



SUB-SAHARAN AFRICA

In 2006, almost two thirds (63%) of all persons infected with HIV are living in sub-Saharan Africa—24.7 million [21.8 million–27.7 million]. An estimated 2.8 million [2.4 million–3.2 million] adults and children became infected with HIV in 2006, more than in all other regions of the world combined. The 2.1 million [1.8 million–2.4 million] AIDS deaths in sub-Saharan Africa represent 72% of global AIDS deaths. Across this region, women bear a disproportionate part of the AIDS burden: not only are they more likely than men to be infected with HIV, but in most countries they are also more likely to be the ones caring for people infected with HIV.

Across sub-Saharan Africa, women are more likely than men to be infected with HIV, and they are more likely to be the ones caring for people infected with HIV.

While there is evidence that some of the epidemics in this region are diminishing, most country trends appear to be stable. In essence this reflects equilibrium: the number of people newly infected with HIV roughly equal the number of people dying of AIDS.

Provision of antiretroviral therapy has expanded dramatically in sub-Saharan Africa: more than one million [930 000–1.15 million] people were receiving antiretroviral treatment by June 2006, a tenfold increase since December 2003 (WHO/UNAIDS, 2006). Scale-up efforts have been espe-

cially strong of late in a few countries, including Botswana, Kenya, Malawi, Namibia, Rwanda, South Africa, Uganda and Zambia.

However, the sheer scale of need in this region means that a little less than one quarter (23%) of the estimated 4.6 million [4–5.4 million] people in need of antiretroviral therapy in this region are receiving it (WHO/UNAIDS, 2006).

Southern Africa

Southern Africa remains the epicentre of the global HIV epidemic: 32% of people with HIV globally live in this subregion and 34% of AIDS deaths globally occur there.

The only evidence of declining national adult HIV prevalence in southern Africa comes from **Zimbabwe**, where both HIV prevalence and incidence have fallen (UNAIDS, 2005). Antenatal clinic data show HIV infection levels in pregnant women hovering at 30%–32% in the early 2000s before declining to 24% in 2004. In the capital, Harare, prevalence among pregnant women peaked at over 36% in 1996 before falling to approximately 21% in mid-2004 (Mahomva et al., 2006; Hargrove et al., 2005; Mugurungi et al., 2005). However, inconsistencies and biases in some of the data mean that the extent of the decline in HIV prevalence might not be as substantial as indicated by the antenatal clinic HIV data (UNAIDS, 2005). Meanwhile, a downward trend in HIV prevalence has also been observed in rural populations in Manicaland amid some evidence of sexual behaviour change (Gregson et al., 2006).

The observed declines in prevalence appear to be related to a combination of factors, especially reductions in casual sex relations with non-regular partners, along with increases in condom use and later sexual debuts (Mahomva et al., 2006; UNAIDS, 2005). In Manicaland in 2001–2003, for example, half as many sexually experienced men (49%) said they had recently had sex with a casual partner, compared with 1998–2000. Consistent condom use with casual partners increased for women (from 26% to 37% over the same periods), though not for men (Gregson et al., 2006). A combination of increased AIDS awareness, relatively extensive health infrastructure and growing anxiety about AIDS mortality appears to have prompted such behaviour changes. In addition, high mortality rates have contributed considerably to the decline in HIV prevalence.

Nevertheless, approximately one in five adults (20.1% in a range of 13.3%–27.6%; UNAIDS, 2006) in Zimbabwe is living with HIV—one of the worst HIV epidemics in the world. The estimated average life expectancy (at birth) for women in Zimbabwe is now among the lowest in the world: 34 years. For men, it is estimated to be 37 years (WHO, 2006). Food shortages, impoverishment, forced removals and drought have compelled many hundreds of thousands of Zimbabweans to migrate in search of livelihood opportunities. The possible effects of these upheavals on HIV transmission trends are not yet apparent, but could prove to be profound—as could the effects of Zimbabwe's economic crisis on its antiretroviral treatment programme.

Zimbabwe's decline in HIV prevalence appears to be partly associated with behaviour changes dating back to the mid-to late-1990s.

In **South Africa**, some 5.5 million [4.9 million–6.1 million] (UNAIDS, 2006)² people, including 240 000 [93 000–500 000] children younger than 15 years, were living with HIV in 2005 (UNAIDS, 2006). HIV data gathered in the country's extensive antenatal clinic surveillance system suggest that HIV prevalence has not yet reached a plateau.

The latest data show a continuing, rising trend nationally in HIV infection levels among pregnant women attending public antenatal clinics: from 22.4% in 1999 to 30.2% in 2005 (a 35% increase) (see Figure 3) (Department of Health South Africa, 2006). However, HIV prevalence among young people may be stabilizing. Antenatal surveillance suggests that HIV prevalence among 15–24-year-old pregnant women has remained relatively stable since 2000 at 14%–16% among 15–19-year-olds and 28%–31% among 20–24-year-olds (Department of Health South Africa, 2006).

As in the rest of sub-Saharan Africa, the epidemic in South Africa disproportionately affects women. Young women (15–24 years) are four times more likely to be HIV-infected than are young men: in 2005, prevalence among young women was 17% compared with 4.4% among young men (Shisana et al., 2005). Those infection levels were similar to those found in the 2003 national survey of 15–24-year-olds when 15.5% of young women and 4.8% of young men were found to be HIV-infected (Pettifor et al., 2004). One in three women aged 30–34 years were living with HIV in 2005, as were one in four men aged 30–39 years, according to the 2005 national HIV household survey. In addition, high infection levels were found among men older than 50 years, more than 10% of whom tested HIV-positive (Shisana et al., 2005).

Having emerged a little later than most other HIV epidemics in the subregion, South Africa's epidemic has now reached the stage where increasing numbers of people are dying of AIDS. The latest official mortality data show total deaths (from all causes) in South Africa increased by 79% from 1997 to 2004 (from 316 505 to 567 488) (Statistics South Africa, 2006). Death rates from natural causes for women aged 25–34 years increased fivefold between 1997 and 2004, and for males aged 30–44 they more than doubled over that period. A large proportion of the rising trend in death rates is attributable to the AIDS epidemic (Anderson and Phillips, 2006; Actuarial Society of South Africa, 2005; Medical Research Council, 2005; Bradshaw et al., 2004; Dorrington et al., 2001), and the increasing death toll has driven average life expectancy below 50 years in three provinces (Eastern Cape, Free State and KwaZulu-Natal) (Actuarial Society of South Africa, 2005).

