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The Global Challenge of HIV and AIDS

by Peter R. Lamptey, Jami L. Johnson, and Marya Khan

- HIV prevalence is stabilizing in some areas, but is increasing in others; HIV and AIDS remain major threats to global health.
- The epidemic can be slowed by halting HIV's spread among people most at risk of infection with the virus.
- New AIDS treatment strategies are protecting newborns and extending the lives of AIDS patients.

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The Global Challenge of HIV and AIDS

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The Global Challenge of HIV and AIDS

by Peter R. Lamptey, Jami L. Johnson, and Marya Khan

The AIDS epidemic may be the most devastating health disaster in human history. The disease continues to ravage families and communities throughout the world. In addition to the 25 million people who had died of AIDS by the end of 2005, at least 40 million people are now living with HIV. An estimated 4.9 million people were newly infected with HIV in 2005—95 percent of them in sub-Saharan Africa, Eastern Europe, or Asia. While some areas have successfully slowed the epidemic, it is surging in others.[1]

In the most-affected regions, hard-earned improvements in health over the last 50 years have been overwhelmed by death and disability from AIDS. The disease is crippling progress at the personal, family, community, and national levels. In severely affected nations, economic growth and political stability are also threatened.[2]

Sub-Saharan Africa is the hardest hit region in the world (see Table 1). More Africans die of AIDS-related illness than of any other cause. South Africa has the largest number of people living with HIV—between 4.5 million and 6.2 million. Swaziland has the highest adult HIV prevalence rate: More than 38 percent of adults are infected with HIV.

While the scale and force of the epidemic have hit Africa hardest, other regions also face serious AIDS epidemics (see Figure 1, page 4). HIV prevalence is spreading fastest in Eastern Europe and the former Soviet republics because of increases in injecting drug use and a breakdown in the health care system.

HIV prevalence is also rising rapidly in many parts of eastern and southern Asia. China and India will see millions of additional infections unless they launch effective, large-scale prevention programs.

Countries throughout the industrialized world face serious challenges from AIDS. Infection rates have not declined significantly in Western Europe or North America, where the epidemic has spread from the gay male population to ethnic minorities, the poor, and other marginalized groups.

Globally, the AIDS pandemic shows no sign of slowing, despite concerted efforts to control it and a few success stories. The difficulties in reducing the number of new infections are also compounded by poor access to lifesaving treatment. The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimates that only about 15 percent of the 6.5 million people in developing countries who need treatment have access to antiretroviral drugs.

Table 1
HIV and AIDS Indicators by Region, 2005

Region	People living with HIV	People newly infected in 2005	Prevalence (% of adults infected)	Deaths due to AIDS in 2005
World	40,300,000	4,900,000	1.1	3,100,000
Sub-Saharan Africa	25,800,000	3,200,000	7.2	2,400,000
N. Africa/Middle East	510,000	67,000	0.2	58,000
South/Southeast Asia	7,400,000	990,000	0.7	480,000
East Asia	870,000	140,000	0.1	41,000
Oceania	74,000	8,200	0.5	3,600
Latin America	1,800,000	200,000	0.6	66,000
Caribbean	300,000	30,000	1.6	24,000
Eastern Europe/Central Asia	1,600,000	270,000	0.9	62,000
Western/Central Europe	720,000	22,000	0.3	12,000
North America	1,200,000	43,000	0.7	18,000

Note: Estimates represent the midpoint of a range. The world total, for example, ranges from 36.7 million to 45.3 million. Prevalence rate refers to the percentage of adults ages 15 to 49 infected with HIV.

Source: Joint United Nations Programme on HIV/AIDS(UNAIDS), and World Health Organization (WHO), *AIDS Epidemic Update, December 2005* (2005): 3.

HIV and AIDS

AIDS, or acquired immunodeficiency syndrome, is caused by the human immunodeficiency virus (HIV), which is spread through blood, semen, vaginal secretions, and breast milk. The most common method of transmission is unprotected sexual intercourse with an HIV-positive partner. Other routes include transfusions of HIV-infected blood or blood products; tissue or organ transplants; use of contaminated needles, syringes, or other skin-piercing equipment; and mother-to-child transmission during pregnancy, birth, or breastfeeding. HIV is extremely fragile. It cannot survive long outside the body's fluids or tissue and it cannot penetrate unbroken skin.[3]

HIV kills by weakening the body's immune system until it can no longer fight infection. Opportunistic infections are illnesses such as pneumonia, meningitis, some cancers, tuberculosis (TB), or other parasitic, viral, and fungal infections that occur when the immune system is weakened.

HIV generally progresses over a decade before developing into AIDS, but there is a long delay after infection before symptoms become evident. Early HIV-related symptoms include chronic fatigue, diarrhea, fever, weight loss, persistent cough, skin rashes, herpes and other oral infections, swelling of the lymph nodes, and memory loss or other mental changes.

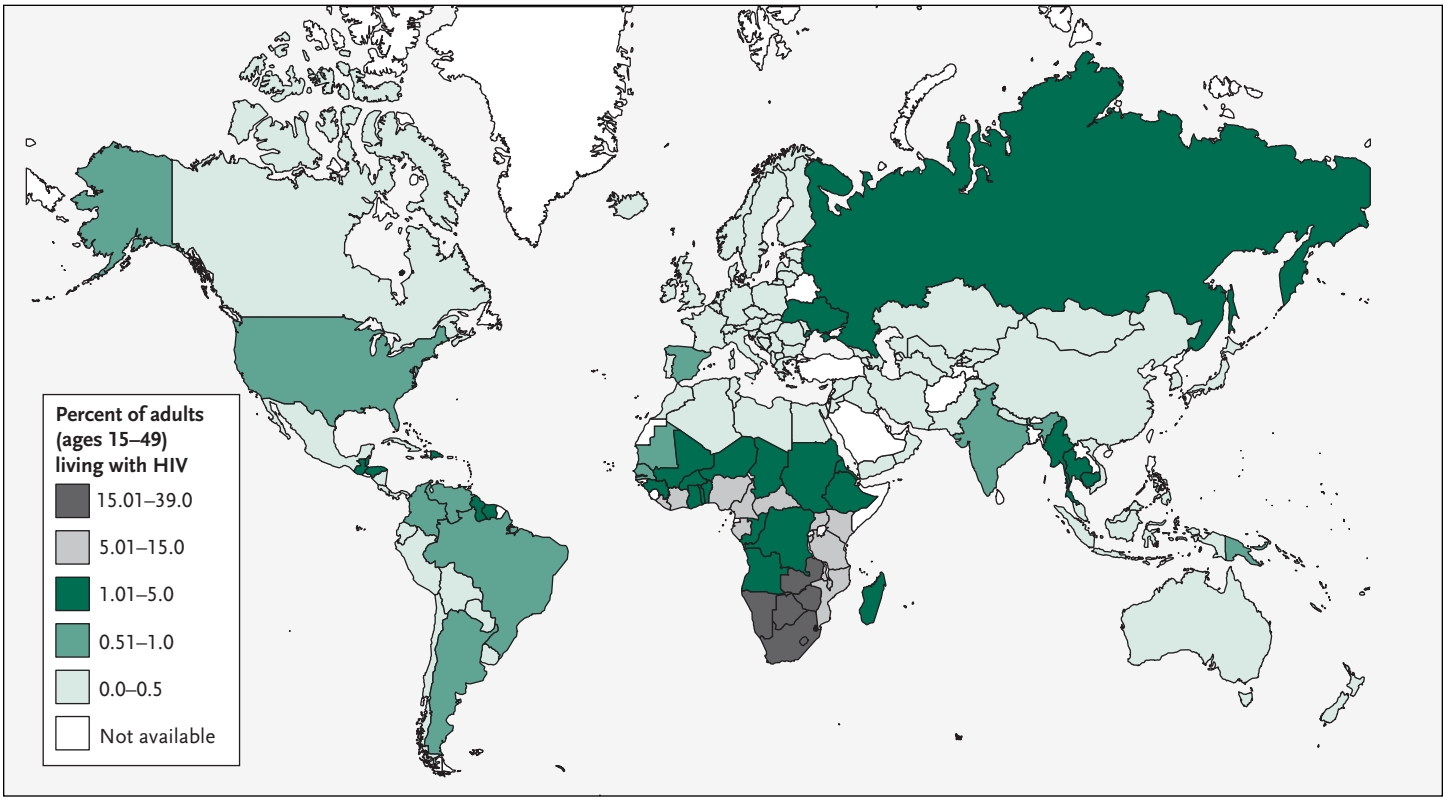
AIDS is almost always fatal without treatment, although a few individuals have survived with AIDS untreated for up to 20 years. Current drug regimens, such as highly active antiretroviral therapy (HAART), slow the virus' replication in the body. Slower replication rates lessen the burden on the immune system, thereby reducing HIV-related illnesses and allowing patients to live longer, higher-quality lives. There is no cure for AIDS: The disease resurges if HAART is halted.

Risk and Vulnerability

When AIDS was first identified in the 1980s, public health officials assumed its spread could be halted by informing people how to protect themselves from infection and by safeguarding blood supplies. This approach has been successful in politically organized communities with access to information and resources: It reduced incidence among white gay men in North America, Australia, and Western Europe, for example. But populations in less developed and socially fragmented countries had little access to accurate information or effective prevention programs, and the virus continued to spread.[4]

In the late 1980s, as the epidemic surged and shifted from people with high-risk behavior to the general population, especially in developing countries, public health professionals realized they needed to better understand the causes of individual infection and the forces driving the pandemic. They knew HIV transmission was linked to specific behavior such as having multiple sex partners, commercial sex, and injecting drug use, but they also realized that these behaviors were influenced by political, economic, social, cultural, and environmental factors—including poverty, military conflict, powerlessness, and gender inequality. Understanding the factors

Figure 1
Percent of Adults Living With HIV by Country, 2003



Note: Updated estimates for HIV prevalence rates by country will be available on PRB's website, www.prb.org.

Source: UNAIDS, *2004 Report on the Global AIDS Epidemic* (2004).

that increase risk and vulnerability to HIV is crucial for responding effectively to the epidemic.

High-Risk Behavior

High-risk behavior—unprotected sex with multiple partners, injecting drug use, and commercial sex—can increase vulnerability to HIV infection. While heterosexual sex between multiple partners has been the driving force behind the epidemics in sub-Saharan Africa, injecting drug use and commercial sex have been the main drivers of epidemics in Asia.

