epidemiological synthesis report in Swaziland suggested that the percentage of men having multiple partnerships may have fallen in response to a public information campaign (Mngadi et al., 2009). However, in Uganda, the proportion of men (aged 15–49) reporting multiple sexual partners increased from 24% in 2001 to 29% in 2005 (Opio et al., 2008). In 2008, 46% of new HIV infections in Uganda were estimated to have occurred among people with multiple sexual partners and the partners of such individuals (Wabwire-Mangen et al., 2009).

Surveys in countries such as Burundi and the United Republic of Tanzania have found near-universal knowledge about HIV (see Tanzania Commission for AIDS et al., 2008; Ndayirague et al., 2008b), although levels of comprehensive knowledge about HIV transmission and its prevention are often much lower.<sup>2</sup> In most West African countries, the number of women who have comprehensive HIV-related knowledge is 10–20% lower than the number of men reported to have such knowledge (Lowndes et al., 2008). Surveys in the United Republic of Tanzania indicate that people with higher education and income levels also have higher rates of comprehensive HIV-related knowledge (Tanzania Commission for AIDS et al., 2008).

Evidence suggests that HIV prevention programmes may be having an impact on sexual behaviours in some African countries. In southern Africa, a trend towards safer sexual behaviour was observed among both young men and young women (15–24 years old) between 2000 and 2007 (Gouws et al., 2008). In South Africa, the proportion of adults reporting condom use during the most recent episode of sexual intercourse rose from 31.3% in 2002 to 64.8% in 2008 (Shisana et al., 2009). Nevertheless, condom use remains low in many parts of sub-Saharan Africa. In Burundi, only about one in five people report using a condom during commercial sex episodes (Ndayirague et al., 2008b), and only 12% of

<sup>2</sup> According to standard monitoring and evaluation indicators, including those used to assess progress in implementing the 2001 Declaration of Commitment on HIV/AIDS, comprehensive HIV knowledge involves not only accurate understanding of the primary modes of HIV transmission and the effectiveness of proven sexual risk reduction methods, but also awareness of the inaccuracy of common misconceptions about HIV (e.g. transmission via mosquito bites).

uniformed personnel in Burundi report using a condom with regular partners (Ndayirague et al., 2008a).

Although data point towards an increased delay in initiation of sex among young people (Figure 5) in many countries in the region (UNAIDS, 2008), this is not universally true. In the United Republic of Tanzania, where 59% of women report becoming sexually active before the age of 18, surveys in 2007–2008 found little change in the age of sexual debut in comparison with the previous survey round in 2003–2004 (Tanzania Commission for AIDS et al., 2008). Women in the United Republic of Tanzania who become sexually active before the age of 16 have higher HIV prevalence (8%) than those who delayed sex until age 20 or older (Tanzania Commission for AIDS et al., 2008). While the percentage of males aged 15–24 in South Africa who report sexual debut prior to the age of 15 has declined—from 13.1% in 2002 to 11.3% in 2008—the percentage of young women having sex before the age of 15 rose from 5.3% to 5.9% (Shisana et al., 2009). In Kenya, where the typical young person becomes

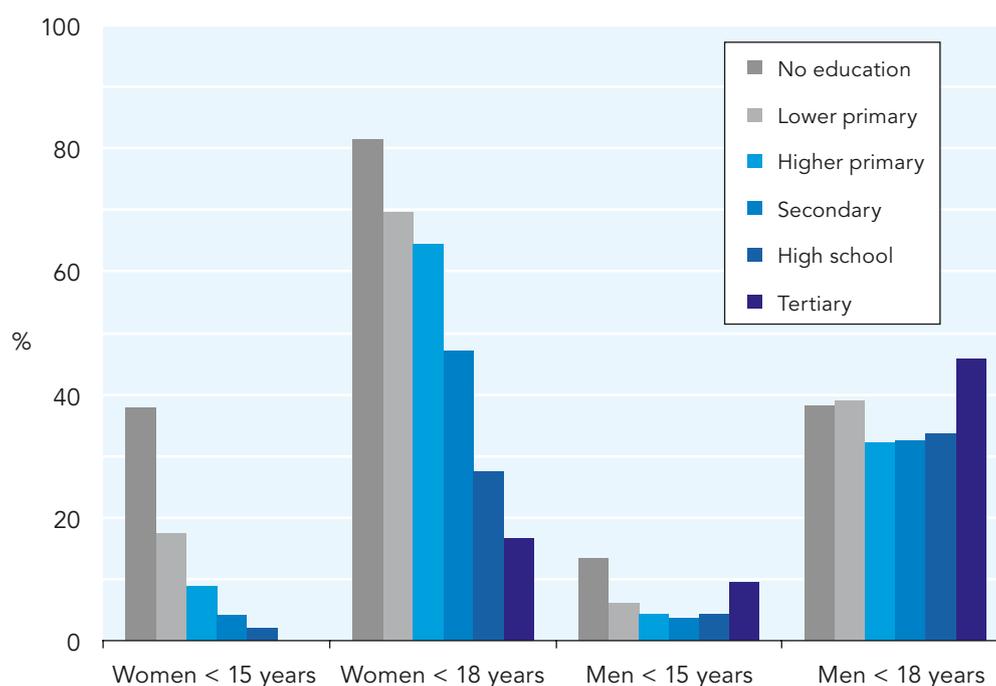
sexually active between the ages of 15 and 19, fewer than 25% of young people use a condom the first time they have sex (National AIDS/STI Control Programme, 2009).

In sub-Saharan Africa, as in some other regions, the high prevalence of intergenerational sexual partnerships may play an important role in young women's disproportionate risk of HIV infection (Leclerc-Madlala, 2008). According to a 2002 survey of young people aged 12–24 in Lesotho, the male partner was at least five years older than the female partner in more than half (53%) of all sexual relationships and more than 10 years older in 19% of sexual relationships (Khubotlo et al., 2009). The percentage of young women in South Africa who report having a sexual partner more than five years older than themselves rose from 18.5% in 2005 to 27.6% in 2008 (Shisana et al., 2009).

Clinical trials have confirmed the results from observational epidemiology that male circumcision reduces transmission of HIV among men (Bailey et al., 2007; Gray et al., 2007; Auvert et al., 2005). In a more recent national survey carried out in Kenya, HIV prevalence among uncircumcised men

**Figure 5**

**Age at first sexual intercourse by education status in Swaziland, 2007**



Source: Central Statistical Office & Macro International (2008).

in 2007 was found to be more than three times higher (at 13.2%) than among men who were circumcised (3.9%) (Kenya Ministry of Health, 2009). A 2008 analysis of available epidemiological, behavioural and programmatic evidence also concluded that the high prevalence of male circumcision had helped to limit the epidemic's spread in West Africa (Lowndes et al., 2008).

Rates of circumcision vary considerably across and within countries (Weiss et al., 2008). For example, while more than 80% of Kenyan males (aged 15–64) outside the Nyanza province were circumcised in 2007 (Kenya Ministry of Health, 2009), only 8% of men in Swaziland are circumcised (Mngadi et al., 2009).

Several countries in the region have taken steps to scale up medical male circumcision for HIV prevention, including Botswana, Kenya and Namibia (Forum for Collaborative HIV Research, 2009). For example, Botswana is integrating male circumcision into its national surgery framework, with the aim of reaching 80% of males aged 0–49 by 2013 (Forum for Collaborative Research, 2009). As of March 2009, Swaziland had drafted a formal male circumcision policy (Mngadi et al., 2009). A recent analysis determined that the scale-up of adult male circumcision in 14 African countries would require considerable funding (an estimated US\$ 919 million over five years) and substantial investments in human resources development, but that scale-up would save costs in the long run by altering the trajectory of national epidemics (Auvert et al., 2008).

The benefits of male circumcision for the prevention of HIV infection have also prompted clinicians and policy-makers to examine strategies for scaling up neonatal circumcision. A recent study in South Africa concluded that painless circumcision is feasible for nearly all newborns if performed within the first week of birth (Banlegbal, 2009).

Recent evidence confirms the long-established role of untreated sexually transmitted infections in accelerating the sexual transmission of HIV. For example, according to the results of a household survey in Uganda, individuals with symptomatic herpes simplex virus type 2 infection (HSV-2) are almost four times more likely than those without HSV-2 to become infected with HIV (Mermin et al., 2008b). These results are consistent with an earlier systematic review of 19 studies that indicates that prevalent HSV-2

infection was associated with a threefold increased risk of HIV acquisition among both men and women in the general population (Freeman et al., 2006). An epidemiological and economic model applied to four diverse settings in East and West Africa determined that more than half of all new HIV infections could be attributed to sexually transmitted infections (White et al., 2008) and concluded that programmes for treating curable sexually transmitted infections may be cost-effective in populations with generalized epidemics. A longitudinal study of women in Uganda and Zimbabwe found that *T. vaginalis* is strongly associated with HIV seroconversion (Van der Pol et al., 2008). Surveys in the United Republic of Tanzania detected an increase in the rates of sexually transmitted infections or genital discharges or sores, from 5% among women and 6% among men in 2003–2004 to 6% and 7%, respectively, in 2007–2008 (Tanzania Commission for AIDS et al., 2008). Despite the consistently demonstrated association between HSV-2 and HIV infection, evidence to date does not support community-based HSV-2 suppression as an effective HIV prevention strategy; in 2008, results from a large multicountry study found that aciclovir suppressive therapy did not reduce HIV acquisition among HIV-negative, HSV-2-seropositive men and women (Celum et al., 2008).

Heavy alcohol consumption is correlated with increased sexual risk behaviours (Van Tieu & Koblin, 2009). In Botswana, men who use alcohol heavily were more than three times more likely to have unprotected sex, to have sex with multiple partners and to pay for sex. Similar patterns were evident among women in Botswana, with heavy alcohol users found to be 8.5 times more likely to sell sex than other women. Researchers found a strong dose–response relationship between alcohol use and risky sexual behaviours, with problem or heavy drinkers engaging in greater risk behaviours than moderate drinkers (Weiser et al., 2006).

## Sex work

HIV infection among sex workers and their clients has long played an important role in the heterosexual transmission of HIV in the region. For sub-Saharan Africa as a whole, median reported HIV prevalence among sex workers is 19%, with reported prevalence in this population ranging from zero in the Comoros and Sierra Leone to 49.4% in Guinea-Bissau (World Health Organization, United Nations Children's Fund,

UNAIDS, 2009). Seven African countries (Benin, Burundi, Cameroon, Ghana, Guinea-Bissau, Mali and Nigeria) report that more than 30% of all sex workers are living with HIV (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). In Ghana, HIV prevalence among female sex workers in Accra and Kumasi is 8 to 20 times higher than among the general population (Bosu et al., 2009). More than one in four (25.5%) sex workers surveyed in Benin in 2006 were HIV-positive (Bénin Ministère de la Santé, 2008). More than one quarter of all sex workers (26%) in Lesotho were reported to have had a symptomatic sexually transmitted infection in the previous year (Khubotlo et al., 2009).

Sex workers are not only a priority population for HIV prevention programmes in their own right—their clients have long been recognized as a potential epidemiological bridge to other populations. Extrapolating from the available data, researchers concluded in 2008 that between 13% and 29% of men in West Africa may have paid for sex in the previous year (Lowndes et al., 2008).

As Africa's epidemics have matured, the portion of new infections attributable to sex work may have declined (Lecler & Garenne, 2008). In Lesotho, a hyperendemic country where the proportion of sex workers is estimated to be small, the modes of transmission model suggested that sex work was the source of approximately 3% of new HIV infections in 2008 (Khubotlo et al., 2009).

Nevertheless, sex work continues to play a notable role in many national epidemics. In Ghana, sex workers, their clients and the sexual partners of clients were estimated to account for 2.4%, 6.5% and 23%, respectively, of all new HIV infections in 2008 (Bosu et al., 2009). In 2006, the modes of transmission exercise in Kenya suggested that sex workers and their clients accounted for an estimated 14.1% of incident HIV infections (Gelmon et al., 2009). Sex workers, their clients and the clients' partners accounted for 10% of incident infections in Uganda in 2008 (Wabwire-Mangen et al., 2009). A modes of transmission study in Rwanda concluded that sex workers accounted for 9–46% of new infections in 2008, with the clients of sex workers representing an additional 9–11% of incident infections (Asiimwe, Koleros, Chapman, 2009).

In Kenya, the per-act rate of HIV acquisition in female sex workers fell fourfold between 1985 and 2005, with the fall in HIV risk predating the drop in HIV prevalence reported in Kenya's general

population in recent years (Kimani et al., 2008). As the sharp reduction in HIV risk is consistent with decreases in gonorrhoea prevalence, researchers speculate that the reduced risk of acquiring HIV may stem from improved prevention of sexually transmitted infections, although condom use also increased dramatically during this period (Kimani et al., 2008).

The low social status of sex workers impedes efforts to deliver HIV prevention services to this population. Surveys in Lesotho indicate that sex work is regarded as morally reprehensible, and the country's national AIDS policy explicitly notes that the stigma associated with sex work deters sex workers from seeking HIV testing or other health services (Khubotlo et al., 2009).

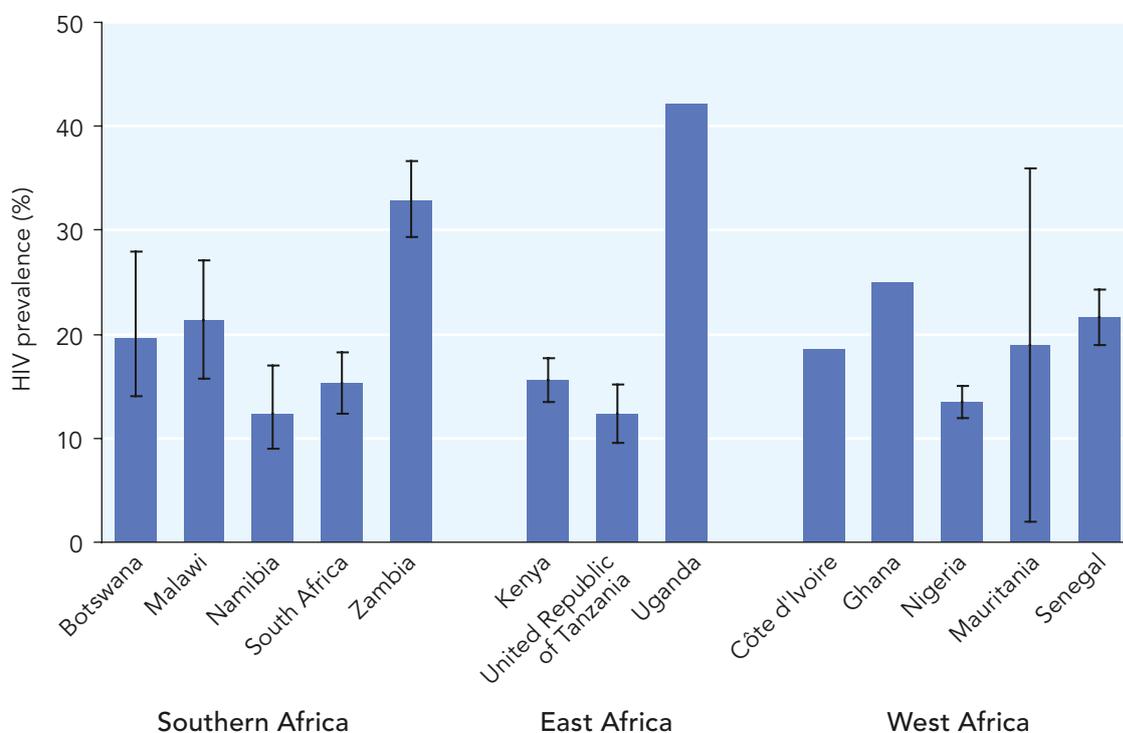
## Men who have sex with men

In recent years, an increase in research on HIV-related risks among men who have sex with men in sub-Saharan Africa has detected an important, previously undocumented, component of many national epidemics (Figure 6). In most countries in which such serosurveys have been conducted, researchers have identified HIV prevalence among men who have sex with men that is substantially higher than among the general male population (Smith et al., 2009).

In a study in Mombasa, Kenya, 43.0% of men who have sex only with other men tested HIV-positive, compared with 12.3% of men who reported having sex with both men and women (Sander et al., 2007). More than one in four (25.4%) men who have sex with men surveyed in Lagos in 2007 tested HIV-positive (Federal Ministry of Health, 2007). In a 2008 study of 378 men who have sex with men in Soweto, South Africa, researchers found an overall HIV prevalence of 13.2%, increasing to 33.9% among gay-identified men (Lane et al., 2009). One third of men who have sex with men surveyed in Cape Town, Durban and Pretoria, South Africa, tested HIV-positive (Parry et al., 2008). A cross-sectional anonymous survey of 537 men who have sex with men in Malawi, Namibia and Botswana found HIV prevalences of 21.4%, 12.4% and 19.7% among study participants in the three countries, respectively. HIV prevalence among study participants over the age of 30 was twice as high as among all men who have sex with men surveyed (Baral et al., 2009). In five urban sites in Senegal, a low-prevalence country, 21.5%

Figure 6

HIV prevalence among men who have sex with men in countries  
in sub-Saharan Africa, 2000–2008



Source: Smith et al. (2009) and Baral (2009).

of men who have sex with men surveyed tested HIV-positive (Wade et al., 2005).

A recent modes of transmission analysis indicates that men who have sex with men may account for as many as 20% of incident HIV infections in Senegal (Lowndes et al., 2008). In Kenya, men who have sex with men (including men in prison settings) accounted for an estimated 15% of incident HIV infections nationwide in 2006 (Gelmon et al., 2009). Similarly, a recent modelling exercise concluded that men who have sex with men accounted for an estimated 15% of new infections in Rwanda (Asiimwe, Koleros, Chapman, 2009). In Ghana, men who have sex with men showed the highest HIV incidence (9.6%) of any population and accounted for 7.2% of all new infections in 2008 (Bosu et al., 2009). Reliable data on the epidemic's burden among men who have sex with men are not available in many countries (see Mngadi et al., 2009).

In studies in Botswana, Malawi and Namibia, lack of consistent condom use with male partners was significantly associated with HIV infection (Baral

et al., 2009). The same study also found that many men apply petroleum-based lubricants when they use a condom, which potentially contributes to condom failure (Baral et al., 2009).

In a study of men who have sex with men in Gauteng province in South Africa, the likelihood of unprotected anal intercourse was significantly associated with regular alcohol drinking (Lane et al., 2008). Surveys in Cape Town, Durban and Pretoria, South Africa, found that use of crack cocaine, methamphetamine and other drugs to facilitate sexual encounters is common among men who have sex with men (Parry et al., 2008).

Although common in sub-Saharan Africa, homosexual behaviour is highly stigmatized in the region. More than 42% of men who have sex with men surveyed in Botswana, Malawi and Namibia reported experiencing at least one human rights abuse, such as blackmail or denial of housing or health care (Baral et al., 2009).

More than 30 countries in sub-Saharan Africa have laws prohibiting same-sex activity between consenting adults (Ottosson, 2009). Punishments

for violations of anti-sodomy laws are often severe, with several countries authorizing the death penalty and others providing for criminal penalties in excess of 10 years imprisonment (Ottosson, 2009). In contrast with some other regions, no trend towards the repeal of such laws is visible in sub-Saharan Africa. In April 2009, Burundi enacted the country's first prohibition of consensual sexual contact between members of the same sex.

### **Injecting drug use**

Although less extensively studied than other key populations, injecting drug users in sub-Saharan Africa appear to be at high risk of HIV infection. In the region as a whole, an estimated 221 000 injecting drug users are HIV-positive, representing 12.4% of all injecting drug users in the region (Mathers et al., 2008). In Ghana, a modelling exercise suggested that injecting drug users had an estimated annual seroincidence rate of 4.0% in 2008 (Bosu et al., 2009). In 2007, 10% of injecting drug users surveyed in the Kano region of Nigeria tested HIV-positive (Federal Ministry of Health, 2007). In Nairobi, 36% of injecting drug users surveyed tested HIV-positive (Odek-Ogunde et al., 2004). Survey-based estimates of HIV prevalence among injecting drug users in other African countries range from 12.4% in South Africa to 42.9% in Kenya (Mathers et al., 2008).

The lack of reliable evidence on the size of national populations of injecting drug users inhibits the development of sound prevention strategies (see Bosu et al., 2009). In Nigeria, researchers found evidence of injecting drug use in all regions of the country, but no indication of the existence of specific HIV prevention and treatment services for drug users (Adelakan & Lawal, 2006).

While studies have often found elevated levels of HIV infection among communities of injecting drug users in sub-Saharan Africa, this form of transmission appears to be significantly outweighed by sexual transmission with respect to prevalent and incident infections. In Kenya, transmission during injecting drug use accounted for an estimated 3.8% of new HIV infections in 2006 (Gelmon et al., 2009).

### **Mother-to-child transmission**

As in the case of antiretroviral therapy, sub-Saharan Africa has made remarkable strides in expanding access to services to prevent mother-to-child HIV transmission. In 2008, 45% of

HIV-infected pregnant women received anti-retroviral drugs to prevent transmission to their newborns, compared with 9% in 2004 (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). However, coverage is much higher in eastern and southern Africa (64%) than in West and Central Africa (27%) (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

In 2008, an estimated 390 000 [210 000–570 000] children were infected in sub-Saharan Africa. As services to prevent mother-to-child transmission have been brought to scale, the annual number of new HIV infections among children has declined fivefold in Botswana, from 4600 in 1999 to 890 in 2007 (Stover et al., 2008). There is also evidence that mother-to-child transmission is contributing a declining proportion of new infections in Lesotho (Khubotlo et al., 2009). Although the vast majority of infections in children are the result of mother-to-child transmission, indications suggest that a small proportion of infections in children under the age of 15 could be the result of rape or other sexual abuse (Khubotlo et al., 2009).

However, mother-to-child transmission continues to account for a substantial, although decreasing, portion of new HIV infections in many African countries. In Swaziland, children were estimated to account for nearly one in five (19%) new HIV infections in 2008 (Mngadi et al., 2009). Perinatally acquired infection accounted for 15% of new HIV infections in Uganda in 2008 (Wabwire-Mangen et al., 2009).

Inadequate knowledge about the availability of prevention services in antenatal settings often impedes their uptake. In the United Republic of Tanzania, only 53% of women and 44% of men reported awareness that medications and other services are available to reduce the risk of mother-to-child HIV transmission (Tanzania Commission for AIDS et al., 2008).

HIV testing, counselling and prevention services in antenatal settings offer an excellent opportunity not only to prevent newborns from becoming infected but also to protect and enhance the health of HIV-infected women. In numerous countries in which testing data have been reported, women are significantly more likely than men to know their HIV serostatus, in large measure due to the availability of testing services in antenatal facilities.

In 2007, a small study in rural Uganda found that women living with HIV who become pregnant experience a sharper decline in CD4 cells than non-pregnant women, although no statistically significant difference was detected between these groups in mortality or AIDS diagnosis. The findings led the research team to recommend that health-care providers inform women who are infected with HIV of the potential negative immunological effect of pregnancy, offer women contraception and prioritize pregnant women for antiretroviral therapy if eligible (Van der Paal et al., 2007).

## Migration

Although mobility is not itself a risk factor for HIV, the circumstances associated with movement increase vulnerability to HIV infection. In the United Republic of Tanzania, women who travelled away from home five or more times in the previous 12 months were twice as likely to be HIV-positive (12%) as those who did not travel (Tanzania Commission for AIDS et al., 2008). In rural KwaZulu-Natal province in South Africa, the risk of becoming infected was found to increase the closer an individual lived to a primary road (Bärnighausen et al., 2008).

Consistent with earlier studies among long-distance truck drivers and migrant mine workers (who are more likely to engage in high-risk or commercial sex), more recent evidence confirms that work-related mobility often significantly increases vulnerability to HIV infection. In Lesotho, the separation of couples as a result of labour migration could also be associated with the high rate of multiple concurrent partnerships (Khubotlo et al., 2009). Consistent with evidence from earlier in the epidemic, recent studies suggest that men in high-mobility occupations (such as truck drivers) are more likely than other men to purchase sex (Lowndes et al., 2008). Modelling suggests that migration increases vulnerability to HIV primarily by encouraging increased sexual

risk behaviour rather than by connecting areas of high and low risk (Coffee, Lurie, Garnett, 2007).