² All estimates of the total number of people living with HIV in a given country are for 2005.

OUTBREAKS OF EXTENSIVELY DRUG-RESISTANT TUBERCULOSIS

At the beginning of 2005, extensively drug resistant tuberculosis (XDR-TB) was detected in KwaZulu-Natal and has highlighted the lethal combination of HIV and TB in South Africa, where an estimated 60% of TB patients overall are also HIV-infected.

Of the 53 persons initially diagnosed with XDR-TB at a district hospital in the KwaZulu-Natal province, from January 2005 to March 2006, 44 tested for HIV and each of them was found to be HIV-positive. Mortality was very high: 52 of the patients died within, on average, a month of initial sputum collection. By early October 2006, XDR-TB had been identified at 33 health care facilities across KwaZulu-Natal (Medical Research Council, WHO, CDC, 2006).

TB drug resistance arises mainly because of inadequate TB control, poor patient or clinician adherence to standard TB treatment regimens, poor quality drugs or inadequate drug supplies. People living with HIV are particularly vulnerable to developing drug-resistant TB because of their increased susceptibility to infection and progression to active TB.

This outbreak underscores the need to rapidly ensure prompt TB diagnosis and effective TB treatment for persons living with HIV in order to prevent drug resistance from developing and spreading. Access to TB culture and drug sensitivity testing must be improved, and effective infection control practices must be introduced in HIV care clinics to prevent the spread of TB.

The problem, however, is not unique to sub-Saharan Africa. In March 2006, WHO and the US Centers for Disease Control and Prevention (CDC) reported that 2% of TB cultures performed at 25 supranational reference laboratories fulfilled the criteria for extensively drug resistant TB, and concluded that extensively drug resistant TB was present in all regions of the world (CDC and WHO, 2006). Because TB culture and drug sensitivity testing are not carried out routinely in most resource-poor settings, the actual extent of the epidemic is not yet known.

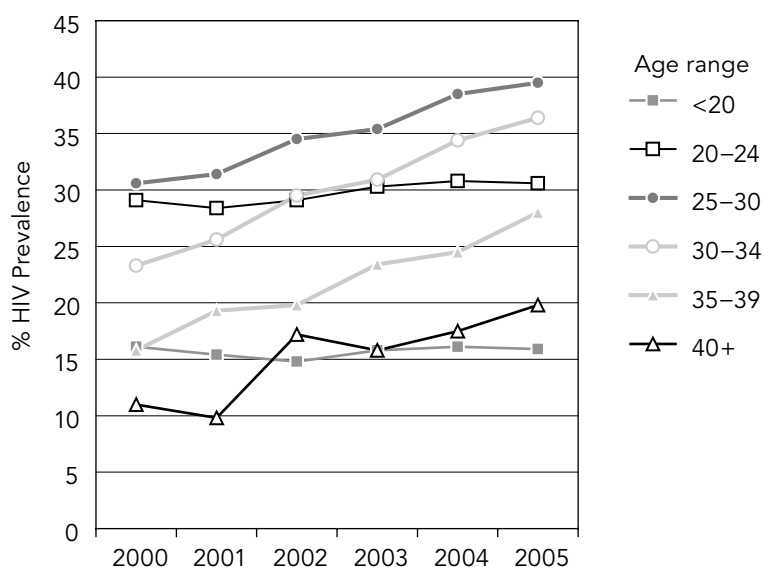
From 9 to 10 October 2006, WHO convened a meeting of a Global XDR-TB Task Force to review available evidence and to develop an emergency action plan to prevent and contain XDR-TB, as well as measures to manage the disease in patients. During this meeting, the definition of XDR-TB was revised³.

This meeting followed an expert consultation meeting in Johannesburg, 7–8 September 2006, organized jointly by the South African Medical Research Council, WHO and CDC, at which a seven-point action plan was developed:

- conduct rapid surveys of extensively drug resistant TB;
- enhance laboratory capacity;
- improve technical capacity of clinical and public health managers to effectively respond to XDR-TB outbreaks;
- implement infection control precautions;
- increase research support for anti-TB drug development;
- increase research support for rapid diagnostic test development;

³ XDR-TB: resistance to at least the two most powerful first-line anti-TB drugs rifampicin and isoniazid, to a fluoroquinolone and to one or more of the following injectable drugs: amikacin, kanamycin and capreomycin.

HIV prevalence by age group among antenatal clinic attendees in South Africa, 2000–2005



Source: Department of Health (2006, National HIV and Syphilis Prevalence Survey South Africa; 2003, National HIV and Syphilis Antenatal Sero-Prevalence Survey in South Africa)

Figure 3

In South Africa, death rates from natural causes for women aged 25-34 years increased five-fold between 1997 and 2004, and for males aged 30-44 it more than doubled.

Yet a large proportion of South Africans do not believe they are at risk of becoming infected with HIV. Some 13% of the persons who took their first HIV test in the 2005 national household survey were found to be HIV-positive. Until then, most of them had declined to take an HIV test because they felt they were at no risk of infection. Overall, half the respondents *who were found to be infected with HIV* had reported that they felt they were at no risk of acquiring HIV (Shisana et al., 2005). Approximately two million South Africans living with HIV do not know that they are infected and believe they face no danger of becoming infected—and therefore are unaware that they can transmit the virus to others. In the absence of an increase in HIV testing uptake, HIV-infected persons typically would only become aware of their status when they become

symptomatic, which can also limit the potential benefit of antiretroviral treatment.

Swaziland now has the highest adult HIV prevalence in the world: 33.4% [21.2%–45.3%]. As in **Lesotho** (see Figure 4), many young women in Swaziland appear to be abstaining from sex until at least their late teens. In one study, almost two in three (61%) female secondary school students said they had not yet had sex (Buseh, 2004). However, it appears that once young women do become sexually active they encounter huge risks of acquiring HIV. Among young women (15–24 years) attending antenatal clinics, HIV prevalence was 39% nationally and 43% in Manzini (Ministry of Health and Social Welfare Swaziland, 2005).