Injecting drug users are more susceptible to HIV infection because they sometimes use contaminated needles and syringes, which are an efficient mode of transmission. Sex workers face increased risk of infection because they engage in sex with multiple partners, often with no protection. The interaction between commercial sex and injecting drug use heightens vulnerability, as many injecting drug users engage in commercial sex to finance their drug habits and a considerable proportion of sex workers also inject drugs. Many countries have seen high levels of HIV for injecting drug users and sex workers, but they have yet to experience epidemics within the general population. However, once HIV is established in high-risk groups, it can easily spread to the general public via bridge groups, such as clients of sex workers. These bridge populations can infect their own spouses and partners with HIV.[5]

Risk and Vulnerability of Women

Whereas men were most affected at the beginning of the epidemic, women's rates of new infection now surpass men's, especially in countries where women live in poverty and have relatively low status. In sub-Saharan Africa, women make up 57 percent of adults living with HIV. The gender gap is especially pronounced among Africans younger than age 25. In sub-Saharan Africa, women ages 15 to 24 are three times more likely to be infected than young men their age.[6]

Biological, cultural, and socioeconomic conditions contribute to women's greater vulnerability to HIV. During unprotected vaginal intercourse, a woman's risk of becoming infected is up to four times higher than that of a man. The vagina has a greater area of susceptible tissue compared with the male urethra and often sustains microtrauma during intercourse.[7] In addition, HIV-infected semen typically contains a higher viral concentration than do vaginal secretions.

The risk of HIV infection increases for people who have other sexually transmitted infections (STIs). Research shows that some untreated STIs in either partner can increase the risk of HIV transmission as much as tenfold. This is especially significant for women because many STI cases in women go untreated. Women's symptoms are often latent or difficult to see, and many women who have been diagnosed with STIs do not receive medical treatment.[8]

Socioeconomic factors, including women's lack of access to education or personal income, and unequal property rights perpetuate women's greater vulnerability to HIV infection. Many women fear their husbands or partners will abandon them if they try to control how and when they have sex and whether their partner uses a condom. Moreover, poverty drives some women into the sex industry, where sexual trafficking and commercial sex promote continued exposure to HIV. Furthermore, men control the main tool for reducing the risk of sexual transmission of HIV: the male condom. Even though the female condom has improved prevention options for women, men's involvement is still crucial.[9]

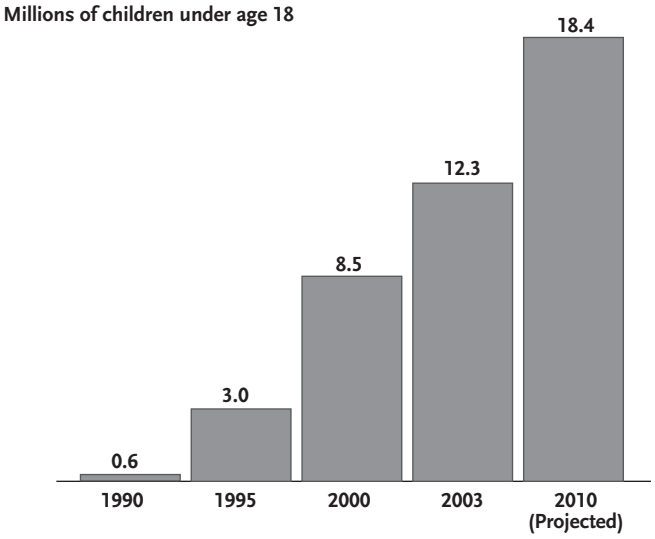
Cultural traditions such as male dominance and older men's preference for young women contribute to women's vulnerability. Throughout the world, prevailing views about masculinity encourage men to undertake risky sexual behaviors—multiple sex partners, alcohol consumption prior to intercourse, and sexual violence—that make women more vulnerable to HIV and other STIs. In many cases, a wife's marriage and fidelity do not protect her from HIV because her husband's sexual behavior before or during marriage puts her at risk. For example, in India, many new infections occur among married women whose husbands have frequented sex workers and, according to one study, married women in Nicaragua are twice as likely to be HIV-positive as are sex workers.[10] Violence against women, including sexual violence, is most often inflicted by a husband or partner and can also be a factor in HIV infection. According to one South African study, women who experienced violence from their partners were 48 percent more likely to be HIV-positive than those who had not.[11]

Young girls are at even greater risk of infection because of their social vulnerability both before and during marriage. Most infections in young women are a result of unprotected sex and reflect a power imbalance that limits women's ability to negotiate or control sexual interactions, especially with older men. Additionally, young girls face heightened biological risks because their reproductive tracts are not yet fully developed.

High-Risk Situations

Military conflicts and natural disasters bring together populations with different levels of HIV infection, thereby increasing the potential for new infections. During such times, socioeconomic and health structures

Figure 2
Increase in Children Orphaned by AIDS in Sub-Saharan Africa, 1990–2010



Note: Estimate of children who lost at least one parent to an AIDS-related cause.

Source: UNAIDS, UNICEF, and U.S. Agency for International Development (USAID), *Children on the Brink 2004* (2004).

begin to break down as populations are displaced from their homes and communities. The massive population dislocations during the 1994 genocide in Rwanda, for example, mixed urban populations with high levels of HIV with rural populations with low levels of HIV, helping expand the epidemic into rural areas.[12] In recent years, more than 50 million people in over 70 countries have been affected by emergencies stemming from armed conflict and natural disasters.[13]

While all population groups in emergency situations may face increased risks of HIV, women and children are the most vulnerable and least able to protect themselves. Some engage in risky behaviors, such as sex work, in an effort to survive. Children may be separated from their parents, recruited as child soldiers, or placed in situations that may make them more vulnerable to infection. Additionally, as security situations deteriorate, women and girls are often subjected to sexual violence and rape.[14]

Military personnel also face heightened risks of contracting or spreading HIV through risky sex during long deployments away from home.[15]

Given the immediate needs of health care, shelter, food, and water, the threat of HIV infection has not historically been a priority in emergency situations. But humanitarian and relief efforts are now beginning to integrate HIV programs into emergency responses. In some cases, especially when conflicts limit the freedom of movement, the greatest threat of HIV transmission can occur during the period of peace following a time of conflict. For example, the civil war in Angola probably slowed the spread of HIV because trade and travel were halted for almost three decades. However, the threat of HIV in Angola has risen since the end of the war in 2002 because of the return of refugees, the opening of borders, increased trade, and more travel.[16]

Labor migration—which involves millions of people every year—also leads to increased vulnerability and spread of HIV. Some of the factors that contribute to migrant and mobile workers' increased vulnerability include frequent travel, long separations from spouses or partners, limited access to health services, and minimal social contact or recreational opportunities. Without family and community support systems, migrants are more likely to engage in risky behaviors and potentially pass those risks on to their own family and community members.[17]

Orphans and Vulnerable Children

The rising HIV infection rates among women, particularly in sub-Saharan Africa, expose children to increased HIV risk even before they are born. In 16 sub-Saharan African countries, at least 5 percent of pregnant women ages 15 to 24 attending prenatal clinics between 2001 and 2003 were HIV-positive.[18] However, fewer than 10 percent of pregnant women were offered services to prevent mother-to-child transmission. In the absence of preventive measures, approximately one-third of children born to HIV-positive mothers will contract HIV.[19]

UNAIDS estimates that 2.3 million children were living with HIV at the end of 2005. Fewer than 5 percent of children who need pediatric AIDS treatment are receiving it. Many HIV-infected children bear a double impact: Not only are they living with the disease themselves, but they have also lost one or both parents to AIDS. At the end of 2003, 15 million children had lost at least one parent to AIDS.

The number of children orphaned by AIDS is increasing at an unprecedented rate. Without AIDS, the percentage of children who are orphans would be expected to decline because of general improvements in health, but AIDS is dramatically increasing the percentage and number of orphans, especially in countries hard hit by the epidemic. As more parents develop AIDS and die, the number of orphans will continue to rise over the next 10 years.[20] In sub-Saharan Africa, AIDS had orphaned 12 million children by 2003; by 2010, 18 million children are expected to be orphaned by AIDS (see Figure 2). In South Africa alone, the number of orphans is expected to increase from 2.2 million in 2003 to 3.1 million in 2010.

Children in resource-poor environments are exceedingly vulnerable to a variety of adverse conditions even before the AIDS-related death of a parent or guardian. Basic needs like schooling, food, shelter, and health care are jeopardized, while children face an increased risk of abuse, exploitation, and social isolation. Psychosocial needs are significant as children deal with the trauma of impending or actual parental loss as well as possible disclosure issues about their parent's or their own HIV status, adjustment to new living and family circumstances, and real or perceived increases in economic and family responsibilities.

Children may serve as the primary caretaker of ailing parents, assume responsibility for younger siblings, or assume additional duties in the household.[21] If the primary wage earner falls ill, children may leave school to find work to help support the family. Illnesses in the family may also divert funds that were previously available for school fees. Families of people living with HIV and AIDS often encounter stigma and discrimination that may deny children access to education and even health care.

Children orphaned by AIDS are at an increased risk of exploitation and abuse. Weak or poorly enforced laws can result in orphans being cheated out of their inheritance. Economic demands may force children, girls in particular, into commercial sex work or relationships with older men to obtain food, shelter, or money. Without the protection of a parent or loving guardian, children may become victims of trafficking, exploitive labor conditions, or violence. These risky conditions increase the orphaned child's vulnerability to HIV.

Health and Demographic Effects

AIDS has exacted a devastating toll on population and health over the last 25 years. The number of people living with HIV has surged from a few thousand in the 1980s to 40 million by 2005, and has spread to all world regions (see Figure 3, and Box 1, page 8). The epidemic has triggered an upsurge in previously rare infections and malignancies and is contributing to an explosive TB epidemic around the world. HIV has reversed hard-won gains in child survival and life expectancy in sub-Saharan Africa and in a growing number of countries and communities worldwide.

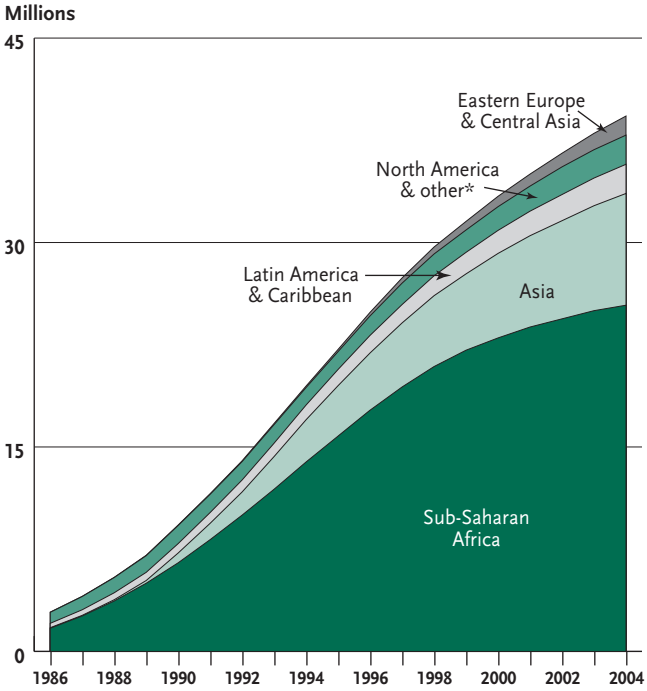
Because AIDS tends to strike the young and sexually active, AIDS deaths have also distorted the age and sex profiles of the populations in heavily affected communities and countries. The unbalanced ratios affect population growth as well as the social and economic health of these areas.