## Prisoners

Population-based rates of incarceration vary substantially among countries in sub-Saharan Africa (Dolan et al., 2007). Among 20 countries for which HIV prevalence data on prison populations are available, eight report that at least 10% of prisoners are HIV-infected either nationally or in parts of the country (Dolan et al., 2007).

## Medical injections

A small percentage of prevalent HIV infections in sub-Saharan Africa is estimated to stem from unsafe injections in medical settings. In an analysis in 2004, it was estimated that unsafe injections and the use of other contaminated skin piercing instruments accounted for 2.5% of all HIV infections in the region (Hauri, Armstrong, Hutin, 2004). In an analysis of data from Kenya, medical injections were estimated to be the source of 0.6% of all HIV infections, with blood transfusions accounting for an additional 0.2% of infections (Gouws et al., 2006).

Analysing serobehavioural survey data from Uganda from 2004–2005, researchers in 2008 concluded that receipt of multiple medical injections was significantly associated with HIV infection (Mishra et al., 2008b). In Uganda, men and women who received five or more medical injections in the previous year were significantly more likely to be HIV-infected (10.8% and 11.4% HIV prevalence, respectively) than those who received no injections (4.0% and 6.3%, respectively). After accounting for other risk factors and potential confounding factors, men and women who received five or more injections were found to be 2.35 times more likely to be infected with HIV than those who had no injections.



## Asia

Number of people living with HIV	2008: 4.7 million [3.8 million–5.5 million]	2001: 4.5 million [3.8 million–5.2 million]
Number of new HIV infections	2008: 350 000 [270 000–410 000]	2001: 400 000 [310 000–480 000]
Number of children newly infected	2008: 21 000 [13 000–29 000]	2001: 33 000 [18 000–49 000]
Number of AIDS-related deaths	2008: 330 000 [260 000–400 000]	2001: 280 000 [230 000–340 000]

*In 2008, 4.7 million [3.8 million–5.5 million] people in Asia were living with HIV, including 350 000 [270 000–410 000] who became newly infected last year. Asia's epidemic peaked in the mid-1990s, and annual HIV incidence has subsequently declined by more than half. Regionally, the epidemic has remained somewhat stable since 2000.*

*In 2008, an estimated 330 000 [260 000–400 000] AIDS-related deaths occurred in Asia. While the annual number of AIDS-related deaths in South and South-East Asia in 2008 was approximately 12% lower than the mortality peak in 2004, the rate of HIV-related mortality in East Asia continues to increase, with the number of deaths in 2008 more than three times higher than in 2000.*

### Regional overview

Asia, home to 60% of the world's population, is second only to sub-Saharan Africa in terms of the number of people living with HIV. India accounts for roughly half of Asia's HIV prevalence.

With the exception of Thailand, every country in Asia has an adult HIV prevalence of less than 1%. However, owing to the region's large population, Asia's comparatively low HIV prevalence translates into a substantial portion of the global HIV burden.

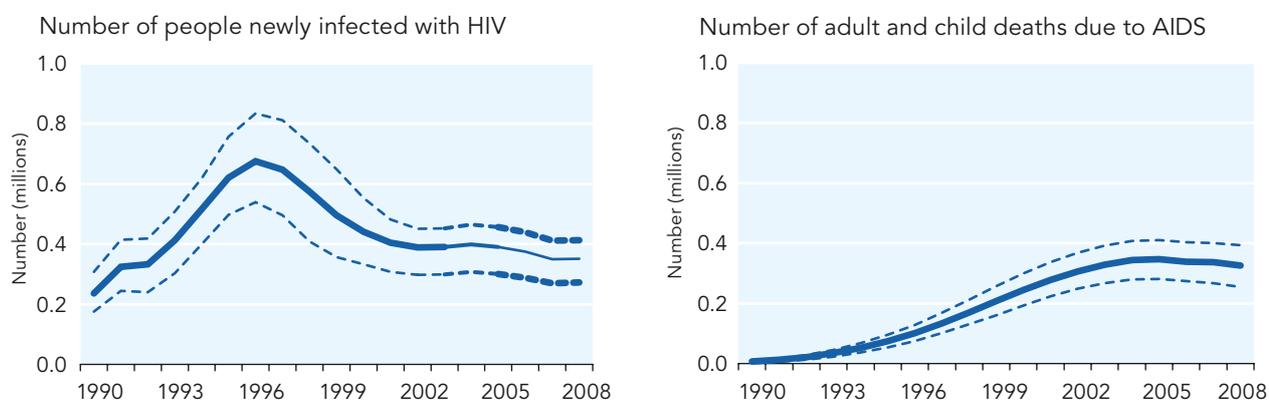
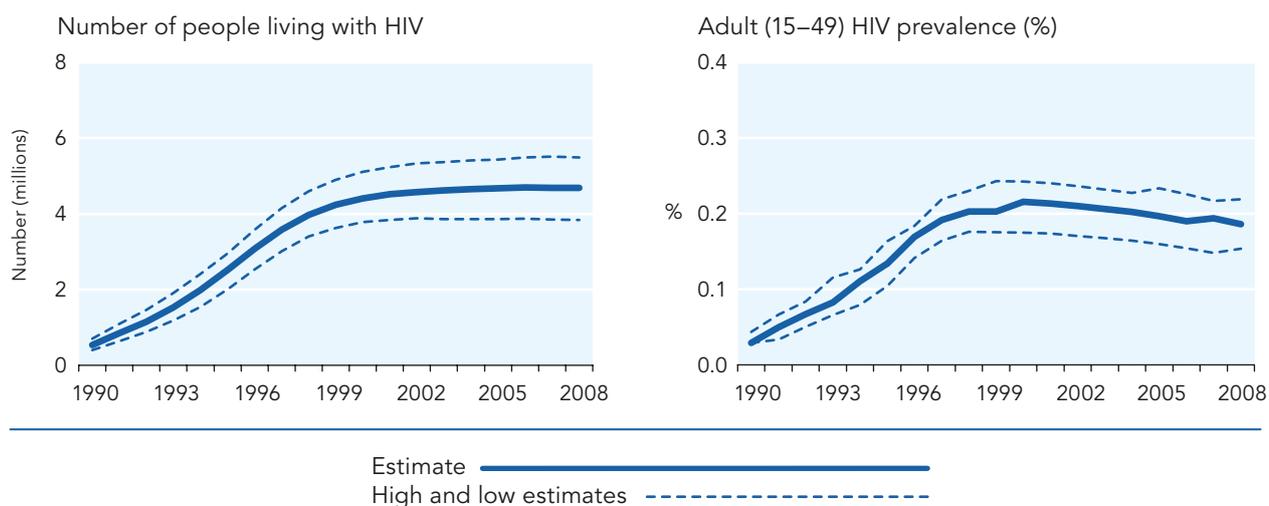
Notwithstanding its comparatively low HIV prevalence, Asia has not escaped the epidemic's harmful consequences. The economic consequences of AIDS will force an additional 6 million households in Asia into poverty by 2015 unless

national responses are significantly strengthened (Commission on AIDS in Asia, 2008).

Substantial improvements in HIV surveillance systems are evident in many countries. In China, for example, the number of HIV surveillance sites increased by roughly 20% between 2005 and 2007 (Wang et al., 2009). Likewise, the first national population-based survey in Cambodia generated strategic information on HIV prevalence and relevant behaviours in the general population (Sopheab et al., 2009). Particular strides have been made in improving epidemiological and behavioural data regarding the populations most heavily affected by the epidemic. For example, Myanmar in 2007 began

Figure 7

## Asia estimates 1990–2008



Source: UNAIDS/WHO.

including men who have sex with men in sentinel surveillance activities. However, recent reviews have emphasized the persistence of information gaps regarding populations at higher risk in some parts of Asia and the need to further strengthen HIV information systems (Wang et al., 2009).

A wide variation in epidemiological patterns between different Asian settings is apparent. For example, while sexual transmission is driving the epidemic throughout most of India, accounting for nearly 90% of prevalence nationwide, transmission during injecting drug use is the primary transmission mode in the north-eastern part of the country (National AIDS Control Organisation, 2008). In China, while the five highest-prevalence provinces account for 53.4% of prevalence, the five provinces with the lowest prevalence account for less than 1% of total infections (Wang et al., 2009). In the Papua province of Indonesia, where a generalized epidemic similar to the one in neighbouring Papua New Guinea has emerged, HIV prevalence is 15 times higher than the national average (National AIDS Commission, 2008).

### An evolving epidemic

Asia's epidemic has long been concentrated in specific populations, namely injecting drug users, sex workers and their clients, and men who have sex with men. However, the epidemic in many parts of Asia is steadily expanding into lower-risk populations through transmission to the sexual partners of those most at risk. In China, where the epidemic was previously driven by transmission during injecting drug use, heterosexual transmission has become the predominant mode of HIV transmission (Wang et al., 2009).

While the regional epidemic appears to be stable overall, HIV prevalence is increasing in some parts of the region, such as Bangladesh and Pakistan. Bangladesh has transitioned from a low-level epidemic to a concentrated epidemic, with especially elevated rates among injecting drug users (Azim et al., 2008). A more promising picture has emerged in the heavily affected Indian states of Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu, where HIV preva-

lence among 15–24-year-old women attending antenatal clinics declined by 54% between 2000 and 2007 (Figure 8) (Arora et al., 2008). Likewise, a national population-based study in Cambodia found an overall HIV prevalence of 0.6%, confirming the long-term decline in HIV prevalence nationally (Sopheab et al., 2009).

Regionally, with the growth in transmission among the low-risk heterosexual population, vigilance is needed in order to prevent the epidemic from entering a new period of growth. The importance of sustained prevention efforts in Asia was confirmed by a recent meta-analysis of available data in Viet Nam, which found that many low-risk women may be at considerable risk of HIV infection due to the high-risk sexual and drug-using behaviours of their male partners (Nguyen et al., 2008).

The proportion of women living with HIV in the region rose from 19% in 2000 to 35% in 2008. In particular countries, the growth in HIV infections among women has been especially striking. In India, women accounted for an estimated 39% of prevalence in 2007 (National AIDS Control Organisation, 2008). During this

decade, women's share of HIV cases in China doubled (Lu et al., 2008).

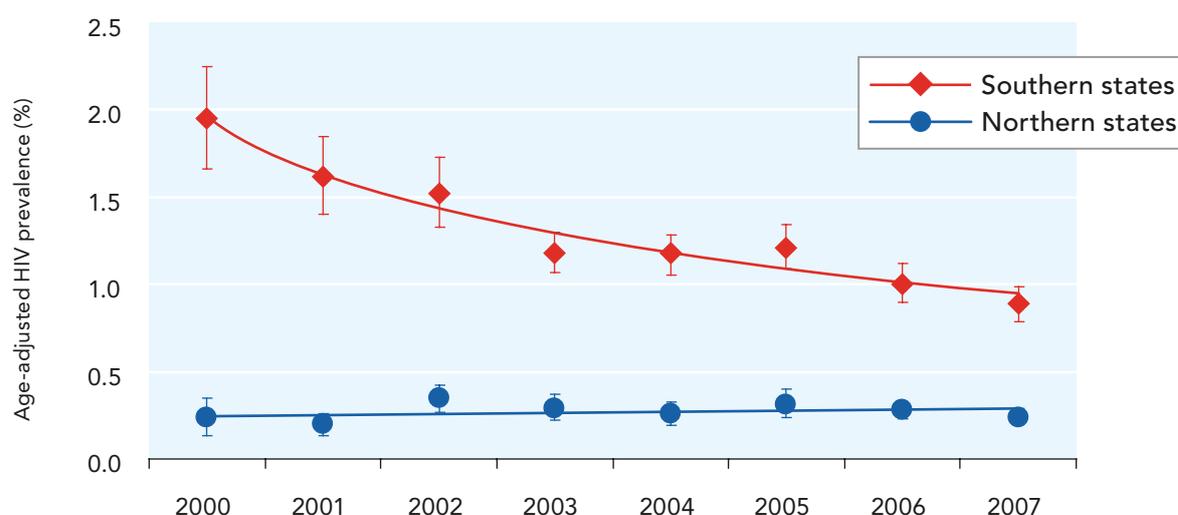
### Need for continued vigilance

Although Asia has produced some of the world's most noteworthy national prevention successes, many national strategic plans fail to accord sufficient priority to HIV prevention. In a region where the heavy concentration of infections in discrete populations offers an opportunity to radically curtail the epidemic's expansion, the failure of many national programmes to prioritize prevention services for populations at higher risk is especially worrisome (Commission on AIDS in Asia, 2008).

Thailand provides a vivid illustration of both the power of HIV prevention leadership and the importance of sustaining a robust response over time. With visionary leadership and implementation of evidence-informed public health strategies in the 1990s, Thailand managed to arrest an epidemic that threatened to spiral out of control. However, after funding for basic prevention services was slashed as a result of the Asian economic crisis in the late 1990s, HIV incidence subsequently increased. Having intensified national

**Figure 8**

Age-adjusted HIV prevalence among antenatal attendees aged 15–24 from 2000 to 2007 in high-prevalence southern states (Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu) and northern states of India



Logarithmic trend line; test for trend by logistic regression, with age adjustment to the entire study population,  $n = 202\ 254$  for the south,  $n = 221\ 588$  for the north.

Source: Arora et al. (2008).

prevention efforts, Thailand has again succeeded in reducing HIV incidence in recent years (Punyacharoensin & Viwatwongkasem, 2009).

As the discussion below reveals, the region does not lack models of courageous AIDS leadership. Particularly noteworthy are the recent expansion of HIV prevention services for traditionally marginalized populations in several settings and the steps taken in different countries to address legal and social impediments to an effective response. In China, national financial outlays for HIV programmes overall rose more than threefold between 2003 and 2006 (State Council AIDS Working Committee Office & UN Theme Group on AIDS, 2008).

### Mixed success on treatment scale-up

The regional picture regarding treatment scale-up is mixed. As of December 2008, 37% of those in Asia needing antiretroviral therapy were receiving it (World Health Organization, United Nations Children's Fund, UNAIDS, 2009), somewhat below the global average (42%) for all low- and middle-income countries. This represents a sevenfold increase in treatment access in five years.

Improvement is needed in promoting widespread knowledge of HIV serostatus (Commission on AIDS in Asia, 2008). For example, it is estimated that fewer than one in three people living with HIV in China have been diagnosed (Wang et al., 2009).

### Key regional dynamics

Asia's epidemic is diverse, with different transmission routes predominating in different parts of the region. While discrete populations—primarily injecting drug users and sex workers and their clients—have accounted for most HIV infections, onward sexual transmission to the female partners of drug users and the clients of sex workers is becoming increasingly apparent. In addition, a growing body of data has documented exceptionally high transmission rates among men who have sex with men and transgender people.

### Sex work

According to national surveys, the percentage of national populations that sell sex ranges from 0.2% to 2.6% of the female population, depending on the country (Vandepitte et al., 2006). (A survey

in two urban areas in China generated somewhat higher estimates, finding that sex workers accounted for 3.4% to 3.6% of the total female urban population (Zhang et al., 2007a).)

Although the total population of female sex workers in the region is relatively small, the number of male clients is much greater (Commission on AIDS in Asia, 2008). In China alone, the number of male clients of female sex workers may be as high as 37 million (Wang et al., 2009).

In many Asian countries, sex workers are at an extremely high risk of infection (Figure 9). In Myanmar, for example, more than 18% of female sex workers are infected with HIV. In four states of southern India, surveys found an HIV prevalence of 14.5% among female sex workers (Ramesh et al., 2008). Since condoms are not consistently used during sex work, sex workers have an elevated risk of becoming infected, which in turn can result in subsequent transmission to their male clients. In China, 60% of female sex workers do not consistently use condoms with their clients (Wang et al., 2009). Inadequate condom use during sex work risks future HIV outbreaks in settings where HIV prevalence is currently low; while a recent survey of sex workers in the Hong Kong Special Administrative Region found no cases of HIV infection, more than half (50.7%) reported having failed to use condoms consistently with their male clients (Lau et al., 2007).

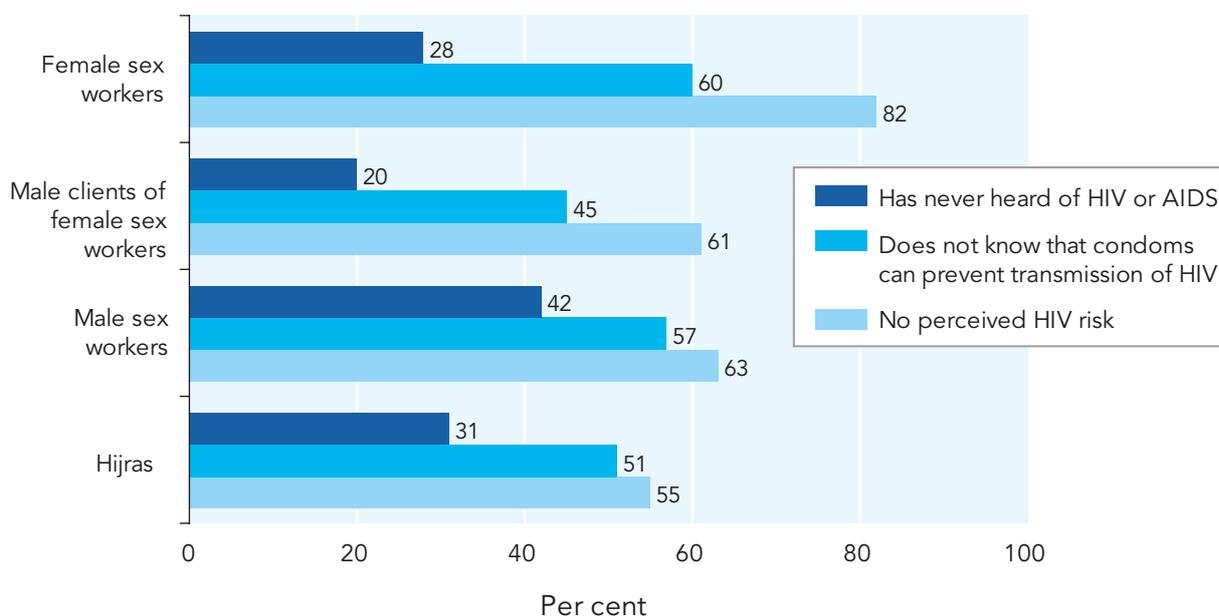
As in other regions, in Asia there is often considerable overlap between the populations of sex workers and injecting drug users (Bokhari et al., 2007). In a study of injecting drug users in Sichuan province in China, more than 40% of females and 34% of males were engaged in sex work (Gu et al., 2009).

The sex worker population is not homogenous, and sex workers' various modes of work and life patterns may have an important effect on HIV risk. In India, brothel-based female sex workers are more likely than home-based sex workers to be infected with HIV, and the risk is also greater for sex workers who are not currently married (Ramesh et al., 2008).

Male sex workers are also at high risk of infection. In Thailand, HIV prevalence among male sex workers is more than twice as high as among their female counterparts and is currently trending upwards (National AIDS Prevention and Alleviation Committee, 2008). In Indonesia, HIV

Figure 9

## Vulnerability to sexual HIV transmission in commercial sex in Karachi and Lahore, Pakistan



Source: Bokhari et al. (2007).

prevalence is nearly three times higher among male sex workers (20.3%) than among female sex workers (7.1%) (National AIDS Commission, 2008). In the Pakistani cities of Karachi and Lahore, 4% of male sex workers are infected with HIV (Bokhari et al., 2007). Sex work is common among male transgender people (hijras) in South Asia (Khan et al., 2008).

Stigma and discrimination against sex workers are widespread. Buying or selling sex is widely criminalized in Asia, although the degree to which such laws are enforced often varies. Moreover, when laws are enforced, punishment is typically harsher for the worker than for the client. In 2009, Taiwan, China, began a process of legalizing sex work, due at least in part to demands from sex workers for equitable treatment.

There is abundant evidence in Asia that sound prevention services focusing on sex workers can generate substantial public health benefits. Beginning with the implementation of the 100 Percent Condom Programme in brothels, HIV prevalence among female sex workers in Thailand fell from 33.2% in 1994 to 5.3% in 2007 (National AIDS Prevention and Alleviation Committee, 2008).

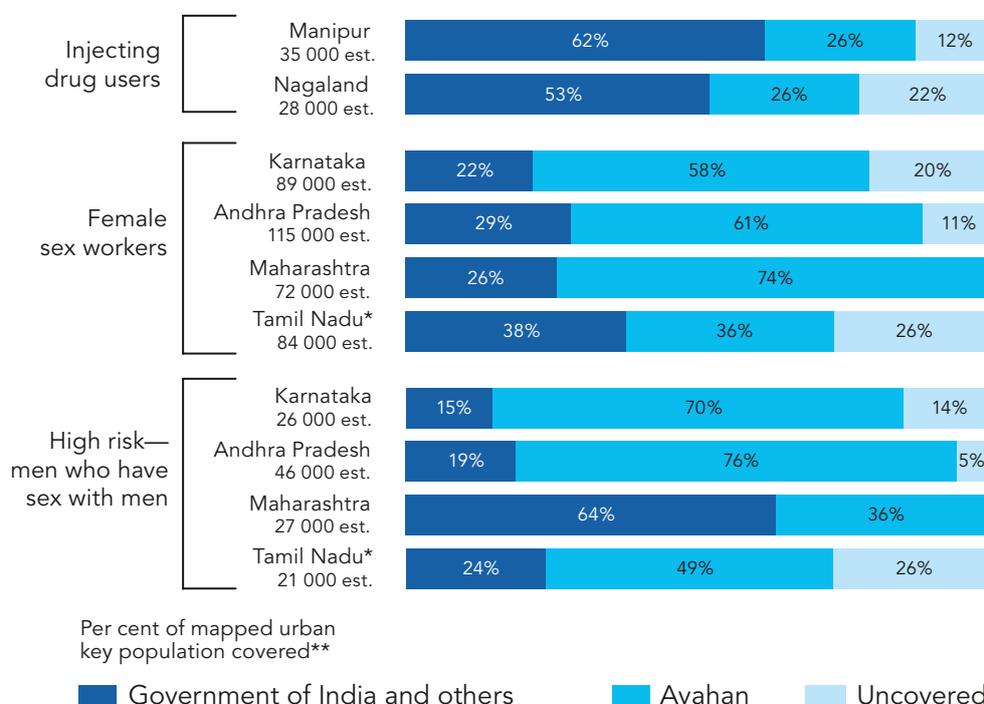
The Avahan India AIDS Initiative—launched by the Bill & Melinda Gates Foundation, with

ownership now being transitioned to the national government—has dramatically expanded prevention services for sex workers in states with a high HIV prevalence (Figure 10). Due to the efforts of the National AIDS Control Office, Avahan and others, prevention services now reach more than 80% of female sex workers in four heavily affected states (Bill & Melinda Gates Foundation, 2008). As prevention services for sex workers have been brought to scale in high-prevalence areas of India, reported condom use during sex work is increasing and the prevalence of curable sexually transmitted infections is on the decline (Bill & Melinda Gates Foundation, 2008). Between 2003 and 2006, HIV prevalence among female sex workers in India fell by more than half—from 10.3% to 4.9% (National AIDS Control Organisation, 2008). In Pune, India, female sex workers' risk of becoming infected with HIV declined by more than 70% between 1993 and 2002, and similarly sharp declines in HIV incidence were reported for male clients of sex workers, primarily as a result of increased condom use (Mehendale et al., 2007).

Sex-trafficked women comprise a subset of the population of female sex workers in Asia. According to global monitoring of human traf-

Figure 10

Saturating prevention coverage through complementary programming. Avahan has achieved a high coverage of target populations (routine programme monitoring data)



Percentages indicate intended coverage through establishment of services in specific geographic areas.

\* Includes districts with no intended coverage.

\*\* Mapping and size estimation quality varies by state.