National adult HIV infection levels are also high in **Botswana**, **Lesotho** and **Namibia** (20%–24%). In **Namibia**, an estimated 230 000 [110 000–360 000] people were living with HIV in 2005. Adult national HIV prevalence was estimated at 19.6% [8.6%–31.7%] in 2005 (UNAIDS, 2006), with the worst-affected areas being Caprivi in the northeast (where 43% of pregnant women have been found to be HIV-infected), Erongo in the centre (HIV prevalence

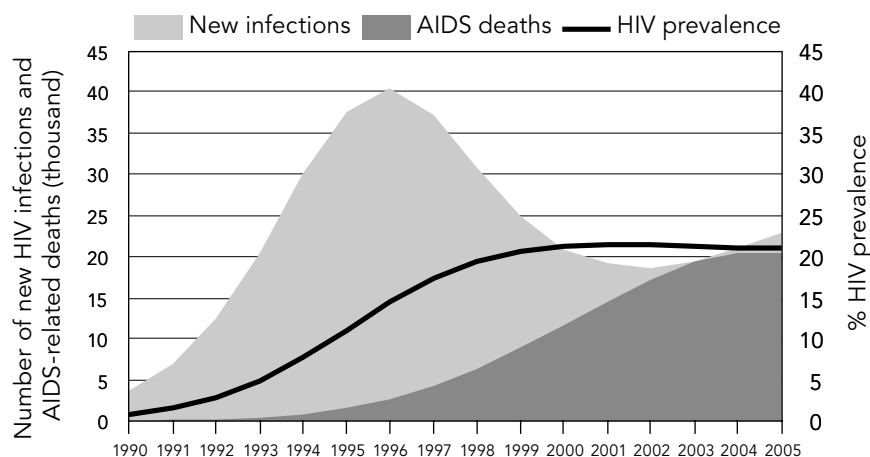
of 27%) and Oshana in the north (prevalence of 25%) (Ministry of Health and Social Services Namibia, 2004). Programmes aimed at reducing mother-to-child transmission of HIV reportedly ensured that 16% of HIV-infected pregnant women in Namibia received antiretroviral prophylaxis in 2005—a considerable improvement on the 0.1% coverage reported two years earlier (Ministry of Health and Social Services Namibia, 2005).

Recent population-based HIV surveys, along with other HIV data, provide a more precise picture of **Botswana's** HIV epidemic, where prevalence remains among the highest in the world. A slight decrease in HIV prevalence among pregnant women nationally has been evident since 2001 (36%) to 33% in 2005, especially among those aged 15–24 years, which suggests the epidemic could be abating. Nevertheless, at least 40% of pregnant women aged 25–39 years were living with HIV in 2005, as was one in two pregnant women aged 30–34 years. In the latter age group, HIV infection levels still appear to be on the rise (Seipone, 2006).

and Tutume districts—both in the north-east (Ministry of Health Botswana, 2006). Surprisingly, comprehensive knowledge of HIV remains low: only about one in three young people aged 15–24 both correctly identified ways of preventing the sexual transmission of HIV and rejected major misconceptions about HIV transmission, which seems to follow the regional pattern (National AIDS Coordinating Agency Botswana, 2005). On the other hand, it is estimated that one in three adults in Botswana know their HIV status, and there appears to be widespread public support for the opt-out voluntary counselling and testing system introduced in 2003 (Weiser et al., 2006).

Adult HIV prevalence in **Lesotho** has remained relatively stable in recent years—but at high levels, with almost one in four (23.2% with a range of 21.9%–24.7%) adults living with HIV in 2005 (UNAIDS, 2006) As Figure 2 illustrates, similar to many other countries in sub-Saharan Africa, the apparent stability in Lesotho's epidemic masks high rates of new HIV infections and AIDS deaths. Lesotho will need to overcome a host of chal-

Estimated number of annual new infections and AIDS-related deaths among adults (15+) in relation to the stabilizing trend of estimated prevalence rate among adults (15–49), Lesotho, 1990–2005



Source: Government of Lesotho/UNAIDS, 2006.

Figure 4

Infection levels in pregnant women vary considerably across Botswana, and range from 21% in the Goodhope district in the south to 47% in Selebi-Phikwe, a populous mining community in the east. More than 40% of pregnant women were found to be HIV-infected in the Francistown

challenges if it is to control its epidemic. Casual sex remains commonplace, for example, and condom use is infrequent. Two thirds of men and one third of women say they have had sex with someone other than their long-term partner in the past year; fewer than half of them used a condom during

those liaisons (Ministry of Health and Social Welfare Lesotho and ORC Macro, 2004).

Efforts to increase HIV prevention among young people also require improvement. Some 15% of young women and 27% of young men (aged 15–24 years) are sexually active before their 15th birthday, yet 40% of surveyed parents do not want children in their early teens to learn about condoms at school. Only 18% of young men and 26% of young women knew how to prevent the sexual transmission of HIV and harboured no major misconceptions about HIV when surveyed in 2004 (Ministry of Health and Social Welfare Lesotho and ORC Macro, 2004). The impact of the epidemic on young women is dire. For women aged 18–19 years, less than 10% are HIV-positive, but by the time they celebrate their 22nd birthday, 30% will have acquired HIV, and by the time they reach 24 years, almost 40% will have been infected. For a large proportion of young women in Lesotho, delaying sex seems simply to be postponing eventual HIV infection (NAC and UNAIDS, 2006).

Having expanded its HIV sentinel surveillance system to all provinces in recent years, **Angola** is gradually acquiring a better understanding of its epidemic. At less than 5%, national adult HIV prevalence in Angola is lower than in any other southern African country. The HIV epidemic, though, varies dramatically between different provinces. HIV prevalence among pregnant women ranges from less than 1% in the central province of Bie to as high as 9% in the province of Cunene, along the Namibian border (Instituto Nacional de Luta contra a SIDA, 2005). Such variance partly reflects the relative inaccessibility of parts of the country during Angola's long-running conflict, which ended in the mid-1990s.

Whereas it is too early to discern precise trends in Angola's epidemic, data from **Mozambique** show a significant increase in HIV infection levels since the turn of the century. The HIV prevalence in pregnant women (15–49 years) rose from 11% in 2000 to 16% in 2004 (Conselho de Combate Nacional ao HIV/SIDA, 2006), one of the steepest increases seen in sub-Saharan Africa in recent years.