HIV and Tuberculosis

Tuberculosis is reemerging in many parts of the world and now infects about one-third of the world's population. Some countries now face HIV and TB epidemics simultaneously. In sub-Saharan Africa, up to 70 percent of TB patients are infected with HIV. AIDS and TB interact destructively, each hastening the progression of the other. TB is a leading cause of death among people with HIV and is responsible for an estimated 13 percent of AIDS deaths. Most people infected with TB, but not HIV, remain healthy: Only 5 percent to 10 percent will develop an active case of TB. HIV, however, triggers the active—and thus infectious—form of TB. A person with an active case of pulmonary TB can infect an average of 10 to 15 people every year with TB if he or she does not receive treatment.[22]

HIV infection also makes TB more difficult to diagnose. People with HIV or AIDS often develop multidrug-resistant TB, detectable only through special laboratory tests often not available in low-income countries. TB is curable in HIV-infected individuals, but treatment is much more expensive and typically requires a strict regimen of drugs for approximately six months. Strict adherence to treatment often is difficult for residents in developing countries, where access to health care is limited.[23]

Figure 3
People Living With HIV by World Region, 1986–2004



*North America, Europe (except Eastern), North Africa, and the Middle East.

Source: UNAIDS and World Health Organization (WHO), published and unpublished data, 2005.

Box 1
Emerging HIV Epidemics

While some countries are controlling the AIDS epidemic, HIV prevalence is spreading into new areas and increasing rapidly in others. The most alarming increases are in Eastern Europe and Central Asia, India, and China.

Eastern Europe and Central Asia are experiencing rapidly growing HIV epidemics. An estimated 1.6 million people are living with HIV in the region. Injecting drug use has been driving the epidemics, but unprotected sex is an increasingly common mode of transmission. The Russian Federation and Ukraine are this region's most-affected areas. An estimated 860,000 people were living with HIV in the Russian Federation at the end of 2003, and 360,000 were living with HIV in Ukraine.

A number of countries in Asia are facing emerging HIV epidemics. In India, at least 5 million people were living with HIV in 2005. In southern India, the virus is spread primarily through unprotected sex, while injecting drug use accounts for most infections in northeastern India. In most parts of India, commercial sex is the driving factor. Overall prevalence continues to rise, and HIV is moving beyond the urban areas.

China had an estimated 650,000 people living with HIV in 2005. The most serious epidemics have been among injecting drug users, sex workers, and plasma donors, as well as their partners. Already there are signs that HIV is spreading from populations who practice high-risk behavior into the general population. HIV has been detected in all 31 provinces in China.

Vietnam, Indonesia, and Pakistan are also on the verge of serious epidemics. In Vietnam, an estimated 263,000 people are living with HIV—twice the number in 2000. The interaction between injecting drug use and sex work is fueling the epidemic. All 64 provinces have detected cases of HIV.

Indonesia had an estimated 110,000 people living with HIV at the end of 2003. Driven primarily by injecting drug use, the epidemic is spreading into remote areas of the country. HIV is also entering commercial sex networks, with an expansion into the general population likely to follow.

In Pakistan, an estimated 74,000 people were living with HIV at the end of 2003. Drug users and sex workers maintain high levels of risky behavior but have limited knowledge about HIV, setting the stage for an increasingly serious HIV epidemic.

References

Joint United Nations Programme on HIV/AIDS (UNAIDS), *2004 Report on the AIDS Epidemic: 4th Global Report* (Geneva: UNAIDS, 2004); Ministry of Health, People's Republic of China, UNAIDS, and WHO, "2005 Update on the HIV/AIDS Epidemic and Response in China" (2006), accessed online at www.unaids.org, on Feb. 7, 2006; and UNAIDS and World Health Organization (WHO), *AIDS Epidemic Update—December 2005* (Geneva: UNAIDS, 2005).

HIV and Malaria

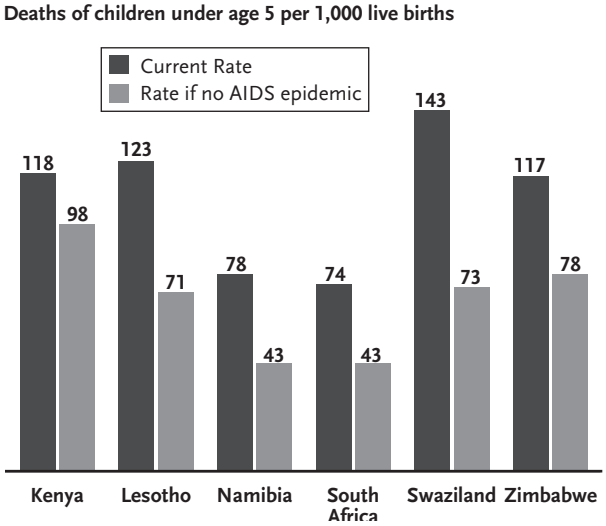
Malaria and HIV are the most common infections and the most important causes of death and illness in sub-Saharan Africa. An estimated 30 million Africans are infected with HIV, and between 300 million and 500 million people suffer from malaria each year. There is increasing evidence that malaria and HIV interact such that HIV infection reduces the effectiveness of antimalarial drugs. HIV is associated with increased risk of malaria infection; more severe disease and death; and in pregnant women, more episodes of malaria and fever, and more adverse birth outcomes.[24]

Lower Life Expectancy

AIDS is the fourth leading cause of death worldwide. In 2005, UNAIDS estimated that 3.1 million adults and children died of AIDS, of whom 2.4 million were in sub-Saharan Africa. Conversely, AIDS-associated deaths in some countries have decreased dramatically, because of effective new medications. In Brazil, government policies to provide universal treatment of AIDS patients reduced AIDS deaths as much as 70 percent between 1996 and 2002 (see Box 2, page 14). But in most countries, the drugs are not widely available, and the annual AIDS death toll will continue to rise.

The epidemic has stalled or reversed progress in child survival and life expectancy, which are key indicators of social and economic development. In less developed countries, mortality rates among children under age 5 are substantially higher than they would be without HIV. Without lifesaving antiretrovirals, an estimated

Figure 4
Effect of AIDS on Child Mortality, Selected Countries in Sub-Saharan Africa Around 2003



Sources: UN Population Division, *World Population Prospects: The 2004 Revision*; and UNAIDS and UNICEF, *A Call to Action: Children, The Missing Face of AIDS* (2005).

one-third of children infected with HIV through mother-to-child transmission die before they reach age 1, and approximately 60 percent die by age 5. The UN estimated that child mortality increased in South Africa from 62 to 74 deaths per 1,000 children under age 5 between the late 1990s and early 2000s. If not for AIDS mortality, under-5 mortality would have been 43 deaths per 1,000 children (see Figure 4). During the same period in Swaziland, under-5 mortality rose from 109 to 143 deaths per 1,000 children; it would have been 73 in 2003 without the AIDS epidemic.

Improvements in public health and living standards throughout the world boosted average life expectancy in the mid- to late 1980s, but the surge of AIDS deaths has halted progress in many countries and caused a precipitous decline in several countries in sub-Saharan Africa. Lesotho's life expectancy is projected at 39 years in 2015–2020, but would have risen to 69 years without the AIDS epidemic (see Figure 5). Some countries outside of sub-Saharan Africa are also experiencing AIDS-related reductions in life expectancy. AIDS shortened projected life expectancy for 2015–2020 by four years in Cambodia and by seven years in Haiti.

In sub-Saharan Africa, where women are infected with HIV at younger ages and in larger numbers than men, some countries are seeing even lower life expectancies among women. Between 2000 and 2005, female life expectancy dropped below male life expectancy because of AIDS in Kenya, Malawi, Zambia, and Zimbabwe. Kenya posted the largest difference—46 years for women and 48 years for men.[25]

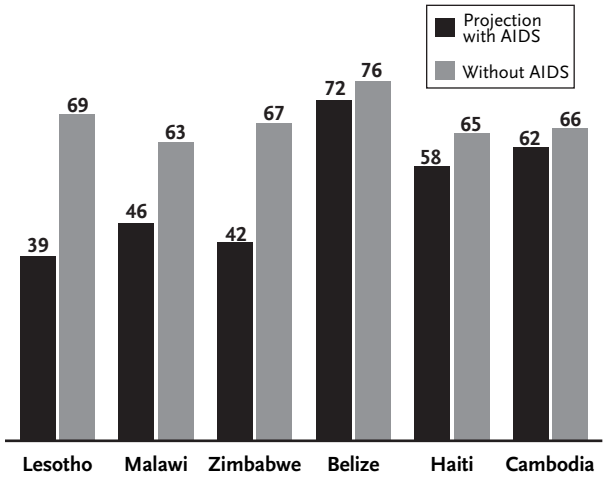
Slower Population Growth

Populations continue to grow in many heavily affected countries, although the growth is less than it would be in the absence of AIDS. In Uganda, for example, the UN projects the population at 51 million by 2020, up from 29 million in 2005. If the country had not experienced an AIDS epidemic, the 2020 total would be about 5 million higher. The effect is much greater in South Africa, where AIDS mortality will nearly halt population growth in the next 15 years despite high fertility. South Africa is projected to add fewer than 1 million people to its 2005 population of 47.4 million in 15 years. If the country had escaped the AIDS epidemic, the UN estimates South Africa's 2020 population would be 63.1 million (see Figure 6).

AIDS-related deaths are altering the age structure in severely affected countries. In southern Africa between 1985 and 1990, most deaths occurred among children under age 5 and adults over age 60, while only one-fifth of all deaths were among adults ages 20 to 49. Between 2000 and 2005, high AIDS mortality among young and middle-age adults meant that people ages 20 to 49 accounted for almost 60 percent of all deaths.