Does not include rural areas

Source: Avahan and State AIDS Control Society programme data (2008).

ficking, East Asia is particularly prominent as a source of women who are trafficked for sex work: East Asian trafficking victims have been detected in more than 20 countries worldwide (United Nations Office on Drugs and Crime, 2009a). Women and girls who have been trafficked to India may be contributing to an expansion of the epidemic in Nepal. A survey of 246 sex-trafficked women and girls in Nepal determined that 30% were HIV-positive, with HIV-infected individuals more likely than their uninfected peers to be infected with syphilis and/or hepatitis B (Silverman et al., 2008).

### Heterosexual transmission

Transmission among sex workers and their clients is helping to drive a much broader epidemic of heterosexually acquired HIV, resulting in extensive transmission among individuals who engage in low levels of risk behaviour. Acquisition of HIV

during heterosexual intercourse is now reported as the dominant mode of transmission in China (Wang et al., 2009), with the share of heterosexually acquired incident infections tripling between 2005 and 2007 (Lu et al., 2008). Likewise, in Indonesia an epidemic that was originally confined to injecting drug users is now becoming more generalized through increased sexual transmission (National AIDS Commission, 2008). Increasingly, male members of populations at higher risk are exposing their female sexual partners to HIV, resulting in a steady rise in HIV prevalence among low-risk heterosexual women. In Cambodia, the age differential between spouses is positively correlated with women's increased risk of HIV infection (Sopheab et al., 2009). With a diffuse epidemic characterized by considerable heterosexual transmission, Tanah Papua in Indonesia has an HIV prevalence of 2.4% in the adult population (aged 15–49) (Statistics Indonesia & Ministry of Health, 2007).

Rapid economic development in Asia has been accompanied by significant changes in sexual patterns. In China, studies indicate that syphilis cases have risen dramatically since the early 1990s (Figure 11) (Chen et al., 2007). Where such evidence is available, behavioural surveys indicate a trend towards earlier initiation of sexual activity in most Asian countries (Wellings et al., 2006). Whether such trends portend an eventual increase in heterosexual HIV transmission remains unclear, as roughly 95% of prevalent infections among young people in Asia are among adolescents at higher risk (Economic and Social Commission for Asia and the Pacific, 2008).

The popularity of methamphetamine and other amphetamine-type stimulants in East and South-East Asia is cause for concern with respect to the risk of sexual HIV transmission. Extensive research in both high-income and developing countries has correlated use of methamphetamine and other amphetamine-type stimulants with sexual risk behaviours and HIV infection (Van Tieu & Koblin, 2009). Up to 20 million people in East and South-East Asia used amphetamine-type stimulants in 2007, with powerful methamphetamine serving as

the drug of choice in this class (United Nations Office on Drugs and Crime, 2009b).

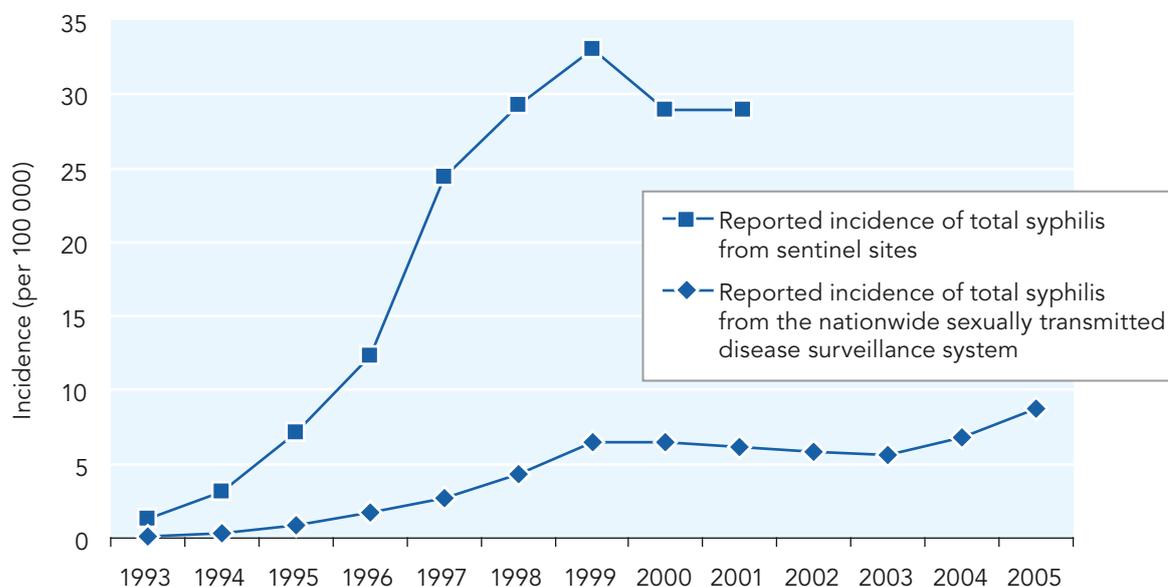
### Injecting drug users

More than 4.5 million people in Asia are estimated to inject drugs. With an estimated 2.4 million drug injectors, China is estimated to have the world's largest population of injecting drug users (Mathers et al., 2008), although the percentage of the national population that injects drugs is higher in some other countries. There are estimated to be between 70 000 and 300 000 injecting drug users in the Islamic Republic of Iran, while the estimated number of injecting drug users in Pakistan ranges from 54 000 to 870 000 (Iranian National Center for Addiction Studies, 2008).

In part, the region's comparatively heavy burden of injecting drug use stems from the presence of long-standing trafficking routes for illicit opium (Lu et al., 2008). Opiates are the drug of choice for 65% of Asia's drug rehabilitation patients, although drug use patterns vary greatly within the region (United Nations Office on Drugs and Crime, 2009b).

Figure 11

Comparison of the incidence of syphilis in China reported from 26 sentinel sites and from the nationwide sexually transmitted disease surveillance system



Source: Chen et al. (2007).

Injecting drug users have some of the highest HIV prevalence of any population in Asia. Regionally, 16% of injecting drug users are believed to be HIV-infected (Mathers et al., 2008). However, HIV prevalence among drug users is considerably higher in many parts of Asia. In Thailand, 30–50% of injecting drug users are believed to be living with HIV (National AIDS Prevention and Alleviation Committee, 2008). More than one in three injecting drug users in Myanmar (37.5%) are HIV-infected, and nearly one in four (23%) injecting drug users in urban settings in Pakistan are HIV-positive (Bokhari et al., 2007). More than half of injecting drug users (52%) in Indonesia are living with HIV, with a slightly higher prevalence among female injectors (National AIDS Commission, 2008). In China, estimated HIV prevalence among injecting drug users ranges from 6.7% to 13.4% (Wang et al., 2009). In one prefecture in Yunnan province, China, more than half (54%) of injectors are estimated to be HIV-infected (Jia et al., 2008). HIV prevalence among injecting drug users exceeds 10% in seven states in India, according to sentinel surveillance undertaken in 2006 (National AIDS Control Organisation & National Institute of Health and Family Welfare, 2007). In a survey of injecting drug users in Kabul, 36.6% of individuals surveyed exhibited antibodies to hepatitis C and 6.5% were antibody-positive for hepatitis B (Todd et al., 2007). In the Islamic Republic of Iran, injecting drug use accounts for more than two thirds (67.5%) of reported HIV cases (Iranian National Center for Addiction Studies, 2008). In Bangladesh, where very low levels of HIV were reported in earlier surveys, a new round of serosurveillance in 2006 found that 7% of injecting drug users surveyed were HIV-infected in Dhaka (Azim et al., 2008).

Injecting drug users in Asia report high rates of risk behaviour. Among injecting drug users surveyed in Pakistan, two thirds reported sharing needles during the previous week (Bokhari et al., 2007). Surveys in China indicate that 40% of injecting drug users share needles (Wang et al., 2009).

Regional coverage for harm reduction programmes is believed to be extremely low, although definitive coverage estimates are not currently available in most settings (Commission on AIDS in Asia, 2008). The United Nations Office on Drugs and Crime estimates that available financial resources for harm reduction programmes

in Asia represent only about 10% of actual need (Bergenstrom, 2009).

Several countries in the region have taken steps to expand access to evidence-informed strategies to prevent new infections among injecting drug users. For example, Indonesia revised its national AIDS strategy in 2007 to include harm reduction, and the country's supreme judicial court issued a ruling that officially prioritized drug rehabilitation over incarceration of drug users. UNAIDS regional staff in Asia report that access to harm reduction has also increased in other countries, including Bangladesh, Malaysia and Viet Nam. The Islamic Republic of Iran has invested in drug substitution programmes, overdose prevention and needle and syringe programmes (Iranian National Center for Addiction Studies, 2008).

China has launched a major push to expand access to harm reduction programmes for drug users (Sullivan & Wu, 2007). As of late 2007, more than 88 000 drug users had enrolled in methadone maintenance treatment programmes, with an annual retention rate of 64.5%, and nearly 50 000 drug users were participating in needle and syringe programmes (State Council AIDS Working Committee Office & UN Theme Group on AIDS, 2008). While policy-makers in China were convinced by public health evidence of the effectiveness of harm reduction, a critical ingredient for the rapid scaling-up of prevention services for drug users has been increased acceptance of the approach by public security personnel (Reid & Aiken, 2009).

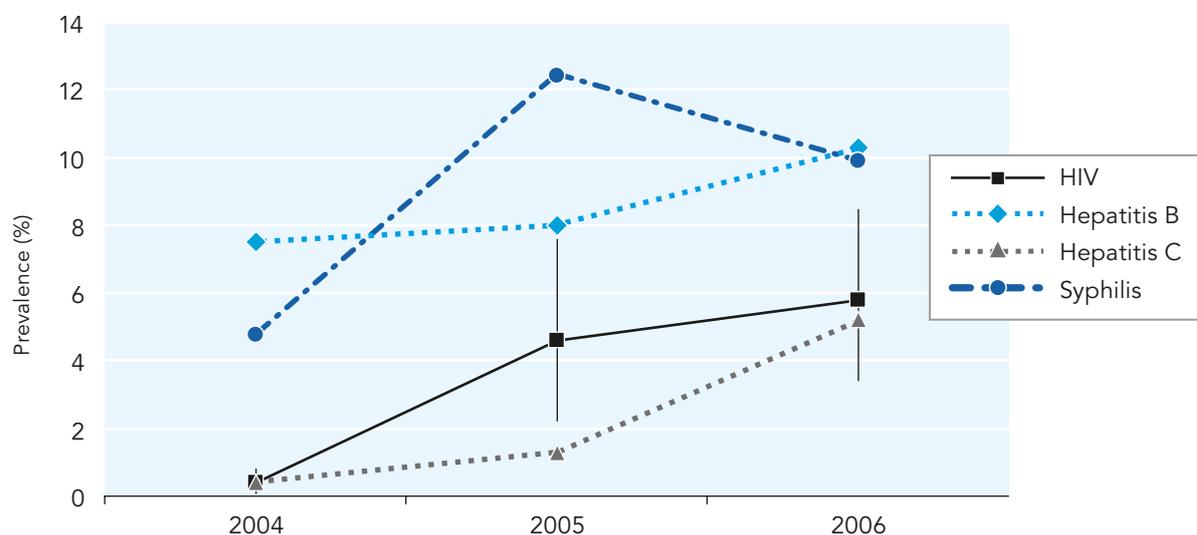
Where harm reduction measures have been implemented, they have slowed the spread of infection. For example, after harm reduction programmes were introduced in south-western China, annual HIV incidence among injecting drug users in the area declined by nearly two thirds (Ruan et al., 2007). In Manipur, India, HIV prevalence among injecting drug users and reported needle sharing at last injection fell by more than two thirds during the seven years after implementation of harm reduction programmes (Economic and Social Commission for Asia and the Pacific, 2008).

### Men who have sex with men

Men who have sex with men in Asia face nearly one in five odds (18.7%) of being infected with HIV (Baral et al., 2007). In a region where overall HIV prevalence is low, high levels of infection among men who have sex with men have been

Figure 12

## Trends in HIV, hepatitis B, hepatitis C and syphilis in men who have sex with men in Beijing in 2004, 2005 and 2006



Source: Ma et al. (2007).

reported in numerous locations—29.3% in Myanmar in 2008 (National AIDS Programme, 2009), 30.7% in Bangkok (Chemnasiri et al., 2008), 12.5% in Chongqing, China (Feng et al., 2009), between 7.6% and 18.1% in a study of over 4500 self-identified men who have sex with men in southern India (Brahmam et al., 2008) and between 4% and 32.8% in sentinel surveillance in 16 cities in India in 2006 (National AIDS Control Organisation & National Institute of Health and Family Welfare, 2007), 5.6% in Vientiane (Sheridan et al., 2009) and 5.2% nationally in Indonesia (National AIDS Commission, 2008). In 2007, men who have sex with men were estimated to account for more than 12% of HIV incidence in China (Wang et al., 2009).

Indications suggest that the epidemic among men who have sex with men is expanding in Asia. Surveillance indicates that the number of cases in this population in China is increasing (Wang et al., 2009; State Council AIDS Working Committee Office & UN Theme Group on AIDS, 2008). Periodic surveys of men who have sex with men in Bangkok over the past several years have likewise detected a steadily increasing

HIV prevalence (Chemnasiri et al., 2008). In the Shandong province of China, HIV prevalence in this population rose from 0.05% in 2007 to 3.1% in 2008 (Ruan et al., 2009). Separate studies in Chongqing, China, also detected a notable increase in HIV prevalence among men who have sex with men between 2006 and 2007 (Feng et al., 2009), and annual surveys in Beijing in 2004, 2005 and 2006 identified a clear upward trend in prevalence (Figure 12) (Ma et al., 2007).

Surveys indicate that a considerable proportion of Asian men who have sex with men also have sex with women (Sheridan et al., 2009). Recently, a number of studies have focused on epidemiological and behavioural differences between men who have sex only with other men and those who have sex with both men and women. In Bangkok, men who have sex only with other men are more than 2.5 times more likely to be HIV-infected than men who have sex with both men and women (Li et al., 2009). While one study in Jinan, China, found that unmarried men who have sex only with other men were more than six times more likely to be HIV-infected than married men with both male and female partners (Ruan et al., 2009), another survey in Chongqing, China, determined

that married men who have sex with men were more than twice as likely to be infected as their non-married counterparts (Feng et al., 2009).

Many Asian men who have sex with men engage in high rates of risk behaviour. Studies in China, Thailand and Viet Nam have found that many men who have sex with men have multiple sex partners (de Lind van Wijngaarden et al., 2009; Ruan et al., 2009; Ruan et al., 2008). For example, 70% of men who have sex with men surveyed in an urban area in China reported having more than one sexual partner in the previous six months (Wang et al., 2009). Reported condom use among men who have sex with men is low (see Ma et al., 2007; Mansergh et al., 2006). In a survey in the Lao People's Democratic Republic, for example, fewer than one in four men who have sex with men reported consistent condom use with non-regular partners (Sheridan et al., 2009). Men who have sex with men experience extremely elevated rates of syphilis and other sexually transmitted infections (Ruan et al., 2008).

A recent study in Bangkok found that the percentage of men who have sex with men who reported using drugs rose sixfold between 2003 and 2007—from 3.6% to 20.7%—and the proportion who said that they used drugs during sex increased from 0.8% to 6.3% (Chemnasiri et al., 2008). In a survey of 541 men who have sex with men in Beijing, having three or more alcoholic drinks a week was significantly associated with syphilis infection (Ruan et al., 2008).

Relatively few epidemiological and behavioural studies have been conducted among male transgender people (known as hijras in South Asia) in the region. However, evidence indicates that the epidemic is heavily affecting transgender communities. The National AIDS Commission in Indonesia estimates that HIV prevalence among the transgender community (waria) ranges from 3% to 17% (National AIDS Commission, 2008). Although a recent study in a city in Pakistan found low HIV prevalence (1%) among hijras, 58% had a sexually transmitted infection, with 38% having multiple infections, and few used condoms (Khan et al., 2008). In a survey of men who have sex with men in Mumbai, India, men who had sex with hijras had higher HIV prevalence than those who did not (Hernandez et al., 2006). In a large study in southern India, HIV prevalence among hijras in 2006 was found to be 18.1% (Brahmam et al., 2008).

Widespread stigma and discrimination associated with same-sex sexual orientation is common in the region and is frequently life-threatening. Seventeen per cent of men who have sex with men surveyed in Vientiane reported suicidal ideation, which was the sole variable significantly and independently associated with HIV infection (Sheridan et al., 2009). Nearly half (45%) of hijras surveyed in Pakistan said that they had experienced discrimination on the basis of their sexual orientation, and 40% had experienced physical abuse or forced sex (Sheridan et al., 2009).

In many cases the social exclusion of men who have sex with men is reinforced or institutionalized by national legal frameworks. At least 11 Asian countries have laws that prohibit sexual activity between consenting adults of the same sex (Ottosson, 2009). In response to a petition by gay rights groups, the Supreme Court of Nepal decreed in 2008 that sexual and gender minorities have full constitutional rights. In July 2009, the High Court in Delhi overturned the country's 150-year-old statute outlawing homosexuality, finding that the law exposed the lesbian, gay, bisexual and transgender community to "harassment, exploitation, humiliation, cruel and degrading treatment". The Delhi High Court also specifically determined that the sodomy law impeded access to HIV services by men who have sex with men.

In part due to such punitive legal frameworks, the community-based infrastructure among men who have sex with men has historically been poorly developed throughout much of Asia. However, as the recent achievements in Nepal and India make clear, men who have sex with men and other sexual minorities have made remarkable strides in recent years in mobilizing their communities for advocacy, social support and service delivery. In part, this appears to stem from a rapidly developing community consciousness in many parts of the region. In the northern Chinese city of Harbin, the percentage of men who have sex with men who self-identify as homosexual rose from 58% in 2002 to 80% in 2006, and the proportion living with a male partner increased from 12% to 41% (Zhang et al., 2007b).

Prevention coverage for men who have sex with men remains extremely low in Asia (Commission on AIDS in Asia, 2008). However, recent experience demonstrates the feasibility of scaling up prevention services for this population. The

Avahan India AIDS Initiative and government officials report that near universal coverage for HIV prevention services has been achieved for men who have sex with men in Andhra Pradesh, Karnataka and Maharashtra states in India (Bill & Melinda Gates Foundation, 2008).

China has also launched a national effort to reach men who have sex with men with HIV prevention services, supporting and partnering with community organizations. However, substantial additional progress is required in order to address the prevention needs of this population, as China estimated that as of late 2007 it had achieved HIV prevention coverage for about 8% of men who have sex with men (State Council AIDS Working Committee Office & UN Theme Group on AIDS, 2008).

## Migrants

Nearly 50 million people in the Asia and Pacific region are not living in their country of birth (Economic and Social Commission for Asia and the Pacific, 2008). However, the number of international migrants in Asia is vastly outweighed by people who migrate internally. China's so-called 'floating population'—generated in large measure by migration for work from rural to urban areas—now approaches 150 million people (National Population and Family Planning Commission of China, 2008).

Although migration itself is not a risk factor for HIV, the circumstances in which migration occurs may increase vulnerability to infection. Studies in China have found that rural-to-urban migrants report frequent substance use and intoxication (Chen et al., 2008) and elevated rates of sexually transmitted infections (He et al., 2009; Chen et al., 2007). In some parts of Asia, such as the India–Nepal border, cross-border migration among sexual and drug-using networks appears to be contributing to a two-way flow of HIV (Nepal, 2007). Often excluded from basic health services in the settings to which they have migrated (Economic and Social Commission for Asia and the Pacific, 2009), migrants are significantly more likely than non-migrants to delay seeking medical treatment for infectious diseases (Wang et al., 2008).

Many Asian countries fail to address the role of mobility in their national AIDS frameworks, although a number of countries, including Bangladesh, India and Nepal, have implemented HIV prevention initiatives for cross-border

migrants (Economic and Social Commission for Asia and the Pacific, 2009). In response to the potential impact of population migration on the dynamics of the epidemic, China in 2006 launched a national HIV education and communication campaign focused on rural-to-urban migrants (State Council AIDS Working Committee Office & UN Theme Group on AIDS, 2008).

## Mother-to-child transmission

An estimated 21 000 [13 000–29 000] children under the age of 15 were newly infected with HIV in Asia in 2008. To date, mother-to-child transmission has been responsible for a relatively modest share of new HIV infections in the region. In 2007, perinatal transmission accounted for an estimated 1.1% of incidence in China (Wang et al., 2009).

As of December 2008, 25% of HIV-infected pregnant women in the region received antiretroviral drugs for the prevention of mother-to-child transmission (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). While this represents a significant improvement over 2004, when a regional prevention coverage of 8% was reported, regional prevention coverage in antenatal settings in 2008 was less than the global average (45%) for low- and middle-income countries. The number of new HIV infections among children (0–14 years) remains relatively stable in South and South-East Asia, although the rate of mother-to-child transmission is still increasing in East Asia.

## Prisoners

Incarcerated populations in Asia appear to have a substantially higher HIV prevalence than the general population. In a region where national HIV prevalence is relatively low, at least three countries (Indonesia, Malaysia and Viet Nam) report that HIV prevalence in the prison population exceeds 10%. However, HIV-related information is not available for the prison systems in all countries (Dolan et al., 2007). Access to antiretroviral therapy or harm reduction services is limited in most prison settings in the region (Economic and Social Commission for Asia and the Pacific, 2009).



## EASTERN EUROPE AND CENTRAL ASIA

Number of people living with HIV	2008: 1.5 million [1.4 million–1.7 million]	2001: 900 000 [800 000 – 1.1 million]
Number of new HIV infections	2008: 110 000 [100 000–130 000]	2001: 280 000 [240 000–320 000]
Number of children newly infected	2008: 3700 [1700–6000]	2001: 3000 [1600–4300]
Number of AIDS-related deaths	2008: 87 000 [72 000–110 000]	2001: 26 000 [22 000–30 000]

*Eastern Europe and Central Asia are considered together because of their physical proximity and their common epidemiological characteristics. Epidemics in this region are primarily driven by transmission during injecting drug use.*

### Regional overview

Eastern Europe and Central Asia is the only region where HIV prevalence clearly remains on the rise (Figure 14). An estimated 110 000 [100 000–130 000] people were newly infected with HIV in 2008, bringing the number of people living with HIV in Eastern Europe and Central Asia to 1.5 million [1.4 million–1.7 million], compared with 900 000 [800 000–1 000 000] in 2001, a 66% increase over that time period.