HIV infection levels in pregnant women are highest in the south and centre of the country. Especially sharp rises have been found in Maputo City, Maputo Province, Sofala and Gaza, where HIV prevalence ranged between 18% and 27% in

2004. At sentinel sites in Quelimane (Zambezia province) and Beira (Sofala province), one in three women seeking antenatal care services was HIV-positive in 2004 (National STD and HIV/AIDS Control Programme, 2005). In parts of the north, where the epidemic initially advanced at a much slower pace than elsewhere in the country, HIV prevalence in pregnant women has almost doubled since 2000—reaching 9.2% and 11% in Nampula and Niassa, respectively, in 2004. The fact that prevalence has also been rising in young pregnant women suggests that new infections continue to increase, and may signal further growth in the country's epidemic (Conselho Nacional de Combate ao HIV/SIDA, 2006).

Almost a million people [940 000 with a range of 480 000–1.4 million] were living with HIV in **Malawi** in 2005. Adult national HIV prevalence was estimated at 14.1% [6.9%–21.4%] in 2005 (UNAIDS, 2006), close to the 12.7% adult prevalence reported in the 2004 Demographic and Health Survey (National Statistical Office and ORC Macro, 2005).

HIV infection levels in Malawi overall appear to have stabilized since the turn of the century, with median HIV prevalence measured at sentinel surveillance sites fluctuating between 15% and 17% in 2001–2005 (National AIDS Commission Malawi, 2005). However, infection levels decreased at semi-urban and urban HIV surveillance sites from 26%–27% in 1999 to 17%–20% in 2005 (National AIDS Commission Malawi, 2005). In the capital, Lilongwe, HIV prevalence among women using antenatal services peaked at 27% in 1996 before receding to 17% in 2003. That decline, however, was not sustained in 2005, when prevalence among pregnant women increased slightly to 19% (Bello, Chipeta, Aberle-Grasse, 2006; National AIDS Commission Malawi, 2005).

Some behavioural changes appear to be associated with the observed declines in HIV prevalence. When surveyed in 2000, smaller percentages of women and men reported having sex with multiple partners, compared with 1996. The proportion of young men (aged 15–24 years) with two or more casual partners, diminished by more than half (from 28% to 12%), while among young women it declined from 3% to less than 1%. More young women reported using condoms with casual partners in 2000, compared with 1996 (31% versus 22%), although condom

use rates for young men stayed the same at 38%. The percentage of women and men abstaining from sex in the previous 12 months altered slightly between 1996 and 2000 (for women it rose from 21% to 22%, and for men it increased from 17% to 20%) (National Statistical Office and ORC Macro 2001 and 1997). In addition, it is likely that rising mortality rates (which doubled between 1992 and 2000) could be responsible for large parts of the observed declines in HIV prevalence.

At current levels of HIV prevalence and in the absence of treatment, young persons in Zambia face a 50% life-time risk of dying of AIDS.

Although Malawi is a small country, its epidemic varies considerably from place to place. At 17.6% in 2004, adult HIV prevalence in the southern region was roughly three times higher than in the central region and twice as high as in the northern region (National Statistical Office and ORC Macro, 2005). The epidemic in the north has been growing, with HIV prevalence tripling from around 5% in 1998 to above 15% in 2003 in rural areas (Bello, Chipeta, Aberle-Grasse, 2006; Ministry of Health and Population Malawi, 2005). This trend in the north may be related to socio-economic growth in and around Mzuzu city and along major transportation routes (Bello, Chipeta, Aberle-Grasse, 2006; Ministry of Health and Population Malawi, 2005).

As in other countries in the region, HIV prevalence among young women (15–24 years) in Malawi is much higher than among men of similar age: 9% compared with 2% overall, and 13% compared with less than 1% in urban areas (National Statistical Office and ORC Macro, 2005). Only one in four young women demonstrated comprehensive knowledge of HIV when surveyed in 2004, compared with more than one in three men (National Statistical Office and ORC Macro, 2005).

Overall HIV prevalence among women attending antenatal clinics in **Zambia** has also stayed relatively stable since the mid-1990s, and has remained at 19%–20% between 1994 and 2004 among pregnant women aged 15–39 years. Yet the data show divergent, localized patterns and

trends, with HIV infection levels in pregnant women aged 15–44 years ranging from under 10% at some sites to over 25% at several others. HIV prevalence was highest in urban areas along the country's main transport routes, such as Kabwe, Livingstone and Ndola (Ministry of Health Zambia, 2005).

A slight decline in HIV infection levels—from 28% in 1994 to 25% in 2004—has been observed in urban areas among pregnant women aged 15–39 years. That decline was most pronounced among 20–24-year-old pregnant women (prevalence dropped from 30% in 1994 to 24% in 2004) and their 15–19-year-old counterparts (prevalence fell from 20% in 1994 to 14% in 2004) (Ministry of Health Zambia, 2005).

In rural areas, however, HIV prevalence increased marginally from 11% to 12% in 1994–2004 (Ministry of Health Zambia, 2005). Among older pregnant women (30–39 years) in urban areas, HIV prevalence rose considerably (from 24% to 30%) in 1994–2004. Among young pregnant women in some urban sites (such as Mongu), HIV prevalence has remained high (at 28%–30% during 1994–2004), while in some rural sites, infection levels almost doubled in the same period (from 7% to 14% in Kalabao, for example) (Sandoy et al., 2006; Ministry of Health Zambia, 2005). At current levels of HIV prevalence, young persons in Zambia face a 50% life-time risk of dying of AIDS, in the absence of treatment (Ministry of Health Zambia, 2005).

The island nations off the southern African coast are experiencing much smaller epidemics. National adult HIV prevalence in **Madagascar** was well under 1% in 2005, with an estimated 49 000 [16 000–110 000] living with HIV. However, knowledge of HIV is poor and condom use is highly infrequent. Only one in five Malagasy could name two methods for preventing the sexual transmission of HIV when surveyed in 2003–2004. Almost one in three (31%) young women (aged 15–24 years) and almost three in four (72%) young men said they had had sex with a casual partner in the previous 12 months—yet only about one in 10 (12%) of those young men and one in 20 (5%) of the women reported using a condom the last time they had sex with a casual partner (Institut National de la Statistique and ORC Macro, 2005a).