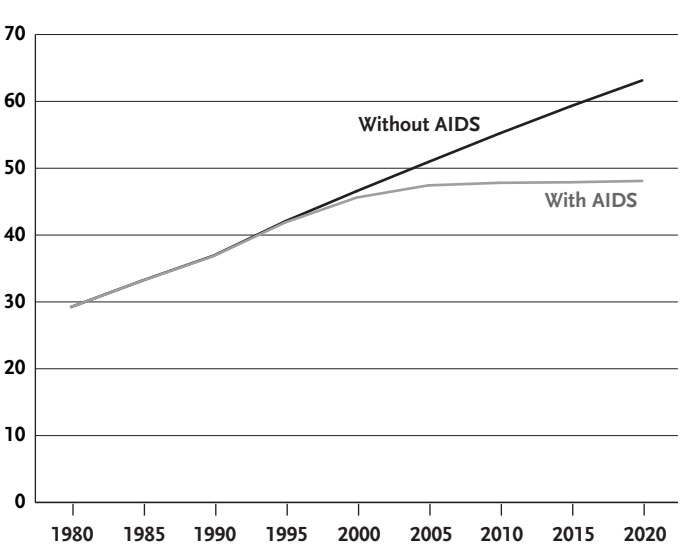
South Africa embodies many of the changes projected for populations severely affected by AIDS. By 2020, fewer children will be born because of deaths and lower fertility among HIV-positive women. Many children will die of AIDS-related causes during childhood. The adult population will shrink, with especially high losses among women in their 30s and 40s, and men over 40, which will be evident in the country's age and

Figure 5
Projected Effect of AIDS on Life Expectancy in Selected High-Prevalence Countries, 2015–2020



Source: UN Population Division, *World Population Prospects: The 2004 Revision*.

Figure 6
South Africa's Population Projected to 2020, With and Without AIDS



Source: UN Population Division, *World Population Prospects: The 2004 Revision* (CD-ROM Edition—Extended Dataset, 2005).

sex structure in 2020 (see Figure 7). Because of the long latent period of HIV, the largest number of AIDS deaths tends to occur approximately 10 years after HIV prevalence rates peak.

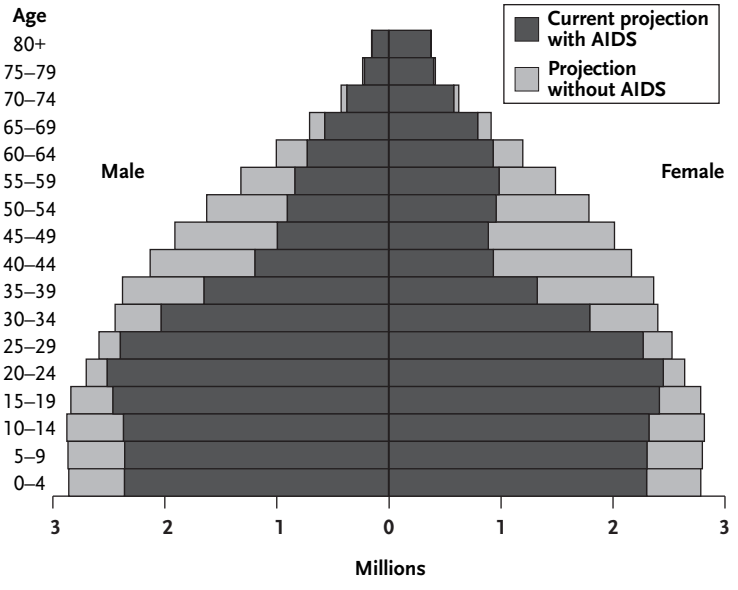
Social and Economic Impact

In heavily affected countries, HIV has overwhelmed public health systems and has stretched health care providers, infrastructure, and budgets beyond capacity. However, AIDS is much more than a health crisis. Its effects extend to nearly every dimension of social and economic life, especially in the worst-affected countries. Although the magnitude of the epidemic varies, in every country, AIDS primarily strikes adults between ages 25 and 45—people who were infected in their adolescent and young adult years. HIV and AIDS rob employees from the labor force, providers and caregivers from families, and teachers from communities.[26]

Public Health Burden

Health sectors feel the impact of HIV through such direct costs as the expense of medical treatment, supplies, and personnel, and through such indirect costs as falling numbers of trained medical providers and increasing stress on health systems struggling to respond to the epidemic.

Figure 7
South Africa's Population by Age and Sex in 2020, With and Without AIDS



Source: UN Population Division, *World Population Prospects: The 2004 Revision* (CD-ROM Edition—Extended Dataset, 2005).

HIV and AIDS continue to overwhelm the health systems in many countries. People living with HIV generally have a range of health care needs, spanning primary care and basic treatment for infections to hospitalization and psychosocial counseling. Where antiretroviral drugs are available, health systems need to monitor patients and manage the complex treatment regimens.

The increased need for care is especially problematic in countries that already find it hard to meet the most basic health care needs of their populations. WHO has reported that nations need between US$35 and US$40 per capita each year to finance minimum general health services packages, including antiretroviral therapy for people living with AIDS. However, the average amount spent in 2001 was US$23, and only US$6 of this came from public spending.[27] Many countries, including some of the poorest, are increasing their domestic spending on HIV and AIDS. South Africa increased HIV/AIDS spending in its 2003/2004 national budget by 86 percent from the previous fiscal year.[28]

AIDS is usurping health sector resources needed to treat other health problems. In many hospitals in sub-Saharan Africa, for example, AIDS patients are crowding out other patients: AIDS patients frequently occupy more than half of hospital beds in some sub-Saharan Africa countries. In Côte d'Ivoire and Uganda, between 50 percent and 80 percent of adult hospital beds are occupied by patients with HIV-related conditions.[29]

The loss of health care staff to AIDS is another blow to the health care sector in heavily affected countries. Their loss is particularly painful given the escalating need for their professional skills as more people fall ill with AIDS. According to the health service in South Africa, 14 percent of staff (mostly nurses) died from AIDS between 1997 and 2001.[30] AIDS also undermines health workers' morale as their workload and stress increase and they witness high mortality among children, young adults, and colleagues.

Business, Agriculture, and Labor

Because AIDS affects people in their prime working ages, businesses are suffering severe effects from the epidemic. This is especially true in some sub-Saharan African countries, where as much as one-third of the working-age population is infected with HIV. In high-prevalence countries, AIDS is consuming business profits because of three primary factors: increased operating costs, decreased productivity, and declining markets.

AIDS was initially believed to be primarily an urban phenomenon, but it now clearly threatens the lives and livelihoods of rural communities throughout the less developed world. AIDS-related deaths among farm

workers threaten agricultural production and food security, most notably in sub-Saharan Africa where a large segment of society relies on agriculture. The Food and Agriculture Organization (FAO) estimates that 7 million agricultural workers died of AIDS between 1985 and 2000 in the 25 hardest-hit countries in sub-Saharan Africa. FAO projects that 16 million more agricultural workers could die because of AIDS by 2020. In the worst-affected countries, losses in the agricultural labor force will range from 13 percent in Tanzania to 26 percent in Namibia by 2020. The loss of agricultural laborers in southern Africa will cause an estimated 3 percent loss in grain output.[31]

By disrupting agricultural production, AIDS can undermine countries' export capacity and thus their ability to earn foreign exchange. In Africa, agriculture accounts for 70 percent of employment, 24 percent of the gross domestic product, and 40 percent of the foreign exchange earnings.[32] The International Labour Organization (ILO) reports that subsistence agriculture employs 80 percent of the population of Swaziland, and export farming is responsible for 10 percent of the gross domestic product.

Farm households coping with AIDS may sell assets such as livestock, equipment, or land to support ill family members and pay for funeral expenses. Time devoted to care, funerals, and mourning of family members with AIDS reduces productivity and jeopardizes households' ability to produce and purchase food. Moreover, important knowledge and skills are lost as deaths mount among the agricultural population. Women in agricultural households are particularly hard hit since they often provide the labor for farming, but must increasingly spend their time caring for sick family members.

Without the necessary labor and resources for planting and harvesting, some families leave their land. A survey in Zambia showed that chronically ill heads of households in rural areas reduced the area of land they cultivated by more than half, reducing crop production and food availability.[33]

As incomes decline and more money is spent on health care, less money is available to spend on food, which can lead to malnutrition. Nutritional deficiencies can speed up the progression from HIV to AIDS and increase susceptibility to opportunistic infections. People living with AIDS need more calories than other people, especially if they have suffered significant weight loss. Individuals on antiretroviral drugs also have specific nutritional needs, and inadequate nutrition can affect their tolerance to the drugs and adherence to drug regimens.[34]

Governance and Public Service

In countries heavily affected by HIV, the epidemic affects governance and public service in three main ways: The country loses hard-to-replace political leaders and civil servants; revenues decline and costs rise; and demand for social services increases. Taken together, these factors exert significant pressure on the governments of less developed countries.

At the highest levels, AIDS is taking the lives of national leaders—including ministers, parliamentarians, and cabinet members—although most of these are not classified as AIDS deaths because the families fear stigmatization. Nations are losing their leaders and their years of political experience, undermining future national stability and security.[35] Zambia held 14 special elections between 1964 and 1984 because of the death of an incumbent. From 1985, when the first case of HIV was recorded in the country, to 2003, Zambia held 59 by-elections due to incumbent deaths, 39 of which occurred when the epidemic was in full force.[36]

The ranks of civil servants are also being depleted, Deaths among skilled civil servants are especially difficult to absorb in countries with low levels of literacy and education. Many of these countries rely on a small pool of staff members to develop and administer services.

Declining revenues and rising costs compound the loss of civil servants. In heavily affected countries, AIDS is reducing productivity and earnings. In 33 countries in sub-Saharan Africa, the annual growth rate for the gross domestic product per capita declined by 0.7 percent between 1992 and 2002 because of the AIDS epidemic.[37] Meanwhile, domestic government spending on AIDS has increased considerably. Between 1999 and 2002, low- and middle-income countries doubled their expenditures on AIDS programs to US$995 million.[38]

At the same time that costs rise and revenues decline, the demands on public services increase. HIV generally affects the poorest households disproportionately, contributing to rising poverty and greater social welfare needs. Furthermore, millions of orphaned children will require new or expanded public services. Funding or investments in some public services are reduced because of increased expenditures on health care and social welfare.[39]

Prevention, Care, and Treatment

In this third decade of the epidemic, there is still neither a cure nor vaccine for AIDS. Life-prolonging drugs have become more affordable and accessible, yet treatment is still largely unavailable to most people who need it in developing countries. As of June 2005, out of the 6.5 million people needing treatment in these countries,

only an estimated 1 million were receiving it.[40] While antiretroviral treatment prolongs the lives of many AIDS patients, it does not cure AIDS. More than 50 HIV vaccine candidates have undergone clinical trials since 1987 and researchers continue to develop strategies for improving defenses against the virus. Despite this progress, a safe and effective vaccine is years away.

As HIV continues to spread, prevention remains the backbone of programs to curb the epidemic for the foreseeable future. However, there is a need for more comprehensive programs that encompass prevention, care, treatment, and support interventions. Comprehensive prevention programs for people living with HIV include:

- General education about the risk of sexual transmission;
- Support for low-risk behavior, including condom use;
- Diagnosis and treatment of STIs;
- Counseling and testing for HIV;
- Preventing mother-to-child transmission;
- Ensuring the safety of blood and blood products;
- Needle exchange programs; and
- Reducing the stigma attached to HIV and AIDS.