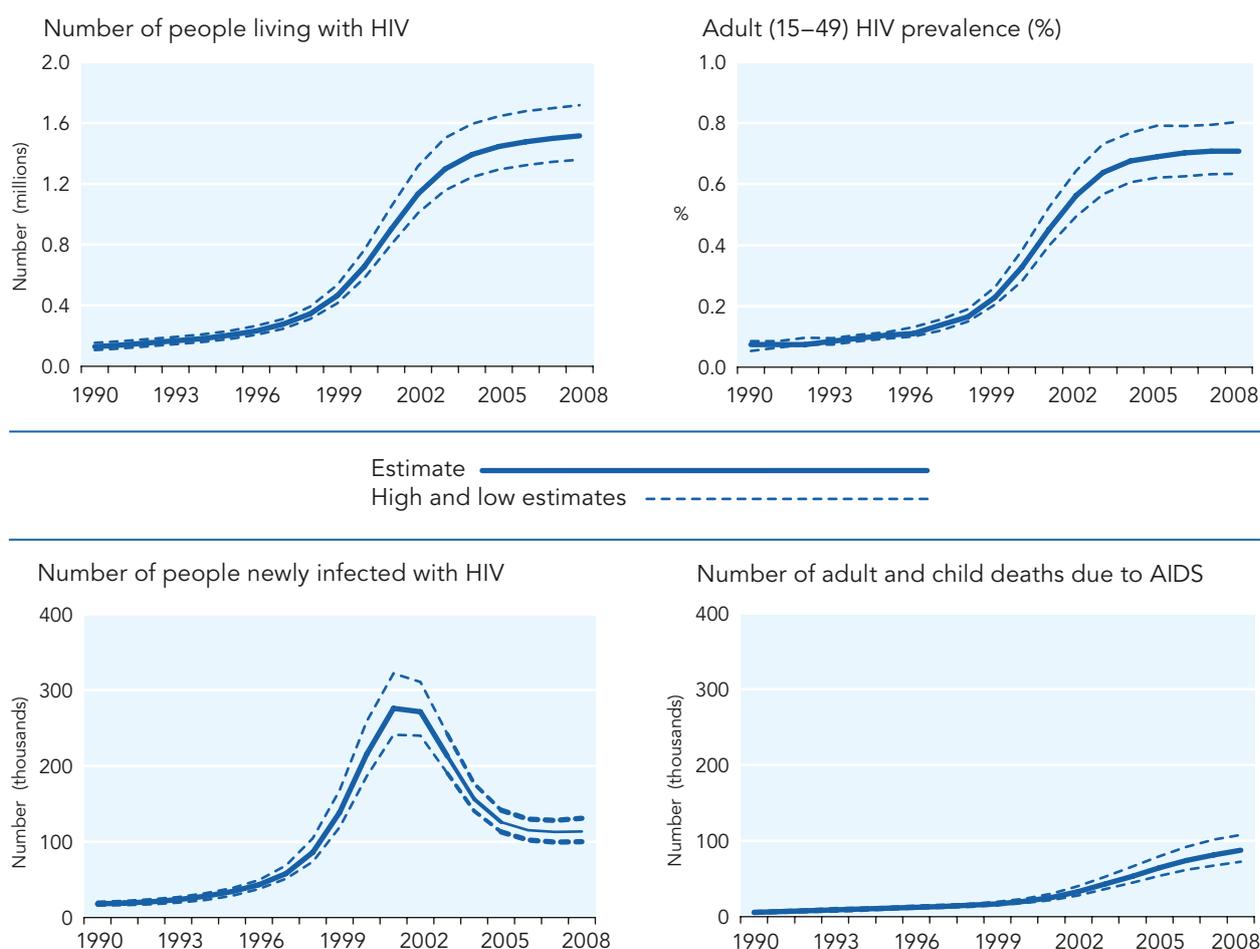
Ukraine and the Russian Federation are experiencing especially severe and growing national epidemics. With adult HIV prevalence higher than 1.6%, Ukraine has the highest inflection level reported in all of Europe (Kruglov et al., 2008). Overall, estimated HIV prevalence exceeds 1% of the adult population in three countries in the region (UNAIDS, 2008).

Epidemiological surveillance efforts have significantly improved in Eastern Europe and Central Asia. These advances have enhanced the reliability of epidemiological estimates in the region and have expanded the evidence on which to base national HIV strategies.

A number of countries in the region have expanded access to antiretroviral therapy, although treatment coverage remains relatively low. By December 2008, 22% of adults in need of antiretroviral therapy were receiving it—a level less than half the global average for low- and middle-income countries (42%). Available evidence suggests that injecting drug users—the population most at risk of HIV infection in Eastern Europe and Central Asia—are often the

Figure 13

## Eastern Europe and Central Asia estimates 1990–2008



Source: UNAIDS/WHO.

least likely to receive antiretroviral therapy when they are medically eligible (International Harm Reduction Development Programme, 2008).

## Key regional dynamics

Injecting drug use remains the primary route of transmission in the region. In many countries, drug users frequently engage in sex work, magnifying the risk of transmission. With increasing transmission among the sexual partners of drug users, many countries in the region are experiencing a transition from an epidemic that is heavily concentrated among drug users to one that is increasingly characterized by significant sexual transmission (Des Jarlais et al., 2009). In addition to new infections associated with injecting drug use and unprotected sex, key informants and scattered media reports suggest that a notable number of new infections may be occurring as a result of unsafe injections in health-care settings.

## Injecting drug users

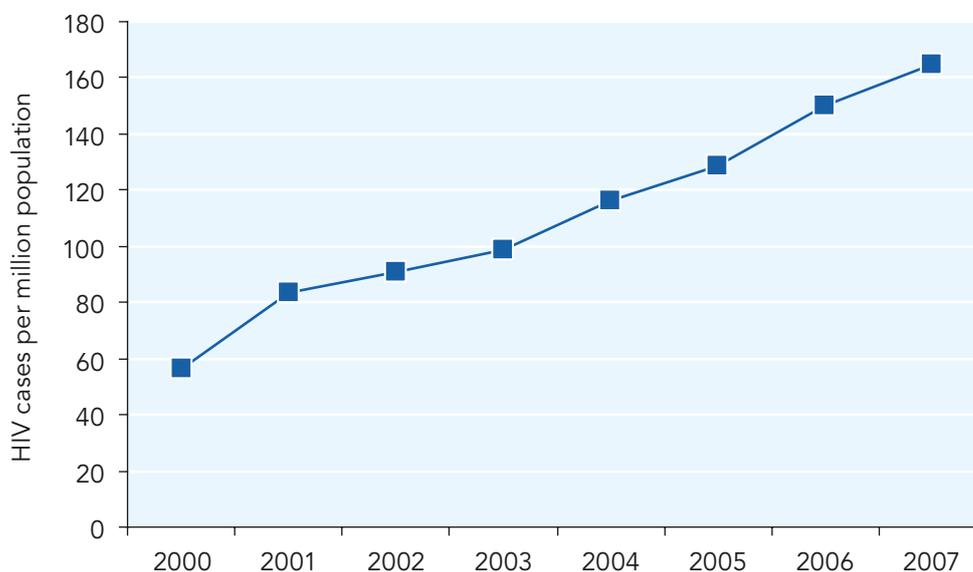
Use of contaminated equipment during injecting drug use was the source of 57% of newly diagnosed cases of HIV infection in Eastern Europe in 2007 (van de Laar et al., 2008). An estimated 3.7 million people in the region currently inject drugs, and roughly one in four are believed to be HIV-infected (Mathers et al., 2008).

Exceptionally high HIV prevalence has been reported in some countries. Between 38.5% and 50.3% of injecting drug users in Ukraine are believed to be living with HIV (Kruglov et al., 2008). In the Russian Federation, 37% of the country's 1.8 million injecting drug users are estimated to be HIV-infected (Mathers et al., 2008).

Evidence indicates that young people account for a considerable number of infections among injecting drug users in the region. In a study involving street youth (aged 15–19) in St. Petersburg, Russian Federation, 37.4% of the

**Figure 14**

**HIV cases per million population in the WHO Eastern Europe region  
by year of notification, 2000–2007**



Note: data from the Russian Federation not included.

Source: Van de Laar et al. (2008).

people surveyed were HIV-infected, with a positive HIV status strongly and independently associated with injecting drugs and sharing needles (Kissin et al., 2007).

Use of contaminated injecting equipment during drug use is an especially efficient means of HIV transmission. In Eastern Europe and Central Asia, this has sometimes resulted in an extremely rapid spread of infection. Whereas HIV infection had not been detected among injecting drug users in Estonia only a decade ago, one recent survey found that 72% of injecting drug users in the country are now HIV-infected (Mathers et al., 2008).

Unsafe injecting practices frequently result in transmission of blood-borne pathogens other than HIV. Hepatitis C prevalence among injecting drug users exceeds 25% in nearly all European countries and reaches as high as 90% (European Monitoring Centre for Drugs and Drug Addiction, 2008). Coinfection with hepatic diseases may increase the complexity of treatment for people living with HIV and may contribute to poorer medical outcomes (Treatment Action Group, 2008).

A package of services collectively known as ‘harm reduction’, which includes needle and syringe programmes, drug treatment, including opioid substitution therapy, antiretroviral therapy access for drug users, and outreach to drug users and their sexual partners, has proven effective in significantly reducing the risk of HIV transmission via injecting drug use (World Health Organization, United Nations Office on Drugs and Crime, UNAIDS, 2009). HIV prevention coverage for injecting drug users remains low in the region. However, scattered progress has been reported in the region in expanding harm reduction services (International Harm Reduction Development Programme, 2008). For example, between 2005 and 2006 the number of sterile syringes distributed through harm reduction programmes per injecting drug user doubled in Estonia, reaching 112 (European Monitoring Centre for Drugs and Drug Addiction, 2008).

### Heterosexual transmission

As most injecting drug users are sexually active—often with non-injecting partners—the existence of a major injection-driven epidemic has inevi-

tably fuelled a growth in heterosexual acquisition of HIV in Eastern Europe and Central Asia (Des Jarlais et al., 2009; Burchell et al., 2008). In Ukraine alone, the number of sexual partners of injecting drug users nationally is estimated to be as high as 552 500 (Kruglov et al., 2008).

In Eastern Europe, heterosexual transmission was the source of 42% of newly diagnosed HIV infections in 2007 (van de Laar et al., 2008). According to a recent study in the Russian Federation, having sex with an injecting drug user increased the odds of acquiring HIV by 3.6 times (Burchell et al., 2008).

As the rate of heterosexual transmission has increased, gender disparities in HIV prevalence are narrowing. In Ukraine, women now represent 45% of all adults living with HIV (Kruglov et al., 2008).

### Sex workers

The common overlap between sex work and injecting drug use further facilitates the spread of HIV in the region. In the Russian Federation, studies indicate that more than 30% of sex workers have injected drugs (UNAIDS, 2008). In Ukraine, available evidence indicates that HIV prevalence among sex workers ranges from 13.6% to 31.0% (Kruglov et al., 2008).

The stigma associated with sex work impedes the delivery of effective prevention and treatment services to this population. Frequently depicted in the popular media as an epidemiological bridge to the general population, sex workers in Eastern Europe and Central Asia are often ostracized and deterred from seeking appropriate services (Beyrer & Pizer, 2007).

### Men who have sex with men

Official surveillance figures suggest that transmission among men who have sex with men is responsible for a relatively small share of new infections in Eastern Europe and Central Asia. In 2007, sex between men accounted for only 0.4% of newly diagnosed infections in Eastern Europe (van de Laar et al., 2008). However, informants in the region fear that official statistics may significantly understate the extent of infection in this highly stigmatized population (UNAIDS, 2009). Serosurveys throughout the region have detected HIV prevalence among men who have sex with men ranging from nil in Belarus, Kazakhstan,

Kyrgyzstan and Lithuania to 5.3% in Georgia (Baral et al., 2007), 6% in the Russian Federation (van Griensven et al., 2009) and between 10% and 23% in Ukraine (Kruglov et al., 2008).

Men who have sex with men not only constitute a priority population itself for prevention interventions but may also serve as an important epidemiological bridge that facilitates further expansion of the epidemic into new populations. Extrapolating from behavioural surveys, researchers estimate that the number of female sex partners of men who have sex with men in Ukraine ranges from 177 000 to 430 000 (Kruglov et al., 2008).

Social exclusion and discriminatory policies and practices hinder efforts to address the epidemic among men who have sex with men. Three Central Asian countries prohibit same-sex activity between consenting adults (Ottooson, 2009). In Eastern Europe, at least six countries have banned public events for the lesbian, gay and bisexual community during the past decade (International Lesbian and Gay Association, 2009). However, three European countries had, as of July 2009, enacted laws to prohibit employment discrimination on the basis of sexual orientation (International Lesbian and Gay Association, 2009).

### Mother-to-child transmission

To date, mother-to-child transmission has played a relatively small role in the epidemic's expansion in Eastern Europe and Central Asia. However, with the rapid growth of sexual transmission, the risk of transmission to newborns may increase. Among previously untested pregnant women admitted to maternity hospitals in St. Petersburg, Russian Federation, 6.5% were found to be HIV-positive (Kissin et al., 2008).

One of the signal achievements in the response to AIDS in the region has been the high coverage achieved of services to prevent mother-to-child transmission. In December 2008, estimated coverage for prevention of mother-to-child transmission in Eastern Europe and Central Asia exceeded 90% (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

### Prisoners

Consistent with international patterns, HIV prevalence in prison settings appears to be significantly higher than in the unincarcerated population in Eastern Europe and Central Asia.

Surveys in the general prison population found HIV prevalence above 10% in several countries, with other countries reporting elevated infection levels among incarcerated injecting drug users (Dolan et al., 2007). According to expert informants in the region, many people living with HIV move repeatedly in and out of prison settings.

In Latvia, estimates suggest that prisoners may comprise a third of the country's total population of people living with HIV (United Nations Office on Drugs and Crime, World Health Organization, UNAIDS, 2008). An

estimated 10 000 prisoners are living with HIV in Ukraine (Kruglov et al., 2008).

In Lithuania, the Russian Federation and Ukraine, studies have documented HIV transmission in prison settings (Dolan et al., 2007). In one correctional setting in Lithuania, injecting drug use was responsible for a large HIV outbreak, with 299 prisoners becoming infected during a four-month period (United Nations Office on Drugs and Crime, World Health Organization, UNAIDS, 2008). Although regional HIV prevention coverage remains inadequate in prison settings, several countries have successfully implemented prison-based harm reduction programmes (United Nations Office on Drugs and Crime, World Health Organization, UNAIDS, 2008).



## CARIBBEAN

Number of people living with HIV	2008: 240 000 [220 000–260 000]	2001: 220 000 [200 000–240 000]
Number of new HIV infections	2008: 20 000 [16 000–24 000]	2001: 21 000 [17 000–24 000]
Number of children newly infected	2008: 2300 [1400–3400]	2001: 2800 [1700–4000]
Number of AIDS-related deaths	2008: 12 000 [9300–14 000]	2001: 20 000 [17 000–23 000]

### Regional overview

Although it accounts for a relatively small share of the global epidemic—0.7% of people living with HIV and 0.8% of new infections in 2008—the Caribbean has been more heavily affected by HIV than any region outside sub-Saharan Africa, with the second highest level of adult HIV prevalence (1.0% [0.9–1.1%]). AIDS-related illnesses were the fourth leading cause of death among Caribbean women in 2004 and the fifth leading cause of death among Caribbean men (Caribbean Epidemiology Centre, 2007).

Although sharp declines in HIV incidence were reported in some Caribbean countries earlier this decade, the latest evidence suggests that the regional rate of new HIV infections has stabilized. An apparent exception to the stability of infection rates is in Cuba, where prevalence is low but appears to be on the rise (de Arazoza et al., 2007).

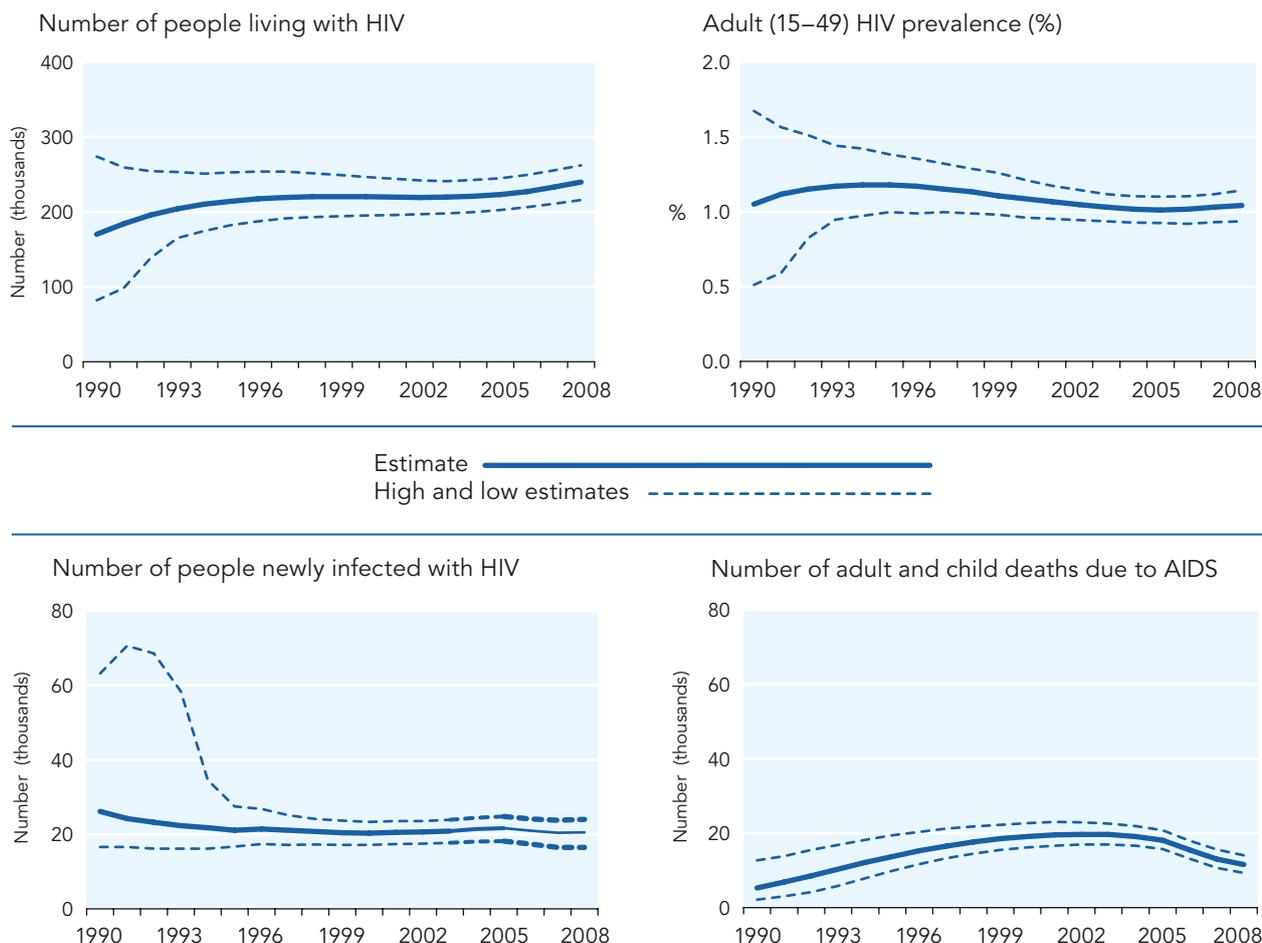
As behavioural data in the region are sparse, it is difficult to determine whether earlier declines in new infections reflected the natural course of the epidemic or the impact of HIV prevention efforts. However, a recent review of epidemiological and

behavioural data in the Dominican Republic concluded that the notable declines in HIV prevalence reported in that country were likely to be due to changes in sexual behaviour, including increased condom use and partner reduction, although the study also highlighted high levels of HIV infection among men who have sex with men (Halperin et al., 2009).

Additional efforts to improve HIV surveillance in the Caribbean are urgently needed in order to obtain a clearer picture of the epidemic and to inform national strategic planning (Garcia-Calleja, del Rio, Souteyrand, 2009). A considerable share (17%) of AIDS cases reported in the Caribbean have no assigned risk category; since many cases are only officially reported long after the diagnosed individual has died, it is often difficult or impossible to carry out epidemiological investigations (Figueroa, 2008).

National HIV burden varies considerably within the region, ranging from an extremely low HIV prevalence in Cuba to a 3% [1.9–4.2%] adult HIV prevalence in the Bahamas (UNAIDS, 2008).

**Figure 15**  
**Caribbean estimates 1990–2008**



Source: UNAIDS/WHO.

The Caribbean has a mixture of generalized and concentrated epidemics.

Women account for approximately half of all infections in the Caribbean. HIV prevalence is especially elevated among adolescent and young women, who tend to have infection rates significantly higher than males their own age (United States Agency for International Development, 2008).

Substantial differences in HIV burden are apparent within many Caribbean countries. There is a nearly sevenfold variation in HIV prevalence between the different regions of the Dominican Republic (Pan American Health Organization, 2008), with HIV prevalence especially elevated in the country’s former sugar plantations (bateyes) (Centro de Estudios Sociales y Demográficos & Measure DHS, 2007). In Haiti, HIV prevalence among pregnant women in 2006–2007 ranged from 0.75% in a sentinel antenatal site in the western part of the country to 11.75% in one urban setting (Gaillard & Eustache, 2007).

In part due to collaborative efforts to reduce the price of medications, the Caribbean region has made important strides towards increasing access to HIV treatment. Whereas only 1 in 10 Caribbean residents in need of treatment were receiving antiretroviral drugs in July 2004 (Pan American Health Organization, 2006), a treatment coverage of 51% had been achieved as of December 2008, a level higher than the global average for low- and middle-income countries (42%) (World Health Organization, United Nations Children’s Fund, UNAIDS, 2009). Paediatric antiretroviral coverage in the Caribbean (55%) was also higher in December 2008 than the global treatment coverage level for children (38%).

### Key regional dynamics

Heterosexual transmission, often tied to sex work, is the primary source of HIV transmission, although emerging evidence indicates that substantial transmission is also occurring among men who have sex with men.

## Heterosexual transmission

The majority of AIDS cases reported in the Caribbean involve heterosexually transmitted infection (Figueroa, 2008). Although it has the region's highest HIV prevalence, Haiti has experienced a notable decline in HIV prevalence since the early 1990s; however, this long-term decline has flattened in recent years (Gaillard & Eastache, 2007). According to a 2004 national behavioural survey in Jamaica, nearly half (48%) of young men (aged 15–24) and 15% of young women had more than one sexual partner in the previous 12 months (National HIV Program, 2008).

Although behavioural data throughout the region are somewhat limited, there is evidence in the Dominican Republic of important changes in sexual behaviour. In particular, signs suggest that the drop in HIV prevalence in that country (Figure 16) may be related to increased condom use and a reduction in multiple partnerships among men (Halperin et al., 2009).

According to 2001 surveys, 2.0% of women in Haiti and 1.8% of women in the Dominican

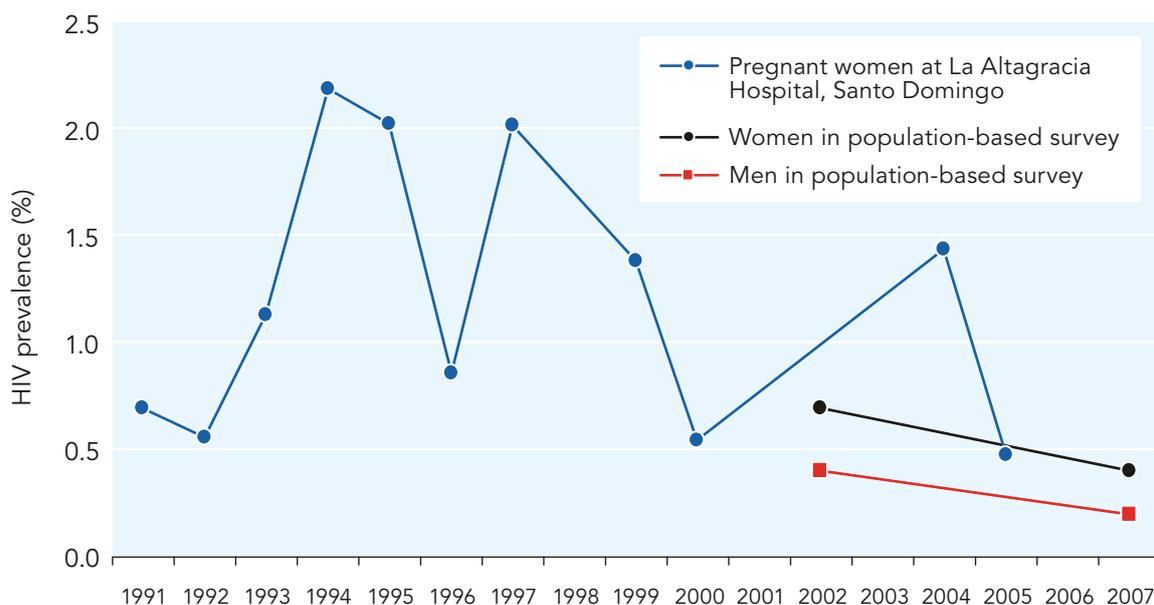
Republic were involved in sex work (Vandepitte et al., 2006). Surveys throughout the Caribbean have identified extremely high infection rates among sex workers—27% in Guyana in 2005 (Presidential Commission on HIV and AIDS, 2008) and 9% in Jamaica in 2005 (National HIV Program, 2008). Civil society monitoring indicates that a relatively small share of external HIV financing in the Caribbean has focused on programmes delivered by sex worker organizations (International HIV/AIDS Alliance, 2009). Although women are believed to account for the vast majority of sex workers in the Caribbean, emerging evidence suggests that male sex workers who sell their services to tourists in the region may also face considerable risks of acquiring HIV (Padilla, 2007).