Mauritius needs to focus stronger prevention efforts on injecting drug users and especially on those who also engage in sex work (Dewing et al., 2006). Among injecting drug users, exposure to non-sterile injecting equipment is the main risk factor for HIV infection in the currently small HIV epidemic in Mauritius. There, about three quarters of the HIV infections diagnosed in the first six months of 2004 were among injecting drug users (Sulliman and Ameerberg, 2004). Use of non-sterile injecting equipment appears to be common: when surveyed in 2004, 80% of injecting drug users said they had shared needles in the previous three months. Among those who agreed to be tested for HIV, 4% were found to be infected. A large percentage of sex workers (75%) said they injected drugs, and condom use was infrequent (only 32% had consistently used condoms during the previous three months). When tested for HIV, 13% of surveyed sex workers were found to be HIV-infected (Sulliman, Ameerberg, Dhannoo, 2004).

East Africa

In East Africa, the general trends of stabilizing or declining HIV prevalence appear to be continuing.

Having diminished during the 1990s, **Uganda's** epidemic has stabilized overall. National adult HIV prevalence was 6.7% [5.7–7.6%] in 2005 but it was significantly higher among women (nearly 8%) than among men (5%) (UNAIDS, 2006; Ministry of Health Uganda and ORC Macro, 2006). Approximately one million [850 000–1.2 million] people were living with HIV in Uganda in 2005 (UNAIDS, 2006). Regionally, prevalence was lowest in the West Nile region and highest in the Kampala, Central and North-Central regions (over 8%) (Ministry of Health Uganda and ORC Macro, 2006).

Trends vary in Uganda's epidemic. HIV prevalence fell sharply among pregnant women in Kampala and other cities from the early 1990s to the early 2000s, in the context of significant behaviour change (including sexual abstinence and condom use during casual sex) and increased AIDS mortality (Kirungi et al., 2006). However, in some rural areas there is now evidence of an increase in HIV infection. Prevalence rose from a low of 5.6% in men and 6.9% in women in 2000, to 6.5% in men and 8.8% in women in 2004, according to data gathered in a study done in 25 villages. A similar trend, dating to 2002, was found among pregnant women at about half the

CONFLICT AND HIV RISK

New research findings from Uganda cast doubt on the widely held assumption that internally displaced persons and refugees are more likely to be HIV-infected than people in ostensibly more stable settings. Acholiland, in northern Uganda, is home to an estimated two million internally displaced persons. At just over 8%, HIV prevalence in the region is high (Ministry of Health Uganda and ORC Macro, 2006). However, a study among pregnant women in the Gulu, Kitgum and Pader districts has found that women living *outside* protected camps had a higher risk of being HIV-infected than their displaced counterparts living in protected camps. This might be due to the reduced mobility and increased access to health and prevention services of women in some of the camps (Fabiani et al., 2006). A recent review of HIV literature on displaced persons in eight countries (including Uganda) also failed to find evidence that conflict increases HIV transmission (Spiegel and Harroff-Tavel, 2006).

VERY HIGH MALARIA RATES FOUND IN HIV-INFECTED PERSONS

Unexpectedly high levels of HIV infection are being found in adults seeking treatment for malaria in Uganda. More than 30% of adults presenting at district health centres with uncomplicated falciparum malaria were co-infected with HIV. Clinical treatment for malaria was three times more likely in adults with HIV. The findings are in line with a growing body of evidence from elsewhere in sub-Saharan Africa that malaria tends to occur with increased frequency and severity in HIV-infected adults. This underlines the need for new strategies of HIV testing and counselling for adults with uncomplicated falciparum malaria (Kamya et al., 2006).

antenatal surveillance sites included in this study (Shafer et al., 2006). The large-scale roll-out of antiretroviral drugs (and prolonged lifespan of people on treatment) cannot account for the fact that there were more people living with HIV. The treatment roll-out only began in 2004, whereas the increase in the percentage of people living with HIV started several years earlier, around 2000. The rural study found that HIV *incidence* in older men and women (40–49 years) increased since 2000; among men, incidence in fact peaked at levels higher than those observed in 1990–1994. The finding was echoed in the 2004–2005 national HIV household survey, which noted high infection levels among middle-aged Ugandans (Ministry of Health Uganda and ORC Macro, 2006). Behavioural changes could be at work. The rural study, for example, found that the percentage of men aged 40 years and older who said they had at least two casual partners in the previous month had increased between 2000–2004 (Shafer et al., 2006).

Further research is needed to validate these apparent trends, but the current findings do hint at the possible erosion of the gains Uganda made against AIDS in the 1990s. Such an interpretation finds support in national behavioural data which show erratic condom use (about half the men and women aged 15–49 years reported using a condom the last time they had sex with a casual partner) and rising numbers of men who had sex with more than one sexual partner in the previous year, according to the 2004–2005 national HIV household survey (Ministry of Health Uganda and ORC Macro, 2006).

More encouraging, meanwhile, are recent study findings (from rural Tororo) that persons receiving antiretroviral therapy had significantly less risk of transmitting HIV after two years on treatment, partly due to a strong reduction in viral load and less frequent unprotected sex (Bunnell et al., 2006).

With 1.3 million people [1.1 million–1.5 million] currently living with HIV, **Kenya** is still contending with a serious AIDS epidemic, despite evidence of declining HIV prevalence among pregnant women (Cheluget, Marum, Stover, 2006; WHO, 2005a; Baltazar, 2005). National adult HIV prevalence fell from 10% in the late 1990s to about 7% in 2003 (Ministry of Health Kenya, 2005) and just over 6% [5.2–7.0%] in 2005 (UNAIDS, 2006). There has also been

a steep drop in infection levels among pregnant women at a majority of antenatal sites with consistent and comparable HIV data. At some of those sites, HIV prevalence fell from 25% in 1998 to 8% in 2004, while in others it declined from 15% in 2001 to 4.3% in 2004 (Cheluget, Marum, Stover, 2006).

In East Africa, the general trends of stabilizing or declining HIV prevalence appear to be continuing. However, recent research hints at the possible erosion of the gains Uganda made against AIDS in the 1990s.

The potential reasons for these trends are complicated. Major HIV prevention efforts were mounted in Kenya from 2000 onwards, and there is evidence that more people have been delaying their sexual debuts, that condom use rates have increased and that a smaller percentage of adults has multiple sex partners. However, new HIV infections appear to have peaked in the mid-1990s already, before the scale-up of prevention programmes occurred. This suggests that other factors—including increasing AIDS mortality and the saturation of infection among people most at risk—provided most of the impetus for the reduction in HIV prevalence observed in the past several years (Cheluget, Marum, Stover, 2006). It is to be hoped that the recently observed changes in behaviour will maintain the declining trend. A new concern, however, is the emergence of injecting drug use as a factor in Kenya's epidemic. Among injecting drug users in Mombassa, for example, 50% were found to be HIV-infected in a 2004 study (Ndetei, 2004), while a study in Nairobi found 53% of injecting drug users were HIV-positive (Odek-Ogunde, 2004).