Comprehensive care and treatment programs include antiretroviral therapy, prevention and treatment of opportunistic infections, palliative and home-based care, psychosocial support, postexposure prophylaxis (primarily for exposure to HIV as a result of rape or needle stick), and support for orphans and children of people living with AIDS.

The various components of the prevention and care continuum are mutually reinforcing. The availability of HIV care and treatment services can be a powerful incentive for people to seek counseling and testing. Without such services, people have little incentive to learn their HIV status. Counseling provides an opportunity to educate infected people about the importance of and methods for preventing the infection of others. Experts often cite counseling and testing for HIV—at AIDS clinics or as routinely offered by health providers—as a crucial entry point for effective prevention, treatment, and care. Access to care and treatment also helps reduce the stigma associated with HIV infection, encourages more people to get tested for HIV, and may promote behavior change. But convincing people to change their behavior is difficult, especially if they believe that they are not personally at risk or that they can be successfully treated for AIDS. Studies in more developed countries have shown that some people practice high-risk sexual behavior when they know that effective AIDS therapies are available.[41]

Prevention programs are much more likely to be successful if they involve policymakers and community leaders. Public policies that support HIV-prevention programs enable people to protect themselves. Successful prevention programs also address the factors that put individuals, families, and communities at risk of HIV infection and that increase their vulnerability to infection.

Prevention programs are effective only if they can reach the majority of people most at risk, especially young adults and marginalized groups such as sex workers, men who have sex with men, injecting drug users, and the sexual partners of those infected. Successful programs are tailored to focus on the main modes of transmission in any given community. Sexual transmission is the primary mode of transmission in most countries, especially in less developed regions (see Table 2), but transfusions of contaminated blood, injecting drug use, and mother-to-child transmission are responsible for up to 30 percent of all global HIV infections. If prevention activities are focused on these groups when an epidemic is localized, the prevalence of HIV in the general population can remain low. However, even when the epidemic is localized, there is still a need for prevention programs for the general population.

In sub-Saharan Africa, successful prevention programs focus on preventing transmission through heterosexual intercourse, from mothers-to-children, and through contaminated blood. In Southeast Asia, the primary focus is preventing transmission through sex and injecting drug use. In Eastern Europe, the emphasis is on transmission via injecting drug use. In Latin America and in high-income countries, prevention efforts need to encompass homosexual and heterosexual transmission, as well as transmission through injecting drug use.

Preventing Sexual Transmission

The most common mode of HIV transmission is sexual contact. Men and women with multiple sexual partners, including sex workers and their clients, men who have sex with men, and youth are the groups at highest risk of sexual transmission.

The most effective prevention programs promote or include interventions such as abstinence, delay in sexual debut and mutual fidelity, as well as limiting the number of sexual partners; consistent and correct condom use; STI treatment; counseling and testing, and a supportive social and policy environment. A program that focuses only on a few components may not serve the entire population and will have minimal national impact. The most effective mix of these components depends on cultural context as well as specific prevention needs and characteristics of key groups. Effective programs also consider the economic, social, and cultural factors that may affect individual's behavior.

Sexual debut at a young age, multiple partners, intergenerational sex, STI infection, and unprotected sex are HIV risk factors that can be mediated through behavior change. These changes require education about modes of HIV transmission, education on how to delay onset of sexual debut, strategies to eliminate high-risk sex or adopt safer behaviors or seek services, and access to supplies or services needed for protection.

Male circumcision is expected to become an important additional tool in reducing the risk of acquiring HIV. Negotiation skills and empowerment are also important so people, especially women and girls, can protect themselves.

Abstinence is the prevention method emphasized in programming directed at youth, the demographic with the highest rate of new infections. Strategies to promote abstinence include changing social norms, sex education, and peer education. "Secondary abstinence" among people who have had sex can also reduce risk of HIV. Abstinence-only programs have been criticized for being unresponsive to the needs of people who are raped, economically dependent on sex work, or are in unions with an HIV-infected spouse or partner.

While abstinence and mutual monogamy with an uninfected partner are effective preventive behaviors, they may be difficult to maintain. Consistent condom use has been very effective in protecting against the transmission of HIV and other STIs in people who are sexually active. In married or monogamous couples, one common barrier to condom use is a concern that it implies infidelity. Teaching strategies to negotiate condom use can increase acceptability to sexual partners while addressing these concerns. In Thailand and Cambodia, commercial sex establishments with condom-use policies reduced HIV transmission among sex workers and their clients, as well as in the general population. Consistent condom use reduces HIV transmission in serodiscordant couples (couples in which only one partner is HIV positive) approximately sixfold.[42]

Condoms also prevent STIs, which may contribute up to a tenfold increase in susceptibility to HIV.[43] STIs such as syphilis or gonorrhea can be treated with antibiotics to reduce this risk, while infections that cannot be cured—genital herpes, for example—may be controlled by acyclovir or other antiviral medications. Even without medication, people with incurable STIs benefit from medical attention by receiving counseling on safer sex, partner notification strategies, and general health information. STI services can address both biological and behavior risk factors in sexually active people through treatment and counseling.

Table 2
Risk of HIV Infection by Mode of Exposure and Contribution to Global Infections

Exposure mode	Transmission rate per exposure	Percent of global infections
Blood transfusion	More than 90%	5% to 10%
Mother-to-child transmission	25% to 40% in less developed countries 15% to 25% in more developed countries	2% to 3%
Unprotected sexual intercourse	0.1-1.0% [a,b]	70% to 80%
Injecting drug use	Less than 1.0% [a]	5% to 10%
Needle stick and other health-care setting exposures	Less than 0.5%	0.01%
Household contact from exposure to blood	Rare	negligible

[a] Risk is cumulative and increases exponentially with each exposure.

[b] Several factors, such as sexually transmitted infections and lack of circumcision, may increase risk.

Sources: Communicable Disease Prevention and Control, "The Risk of HIV-1 Transmission by Type of Exposure" (www.cdpc.com, accessed July 8, 2002); and P.R. Lamptey and H.D. Gayle, *HIV/AIDS Prevention and Care in Resource-Constrained Settings: A Handbook for the Design and Management of Programs* (2001).

The Brazil HIV/AIDS program has demonstrated that education about and access to condom use among young people are effective. Condom use at first sexual intercourse among young Brazilians increased from less than 5 percent in 1986 to 63 percent in 2003.[44]

Ongoing research has demonstrated that male circumcision can protect against HIV infection. Circumcision is not practiced in many areas of eastern and southern Africa, which may be one reason for the high HIV prevalence in those regions.[45] A clinical trial in South Africa found that circumcised men were 61 percent less likely to become infected with HIV than men who were not circumcised. In Rakai, Uganda, a recent study has demonstrated that male circumcision reduced HIV infection in female partners by 30 percent.[46] If subsequent studies confirm these findings, male circumcision could become an important tool for the control of HIV.

There are several factors that may reduce the risk of HIV infection in circumcised men.[47] The absence of foreskin can shorten drying time following sexual contact, which reduces the life expectancy of HIV and the amount of time the skin is in direct contact with the virus. The total surface area of the penis and the number of target cells, abundant on the foreskin, are reduced through circumcision.

Several studies have indicated that most adult men would undergo circumcision if they believed it protected them against HIV infection.[48] Male circumcision may prove effective in reducing HIV infection, but it is not a panacea for prevention. Circumcision does not

Box 2

Three Success Stories in the Fight Against HIV and AIDS

Brazil

In 1996, one in every three Latin Americans with HIV lived in Brazil, and the country had one of the highest prevalence rates in the region. To respond to the growing epidemic, Brazilian legislators mandated free antiretrovival therapy (ART) for all people living with AIDS who were eligible for national insurance. This was an unprecedented and expensive decision for a developing country. But, after nearly a decade, their efforts have succeeded in dramatically reducing HIV prevalence and AIDS mortality.

The national AIDS mortality rate was cut in half and AIDS-related hospitalizations in public health facilities fell by 80 percent between 1996 and 1999. More than 170,000 HIV-positive Brazilians were receiving lifesaving treatment through government efforts in 2005.

HIV-prevention messages and activities also had a high priority. They are woven into everyday life at schools, workplaces, entertainment venues, and in the streets. National HIV prevalence dropped to 0.6 percent in 2000 and has remained low.

Brazil demonstrated that a national commitment to comprehensive treatment and prevention is both feasible and successful. It has served as a model for several other Latin American countries to establish HIV programs.

Cambodia

With 2.6 percent of adults infected with HIV, Cambodia has the highest HIV prevalence in Asia. It is also one of the poorest countries in the developing world. Despite its limited resources, Cambodia launched a prevention program that has achieved success in reducing rates of transmission. The epidemic is fueled by an active commercial sex industry with high HIV prevalence among sex workers and their clients, and some partners or wives of clients. Cambodia adopted prevention strategies similar to those that had successfully lowered transmission rates in nearby Thailand, most notably enforcing 100 percent condom use in commercial sex establishments. The strategy is credited with a dramatic reduction in HIV prevalence among sex workers and their clients. National HIV prevalence also declined slightly between 2001 and 2003, from 2.7 percent to 2.6 percent of adults ages 15 to 49.

Botswana

Botswana has been burdened with one of the most severe HIV epidemics in the world. At least three in every 10 adults are infected and life expectancy is at least 20 years below what it would have been without AIDS. In 2002, the president and other national leaders worked to create the Masa ("New Dawn") Program. This was the first free AIDS treatment program in Africa. Masa delivers ART to around 42,000 Botswanans, 56 percent of the total number of people who need it. Botswana, a country that has been ravaged by AIDS, has demonstrated that expanded access to treatment for all is possible, even in highly affected African countries.

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offer complete protection from HIV. A comprehensive prevention approach including education about abstinence, being faithful, and condom use should be available to all men, circumcised or not, to prevent the spread of the virus.

A UN Work Plan on Male Circumcision is developing technical guidance on programmatic, social, and clinical issues concerning the expansion of male circumcision services. These guidelines will assist country program managers to ensure that male circumcisions are being performed appropriately while minimizing the risk of clinical complications, the stigma and discrimination against circumcised and uncircumcised men, and to avoid undermining other HIV-prevention strategies.

HIV and Injecting Drug Use

There are an estimated 13 million injecting drug users worldwide, and as many as 3.3 million are infected with HIV.[49] Between 5 percent and 11 percent of all AIDS cases are related to injecting drug use, which is a major mode of HIV transmission in southern and Eastern Europe, most of Asia and North America, and parts of South America. Injecting drug use is also an important source of infection in North Africa and the Middle East. Transmission in injecting drug users is primarily a result of sharing contaminated needles. However, all drug users, injecting or noninjecting, can play a role in spreading HIV to the general population through sexual transmission, especially users who trade sex for drugs or money, or who engage in risky sexual behaviors when impaired by drugs.