## Men who have sex with men

Although epidemiological studies involving men who have sex with men are relatively rare in the Caribbean, the few that exist suggest a high burden of HIV infection in this population. A 2006 study in Trinidad and Tobago found that 20.4% of men who have sex with men surveyed were HIV-infected (Baral et al., 2007), while a

Figure 16

HIV prevalence trends among young people (aged 15–24) in the Dominican Republic, 1991–2007



Source: Halperin et al. (2009).

subsequent study in Jamaica found HIV prevalence of 31.8% (Figueroa et al., 2008). Sex between men also appears to be driving an increase in HIV prevalence in Cuba (de Araozza et al., 2007).

Surveys of men who have sex with men in the Dominican Republic found that 11% were living with HIV and that only about half (54%) reported using condoms consistently during anal intercourse with another man (Toro-Alfonso, 2005). The continuing high prevalence of males among people living with HIV in the Dominican Republic, a country previously believed to have an epidemic overwhelmingly characterized by heterosexual transmission, has led researchers to conclude that sexual transmission between men may account for a much larger share of infections than earlier believed (Halperin et al., 2009).

As in many other parts of the world, the stigma associated with homosexuality impedes HIV prevention initiatives in the Caribbean focused on men who have sex with men (Figueroa, 2008). At least nine Caribbean countries criminalize sexual conduct involving members of the same sex (Ottosson, 2009).

### **Injecting drug use**

Transmission during injecting drug use plays a relatively modest role in the epidemic in the Caribbean. However, a notable exception to this pattern is Puerto Rico, where injecting drug use represents the most common transmission route; it accounted for 40% of HIV incidence among

males in 2006 and for 27% of new infections among females (Centers for Disease Control and Prevention, 2009). Puerto Rico, which is a legal territory of the USA, had in 2006 an HIV incidence rate twice as high as in the USA as a whole (Centers for Disease Control and Prevention, 2009).

### **Mother-to-child transmission**

As of December 2008, 52% of HIV-infected pregnant women in the Caribbean were receiving antiretroviral drugs for the prevention of mother-to-child transmission (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). Regional prevention coverage in Caribbean antenatal settings exceeds the global average (45%) and is an improvement over the regional coverage in 2003 (22%). In response to the remaining coverage gaps, United Nations stakeholders joined with regional partners to launch the Caribbean Initiative for the Elimination of the Vertical Transmission of HIV and Syphilis.

### **Prisons**

Relatively little data exist on HIV prevalence in general prison populations in the Caribbean. From information available in three countries (Cuba, Jamaica and Trinidad and Tobago), regional patterns are consistent with those seen internationally, with HIV prevalence among prisoners (ranging from 4.9% in Trinidad and Tobago to 25.8% in Cuba) substantially higher than in the general population (Dolan et al., 2007).



## LATIN AMERICA

Number of people living with HIV	2008: 2 million [1.8 million–2.2 million]	2001: 1.6 million [1.5 million–1.8 million]
Number of new HIV infections	2008: 170 000 [150 000–200 000]	2001: 150 000 [140 000–170 000]
Number of children newly infected	2008: 6900 [4200–9700]	2001: 6200 [3800–9100]
Number of AIDS-related deaths	2008: 77 000 [66 000–89 000]	2001: 66 000 [56 000–77 000]

*In 2008, an estimated 170 000 [150 000–200 000] new HIV infections occurred in the region, bringing the number of people living with HIV to an estimated 2 million [1.8 million–2.2 million].*

### Regional overview

The latest epidemiological data suggest that the epidemic in Latin America remains stable. With a regional HIV prevalence of 0.6% [0.5–0.6%], Latin America is primarily home to low-level and concentrated epidemics.

Substantial new evidence on epidemiological trends in the region, including the first ever modes of transmission analysis for Peru and numerous serosurveys among key populations in Latin America, has been generated over the past two years. As a general rule, however, surveillance systems need to be strengthened in Latin America in order to provide a stronger evidence base for national planning (García-Calleja, del Río, Souteyrand, 2009).

Due in large measure to the prominence in the region's epidemic of sexual transmission between men, the number of HIV-infected men in Latin America is substantially higher than the number

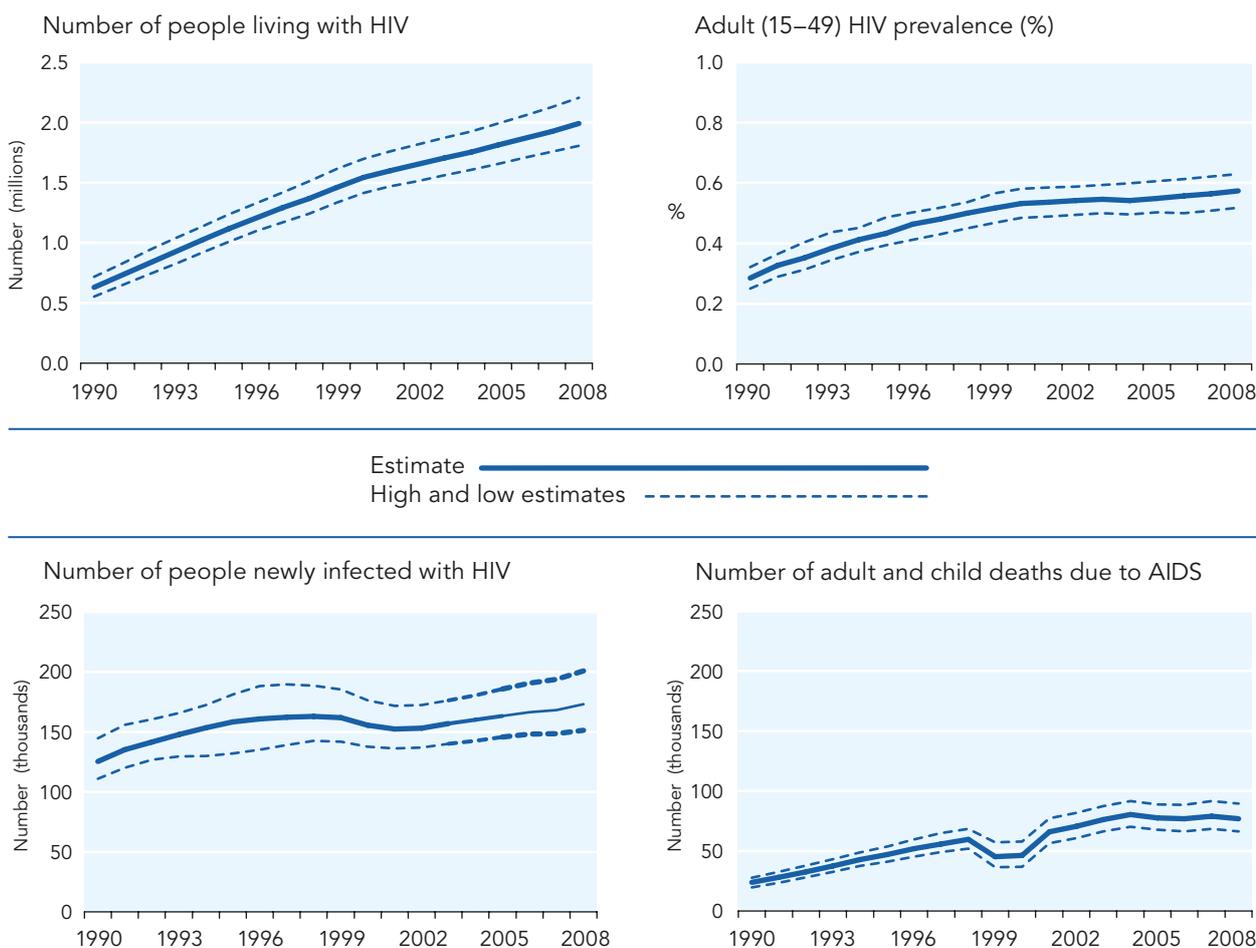
of women living with HIV. For example, in Peru the number of male AIDS cases reported in 2008 was nearly three times higher than the number among females, although this 3:1 differential represents a considerable decline from 1990, when the male:female ratio of AIDS cases approached 12:1 (Alarcón Villaverde, 2009).

### Concerns regarding commitment to HIV prevention

Latin America offers examples of strong leadership on HIV prevention. In particular, Brazil has been noted for its early support for evidence-informed HIV prevention, which analyses suggest helped to mitigate the severity of the country's epidemic (Okie, 2006).

For the region as a whole, however, commitment to evidence-informed HIV prevention has been highly variable. According to one recent analysis, prevention efforts have been hindered

**Figure 17**  
Latin America estimates 1990–2008



Source: UNAIDS/WHO.

by insufficient attention to human rights and sexual health and by inadequate monitoring and evaluation (Cáceres & Mendoza, 2009). Even though national epidemics in Latin America are heavily concentrated among men who have sex with men, injecting drug users and sex workers, only a small fraction of HIV prevention spending in the region supports prevention programmes specifically focused on these populations (UNAIDS, 2008). In recent years, however, Mexico has taken steps to increase funding for prevention services focused on men who have sex with men (UNAIDS, 2008).

### Above-average treatment coverage

Antiretroviral coverage in Latin America (at 54% in 2008) is above the global average, with especially high coverage achieved in several upper-middle-income countries (World Health Organization, United Nations Children’s Fund, UNAIDS, 2009). In general, treatment coverage is higher in South America than in Central America (UNAIDS, 2008).

Studies in various localities in Latin America have correlated treatment scale-up with notable declines in HIV-related mortality (Kilsztajn et al., 2007). The most recent epidemiological estimates confirm these site-specific findings. In 2008, 77 000 [66 000–89 000] AIDS-related deaths in the region occurred—a 5% decline over the HIV-related mortality estimated in 2004.

Consistent with the evolving state of the art of HIV treatment, a growing number of people living with HIV in Latin America are initiating treatment earlier in the course of infection; that is, they are starting treatment when their CD4 count has fallen below 350 cells per cubic millilitre rather than waiting until their CD4 count falls below 200. Earlier initiation of therapy offers the possibility that medical outcomes in the region may improve further still and that reductions in the population-level viral load may yield additional HIV prevention benefits. In Argentina, nearly two thirds (65%) of men who have sex with men surveyed in 2007 said that

they had been tested for HIV in the previous 12 months (Barrón López, Libson, Hiller, 2008).

## Key regional dynamics

Men who have sex with men account for the largest share of infections in Latin America, although there is a notable burden of infection among injecting drug users, sex workers and the clients of sex workers. The HIV burden appears to be growing among women in Central America and among indigenous populations and other vulnerable groups (Bastos et al., 2008). Divergent epidemiological patterns are evident across the region, particularly with regard to the contribution of injecting drug use to national epidemics.

### Men who have sex with men

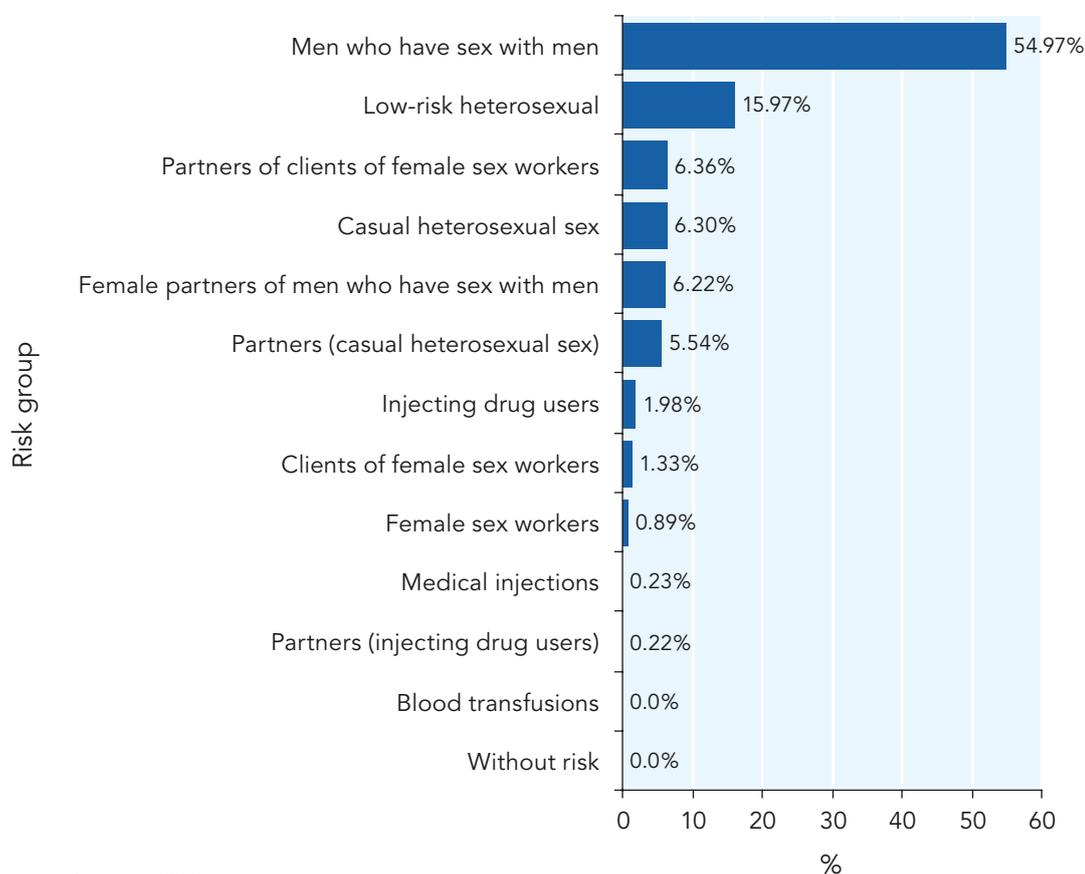
Epidemiologists estimate that men who have sex with men in Latin America have a one in three

chance of becoming infected with HIV (Baral et al., 2007). However, studies point towards substantial variations in HIV prevalence among men who have sex with men among Latin American countries (Cáceres et al., 2008).

Surveys have found HIV prevalence among men who have sex with men ranging from 7.9% in El Salvador to 25.6% in Mexico and prevalence exceeding 10% in 12 out of 14 countries (Baral et al., 2007). Surveys in four cities in Argentina between 2006 and 2008 found that 11.8% of men who have sex with men were HIV-infected (Ministerio de Salud, 2009). A 2009 survey of urban men who have sex with men in Costa Rica determined that 11% of those surveyed were living with HIV (Ministerio de Salud de Costa Rica, 2009). A modes of transmission analysis completed in 2009 determined that men who have sex with men account for 55% of HIV incidence in Peru (Alarcón Villaverde, 2009) (Figure 18).

Figure 18

#### Distribution of HIV incidence by mode of exposure in Peru: estimate for 2010



Source: Alarcón Villaverde (2009).

The rate of new HIV infections appears to be exceptionally high among men who have sex with men. Serosurveys in five Central American countries detected an annual HIV incidence per 100 person-years of 5.1 among men who have sex with men (Soto et al., 2007). Men who have sex with men were 21.8 and 38 times more likely than the general population to be infected in El Salvador and Nicaragua, respectively (Soto et al., 2007). In the Central American region, 39% of men who have sex with men surveyed reported that they do not consistently use condoms with casual partners and only 29% reported having been reached by HIV prevention programmes (Soto et al., 2007).

The limited evidence suggests HIV prevention programmes may be encouraging men who have sex with men to adopt safer behaviours. Among men who have sex with men in El Salvador, condom use during the last episode of sexual intercourse rose significantly between 2004 and 2007, from 70.5% to 82.1% (Population Services International, 2008a). Similarly, men who have sex with men in Argentina were found to have increased condom use between 2004 and 2007 with both stable and casual partners (Barrón López, Libson, Hiller, 2008).

Untreated sexual transmitted infections may be facilitating the spread of HIV among men who have sex with men. In Peru, newly HIV-infected men who have sex with men were roughly four times more likely than their uninfected peers to have syphilis or herpes simplex virus type 2 (HSV-2) (Sanchez et al., 2009). According to sentinel surveillance in Central America, HSV-2 and syphilis are associated with HIV seropositivity (Soto et al., 2007).

As in other regions, the 'men who have sex with men' label covers a wide array of groups with varying sexual identities and socioeconomic status. Many men who have sex with men in Latin America do not identify themselves as homosexual. In El Salvador, which has the highest documented HIV prevalence among men who have sex with men in Central America, 17% of men who have sex with men identify themselves as heterosexual (Soto et al., 2007). In urban settings in Peru, 6.5% of men who said that they only assumed the active role during anal intercourse with other men were HIV-infected (Peinado et al., 2007).

Studies indicate that transgender people in Latin America are often at an extremely high risk of

HIV infection (Cáceres & Mendoza, 2009). In 2006, 34% of transgender people surveyed in Argentina were found to be HIV-infected (Sotelo, Khoury, Muiños, 2006). While another study in 2002–2006 found a somewhat lower HIV prevalence among transgender people tested at a local health facility in Argentina (27.6%), the study confirmed that infection levels among the transgender population are several times higher than among other high-risk individuals who sought testing services at the same facility (Toibaro et al., 2008). A separate survey of transgender people in Argentina in 2007 found that nearly half (46%) reported having more than 200 sexual partners in the previous six months (Barrón López, Libson, Hiller, 2008).

### Injecting drug users

An estimated 29% of the more than 2 million Latin Americans who inject drugs are infected with HIV (Mathers et al., 2008). Epidemics among injecting drug users in Latin America tend to be concentrated in the Southern Cone of South America and in the northern part of Mexico, along the USA border. (As described below in the discussion on heterosexual transmission, there is also substantial evidence of sexual transmission among users of non-injecting drugs.)

A robust grassroots harm reduction movement has long been present in Latin America (Bueno, 2007). Six countries in the region provide various components of harm reduction, although opioid substitution therapy is not widely available (Cook, 2009).

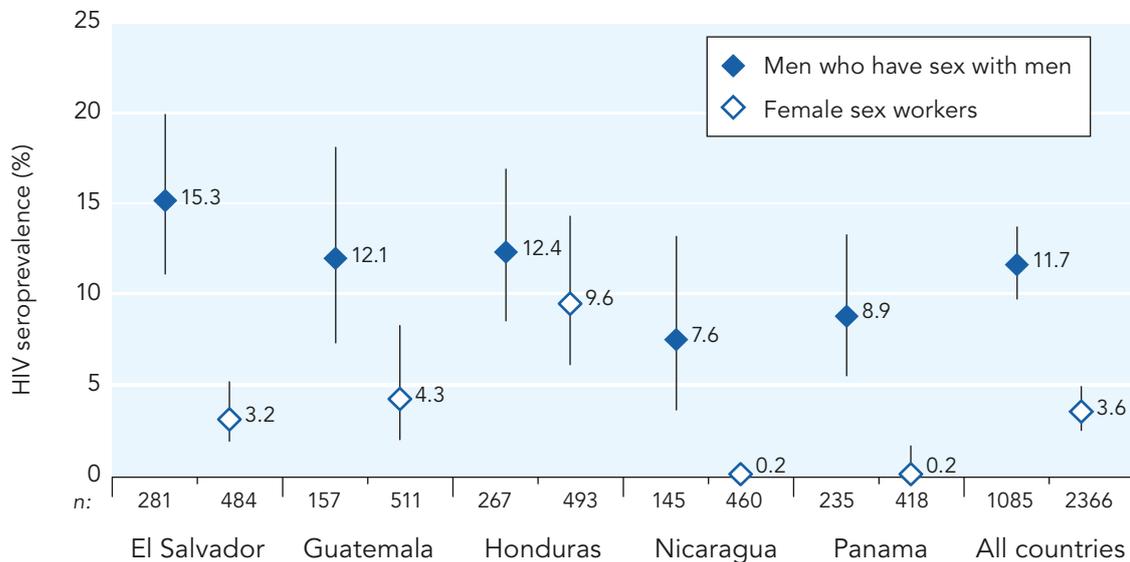
### Sex work

The percentage of the female population engaged in sex work in Latin America varies from 0.2% to 1.5% (Vandepitte et al., 2006). In Peru, 44% of men report having had sex with a sex worker in the past (Cáceres & Mendoza, 2009). Serosurveys in Central America in recent years have detected HIV prevalences among female sex workers of 4.3% in Guatemala and 3.2% in El Salvador (Soto et al., 2007) (Figure 19).

A significant percentage of Central American sex workers are infected with a sexually transmitted infection, with especially high rates reported for HSV-2 (85% HSV-2 seroprevalence among female sex workers in five countries studied) (Soto et al., 2007). While most public health attention has

Figure 19

Estimated HIV-1 seroprevalence and 95% confidence interval for HIV among men who have sex with men and female sex workers by country



Source: Soto et al. (2007).

focused on preventing HIV transmission among female sex workers and their male clients, surveys in Argentina indicate that HIV prevalence is significantly higher among male sex workers (22.8%) than among female sex workers (1.8%) in that country (Ministerio de Salud, 2009).

There is a frequent overlap between sex work and drug use in the region (Strathdee & Magis-Rodriguez, 2008). Cocaine injection and the non-injection use of methamphetamine are independently associated with HIV infection among sex workers in Mexico (Patterson et al., 2008).

Emerging evidence suggests that HIV prevention efforts may be having an impact among sex workers in Latin America. A five-clinic survey of female sex workers in Santiago, Chile, detected no HIV infections; sex workers reported always using condoms with clients (93.4%), although consistent condom use with steady partners was rare (9.9%) (Barrientos et al., 2007). A recent study in Guatemala found that a multilevel intervention focused on female sex workers resulted in a more than fourfold decline in HIV incidence in the population, as well as a significant increase in consistent condom use (Sabido et al., 2009). In

El Salvador, the rate of sex workers' condom use with non-paying partners increased nearly four-fold between 2004 and 2007 (Population Services International, 2008b).

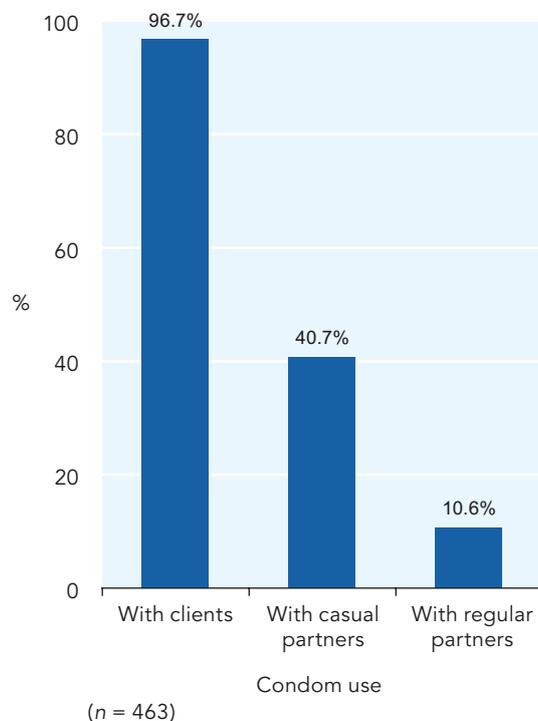
As in other regions, surveys in Latin America suggest that sex workers are more likely to use condoms with clients than with casual or regular partners. A 2008 survey of more than 460 sex workers in Honduras found that while 96.7% reported consistent condom use with clients, frequency of condom use declined to 40.7% with casual partners and to 10.6% with regular partners (Secretaria de Salud Honduras, 2008) (Figure 20).

### Heterosexual transmission

Although heterosexual transmission outside sex work has thus far played a somewhat limited role in Latin America's epidemic, the risk of further spread of infection is present. More than one in five (22%) men who have sex with men surveyed in five Central American countries reported having sex with both men and women (Soto et al., 2007). Surveys in Peru suggest that non-homosexually-identified men who only assume the active role during anal intercourse with other men may

**Figure 20**

Condom use among female sex workers who attend VICITS (Vigilancia Centinela de ITS) in Tegucigalpa, San Pedro Sula and La Ceiba, Honduras, in 2008



Source: Secretaria de Salud Honduras (2008).

often expose their female sexual partners to HIV (Peinado et al., 2007). In Peru, the female sexual partners of men who have sex with men account for an estimated 6% of HIV incidence (Alarcón Villaverde, 2009).