An estimated 1.4 million [1.3 million–1.6 million] adults and children were living with HIV in the **United Republic of Tanzania** at the end of 2005, making it one of the most-affected countries in the world. Here, too, HIV infection levels have diminished somewhat—from 8.1% to 6.5% nationally between 1995 and 2004 (Somi et al., 2006), and from 14% to 11% among pregnant women in Dar es Salaam between 1995–2003 (Urassa et al., 2006). In Mbeya and Iringa, the worst-affected regions in the country, HIV

infection levels ranged between 15% and 19% in several urban areas in 2004 (Swai et al., 2006; National Bureau of Statistics Tanzania and ORC Macro, 2005).

On the other hand, high HIV prevalence has been observed at rural antenatal sites: 8% and 11% at Ilemba and Igamba in the Mbeya region in 2004, for example (Swai et al., 2006). According to projections, the number of new HIV infections in rural areas (where about three quarters of the country's population live) could be twice as high as in urban areas by 2010. This reinforces the need to ensure sufficient resources for prevention, treatment and care are also developing in rural parts of the country (Somi et al., 2006).

There are signs that injecting drug use, which has spread rapidly in East Africa (McCurdy et al., 2005a) could also become a contributing factor in Tanzania's epidemic. HIV prevalence among Tanzanian injecting drug users is not yet known, but practices highly likely to transmit the virus are common. Up to one in three injecting drug users in Dar es Salaam has used non-sterile injecting equipment, according to one small study, and a majority of female injecting drug users also sell sex. Especially risky is a practice called 'flashblood' (known as 'backloading' in some other countries), which involves drawing blood back into the syringe after having injected heroin, and then passing the syringe to a companion. Common among injecting female sex workers in Dar es Salaam, and reportedly intended to share a 'high' with companions who cannot afford their own drugs, this practice carries a very high risk of HIV transmission (McCurdy et al., 2005b).

Injecting drug use also features in **Zanzibar's** smaller epidemic. HIV prevalence among women attending antenatal clinics was 0.9% in 2005. However, one in three injecting drug users was found to be infected with HIV in a recent study. Almost half (46%) the injecting drug users reported using non-sterile needles. In addition, almost one in five injecting drug users was found to be infected with syphilis, which suggests that a combination of unsafe injecting and sexual practices was prevalent among injecting drug users (Dahoma et al., 2006).

Rwanda's epidemic has stabilized in the 2000s, but HIV prevalence remains high in the capital, Kigali, where approximately 13% of pregnant women were HIV-positive in 2003. Rwanda has expanded HIV surveillance, especially in rural

areas (where HIV prevalence has been shown to be significantly lower, at 3% or less among pregnant women, than in urban areas), and introduced improved HIV estimation methodologies in recent years (Kayirangwa et al., 2006). For this reason, only data from consistent surveillance sites should be compared over time. Such a comparison shows a drop in HIV prevalence among pregnant women in urban areas, particularly in 1998–2003. In Kigali, prevalence declined from a little over 16% to 13% in that period, while in two other urban areas it declined from 9.5% to 5.8%. That declining trend appears to have weakened in recent years. In rural areas, meanwhile, HIV prevalence has remained stable, albeit at considerably lower levels (between 2.1% and 2.8% in 1998–2003) (Kayirangwa et al., 2006). Preliminary results of the latest Demographic and Health Survey show HIV infection levels are more than three times higher in urban than in rural areas: 7.3%, compared with 2.2%. The highest prevalence continues to be found in Kigali, where infection levels are 2–3 times higher than elsewhere in the country (Institut National de la Statistique et al., 2005).

Just over 3% [2.7%–3.8%] of adults—approximately 150 000 people—were living with HIV in 2005 in neighbouring **Burundi**, where divergent trends are evident in different parts of the country. HIV prevalence among young (15–24 years) pregnant women declined from 13% to 9% in 2000–2004 (prevalence from 13% to 9%) at antenatal clinics in Bujumbura and other urban areas (Ministère de la Santé Publique Burundi, 2005). However, the latest sentinel surveillance data show a sharp rise in HIV infections among antenatal clinic attendees in Bujumbura (from 12.6% in 2004 to 18% in 2005), with infection levels among young (15–24-year-old) antenatal clinic attendees almost doubling from 8.6% in 2004 to 15.5% in 2005. In 2004–2005, prevalence in pregnant women also rose in rural areas (Ministère de la Santé Publique Burundi, 2005).

Based on HIV data collected at antenatal clinics, national adult HIV prevalence in **Ethiopia** in 2005, with infection levels more than five times higher in urban (10.5%) than in rural (1.9%) areas. A gradual decline in HIV prevalence among pregnant women has been found at some antenatal clinics in Addis Ababa and in other urban areas, most notably since 1997–98 (Federal Ministry of Health, 2006). However, prevalence remains high in Addis Ababa overall (where it has

remained at 14%–16% since the mid-1990s) and in other urban areas (where it has stayed between 11% and 13% in the same period) (Hladik et al., 2006). About 80% of the country's population lives in rural areas, and prevalence among women attending antenatal clinics there rose from 1.9% in 2000 to 2.6% in 2003 and 2.2% in 2005 (Hladik et al., 2006; Federal Ministry of Health Ethiopia, 2004; Federal Ministry of Health Ethiopia, 2006).

Since a minority of pregnant women attend such clinics in Ethiopia, HIV data collected at antenatal clinics present an incomplete picture of epidemiological trends. Results from the 2005 Demographic and Health Survey (which included more than 13 000 men and women from all regions) therefore enable a fuller picture to be drawn of Ethiopia's epidemic. According to the survey, 1.4% of adults (15–49 years) were living with HIV in 2005, with prevalence among adult women double that among adult men. Infection levels were much higher in urban areas (5.5% among adults) than in rural areas (0.7%) (Central Statistical Agency and ORC Macro, 2006).⁴

The most recent data from neighbouring **Eritrea** also indicate a stable epidemic, with 2.4% of women seeking antenatal care testing HIV-positive. This is consistent with the HIV prevalence of 2.8% and 2.4% found in 2001 and 2003, respectively. Prevalence ranged from over 7% in Assab (in the south) and 6% at Assia (in the centre of the country), to 0% in Shieb (also in the centre) (Ministry of Health Eritrea, 2006).