The spread of HIV in people using drugs is often rapid and difficult to control. The underground culture and social stigma attached to drug use and HIV make this population difficult to reach. Studies show, however, that given the appropriate information and oppor-

tunity, many injecting drug users will change their drug-using and sexual behaviors to protect themselves and their partners from HIV. Education programs have succeeded in reducing HIV transmission among people who inject drugs in several developed countries, including Australia, Canada, and the United States. Harm reduction models, such as needle exchange programs, can minimize the use of contaminated needles. Concerns that needle exchange programs increase the frequency of drug use have not been realized.[50]

Methadone and buprenorphine treatment can reduce dependency on illegal drugs, thereby reducing high-risk behaviors. Ensuring condom availability and teaching correct condom use can curb unprotected sex. STI and other health care services reduce risk while creating opportunities for counseling or referrals to drug treatment programs. For drug users living with HIV or AIDS, care, treatment, and support services can be integrated into drug treatment programs.

HIV-Infected Blood

Some of the first people identified with HIV acquired the infection from infected blood products in high-income countries. Thousands of people were infected through blood products in the 1980s, but the number of such infections plummeted when tests to screen blood and blood donors became widely used. In more developed countries, the dramatic reduction of HIV transmission from blood is one of the greatest success stories in the battle against the epidemic.[51]

However, contaminated blood continues to cause between 5 percent and 10 percent of new HIV infections worldwide and is especially problematic in low-income countries that have inadequate health infrastructures. Unsanitary blood collection practices infected thousands of villagers in rural China in the 1990s.[52]

Preventing the transmission of HIV through blood and blood products involves establishing a well-organized blood transfusion service; exercising universal precautions during blood collection and handling; recruiting safe blood donors; using effective blood tests for HIV and other infectious diseases; ensuring appropriate use of blood and blood products, including avoiding unnecessary transfusions; and preventing health problems, such as anemia, that require blood transfusions.

Iatrogenic Transmission

Unsafe medical practices contribute to iatrogenic transmission—the unintentional transmission of HIV by medical personnel. Health care workers, particularly in rural areas, may not receive adequate training in universal safety precautions. Ineffective sterilization techniques and poor sanitation practices in medical facilities can expose health workers and patients to blood and other body fluids containing HIV. Improper disposal of used syringes, needles, and other medical equipment is another potential hazard.

Cultural expectations of medical care may increase the risk of iatrogenic HIV transmission. In some areas, a medical visit is considered incomplete without an injection—often unnecessary injections of antibiotics, vitamins, analgesics, or chloroquine. HIV can survive in needles that are used for intramuscular and subcutaneous injections and pose a risk for HIV transmission if reused.[53] In 2000, the reuse of injection equipment accounted for an estimated 5 percent of new HIV infections.[54]

Transmission between provider and patient is also a risk in health care settings. Health care workers are commonly exposed to blood or infectious products in the course of routine work. Practicing universal precautions, such as wearing gloves and masks, consistently allows for nonstigmatizing care for all people, regardless of patient or provider's HIV status.

Traditional healers are a significant source of care in many regions of the world, and many engage in activities that could expose them or their patients to HIV. Some practitioners believe the source of HIV is not biologically rooted, making precautions seem unnecessary. Contact with contaminated equipment may occur through common cultural practices including scarification, male and female circumcision, and tattooing.

Managing HIV and AIDS

In 2005, an estimated 6.5 million people needed antiretroviral treatment; only about 15 percent—1 million people—had access to it. In sub-Saharan Africa, around 11 percent of those in need of treatment were receiving it.[55] The main reasons for this shortfall include the high cost of treatment; procurement challenges; inadequate health infrastructure, including a lack of health care providers; insufficient political commitment at the national level; inadequate or uncertain financial resources; and the persistent stigma that often prevents people from seeking care.

The clinical objectives of antiretroviral therapy are to suppress the replication of the virus and restore immune function of the body; limit the likelihood of viral resistance to antiretroviral drugs; and reduce HIV-related morbidity and mortality.

Since the introduction of antiretrovirals in 1996, drug therapy has transformed HIV from a progressive terminal illness to a manageable chronic disease. Drugs

can slow or reverse the progression of AIDS, although they cannot cure it. The current antiretroviral drugs—which fall into three main classes*—work by blocking enzymes that are important for the replication and functioning of HIV in the body.[56] A newer class of antiretrovirals—entry inhibitors—works differently: It fights HIV after it has infected the immune system. Entry inhibitors offer hope to people who have developed resistance to current HIV medications. Combining drugs from different classes is the most effective therapy for thwarting AIDS, because the virus can develop resistance to drugs used individually. A similar multidrug approach is used to treat cancer and TB.

Recent studies have shown that low-cost regimens can prevent some of the opportunistic infections that commonly occur with HIV, including TB and *Pneumocystis carinii* pneumonia (PCP), and other major causes of illness, such as nontyphoid salmonella infections and cerebral toxoplasmosis. Preventive therapy for TB would be especially effective in sub-Saharan Africa, where TB is a major cause of death in HIV-positive individuals. Using cotrimoxazole to treat PCP patients who have HIV can significantly reduce hospitalizations and mortality from other bacterial opportunistic infections.[57] Fungal infections, a major cause of illness and death in HIV-positive individuals, respond to preventive therapy with fluconazole.[58]

These simple preventive therapies could reduce illness in people living with HIV. Their relatively low cost means they could reach a much wider population than more expensive antiretroviral drugs. However, further research is needed on who should receive them for how long and how the therapies affect drug resistance in the long term.

The broad goal of clinical care (including drug therapy) is to improve the quality of life of people living with HIV by improving access to comprehensive prevention and care programs. Evidence from both developed and developing countries has shown that antiretroviral therapy can dramatically prolong the lives of persons living with HIV, enabling them to remain productive members of their community, support their families, and raise their children.

Clinical care programs can also help reduce the number of orphans and vulnerable children by prolonging the lives of parents; reduce mother-to-child transmission; and lessen the risk of sexual transmission because of lower viral load in body fluids. Care programs also combat stigma and discrimination associated with HIV and AIDS.

Palliative care is an important component of comprehensive care for people living with HIV. Many people experience pain, diarrhea, nausea, cough, shortness of breath, fatigue, fever, and confusion, as well as damaging psychosocial stress associated with illness, stigma, and end-of-life issues. Preventing these symptoms through palliative care prevents pain and unnecessary visits to health care facilities and allows people with AIDS to remain as active as possible in their community. Traditional healing, local remedies, and a mix of support services can also play a significant role. Training home-based care providers, community volunteers, or family members in palliative care can enhance the quality of life of people living with AIDS.

Home-based care offers a variety of benefits to people living with HIV and AIDS, as well as their families, especially to people with uncertain access to health care facilities. Home-based care providers have a unique opportunity to identify vulnerable children in the household who may need services.

Increased Access to Treatment

A recent and dramatic rise in global funding, aggressive international initiatives, and lower costs of antiretrovirals have increased access to treatment in several countries.

The most successful national treatment programs in developing countries are in Brazil and Botswana (see Box 2, page 14). Brazil's treatment program demonstrates the importance of political commitment, adequate national resources, the close involvement of civil society, and comprehensive prevention and treatment programs. Brazil's program also shows the considerable level of resources needed to provide universal access and comprehensive prevention and treatment services. The Brazilian government provided nearly 90 percent of these resources. The commitment of huge resources has certainly worked for Brazil—a middle-income country—but most developing countries may not be able to afford to provide free treatment for everyone in need.[59]

The African Comprehensive HIV/AIDS Partnerships (ACHAP) in Botswana program is a joint effort between the government of Botswana, the Bill & Melinda Gates Foundation, and the Merck Company Foundation/Merck Company Inc. that has dramatically improved national access to treatment. The program was launched in 2000 and reached 42,000 with antiretroviral drug therapy (56 percent of those in need) by December 2004.

* The antiretroviral drugs used most often to treat AIDS belong to three major classes: nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors. A fourth class of drugs called entry inhibitors (including fusion inhibitors) is now available. Entry inhibitors work by preventing HIV from entering T-cells. Healthy T-cells are crucial for the body's defense against pathogens like HIV.

Treatment coverage continues to improve in several countries as a result of increased resources from the U.S. President's Emergency Plan for AIDS Relief and the Global Fund to Fight AIDS, Tuberculosis, and Malaria. The President's Emergency Plan expects to reach 2 million people in 15 focus countries by 2008. The Global Fund has committed nearly US$2.5 billion to HIV/AIDS and estimates that more than 1.8 million people will be on antiretrovirals through grants (see Box 3).

Despite these efforts, the vast majority of people living with HIV will go without effective treatment for several years to come. Many people living with HIV lack access to health facilities and cannot afford to pay reduced, but still substantial, copayments for treatment. Many developing countries do not have the financial resources and infrastructure to support a large-scale HIV treatment program. The most neglected populations for treatment are often children, women, rural

Box 3

Funding Initiatives to Fight HIV and AIDS

Several important initiatives expanded the arsenal of weapons in the battle against HIV and AIDS. Three are highlighted below.

The Global Fund to Fight AIDS, Tuberculosis and Malaria

In 2001, the UN created the Global Fund to Fight AIDS, Tuberculosis and Malaria, with a target of US$9 billion to support integrated approaches to prevention, care, support, and treatment. The establishment of the fund helped refocus attention not only on HIV, but also on two other important threats to international health: tuberculosis (TB) and malaria.

The Global Fund disburses funds to implementing agencies, a diverse group representing multiple sectors of society. Donors to the Global Fund include the governments of more than 50 countries, as well as foundations, corporations, and private donors. The Global Fund also finances programs for malaria and TB, diseases that are rampant in many high-HIV-prevalence countries.

The Global Fund has committed US$2.5 billion to HIV prevention, care, and treatment programs in countries around the world.[1] Between 2001 and 2005, the Global Fund provided treatment for 220,000 people with HIV, more than 1.1 million people with malaria, and 600,000 people with TB.[2]

If fully funded, the Global Fund aims to provide 1.8 million people with antiretroviral therapy (ART) and 62 million people with voluntary counseling and testing, and to support more than 1 million orphans with medical services, education, and community care.

The U.S. President's Emergency Plan for HIV/AIDS Relief

In 2003, the U.S. President's Emergency Plan for AIDS Relief was initiated as a five-year, US$15 billion global initiative to fight HIV and AIDS outside the United States. The Emergency Plan has a strong emphasis on care and treatment, with 55 percent of funds devoted to treatment, 15 percent for palliative care, 20 percent for HIV/AIDS prevention (with at least 33 percent for promoting abstinence until marriage), and 10 percent for helping orphans and vulnerable children.