As epidemics mature, the extent of heterosexual HIV transmission often increases. According to the 2009 modes of transmission study in Peru, various forms of heterosexual transmission account for 43% of new HIV infections in that country, with 16% of all infections stemming from so-called 'low-risk' sexual activity (Alarcón Villaverde, 2009). In the Southern Cone of South America, the early establishment of HIV among networks of injecting drug users has since given rise to increasing transmission among low-income heterosexuals (Bastos et al., 2008).

In Argentina, a survey of 504 non-injecting cocaine users found that 6.3% were HIV-infected, with infection significantly associated with having had a sexual partner who was either an injecting drug user or known to be HIV-positive (Rossi et al., 2008). More than 40% of HIV-infected

non-injecting cocaine users in Argentina were reactive for antibodies to the hepatitis C virus (Rossi et al., 2008).

Individuals with lower educational levels in Latin America especially tend towards early initiation of sexual activity, which potentially increases their risk of HIV acquisition (Bozon, Gayet, Barrientos, 2009). In Bolivia (Plurinational State of), males with post-secondary educational levels are nearly three times more likely to use a condom during sex with a non-cohabiting partner than their counterparts with only a primary education (Bolivian Ministry of Health, Macro International, Measure DHS, 2008). In Honduras, surveys among the ethnic minority Garífuna community found low levels of condom use, elevated levels of HIV infection (4.5%) and extremely high prevalence (51%) of HSV-2 (Paz-Bailey et al., 2009).

### Mother-to-child transmission

An estimated 6900 [4200-9700] children under the age of 15 were newly infected with HIV in Latin America in 2008. As of December 2008,

54% of HIV-infected pregnant women in the region were receiving antiretroviral drugs to prevent transmission to their newborns, compared with the global coverage of 45% (World Health Organization, United Nations Children's Fund, UNAIDS, 2009); in 2004 the coverage was 23%.

### Mobile populations

Cross-border migration between Mexico and the USA may be having a considerable effect on Mexico's HIV epidemic. Male injecting drug users in Tijuana who had been deported from the USA were more than four times more likely to be living with HIV than male injecting non-deportees (Strathdee et al., 2008). In the southern Mexican states of Michoacán and Zacatecas, where significant numbers of residents travel to the USA for work, more than one in five AIDS cases are among individuals who resided in the USA (Strathdee & Magis-Rodriguez, 2008). Almost 50% of men who have sex with men in Tijuana (Mexico) report having male partners from the USA, while three quarters

of their peers in nearby San Diego (USA) report having sex with Mexican men (Strathdee & Magis-Rodriguez, 2008). A survey of more than 1500 Mexican individuals who had spent time in the USA found that migrants had more sexual partners and used more non-injecting drugs than non-migrants, but migrants also reported higher rates of condom use and HIV testing (Magis-Rodriguez et al., 2009).

### Prisoners

Documented HIV prevalence in the general prison population exceeds 10% in at least two Latin American countries (Argentina and Brazil) (Dolan et al., 2007). In a survey of non-injecting cocaine users in Argentina, HIV infection was significantly associated with previous imprisonment (Rossi et al., 2008). Harm reduction programmes are not widely available in prison settings in Latin America (Cook, 2009), although a number of countries are considering the implementation of prevention programmes in prisons.



## NORTH AMERICA AND WESTERN AND CENTRAL EUROPE

Number of people living with HIV	2008: 2.3 million [1.9 million–2.6 million]	2001: 1.9 million [1.7 million–2.1 million]
Number of new HIV infections	2008: 75 000 [49 000–97 000]	2001: 93 000 [76 000–110 000]
Number of children newly infected	2008: <500 [<200–<500]	2001: <500 [<200–<500]
Number of AIDS-related deaths	2008: 38 000 [27 000–61 000]	2001: 27 000 [18 000–42 000]

*In 2008, 75 000 [49 000–97 000] new HIV infections occurred in North America and Western and Central Europe combined, bringing the total number of people living with HIV in these regions to 2.3 million [1.9 million–2.6 million].*

### Regional overview

Progress in reducing the number of new HIV infections has stalled in high-income countries. Between 2000 and 2007, the rate of newly reported cases of HIV infection in Europe nearly doubled (van de Laar et al., 2008). In 2008, the Centers for Disease Control and Prevention (USA) estimated that annual HIV incidence has remained relatively stable in the USA since the early 1990s, although the annual number of new HIV infections in 2006 (56 300) was approximately 40% greater than previously estimated (Hall et al., 2008a). In Canada, official epidemiological estimates suggest that annual HIV incidence may have increased between 2002 and 2005 (Public Health Agency of Canada, 2007).

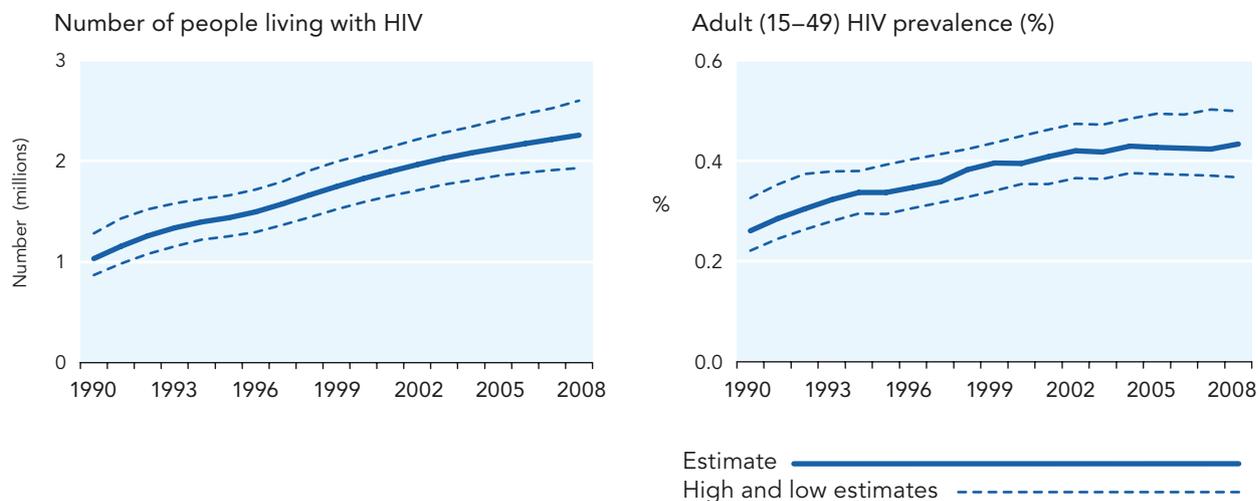
### Evolving epidemics

In North America and in Western and Central Europe, national epidemics are concentrated among key populations at higher risk, especially men who have sex with men, injecting drug users and immigrants. Within these regions, the rates of new HIV infections appear to be highest in the USA (Hall et al., 2008a) and Portugal (van de Laar et al., 2008).

Although HIV incidence has either remained relatively stable or increased slightly in high-income countries in recent years, epidemiological patterns have evolved considerably. In particular, evidence indicates that the number of new HIV infections among men who have sex with men

Figure 21

## North America and Western and Central Europe estimates 1990–2008



Source: UNAIDS/WHO.

has increased in the past decade, while rates of new infections among injecting drug users have fallen.

Racial and ethnic minorities are more heavily affected by the epidemic than other populations in many countries. Although African-Americans represent 12% of the population of the USA, they accounted for 46% of HIV prevalence (Centers for Disease Control and Prevention, 2008a) and 45% of HIV incidence in 2006 (Hall et al., 2008a). African-American males in the USA have a lifetime risk of HIV seroconversion that is 6.5 times higher than that for Caucasian males, while African-American females are 19 times more likely than their Caucasian counterparts to become infected (Hall et al., 2008b). In Canada, aboriginal people were seven times more likely to receive an AIDS diagnosis in 2005 than Caucasian people (Hall et al., 2009).

Men outnumber women in both HIV prevalence and incidence by more than 2:1 in North America and in Western and Central Europe. Males accounted for 73% of estimated new HIV infections in the USA in 2006 (Centers for Disease Control and Prevention, 2008b). HIV incidence among women has remained relatively stable since the early 1990s (Hall et al., 2008a).

Females account for 31% of new HIV diagnoses in Europe (van de Laar et al., 2008) and for 24% of new infections in Canada (Public Health Agency of Canada, 2007).

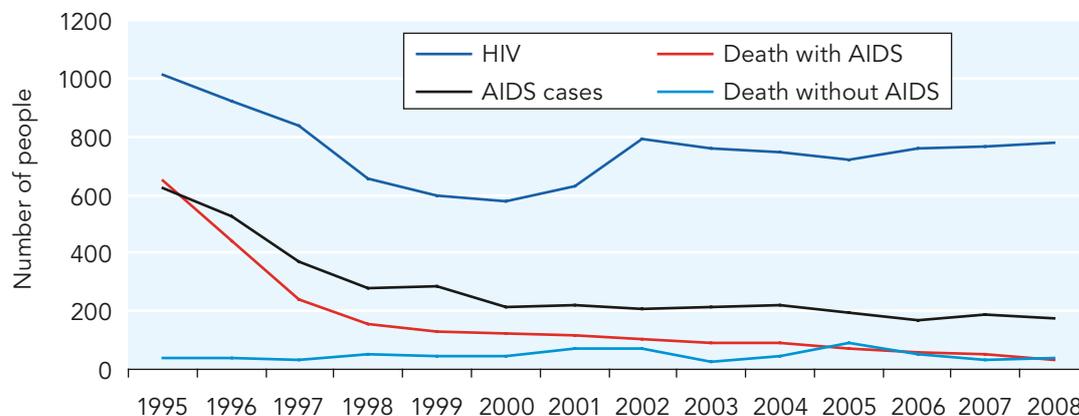
### Benefits of antiretroviral therapy

Epidemiological data in high-income countries continue to reflect the extraordinary medical benefits of antiretroviral therapy. In the USA, the number of AIDS-related deaths in 2007 (14 581) (Centers for Disease Control and Prevention, 2009) was 69% lower than in 1994 (47 100) (Centers for Disease Control and Prevention, 1996). In Switzerland, the drop in AIDS-related deaths has been even sharper, dropping from more than 600 in 1995 to less than 50 in 2008 (Federal Office of Public Health, 2009) (Figure 22). According to the multicountry CASCADE study in Europe, Australia and Canada, mortality rates among people living with HIV in the first five years after infection now approach those in the HIV-uninfected population, although excess mortality among HIV-infected people increases with the duration of infection (Bhaskaran et al., 2008).

A modelling exercise tested against the available epidemiological evidence tracked the steady rise

Figure 22

## Yearly number of new HIV and AIDS cases and related deaths in Switzerland, 1995–2008



Source: Federal Office of Public Health (2009).

in antiretroviral drug utilization in the United Kingdom. More than a decade after antiretroviral therapy was introduced in the country, 49% of all people living with HIV were on antiretroviral therapy, with no appreciable increase observed in the number of patients with virologic failure or resistance to the three original classes of antiretroviral drugs (Phillips et al., 2007).

### The challenge of late diagnosis

Further progress in reducing HIV-related mortality in high-income countries is likely to require greater success in encouraging timely diagnosis of HIV infection. An estimated 21% of people living with HIV in the USA (Centers for Disease Control and Prevention, 2008a), and 27% in Canada (Public Health Agency of Canada, 2007), are unaware of their HIV status. In the United Kingdom, nearly one third (31%) of people diagnosed with HIV in 2007 had fewer than 200 CD4/mm<sup>3</sup> within three months of their diagnosis (Health Protection Agency, 2008a). For Europe as a whole, the percentage of people living with HIV who are diagnosed late in the course of infection ranges from 15% to 38% (Adler, Mounier-Jack, Coker, 2009). In the USA in 2006, 36% of people diagnosed with HIV received an AIDS diagnosis within 12 months (Centers for Disease Control and Prevention, 2009), while 33% of an HIV-infected cohort in

France were classified as ‘late testers’ (Delpierre et al., 2007). In France, the USA and the United Kingdom, people with heterosexually acquired HIV infection are most likely to be diagnosed late in the course of infection (Delpierre et al., 2007; Centers for Disease Control and Prevention, 2009; Health Protection Agency, 2008), while in Switzerland being non-Caucasian was associated with late diagnosis (Wolbers et al., 2008).

Studies indicate that undiagnosed infection facilitates ongoing HIV transmission and increases susceptibility to early mortality among people living with HIV. The Centers for Disease Control and Prevention estimates that people who are unaware of their HIV-positive status are responsible for up to 70% of new HIV infections in the USA; individuals who are unaware of their HIV infection are 3.5 times more likely to transmit the virus to others than those who know about their infection (Marks, Crepaz, Janssen, 2006). In New York City, individuals who were diagnosed with AIDS within three months of testing HIV-positive were more than twice as likely to die within four months of their diagnosis as patients with an earlier HIV diagnosis (Hanna et al., 2008).

Many people diagnosed late in the course of infection were never offered an HIV test prior

to their diagnosis, notwithstanding their frequent visits to health-care settings. Even though HIV prevalence among African-American residents of Washington, DC, may be as high as 5%, nearly half (49%) of sexually active African-Americans who saw a health-care provider in the previous year were not offered an HIV test (Washington DC Department of Health, George Washington School of Public Health and Health Services, 2008). Among African-American and Hispanic men who have sex with men surveyed at nine gay pride events in the USA in 2004–2006, 74% reported having visited a health facility but only 41% were offered an HIV test (Dowling et al., 2007).

With the aim of increasing the percentage of people who receive a timely diagnosis of HIV, the Centers for Disease Control and Prevention now recommends routine voluntary HIV testing in all health-care settings unless the patient expressly opts not to be tested (Centers for Disease Control and Prevention, 2006). Several other countries have taken steps to streamline the process of informed consent in order to increase testing uptake.

## Key regional dynamics

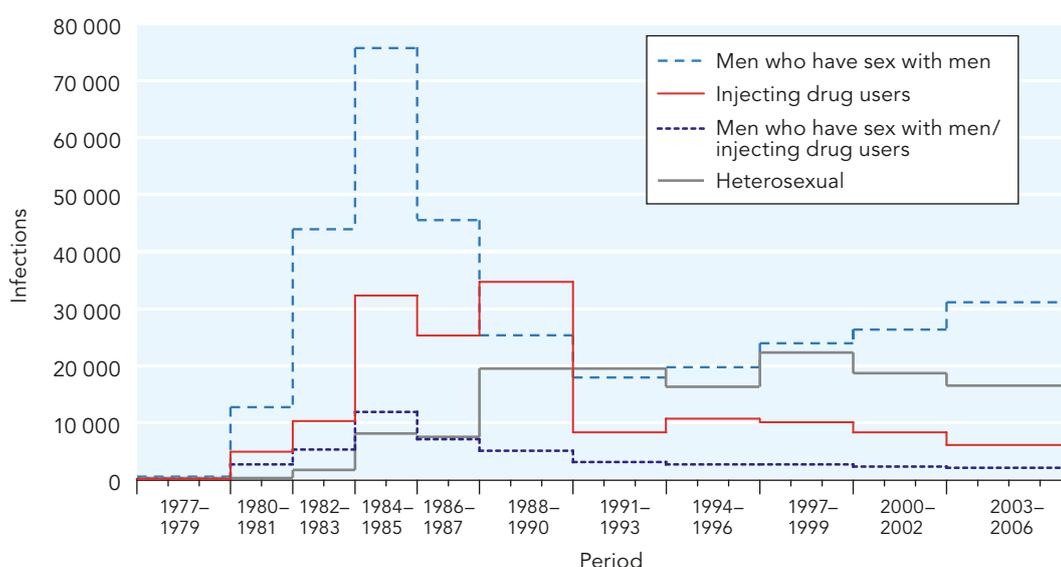
Epidemics tend to be quite diverse in most European and North American countries. A clear trend towards increased transmission among men who have sex with men is apparent in many countries.

### Men who have sex with men

Sex between men represents the dominant mode of transmission in North America and the European Union. A re-emergence of the epidemic among men who have sex with men is now clearly apparent in many high-income countries. While the rate of HIV notifications among men who have sex with men in North America, Western Europe and Australia fell by 5.2% in 1996–2000, it rose by an annual rate of 3.3% between 2000 and 2005. In the USA, the rate of new HIV infections among men who have sex with men has steadily increased since the early 1990s, rising by more than 50% between 1991–1993 and 2003–2006 (Hall et al., 2008a) (Figure 23). HIV diagnoses among men who have sex with men in the United Kingdom rose by

Figure 23

Estimated new HIV infections by transmission category, extended backcalculation model, 50 US states and the District of Columbia, 1977–2006



Tick marks denote the beginning and end of a year. The model specified periods within which the number of HIV infections was assumed to be approximately constant.

Source: Hall et al. (2008a).

74% between 2000 and 2007 (Health Protection Agency, 2008b). In Europe overall, the number of HIV reports among men who have sex with men increased by 39% between 2003 and 2007 (van de Laar et al., 2008). Similar trends have been observed in Canada (Public Health Agency of Canada, 2007).

The resurgence in HIV among men who have sex with men in high-income countries is tied to an increase in sexual risk behaviours. In Denmark, the percentage of men who have sex with men who engaged in unsafe sex (i.e. unprotected anal sex with a partner of unknown or different HIV serostatus) rose from 26–28% in 2000–2002 to 33% in 2006 (Cowan & Haff, 2008). In several high-income countries, sharp increases in diagnoses of sexually transmitted infections other than HIV have been reported among men who have sex with men (Health Protection Agency, 2008b; Centers for Disease Control and Prevention, 2008c).

### Heterosexual transmission

The role of heterosexual transmission varies notably among national epidemics in high-income countries. While heterosexual HIV transmission accounted for 29% of newly diagnosed cases of HIV infection in Western Europe, it represented a majority (53%) of new HIV diagnoses in Central Europe (van de Laar et al., 2008). In the USA, the number of new heterosexually acquired HIV infections levelled off in the 1990s after increasing steeply in the 1980s; in 2006, heterosexual transmission accounted for slightly more than one in three new HIV infections (Hall et al., 2008a).

### Injecting drug users

The role of injecting drug use in national epidemics in Europe and North America has dramatically declined over the course of the epidemic. Although more than 30 000 injecting drug users became infected annually with HIV in 1984–1986 in the USA, fewer than 10 000 contracted HIV in 2006 (Hall et al., 2008a). In 2007, injecting drug users accounted for 8% and 13% of new HIV diagnoses in Western and Central Europe, respectively (van de Laar et al., 2008).

In countries that have invested heavily in harm reduction programmes, reductions in drug-related HIV transmission have been especially pronounced. In Switzerland, where transmission during injecting drug use accounted for a majority of HIV diagnoses in the late 1980s (Federal Office of Public Health, 2008), this mode of transmission accounted for only 4% of new HIV infections in 2008 (Federal Office of Public Health, 2009). Similarly, injecting drug users accounted for 5% of new infections in the Netherlands in 2007 (van den Broek et al., 2008).

The disproportionate risk of death experienced by injecting drug users in some settings may also help to explain the documented declines in HIV prevalence among drug users. While accounting for 20.9% of people with diagnosed HIV infection in New York City in 2007, injecting drug users accounted for 38.1% of all deaths among HIV-diagnosed individuals (New York City Department of Health and Mental Hygiene, 2008).

### Mother-to-child transmission

Implementation of measures to prevent mother-to-child HIV transmission has virtually eliminated this source of infection in Europe. No new HIV infections due to mother-to-child transmission were reported in the Netherlands in 2007 (van den Broek et al., 2008) or in Switzerland in 2008 (Federal Office of Public Health, 2008). In the United Kingdom, perinatally exposed infants accounted for 1.4% of new HIV infections in 2007 (Health Protection Agency, 2008a). For Europe as a whole, the share of new HIV infections among newborns approaches nil (van de Laar et al., 2008).

Similar, although somewhat more modest, declines in HIV incidence among infants have been reported in North America. In Canada, the HIV infection rate among perinatally exposed infants fell from 22% in 1997 to 3% in 2006 (Public Health Agency of Canada, 2007). In 25 states in the USA with longstanding HIV infection reporting systems, the number of annual HIV diagnoses among infants dropped from 130 in 1995 to 64 in 2007 (Centers for Disease Control and Prevention, 2009). In New York City, the number of newly diagnosed infants

fell from 370 in 1992 to 20 in 2005 (New York City Department of Health and Mental Hygiene, 2007).

### **Prisoners**

Evidence has long indicated that HIV prevalence among prisoners is higher than among the general population. Whereas overall adult HIV prevalence in the USA is 0.6% (UNAIDS, 2008), 1.6% of males and 2.4% of females incarcerated in federal and state prison facilities in 2006 were living with HIV (Maruschak, 2006). In prison facilities in New York State, 12.2% of female inmates and 6.0% of male inmates were living with HIV in 2006 (Maruschak, 2006).

### **Mobility**

People who acquired HIV infection in their countries of origin before migrating to a high-income country account for a considerable share of the epidemic in Europe and North America. Of the 4260 people who were newly diagnosed with HIV in the United Kingdom in 2007 and who acquired the virus heterosexually, an estimated 77% were believed to have become infected outside the UK (Health Protection Agency, 2008a). Individuals who were originally from countries with a generalized epidemic accounted for approximately 17% of new HIV diagnoses in Europe in 2007 (van den Broek et al., 2008).



## MIDDLE EAST AND NORTH AFRICA

Number of people living with HIV	2008: 310 000 [250 000–380 000]	2001: 200 000 [150 000–250 000]
Number of new HIV infections	2008: 35 000 [24 000–46 000]	2001: 30 000 [23 000–40 000]
Number of children newly infected	2008: 4600 [2300–7500]	2001: 3800 [1900–6400]
Number of AIDS-related deaths	2008: 20 000 [15 000–25 000]	2001: 11 000 [7800–14 000]

*In 2008, an estimated 35 000 [24 000–46 000] people in the Middle East and North Africa became infected with HIV, and 20 000 [15 000–25 000] AIDS-related deaths occurred. The total number of people living with HIV in the region at the end of 2008 was estimated to be 310 000 [250 000–380 000].*

### Regional overview

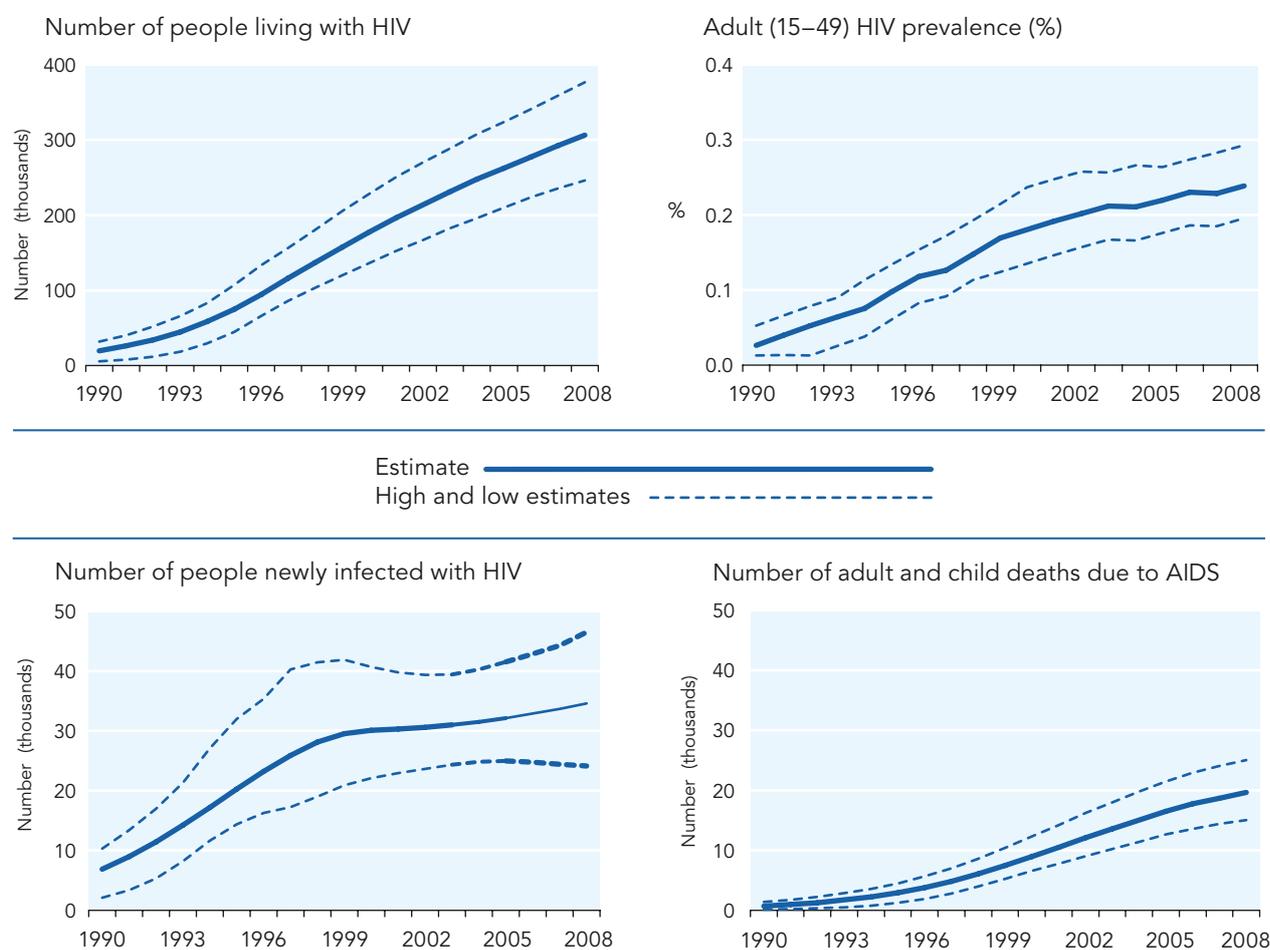
An acute shortage of timely and reliable epidemiological and behavioural data has long hindered a clear understanding of HIV-related dynamics and trends in the Middle East and North Africa. Although several countries have taken steps to improve HIV information systems, passive reporting remains the primary mechanism for obtaining evidence on epidemiological and behavioural trends in the region (Shawky et al., 2009). In the absence of strategic information about the region, various theories about the status of the epidemic in the Middle East and North Africa have been put forward. While some have asserted that cultural values in the region provide a sort of ‘immunity’ against HIV, others have asserted that substantial HIV transmission is occurring but is unrecorded.