No new HIV data are available for **Somalia**, where a 2004 sentinel surveillance survey found comparatively low HIV infection levels of 0.9% among pregnant women nationally. At some antenatal clinics, HIV prevalence was considerably higher than in 1999—at Hargeisa it had risen from 0.7% to 1.6%, while in Berbera it had risen from 0% to 2.3% (WHO, 2005a). Knowledge of HIV transmission is low and condom use very rare: more than 85% of young men and women, aged 15–24 years, have never used a condom, according to one survey (WHO, 2005b).

West and Central Africa

National adult HIV prevalence continues to be much lower in **West Africa** than in other parts of sub-Saharan Africa. National adult HIV prevalence surpasses 4% only in **Côte d'Ivoire**, and is 2% or lower in several other countries, especially those of the Sahel. As in most of East Africa, HIV infection trends are generally stable although declining prevalence has been noted among pregnant women in several cities, including Ouagadougou (**Burkina Faso**), Abidjan (**Côte d'Ivoire**) and Lomé (**Togo**) (WHO, 2005).

Only India and South Africa have more people infected with HIV than does **Nigeria**, where an estimated 2.9 million [1.7 million–4.2 million] people were living with the virus in 2005 (UNAIDS, 2006). Approximately 300 000 adults were newly infected with HIV in 2005. When the improved assumptions used to obtain current estimates of HIV prevalence among pregnant women are applied to previous rounds of sentinel surveillance, the overall trend in HIV infection levels among pregnant women in Nigeria appears to be stable. Nationally, about 4.4% [4.2%–4.6%] of women attending antenatal clinics were found to be infected with HIV in 2005, but prevalence in pregnant women exceeded 5% in almost a dozen states. The epidemic shows considerable variation, with state-wide prevalence ranging from as high as 10% in Benue (in the North Central zone) and 8% in Akwa Ibom (South South zone) to under 2% in Ekiti, Oyo (both in the South West zone), and in Jigawa (North West zone). In some states, HIV prevalence among pregnant women is higher in rural than in urban areas, while in others the reverse is being found. More detailed research is required to achieve a better understanding of the reasons for these varying patterns (Federal Ministry of Health Nigeria, 2006).

National adult HIV prevalence remains just under 1% [0.4%–1.5%] in **Senegal** (UNAIDS, 2006), although infection levels in adults are more than twice as high (2.2% and 2%, respectively) in the Ziguinchor and Kolda regions in the south (Centre de recherche pour le Développement Humain et MEASURE DHS+, 2005). Sex work still appears to be the main factor in Senegal's

⁴ The differences between HIV estimates based on antenatal clinic data and those presented in this population-based survey seem to derive mainly from the limited coverage of antenatal care services in Ethiopia and differences in geographical coverage between the two surveillance systems. It is worth noting that HIV prevalence in the population-based survey among women who had received antenatal care was the same—3.5%—as the prevalence estimate derived from antenatal clinic data (Central Statistical Agency and ORC Macro, 2006).

epidemic, with HIV prevalence as high as 30% among sex workers in Ziguinchor, for example. There remains a danger of HIV spreading from sex workers and their clients to the general population (Gomes do Espirito Santo and Etheredge, 2005).

Research is identifying a previously hidden aspect of the epidemic in Senegal: the role of sex between men as a risk factor for HIV infection. Conducted in five urban areas (Dakar, Kaolack, Mbour, Saint-Louis and Thiés), a study has found HIV prevalence of 22% in men who have sex with men, most of whom (94%) said they also had sex with women (Wade et al., 2005). This population of men who have sex with men could serve as a potential bridge for HIV transmission to women who ordinarily would be at low risk of infection. Only about half of the men in the study reported using condoms during sex with men or women in the previous month (Wade et al., 2005).

There are signs of declining HIV prevalence in urban parts of Burkina Faso, Côte d'Ivoire and Ghana, but Mali's epidemic appears to be growing.

The HIV epidemic in **Mali** could be growing, after having remained stable for many years. A comparison of data from sentinel surveillance sites with consistent information for 2002–2005 shows HIV prevalence among pregnant women rising from 3.3% in 2002 to 4.1% in 2003 and 2005. Similarly among 15–19-year-old pregnant women, HIV infection levels have risen (from 2.5% in 2002 to 3.4% in 2005), as they have among those older than 35 years (1.5% in 2002 to 4.5% in 2005). Usually, infection levels would tend to be higher among slightly older women, who have been sexually active for longer and therefore are more likely to have become infected. Overall, HIV prevalence was highest in the Ségou region, where 5.1% of pregnant women were found to be HIV-infected in 2005—a reminder that serious, localized epidemics are under way in this large country (Ministère de la Santé Mali, 2005).

Guinea is experiencing one of the smaller AIDS epidemics in sub-Saharan Africa. Adult HIV prevalence was an estimated 1.5% [1.2%–1.8%]

in 2005, and approximately 85 000 [69 000–100 000] people were living with HIV. The recent national household survey shows that HIV infection levels are highest in urban areas, where they exceeded 2% among adults in the capital, Conakry (Direction Nationale de la Statistique Guinée and ORC Macro, 2006).

New HIV data is still pending for **Côte d'Ivoire**, where civil conflict has hindered HIV surveillance and probably also HIV prevention work. Available HIV data suggest a relatively stable but serious epidemic, with at least 4% of adults living with HIV in 2005 (UNAIDS, 2006). HIV data for **Togo** also point to a serious epidemic, with the Maritime, Plateaux and Savanes regions, and the capital, Lomé, worst-affected (WHO, 2005). At least 7% of women attending antenatal clinics in those parts of the country have tested HIV-positive (WHO, 2005; Ministère de la Santé Togo, 2004). Overall adult HIV prevalence was an estimated 3.2% [1.9–4.7%], and about 110 000 [65 000–160 000] people were living with HIV in 2005 (UNAIDS, 2006).