Fifteen focus countries (Botswana, Côte d'Ivoire, Ethiopia, Guyana, Haiti, Kenya, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Tanzania, Uganda, Zambia, and Vietnam) receive Emergency Plan funds. ART has been provided to more than 235,000 people living with HIV; more than 1.1 million have been reached with essential care services. Treatment may increase at a faster rate since funds can now be spent on much less expensive generic antiretroviral drugs (ARVs), following a ruling by the U.S. Food and Drug Administration in 2005.[3]

"3 by 5" Initiative

The 3 by 5 Initiative was launched by the World Health Organization (WHO) and UNAIDS in September 2003. Its goal: To provide antiretroviral drugs to 3 million people living with AIDS in developing countries by the end of 2005 (3 million by 2005), and to reach at least half of the people in need. The UNAIDS/WHO initiative relied on partnerships with the Global Fund, the Emergency Plan, the World Bank, national governments, and nongovernmental organizations (NGOs). By mid-2005, approximately 1 million people in the developing world had access to ARVs, 2 million below the target number. Fourteen low- to middle-income countries surpassed the 3 by 5 goal of providing ARVs to more than 50 percent of those in need. However, ART reached only about 15 percent of all those in need, well below the target of 50 percent.

The 3 by 5 goals proved too ambitious, given the many barriers to rapidly scaling up ART, especially in poor countries. Some countries lacked the political commitment needed for rapidly increasing access to ART. Bottlenecks in supply, limited human capacity, high drug prices, and poor infrastructure within many developing countries were also major obstacles. Funding from donors was often unpredictable and insufficient, and technical assistance from WHO and other agencies could not overcome the weak infrastructure in many countries. Although the 3 by 5 goals were not met, the plan did help many countries deliver ART to more people, improve health infrastructure, and, most important, demonstrate the feasibility of treating large numbers of people living with AIDS in the developing world.[4]

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residents, and marginalized populations such as injecting drug users and sex workers. Drug therapy programs need to closely involve civil society, especially community-based organizations of people living with HIV, and ensure equal access to clinical care for women, children, and other vulnerable and marginalized populations.

Treatment for children with HIV poses special challenges. Without treatment, at least one-half of infected infants will die before their second birthday; yet even determining the HIV status of infants is difficult. The antibody tests used in developing countries cannot detect HIV infection in children less than 18 months of age. The more costly antigen tests that can measure infection in very young children are rarely available. Children are also vulnerable because they usually cannot advocate for their own health care and depend on parents or guardians to initiate medical visits. Children also have limited treatment options—most AIDS drugs formulations are not appropriate for children—and treatment regimens must be constantly monitored because effective doses change as children grow. Only about 5 percent of an estimated 700,000 children in need of antiretroviral therapy received it in 2005.

Mother-to-Child Transmission

The great majority (90 percent) of HIV-positive children acquired the virus from their mother. The risk of a mother transmitting the virus to her baby is around 15 percent to 30 percent—a risk that increases to as high as 45 percent with prolonged breastfeeding.[60] Approximately 800,000 infants are newly infected with HIV annually, nearly all in developing countries; 90 percent of infected children live in sub-Saharan Africa.

Risk of transmission is affected by factors related to the virus, the mother, the delivery process, the baby, and how the infant is fed. During pregnancy and delivery, the mother's health, disruption of the placental barrier, preterm delivery, and hemorrhage are significant predictors of the child's infection. After delivery, breastfeeding is the most important risk factor. Without treatment, an estimated one in every seven infants breastfed by an HIV-positive mother becomes infected through breast milk.

Current strategies for preventing mother-to-child transmission include primary prevention of HIV in girls and women; counseling and testing in pregnant women; family planning services to reduce pregnancy in infected mothers; preventive antiretroviral drug therapy; followup care and treatment for mother and infant; and nutritional counseling and breast-milk substitutes, if appropriate. The most effective drug therapy tested so far is long-course HAART, which can reduce transmission to 2 percent. HAART's complexity and cost have limited its use in resource-poor settings. Shorter, simpler, and less costly regimens are available. The most practical and least expensive (US$4 per dose) of these options is nevirapine. Single doses can be given at birth to both the mother and infant. Boehringer-Ingelheim, the company that manufactures nevirapine, has made the drug available for free in less developed countries to prevent mother-to-child transmission. But many women are developing a resistance to nevirapine and similar drugs, making them less useful in the future. A recent study reported that up to 69 percent of women may have resistance to this class of drugs one to four months after nevirapine prophylactic treatment is discontinued.[61] WHO is currently reviewing the policy implications of this finding and is likely to recommend a combination of HAART for the prevention of mother-to-child transmission.

Based on trial data from Zambia, WHO, UNICEF, and UNAIDS recommend the use of cotrimoxizole to reduce mother-to-child transmission. In regions where children under 18 months of age cannot be reliably tested, cotrimoxizole prophylaxis is recommended for all children born to HIV-infected mothers. Cotrimoxizole can also prevent and treat *Pneumocystis* pneumonia, as well as other opportunistic infections, in children infected with HIV.

Helping Orphans and Vulnerable Children

Because HIV is infectious, there is a high risk that a child who loses one parent to AIDS will lose the other one as well. While the increasing availability of treatment will slow the rate of increase in children orphaned by AIDS, the number of orphans and vulnerable children will continue to rise for the foreseeable future. When children are left without parents, communities must respond to their needs to avoid their exploitation, ensure their welfare, and promote healthy development.

Most of the children orphaned by AIDS in sub-Saharan Africa are cared for by extended family members. Some of these caregivers are HIV-infected or are responsible for other family members living with HIV and AIDS, which can create both financial and emotional burdens. Many extended families are unable to provide the school fees, food, and health care costs of additional children. In many high-HIV-prevalence regions, community-based organizations help families meet the needs of the orphan households through mate-

rial, financial, emotional, or psychosocial support to the children and the caretaker. Community support for families is more cost-effective than other options that countries are trying, including building or expanding orphanages. While orphanages can meet the immediate, urgent needs of an orphaned child, they are not the best long-term situation. Orphanages are expensive to operate, often fail to meet the developmental needs of the child, and can isolate children from community support systems.

Expanding Counseling and Testing

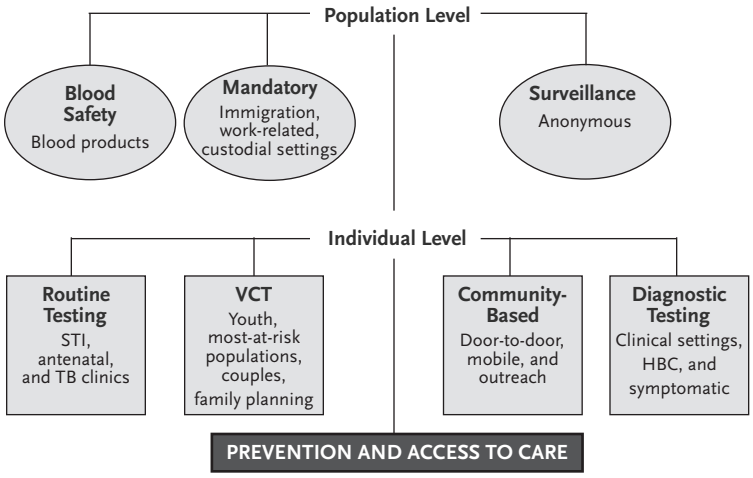
Counseling and testing services for HIV have long been a component of HIV prevention and care programs in more developed countries and are proving to be a cost-effective way of reducing risky behaviors and of leading patients to other services (see Figure 8). A study of data from Kenya, Tanzania, and Trinidad documented a 43 percent reduction in unprotected sex among people who received voluntary counseling and testing (VCT) for HIV.[62]

Counseling and testing programs involve raising community awareness, pre- and post-test counseling, psychological support, and referral to relevant services. HIV counseling helps people cope with personal stress and make decisions related to HIV.[63] It enables an individual or couple to evaluate their risk of contracting or transmitting HIV and helps them avoid it. Counseling helps people deal with the stigma and discrimination associated with HIV. The very act of being tested, for example, may have negative consequences in communities where HIV-positive people are stigmatized.

Despite their importance, counseling and testing services tend to be of limited quality and coverage in less developed countries. A lack of trained staff, concerns about confidentiality, stigma and discrimination, clients' lack of knowledge about services, and limited resources are some of the reasons why VCT programs are inadequate or underused.

Many countries are increasing the availability and use of testing and counseling services by shifting from *voluntary* counseling and testing, in which a person goes to a health facility for the primary purpose of receiving an HIV test, to *routine* testing, in which all patients arriving at a facility are routinely offered an HIV test. Tests with same-day results also increase use, because they eliminate the need for patients to return to a health clinic to receive their results—and more patients will actually learn their HIV status.

Figure 8
HIV Testing Models for Different Needs and Settings: The Doorway to Prevention and Access to Care



Notes:
VCT: Voluntary counseling and testing; HBC: Home-based care; STI: sexually transmitted infections; TB: tuberculosis; custodial settings include prisons.

Source: Family Health International, 2006.

Several countries have successfully increased counseling and testing services. Botswana, one of the highest prevalence countries, was the first in Africa to routinely offer HIV testing in both public and private clinics. A growing body of evidence suggests that making HIV testing part of standard care reduces the stigma associated with the disease and increases the number choosing to be tested. Routine testing, mass media campaigns promoting the value of knowing HIV status, and learning the benefits and the wide availability of treatment, have dramatically increased the use of counseling and testing services in Botswana.[64]

In Kenya, the introduction of routine testing (with the option of refusal) in antenatal care clinics doubled the use of testing and counseling from 37 percent to 75 percent in one month.[65] Lesotho has taken the concept of routine testing one step further to community-based door-to-door testing in their KYS (Know Your Status) campaign. This is an attempt to significantly boost the number of people who know their HIV status. Currently, only 9 percent of men and 13 percent of women are aware of their status in a country with an adult HIV prevalence of 30 percent. The program includes training community leaders as prevention and treatment supporters, involving people living with HIV in adherence and prevention activities, and recruiting 7,500 health workers for counseling and testing.[66]

Challenges in HIV Control

Despite major medical and technological breakthroughs and advances, the AIDS epidemic continues its relentless spread in many resource-poor settings. AIDS continues to be one of the most devastating and important global public health and developmental problems. However, HIV and AIDS control must compete with other emergencies, including civil strife, natural disasters, and continuing threats of emerging infectious diseases such as Ebola, SARS, and avian influenza. Three key challenges for the future are controlling further spread of the epidemic in infants and young adults; treating, caring for, and supporting the neglected millions of people living with HIV; and mitigating the epidemic's impact on the millions of people affected by AIDS in resource-constrained countries. To meet these challenges, the international community and national governments and civil society need to take a number of steps, including:

- Increasing resources available for comprehensive prevention, care, treatment, and support services;
- Ensuring that prevention remains the backbone of AIDS control programs, even with expanded treatment access;
- Improving the health infrastructure and capacity for delivery of services;
- Improving technologies for the treatment and prevention of AIDS;
- Reducing poverty, illiteracy, and other social, economic, and political actors that increase vulnerability to infection; and
- Reducing the stigma and discrimination against those living with HIV.