A recent detailed review of available HIV-related data demonstrates that neither ‘cultural immunity’ nor an out-of-control epidemic describes the situation with regard to HIV in the Middle East and North Africa (Abu-Raddad et al., 2008). Although no country in the region is likely to experience an epidemic comparable with the most heavily affected countries of sub-Saharan Africa, current trends underscore the need for a substantial strengthening of AIDS responses in the region.

The review highlights the urgent need to address the pervasive weakness of ongoing monitoring efforts in the region. Integrated biobehavioural surveys should be conducted regularly among priority populations and the results should be monitored over time. These studies should be complemented by research to estimate the size and distribution of priority populations.

Figure 24

## Middle East and North Africa estimates 1990–2008



Source: UNAIDS/WHO.

In a region where people between the ages of 15 and 24 represent one fifth of the total population, multicentre studies of vulnerable youth are needed (Abu-Raddad et al., 2008). In Egypt, more than 95% of street children surveyed in 2006 reported regularly engaging in sexual behaviour (Shawky et al., 2009).

Egypt's experience in improving HIV-related information provides useful guidance on the value of strengthening surveillance systems. By undertaking biobehavioural studies of street children, female sex workers, men who have sex with men and injecting drug users (Figure 25), Egypt found that 6.4% of high-risk males and 14.8% of high-risk females were HIV-infected in 2006 (Shawky et al., 2009). The survey also detected behavioural patterns that indicate possible epidemiological bridges between key groups and the general population and generated critical evidence to inform

the development and implementation of public health policies (Shawky et al., 2009).

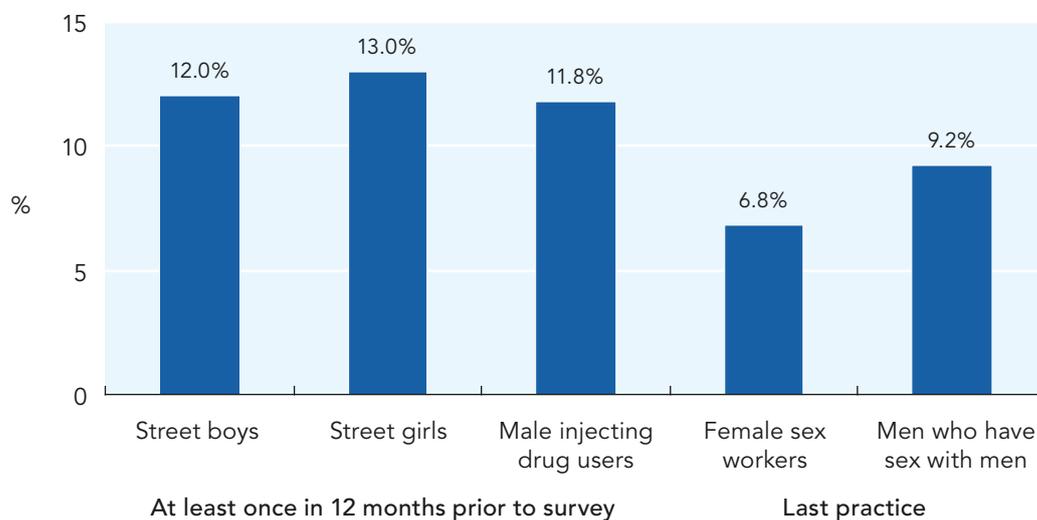
### Low but increasing HIV prevalence

Throughout most of the region HIV prevalence remains low. Exceptions to this general rule are evident in Djibouti and southern Sudan, where HIV prevalence among pregnant women now exceeds 1%. However, even in settings where overall HIV prevalence is low, discrete populations are often heavily affected by the epidemic (Abu-Raddad et al., 2008).

At least two broad epidemiological patterns are contributing to the spread of HIV in countries of the Middle East and North Africa. First, many people in the region are contracting HIV while living abroad, often exposing their sexual partners to infection upon their return to their home country. The second epidemic driver is transmis-

**Figure 25**

Percentage of condom use as reported by street children, male injecting drug users, female sex workers and men who have sex with men in Egypt



Source: Shawky et al. (2009).

sion within key populations, which may also result in ongoing transmission to sexual partners. Intensified prevention efforts are needed for the female sexual partners of men who are exposed to HIV during work abroad, drug use, sex with another man or sex with a sex worker. A related issue, although one that often manifests itself outside the region, involves the large number of South Asian men who are guest workers in the Middle East and North Africa—aneecdotal information suggests that guest workers often risk becoming infected through contact with sex workers in the region, eventually returning home to South Asia.

### Stronger AIDS responses needed

In most parts of the region, the AIDS response remains weak. With 14% of people in need of treatment receiving antiretroviral drugs in 2008, treatment coverage in the Middle East and North Africa was less than half the global average for low- and middle-income countries (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). Moreover, the pace of service expansion is slower in the Middle East and North Africa than in other regions. While global antiretroviral coverage increased more than

fourfold between 2004 and 2008, a more modest expansion was reported in North Africa and the Middle East, with coverage rising from 11% to 14% in the same four-year period (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Some progress has been reported in promoting knowledge of HIV serostatus, although the number of people tested remains low. Between 2007 and 2008, the number of people receiving HIV counselling and testing in Yemen increased 18-fold—from 121 to 2176 (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). In Morocco there was a 24-fold rise in the number of people tested between 2001 and 2007—from 1500 to 35 458 (Morocco Health Ministry, 2008).

### Key regional dynamics

Epidemics in the Middle East and North Africa are typically concentrated among injecting drug users, men who have sex with men, and sex workers and their clients. Exceptions to this general pattern are Djibouti and southern Sudan, where transmission is also occurring in the general population.

## Injecting drug use

Nearly one million people are believed to inject drugs in the Middle East and North Africa region, which is a region that plays an important role in the global drug trade (Abu-Raddad et al., 2008). Elevated levels of HIV infection have been detected in networks of drug users in several countries, including mid-range prevalence estimates among injecting drug users of 11.8% in Oman, 6.5% in Morocco, 2.9% in Israel, 2.6% in Egypt and 2.6% in Turkey (Mathers et al., 2008). National HIV prevalence estimates for injecting drug users tend to be somewhat lower than the figures yielded by surveys in specific localities (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Data from the available surveys indicate that the sharing of injecting equipment is common among drug users in the region. In most countries in the Middle East and North Africa, most injecting drug users are infected with hepatitis C. Most injectors are sexually active, but the level of HIV-related knowledge is highly variable among drug users in the region (Abu-Raddad et al., 2008).

Information on service coverage for harm reduction programmes for injecting drug users in the region is limited. According to information provided to WHO in 2009, at least two countries in the region (Morocco and Oman) offer needle and syringe programmes, while Oman also provides opioid substitution therapy (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). Most harm reduction programmes in the region are limited to small pilot projects (Iranian National Center for Addiction Studies, 2008). Morocco reports that 53% of injecting drug users surveyed reported using sterile equipment the last time they injected, although only 13% said they used a condom during their most recent episode of sexual intercourse (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). Few countries in the region have formally implemented comprehensive harm reduction efforts.

## Men who have sex with men

Although as common as in other regions, sexual contact between men is highly stigmatized in the Middle East and North Africa (Abu-Raddad et al., 2008). Most countries in the region criminalize same-sex activity between consenting

adults, either through formal statutes or through the application of sharia laws that mandate death by stoning for individuals who engage in sodomy (Ottosson, 2009).

Epidemiological surveys of men who have sex with men are relatively rare in the Middle East and North Africa, although available evidence suggests that this population is heavily affected by the epidemic. In Sudan, 9.3% of men who classified themselves as receptive sexual partners of other men were found to be HIV-infected, with a somewhat lower prevalence (7.8%) reported among 'active' men who have sex with men (van Griensven et al., 2009). In Egypt, 6.3% of men who have sex with men surveyed in 2006 were living with HIV (Shawky et al., 2009). Using diverse methodological approaches, Morocco estimates that 4% of men who have sex with men are HIV-infected, while Lebanon estimates an HIV prevalence of 1% in this population (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Available evidence indicates that many men who have sex with men in the Middle East and North Africa also have sex with women (Abu-Raddad et al., 2008). Only 15% of men who have sex with men in Jordan reported using a condom during their most recent episode of anal intercourse with a male partner (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). According to surveys, a significant percentage of men who have sex with men also inject drugs and use non-injecting drugs (Abu-Raddad et al., 2008). Forty-two per cent of men who have sex with men in Egypt reported sexual relations with at least one sex worker (Shawky et al., 2009).

Although there is evidence that some countries in the region have awakened to the epidemic's inroads among men who have sex with men, service coverage estimates for this population are limited. According to reports to WHO, 13% of men who have sex with men in Jordan are currently reached by prevention services (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

## Sex work

Most studies in the Middle East and North Africa have failed to detect high levels of HIV infection among female sex workers. However, surveys of bar-based female sex workers in Djibouti

have found HIV prevalence rates as high as 26%, while HIV prevalence among sex workers in Yemen has ranged from 1.3% to 7% in multiple studies (Abu-Raddad et al., 2008). In Egypt, 0.8% of female sex workers surveyed in 2006 were HIV-infected (Shawky et al., 2009). Using variable monitoring approaches, national informants in Algeria, Morocco and Yemen estimate that, respectively, 3.9%, 2.1% and 1.6% of their national populations of female sex workers are infected with HIV (World Health Organization, United Nations Children's Fund, UNAIDS, 2009). According to limited data supplied by countries in 2009, the percentage of sex workers who report having used a condom during the most recent episode of intercourse with a client ranged from 44.4% in Jordan to 61.1% in Yemen (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

Only limited evidence exists regarding HIV transmission to sex workers' male clients, who may subsequently expose their wives or other female sex partners to the virus. Some experts have suggested that the near universal circumcision of males in the region may slow the potential secondary spread of infection from male clients to their primary female partners (Abu-Raddad et al., 2008). However, an earlier study of 410 people living with HIV in Saudi Arabia found that 90% of males with heterosexually acquired HIV became infected as a result of intercourse with a female sex worker (Abdulrahman, Halim, Al-Abdely, 2004). Information on HIV prevention service coverage for sex workers is not available from most countries in the region.

### **Mother-to-child transmission**

In 2008, 4600 [2300–7500] children became newly infected with HIV in the region. Prevention

coverage in antenatal settings remains virtually non-existent in the region, with regional coverage below 1% as of December 2008 (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

### **Prisons**

The limited evidence indicates that prisoners experience significantly higher levels of HIV infection than the general population in the region. HIV prevalence among the general prison population reportedly exceeds 10% in Yemen, with elevated HIV prevalence reported among drug-using prison inmates in the Islamic Republic of Iran and the Libyan Arab Jamahiriya (Dolan et al., 2007). In Morocco, HIV prevalence among prisoners fell by half between 2002 and 2007, from 1.2% to 0.6% (Morocco Health Ministry, 2008).

### **Blood safety**

Transmission resulting from blood transfusions, organ transplants or renal dialysis accounts for a considerable percentage of HIV prevalence in the region. In Egypt, 6.2% of reported AIDS cases are due to receipt of blood products, while 12% stem from renal dialysis (Shawky et al., 2009). Blood transfusions are reported to be the mode of transmission for 6% of HIV prevalence in Lebanon (Shawky et al., 2009). In Saudi Arabia, 12% of people living with HIV contracted their infection through blood transfusions, while another 1.5% became infected due to an organ transplant (Abdulrahman, Halim, Al-Abdely, 2004). Data from Saudi Arabia suggest that the role of blood transfusions as a source of HIV infection has declined (Abdulrahman, Halim, Al-Abdely, 2004).



## OCEANIA

Number of people living with HIV	2008: 59 000 [51 000–68 000]	2001: 36 000 [29 000–45 000]
Number of new HIV infections	2008: 3900 [2900–5100]	2001: 5900 [4800–7300]
Number of children newly infected	2008: <500 [<500–<1000]	2001: <500 [<200–<500]
Number of AIDS-related deaths	2008: 2000 [1100–3100]	2001: <1000 [<500–1200]

*In 2008, 3900 [2900–5100] new HIV infections occurred in the Oceania region, bringing the total number of people living with HIV to 59 000 [51 000–68 000].*

### Regional overview

There is generally a very low HIV prevalence in Oceania compared with other regions. In the small island nations that make up most of the countries in the region, adult HIV prevalence tends to be well below 0.1%. Likewise, with an estimated HIV prevalence of 0.2%, Australia's epidemic is considerably less severe than those of any other high-income country. National epidemics in Oceania are overwhelmingly driven by sexual HIV transmission, although the specific populations most affected vary substantially within the region.

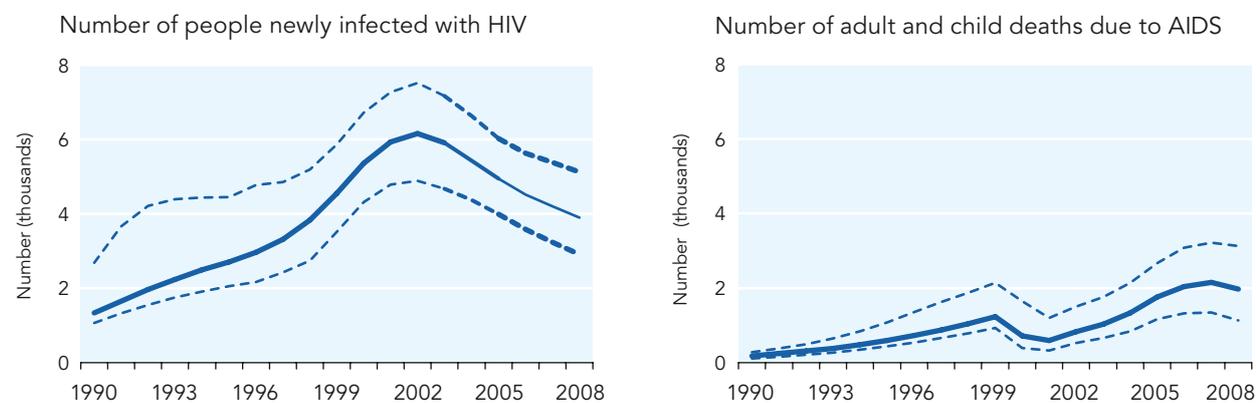
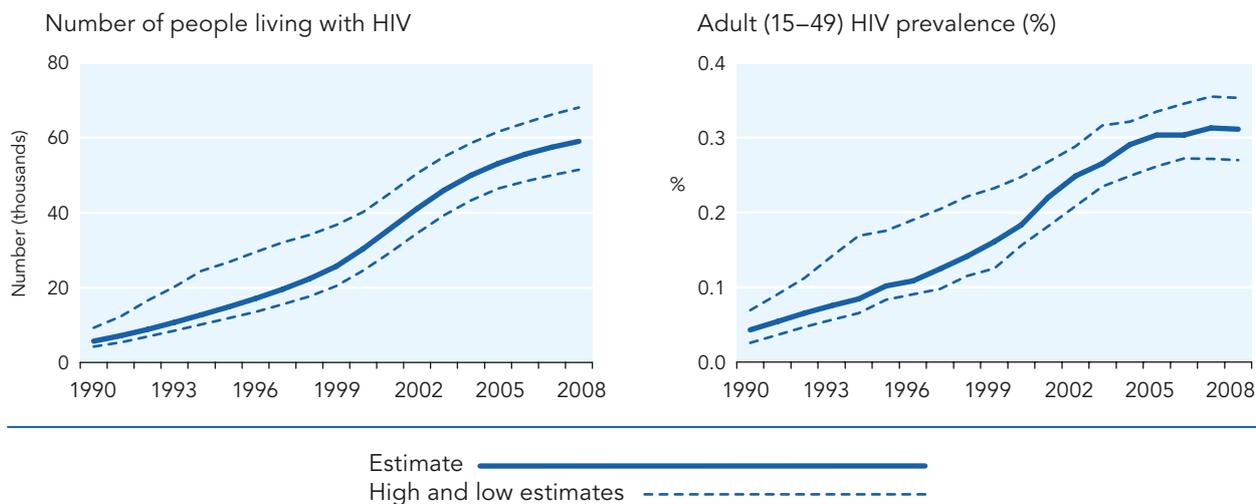
### Infections on the rise in some countries

One notable exception to the preponderance of low-level epidemics is Papua New Guinea, which is experiencing an expanding, generalized epidemic. Excluding the high-income countries of Australia and New Zealand, Papua New Guinea accounted for more than 99% of reported HIV diagnoses in the region in 2007 (Coghlan

et al., 2009). Reversing the pattern typically seen, HIV prevalence in Papua New Guinea is higher in rural areas than in urban settings (National AIDS Council Secretariat, 2008). The high prevalence reported in the country's rural areas is comparable with epidemiological patterns in the neighbouring Papua province of Indonesia. Among the smaller island nations of the Pacific, New Caledonia, Fiji, French Polynesia and Guam account for the vast majority of HIV infections in the region outside Papua New Guinea (Coghlan et al., 2009) (Figure 27).

While most epidemics in the region appear to be stable, new infections in Papua New Guinea are on the rise. Reported HIV infections are also increasing in Fiji, while the rate of new infections appears to be declining in New Caledonia (Coghlan et al., 2009). In Fiji, the number of new HIV case reports in 2003–2006 was nearly 2.5 times greater than the number reported in 1999–2002 (Coghlan et al., 2009).

**Figure 26**  
**Oceania estimates 1990–2008**



Source: UNAIDS/WHO.

A slow, steady increase in new HIV diagnoses is also apparent in Australia (Figure 28) and New Zealand. Laboratory testing in Australia indicates that the rate of recently acquired HIV infections rose by roughly 50% between 1998 and 2007 in several regions of the country (National Centre in HIV Epidemiology and Clinical Research, 2008), although the number of new HIV diagnoses nationwide fell modestly between 2006 and 2008 (from 308 to 281) (National Centre in HIV Epidemiology and Clinical Research, 2009). In New Zealand, the number of people diagnosed through antibody testing in 2008 (184) was the highest number ever reported in any single year (New Zealand AIDS Epidemiology Group, 2009).

Monitoring of epidemiological trends in the region is inhibited by the weakness of HIV surveillance systems in many countries. In Papua New Guinea, for example, nearly two out of three HIV infections reported between 1987 and 2006 have not been assigned a mode of transmission (National AIDS Council Secretariat, 2008). In particular, existing

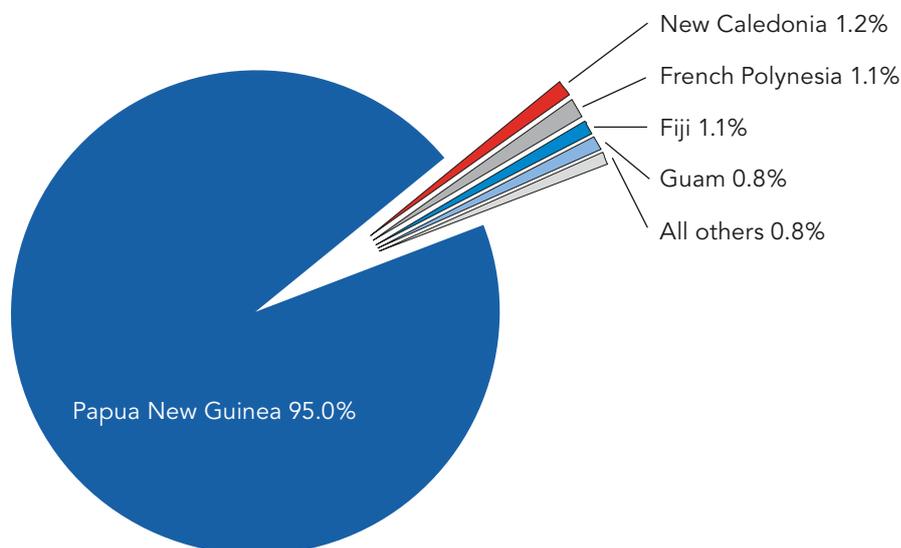
evidence does not permit definitive conclusions regarding the impact of regional migration on epidemiological trends, nor is it possible to determine whether the epidemic in Papua New Guinea is affecting neighbouring countries such as the Solomon Islands (Coghlan et al., 2009).

**Diverse epidemiological patterns**

The gender distribution of new infections varies considerably between the smaller island nations in the region on the one hand and Australia and New Zealand on the other. In Papua New Guinea, males and females are equally likely to become infected, with the risk of infection growing among young women (Coghlan et al., 2009; National AIDS Council Secretariat, 2008). By contrast, males account for more than 80% of new diagnoses in Australia and New Zealand (New Zealand AIDS Epidemiology Group, 2009; National Centre in HIV Epidemiology and Clinical Research, 2008).

**Figure 27**

Proportion of all HIV and AIDS cases in different Pacific island countries and territories, 1984–2007



Source: the Secretariat of the Pacific Community and the Papua New Guinea Department of Health.