Neighbouring **Bénin** has a smaller epidemic with about 87 000 [57 000–120 000] people living with HIV in 2005 and adult HIV prevalence estimated at 1.8% [1.2%–2.5%] (UNAIDS, 2006). At the limited number of urban sentinel sites with HIV data dating back to the mid-1990s, a declining trend in HIV infections has been apparent since 2000, with HIV prevalence having fallen from about 4% (2001) to under 2% (2005). At the same time, high HIV infection levels (ranging from 3% to over 5%) have been found among women attending antenatal clinics in both urban and rural parts of the Atlantique and Mono départements. Overall, though, Benin's epidemic appears to be stable, with HIV prevalence in antenatal clinic attendees ranging between 1.8% and 2.2% since 2003 (Ministère de la Santé Bénin, 2006) (Alary et al., 2002).

In neighbouring **Ghana**, where adult HIV prevalence was estimated at 2.3% [1.9%–2.6%] in 2005 (UNAIDS, 2006), there are signs that the country's epidemic could be in decline. Having risen steadily to a peak of 3.6% in 2003, HIV infection levels among women attending antenatal clinics declined subsequently to 3.1% in 2004 and 2.7% in 2005 (National AIDS/STI Control Programme, 2006). The 2003 national survey showed that, unlike most countries in sub-Saharan Africa, HIV prevalence in Ghana overall

differs only slightly between urban and rural areas of Ghana (2.3% versus 2.0%) (Ghana Statistical Service, Noguchi Memorial Institute for Medical Research, ORC Macro, 2004). At the same time, HIV spread differs from region to region, with prevalence among pregnant women ranging from 1.2% in the northern region to 4.7% in the eastern region (National AIDS/STI Control Programme, 2006).

HIV infections are especially prevalent among older Ghanaians, especially in women aged 35–39 years and in men aged 40–44 years (Akwaru et al., 2005). However, among pregnant women, most of the HIV cases are found in the 25–34-year-old age group (National AIDS/STI Control Programme, 2006). As in many other countries, marriage appears to be a significant risk factor for women in Ghana, while mobility is a strong risk factor among men (Akwaru et al., 2005). Married women were almost three times more likely to be HIV-infected than women who had never been married (Ghana Statistical Service, Noguchi Memorial Institute for Medical Research, ORC Macro, 2004).

Research conducted in three prisons in Nsawan and Accra in Ghana has uncovered high HIV prevalence among inmates (19%) and prison officers (8.5%) who participated in the study. The study's small sample size might have led to an overestimation of HIV prevalence, but the findings indicate HIV outbreaks are occurring in those prisons. Overall, almost one in three of the male inmates participating in the study reported having had sex with other men (inside or outside the prison), while a small percentage of inmates said that they injected drugs. Skin tattooing might also be a cause of some in-prison HIV transmission. It appears that many of the HIV-infected inmates acquired the virus in prison; although a majority of them had been imprisoned for about 10 years, none had reached a symptomatic stage of AIDS, which indicates relatively recent infection (Adjei et al., 2006).

There are also signs of declining HIV prevalence to Ghana's north, in **Burkina Faso**, where adult HIV prevalence remained an estimated 2% [1.5%–2.5%] (UNAIDS, 2006). Among young women (aged 15–24 years) attending antenatal clinics in urban areas, HIV infection levels fell by half between 2001–2003, to below 2% amid indications from national survey data that more

citizens of Burkina Faso are protecting themselves and their sex partners against possible HIV infection (Présidence du Faso, 2005; Institut National de la Statistique et de la Démographie and ORC Macro, 2004). The south and west of the country (including Poni province, where adult HIV prevalence was 3.7% in 2003) is notably more affected by the epidemic than are the eastern regions (Institut National de la Statistique et de la Démographie and ORC Macro, 2004).

In sparsely populated **Chad**, a recent national HIV survey has found adult HIV prevalence of 3.3%. In the country's five largest cities and towns, over 6% of adults were living with HIV and in the capital, N'Djamena, prevalence was 8%. There is considerable room for improving HIV prevention. Fewer than one in ten (8%) men and women said they had used a condom the last time they had sex, and about 4% of men and 2% of women said they had exchanged sex for money at some stage (but only about half of them used a condom when doing so). Basic knowledge of HIV is poor: only one in four men and women knew how to prevent sexual transmission of HIV and rejected major misconceptions about the virus (République du Tchad, 2005).

Incomplete HIV data make it difficult to discern clear trends in most countries of Central Africa, but **Cameroon** and the **Central African Republic** appear to be most-affected. In the latter, almost 11% [4.5–17.2%] of adults (aged 15–49 years) were living with HIV in 2005 (UNAIDS, 2006), while adult HIV prevalence in the former exceeded 5% [4.9%–5.9%] (UNAIDS, 2006). Infection levels are highest in the north-west and eastern regions (almost 9%) and lowest in the north of **Cameroon** (2% or lower) (Institut National de la Statistique et de la démographie and ORC Macro, 2005b). According to the 2005 Demographic and Health Survey, prevalence was almost twice as high for adult women than for men (15–49 years) (6.8% compared with 4.1%). The survey found widespread awareness of AIDS but poor knowledge of HIV: more than one third of women did not know the methods for preventing sexual transmission of HIV (Institut National de la Statistique and ORC Macro, 2004).

It is estimated that as many as one million [560 000–1.5 million] people, more than 100 000

[40 000–270 000] of them children younger than 14 years, were living with HIV in the **Democratic Republic of the Congo** in 2005 (UNAIDS, 2006). However, HIV surveillance data are unavailable for many parts of this large country. To its west, in the smaller and less populous **Republic of the Congo**, some 120 000 [75 000–160 000] people were living with HIV in 2005 (UNAIDS, 2006). In 2005, 4.9% of women attending antenatal clinics were HIV-infected. Prevalence among pregnant women varied widely, though—from as low as 2% in Djambala to 9% in Sibiti and 10% in Gamboma. In the capital, Brazzaville, some 4% of antenatal clinic attendees were HIV-infected (Ministère de la Santé et de la Population République du Congo, 2005).

In sum, sub-Saharan Africa's HIV epidemics are following divergent trends. There is evidence of diminishing or stable HIV spread in most east African and west African countries, along with signs of growing epidemics in a few countries. In southern Africa, only Zimbabwe presents evidence of a strong decline in national HIV prevalence. In several other countries—including South Africa—the epidemics do not yet show signs of abating.