Improving Resources for HIV Programs

Resources available for HIV and AIDS have increased from US$300 million in 1996 to US$10 billion in 2006. Despite this increase, UNAIDS estimates that US$22 billion is needed by 2008 to ensure an adequate response to the expanding AIDS epidemic. The response would include low-cost HAART, treatment of opportunistic infections, and support for orphans and vulnerable children.[67] Providing such support will likely require major increases in national government allocations; greater support from the private sector; and substantial increases in international assistance.

Prevention and treatment programs for the AIDS pandemic have been inadequate, small-scale, and fragmented in most countries, particularly in less developed regions. With few exceptions, the efforts have failed to slow the spread of the virus or to reduce the damaging effects of the pandemic. However, public health and policy experts cite a number of strategies that could help meet the need for an expanded and comprehensive response.

An effective response should include strategic planning, a multisectoral approach, and the active involvement of nongovernmental organizations (NGOs). Ideally, HIV programs should also include state-of-the-art technical strategies; adequate distribution of resources at the community level; development of human capacity as well as technical and operational competence; and better management and supply of drugs and commodities.[68]

Program planners also need to anticipate the costs of expanded coverage, program evaluation, and future technological developments. An expanded and comprehensive response also requires improving public- and private-sector capacity to expand care and treatment services, including new technologies such as HAART and vaccines. But the most critical challenge is the effective application of current technologies on a large-enough scale to curb the epidemic, improve access to care and treatment, reduce stigma and discrimination for persons living with HIV, and support and protect orphans and vulnerable children.

Integrating Prevention and Treatment

Programs to *prevent* HIV transmission often compete with programs to *treat* people suffering from AIDS for scarce resources and political support. But new mathematical models confirm there is a synergy between prevention and treatment efforts, and that both are crucial for controlling the AIDS epidemic.[69] Successful prevention programs help reduce the number of new infections and ultimately the number of people who need treatment. Successful treatment programs not only prolong the lives of people living with HIV but will also slow the spread of HIV by lowering the viral load of people with the virus. Effective care and treatment programs can reduce AIDS deaths, but a long-term decline will be driven by preventing new infections. Treatment programs can also enhance prevention efforts by reducing stigma. Scaling up both treatment and prevention efforts could avert about one-half of new HIV infections and prevent more than one-fourth of AIDS-related deaths over the next two decades.

Search for a Vaccine

A safe, stable, efficacious, affordable, and accessible HIV vaccine would significantly enhance HIV prevention and help control the global epidemic. HIV vaccine development and testing has greatly accelerated over the

last few years, notably with the Global HIV Vaccine Initiative, an alliance of independent organizations trying to accelerate the development of a vaccine by sharing information and working cooperatively.[70]

HIV researchers say that an ideal vaccine is at least seven to 10 years away because of many scientific, ethical, legal, and financial stumbling blocks. HIV infection and the human immune response are highly complex, and research and development are costly and time-consuming. In addition, there are no appropriate animal tests or alternate models for investigating possible vaccines.

Human clinical trials always raise ethical and legal issues, especially when trials involve a fatal infectious agent like HIV. More than 30 HIV vaccine candidates were in clinical trials as of mid-2005. One large-scale efficacy trial completed in 2003 demonstrated that people are willing to participate in vaccine trials. The search for a vaccine is not limited to people living in high-income countries; nine developing countries are currently conducting or preparing to conduct HIV vaccine trials.[71] The full participation of people living in the hardest-hit areas is important to ensure that a vaccine is effective against different subtypes of the virus.

One of the greatest barriers to an effective vaccine is the lack of financial incentive to produce it. Current investment in HIV vaccine development is around US$682 million per year, less than 1 percent of spending on all health product development.[72] Private-sector involvement in vaccine development has been limited and only four pharmaceutical companies currently have vaccines in clinical trials. Governments, small biotechnology companies, and NGOs have broadened ongoing research, but more resources are needed to hasten the process.

If an effective HIV vaccine becomes available, the international community will need to address new challenges, including determining who will benefit the most from the vaccine and ensuring equitable access; understanding behavioral issues raised by a vaccine; developing new tests to differentiate between vaccine-induced and active HIV infection; and raising sufficient resources to deliver the vaccine.

Developing Microbicides

Millions of women around the world are not able to protect themselves from HIV infection. Most prevention strategies rely on abstinence, monogamy, condom use, fewer sexual partners, and treatment of STIs. However, many women are powerless to demand condom use or refuse sex. A woman may risk HIV infection through other sexual partners her husband may have had.

Microbicides would give women much more control over their risk of infection. A microbicide is a substance—usually a gel, cream, or suppository—that can be applied to the vagina or rectum to prevent or substantially reduce the transmission of STIs or HIV. Microbicides can kill or immobilize the pathogen by creating a barrier between the pathogen and the vagina or rectum or by preventing the pathogen from replicating once it has entered the cells. A woman could use a microbicide if her partner does not use a condom, as an adjunct to condom use, and as backup protection in the event of condom failure. Microbicides could be applied before sexual intercourse and without the knowledge of the sexual partner.

The search for a microbicide suffered a major setback when a study in Cameroon showed that nonoxynol-9 (N-9), a widely used spermicide, did not protect users against HIV. It may even increase the risk slightly when used frequently.

About 30 microbicides are in various stages of development in 2006. Five of these are in or about to enter large-scale clinical trials.[73] The development of an effective and affordable microbicide would place HIV prevention in the hands of women and has the potential to avert between 2.5 million and 3.7 million infections over three years.[74]

The antiretroviral drug tenofovir may also be an effective pre-exposure prophylactic agent. Tenofovir can be taken once daily by mouth and has few side effects in people living with HIV. Research in uninfected animals has shown that tenofovir may reduce the risk of HIV infection if taken prior to exposure to the virus.[75] Clinical trials in Cambodia, Nigeria, and Cameroon to evaluate the effectiveness of tenofovir in preventing human infection were halted in 2004 and 2005 because of pressure from activist groups about ethical concerns. Despite these setbacks, new trials have begun to determine if tenofovir can effectively protect people from HIV infection.

Protecting Human Rights

Human rights protections are critical for reducing vulnerability to HIV, protecting the dignity of persons affected by the virus, and sharing medical advances with less developed countries.

Women's rights are especially relevant to the fight against HIV. Combating gender inequality tackles one of the root causes of the epidemic: women's inability to protect themselves from HIV.[76] AIDS experts have outlined several ways to enhance women's rights to reduce their vulnerability and exposure to HIV, including promoting sexual responsibility among boys and men, developing

female-controlled prevention methods such as microbicides, and increasing women's economic opportunities.

Violations of the rights of those living with HIV have been documented worldwide and have included denial of medical care, breaches of the right to privacy, restriction of HIV information for certain populations, and discrimination in employment and housing. Under international law, governments are obligated to respect, protect, and fulfill the human rights of people vulnerable to HIV, those living with HIV/AIDS, and those affected by the disease.

The right of people in less developed countries to have access to lifesaving drugs is a crucial human rights issue in the context of HIV. AIDS activists argue that lack of resources at the individual and national levels, inadequate health infrastructure, and protecting pharmaceutical companies' investments and patents are no longer acceptable reasons for denying treatment access to AIDS patients in less developed countries.[77] Human rights groups, people living with HIV, and civil and political leaders have joined in the call to make HIV-related treatments available and affordable to less developed countries. As a result, prices of antiretroviral drugs have dropped dramatically, therapies have been offered at cost or free to less developed countries, resources are becoming available to provide treatment and care, and pharmaceutical patent rights are being challenged. Despite these changes, the vast majority of people living with HIV in less developed countries will not have access to treatment in the foreseeable future.

Conclusion

HIV is a human tragedy around the world, but especially in resource-poor countries. Despite concerted efforts to curb the epidemic, and many success stories, HIV continues its relentless march. Its spread is due at least in part to the global community's failure to provide adequate care for millions of people living with HIV. HIV and AIDS have compounded the effects of other serious infectious diseases, such as malaria and TB, especially in sub-Saharan Africa.

The knowledge to effectively fight the epidemic already exists. Yet effective treatments for AIDS are in short supply in the less developed world. "Sixty-five hundred Africans are still dying every day of a preventable, treatable disease, for lack of drugs we can buy at any drug store," the entertainer and AIDS activist Bono told a gathering of U.S. lawmakers in February 2006.[78]

In Africa, 150,000 people lose their life every month to a completely avoidable disease. It is amazing that an infectious disease could so quickly reverse gains of the past half-century in health and development. The international community and most developing countries have not yet demonstrated they have the will, the commitment, and the resources to implement effective programs to halt HIV and AIDS.

Recent global funding commitments, increasing access to treatment and care, and a rising number of national success stories offer glimmers of hope for a better future. Leaders in the fight against HIV/AIDS have demanded an unprecedented response to an unprecedented epidemic. "The normal rules and a 'business as usual' attitude cannot apply," said Peter Piot, the executive director of UNAIDS, in November 2005. "At this juncture where success is within sight, we have to intensify our efforts more than ever before. We have come so far that we cannot accept failure."[79]

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Suggested Resources

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Monitoring the AIDS Pandemic (MAP) Network. *AIDS in Asia: Face the Facts. 2004.* Available online at www.fhi.org.

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UNAIDS and World Health Organization (WHO). *AIDS Epidemic Update: December 2005*. Geneva: UNAIDS/WHO, 2005.

UNAIDS. *The Three Ones in Action: Where We Are and Where We Go From Here*. Geneva: UNAIDS, 2005.

Selected Websites With Information on HIV/AIDS

AIDSMap
www.aidsmap.com

Centers for Disease Control and Prevention
www.cdc.gov/hiv/

Family Health International
www.fhi.org

HIV InSite
Center for HIV Information (CHI), University of California San Francisco
http://hivinsite.ucsf.edu/

Integrated Regional Information Networks (IRIN)
PlusNews, HIV/AIDS News Service for Africa
www.irinnews.org/AIDSfp.asp

Joint United Nations Programme on HIV/AIDS (UNAIDS)
www.unaids.org

Monitoring the AIDS Pandemic Network
www.mapnetwork.org/reports.shtml

The Global Fund to Fight AIDS, Tuberculosis and Malaria
www.theglobalfund.org

The Henry J. Kaiser Family Foundation
Global Health Reporting
www.globalhealthreporting.org

The Synergy Project
www.synergyaids.com

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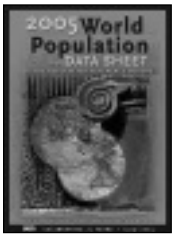

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