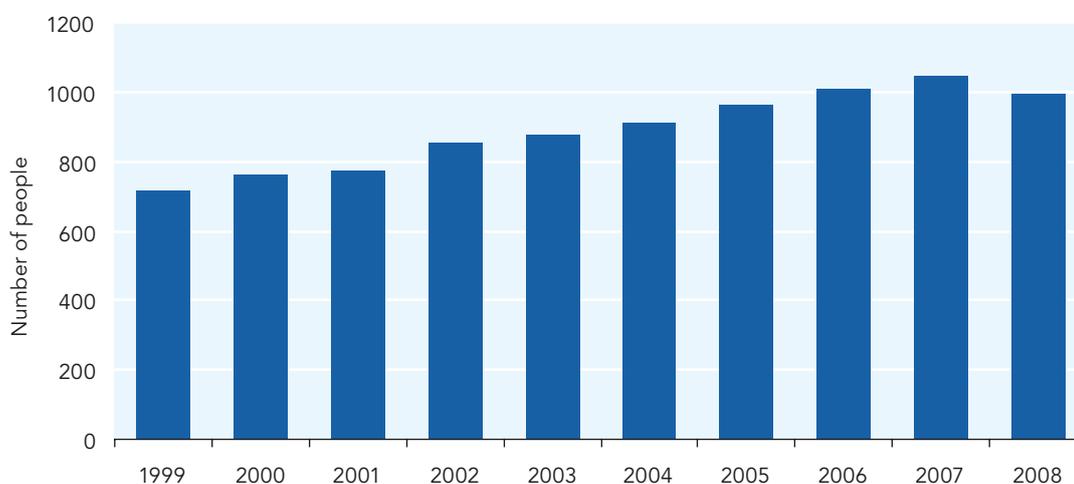
The age of those most likely to become infected also differs substantially among countries. While young women aged between 20 and 24 are most likely to be diagnosed with HIV in Papua New Guinea (National AIDS Council Secretariat, 2008) (Figure 29), the common age group for new HIV diagnoses among men who have sex with men in New Zealand is 40–49 years (New Zealand AIDS Epidemiology Group, 2009).

### Treatment advances in many countries

Although antiretroviral therapy coverage estimates are not routinely available throughout the region, a number of countries appear to have made important strides in expanding access to HIV treatment. In Australia, 72% of a national cohort of people living with HIV were receiving antiretroviral medications in 2006 (Department of Health and Ageing, 2008). Among HIV-positive males on

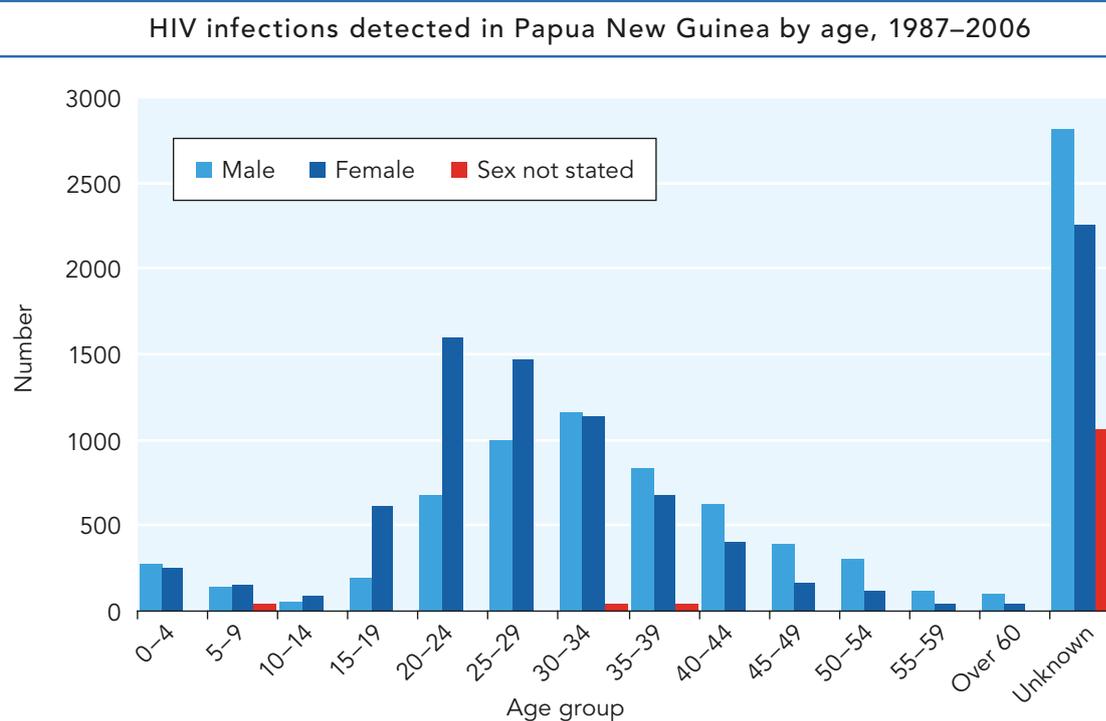
**Figure 28**

Annual newly diagnosed HIV infections in Australia, 1999–2008



Source: National Centre in HIV Epidemiology and Clinical Research (2009).

Figure 29



Source: Papua New Guinea National AIDS Council and Department of Health.

antiretroviral therapy in Australia in 2006, 85% had undetectable viral loads (Department of Health and Ageing, 2008).

Late diagnosis of HIV infection reduces the effectiveness of HIV prevention efforts and complicates treatment. While it was estimated that approximately 60 000 people were living with HIV in Papua New Guinea in December 2007, the cumulative number of people ever diagnosed amounted to only 18 484 (National AIDS Council Secretariat, 2008). To promote more widespread knowledge of HIV serostatus, the Government of Papua New Guinea introduced a policy of provider-initiated HIV testing and counselling in 2007. Between 2007 and 2008, the number of people over the age of 15 who received HIV testing and counselling in Papua New Guinea rose approximately fourfold, from 26 932 to 107 615 (World Health Organization, United Nations Children's Fund, UNAIDS, 2009).

In Australia, the proportion of AIDS diagnoses that occur around the time of HIV diagnosis rose from 31% in 1997 to 56% in 2006 (Department of Health and Ageing, 2008). Individuals with heterosexually acquired HIV infection or who were born in Asia are most likely to be diagnosed late in the course of infection in Australia (McDonald et al., 2007; Körner, 2007).

## Key regional dynamics

Modes of transmission vary considerably within the region. Heterosexual transmission predominates in the generalized epidemic of Papua New Guinea, while men who have sex with men appear to account for roughly half of the national epidemics in many other smaller Pacific nations. In the larger nations of Australia and New Zealand, men who have sex with men is by far the largest transmission category for both prevalence and incidence. Transmission during injecting drug use has made a relatively small contribution to the epidemics in Oceania, in part due to the early adoption of evidence-informed harm reduction programmes in Australia and New Zealand.

## Heterosexual transmission

Heterosexual acquisition accounts for nearly 95% of cumulative HIV diagnoses in Papua New Guinea and for almost 88% in Fiji. The proportion of heterosexually acquired cases is somewhat lower in Melanesia countries other than Papua New Guinea (59.4%) and in New Caledonia (36.3%) (Coghlan et al., 2009).

The contribution of heterosexual HIV transmission is significantly lower in the region's high-income countries. In Australia, heterosexual contact was the transmission mode for 21%

of new HIV diagnoses and for 9% of cases of recently acquired HIV infection between 2003 and 2007 (National Centre in HIV Epidemiology and Clinical Research, 2008). One in three new HIV diagnoses in New Zealand in 2008 stemmed from heterosexual contact (New Zealand AIDS Epidemiology Group, 2009).

According to surveys in a number of countries, young people exhibit levels of comprehensive HIV knowledge that are below the global average (Coghlan et al., 2009; UNAIDS, 2008), although the vast majority of young people at higher risk surveyed knew that condoms could protect against sexual HIV transmission (Coghlan et al., 2009). However, fewer than half of young people surveyed in Papua New Guinea report using a condom the last time they had sex with a non-commercial partner (Coghlan et al., 2009). Surveys in several Pacific nations indicate that a substantial minority of young people become sexually active before the age of 18, with roughly 40% of young people in Papua New Guinea and Vanuatu reporting more than one sexual partner (Coghlan et al., 2009).

Surveys in diverse populations have consistently found sexually transmitted infections to be endemic in the Pacific islands. Studies in Papua New Guinea have typically found a sexually transmitted infection prevalence of 40–60% (Coghlan et al., 2009).

The scarcity of recent HIV serosurveys among sex workers in the region makes it difficult to quantify the role of sex work in national epidemics. Behavioural surveys in Papua New Guinea in 2006 found that 70% of truck drivers and 61% of military personnel reported having paid a woman for sex in the previous 12 months (National AIDS Council Secretariat, 2008). Also in Papua New Guinea, more than two thirds of female sex workers surveyed in 2006 reported using condoms with their last client, although less than half said that they consistently used condoms (National AIDS Council Secretariat, 2008).

### Men who have sex with men

Sex between men is the primary driving force of several national epidemics in the Pacific region. In 2003–2007, men who have sex with men made up 68% of newly diagnosed cases of HIV in Australia and 86% of newly acquired HIV infections (National Centre in HIV Epidemiology and Research, 2008). In New Zealand, men

who have sex with men represented 49% of new cases diagnosed through antibody testing in 2008 (New Zealand AIDS Epidemiology Group, 2009). Roughly two out of three cumulative diagnoses in Guam are among men who have sex with men, who also account for the largest share of HIV cases in New Caledonia (37%) (Coghlan et al., 2009).

Consistent with trends in other high-income countries, Australia and New Zealand have experienced an increase in HIV diagnoses in recent years among men who have sex with men. In New Zealand, for example, annual HIV diagnoses among men who have sex with men rose by 89% between 2000 and 2006 (New Zealand AIDS Epidemiology Group, 2009).

Although existing evidence is not definitive, there are signs that the recent growth in HIV diagnoses among men who have sex with men in Australia and New Zealand stems from increases in sexual risk behaviours (Guy et al., 2007). In Australia, syphilis rates more than doubled between 2004 and 2007, with men who have sex with men accounting for most new cases (National Centre in HIV Epidemiology and Clinical Research, 2008).

### Injecting drug use

Transmission during injecting drug use is responsible for a relatively modest share of new HIV infections in the region—2% of newly acquired infections in Australia between 2003 and 2007 (National Centre in HIV Epidemiology and Clinical Research, 2008) and 1% of new HIV diagnoses in New Zealand in 2008 (New Zealand AIDS Epidemiology Group, 2009). Somewhat higher figures are reported in the smaller Pacific island nations, where injecting drug users represent 11.7% of cumulative HIV case reports in French Polynesia and 5.7% in Melanesia (excluding Papua New Guinea) (Coghlan et al., 2009). In both Fiji and Papua New Guinea, injecting drug users account for less than 1% of reported infections (Coghlan et al., 2009).

Oceania is home to some of the world's earliest harm reduction programmes. Early in the epidemic Australia and New Zealand invested in diverse harm reduction services in order to avert HIV transmission during drug use. New Zealand began offering needle exchange services in 1987, and now scores of community pharmacies participate in the programme (Sheridan et al., 2005).

## Mother-to-child transmission

In the smaller island nations where heterosexual contact is a leading mode of HIV transmission, the percentage of cumulative HIV diagnoses stemming from perinatal exposure ranges from 2.4% in New Caledonia to 7.6% in Papua New Guinea (Coghlan et al., 2009). National authorities in Papua New Guinea report that rates of mother-to-child transmission are increasing and that they are expected to rise further as the epidemic continues to escalate (National AIDS Council Secretariat, 2008). Papua New Guinea has taken steps to expand access to services to prevent mother-to-child transmission, but prevention coverage in antenatal settings was only 2.3% in 2007 (National AIDS Council Secretariat, 2008).

In the region's larger high-income countries, with epidemics primarily driven by sex between men, rates of mother-to-child transmission are extremely low. Only three infants in Australia were diagnosed with HIV in 2006–2007 (National Centre in HIV Epidemiology and Clinical Research, 2008), while one child born in New Zealand was diagnosed in 2008 (New Zealand AIDS Epidemiology Group, 2009).

## Prisoners

Little recent evidence is available on HIV prevalence in prison settings in Oceania (Dolan et al., 2007). After studies documented HIV transmission in Australian prison settings earlier in the epidemic, the country took steps to implement harm reduction programmes in prisons (World Health Organization, United Nations Office on Drugs and Crime, UNAIDS, 2007).

## Mobility

In Australia, the per capita rate of HIV diagnosis in 2006–2008 was more than eight times higher among individuals who immigrated from sub-Saharan Africa than among Australian-born persons (National Centre in HIV Epidemiology and Clinical Research, 2009). Among the relatively small percentage of heterosexually acquired cases of HIV infection reported in Australia between 2004 and 2008, 59% were among individuals born in sub-Saharan Africa or among individuals with sexual partners born in a high-prevalence country (National Centre in HIV Epidemiology and Clinical Research, 2009).

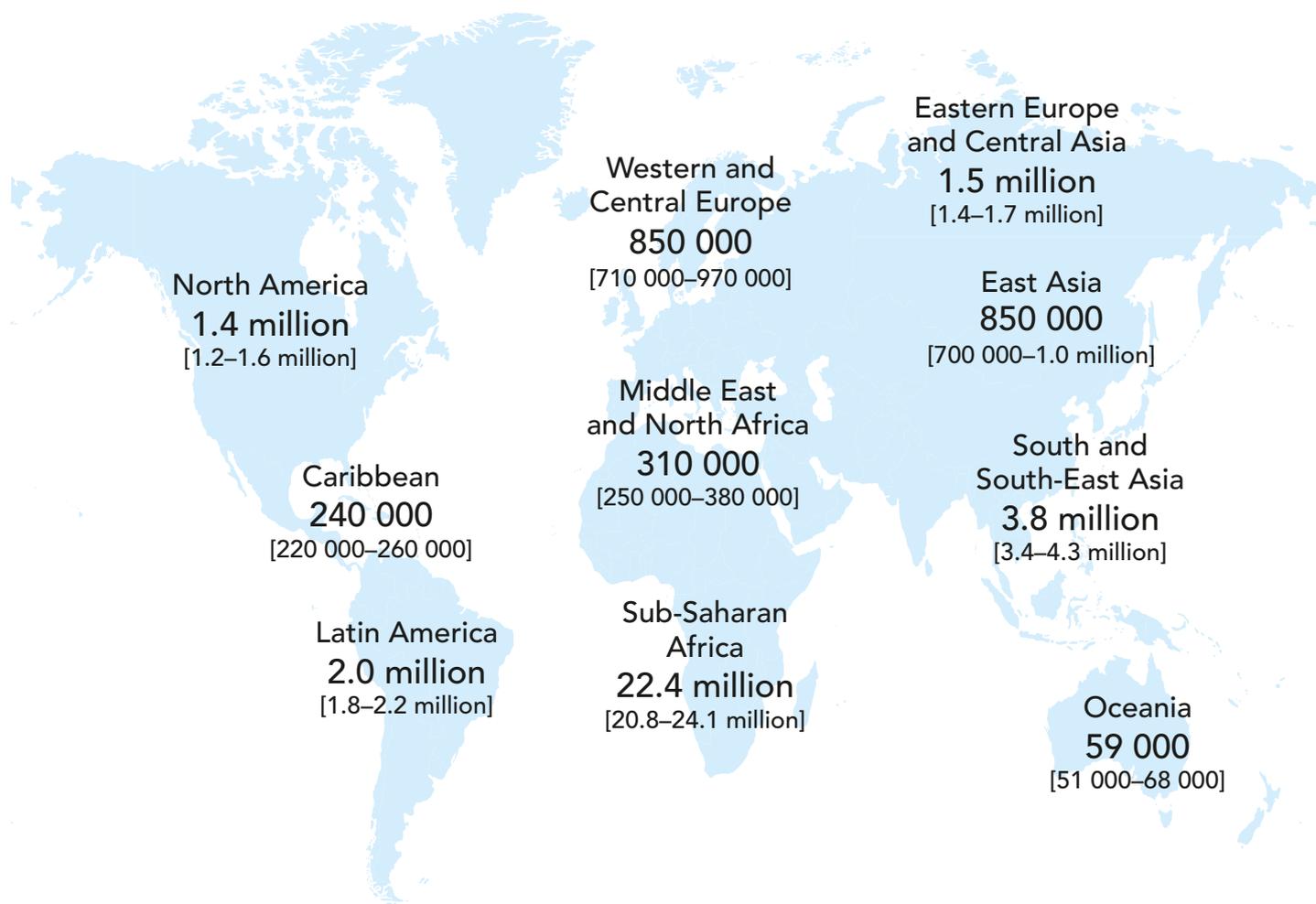
# Global estimates for adults and children, 2008



People living with HIV	33.4 million [31.1–35.8 million]
New HIV infections in 2008	2.7 million [2.4–3.0 million]
Deaths due to AIDS in 2008	2.0 million [1.7–2.4 million]

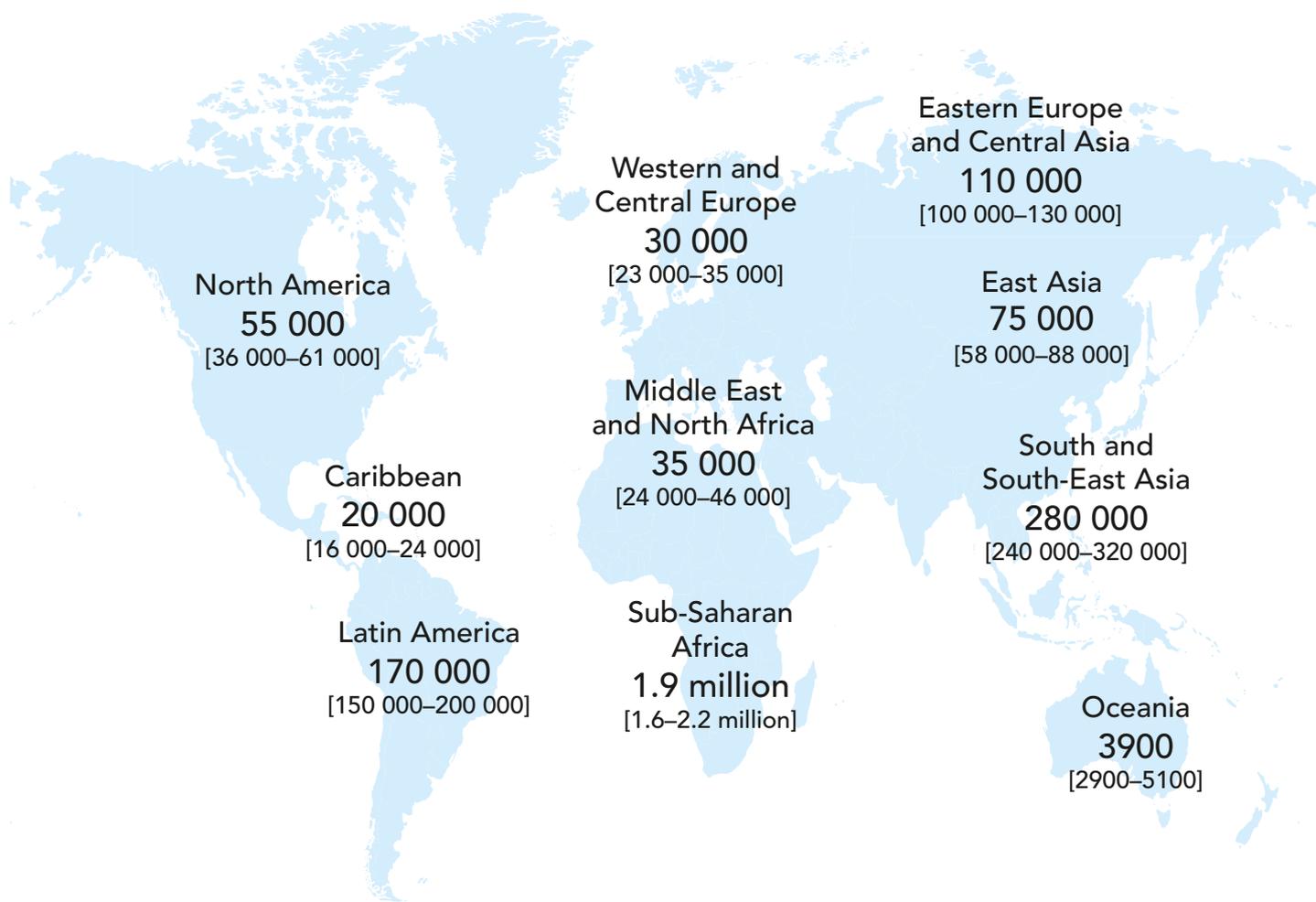
The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information.

# Adults and children estimated to be living with HIV, 2008



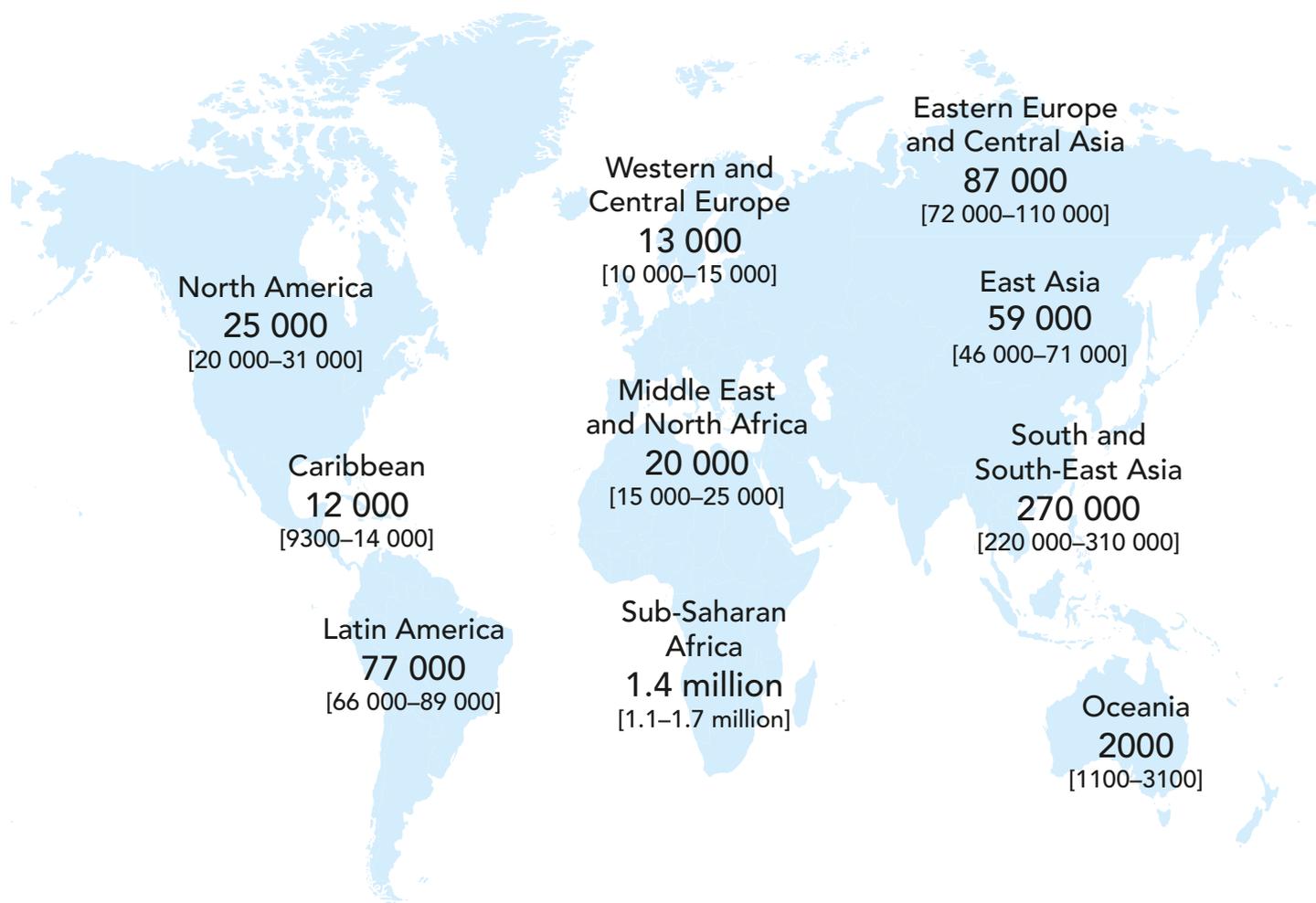
**Total: 33.4 million (31.1–35.8 million)**

# Estimated number of adults and children newly infected with HIV, 2008



Total: 2.7 million (2.4–3.0 million)

# Estimated adult and child deaths due to AIDS, 2008



Total: 2.0 million (1.7–2.4 million)

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## INTRODUCTION

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