

## **Part I. Background Information**



## **SESSION 1. THE BASICS OF HIV and AIDS**

### **Purpose** (slide 2)

This session provides nursing and midwifery students with basic information about HIV and AIDS—the causes, transmission routes, stages of progression, clinical management and associated challenges.

### **Learning objectives** (slide 3)

By the end of the session, students will be able to:

- Discuss the scale of HIV and AIDS globally and in their countries.
- Outline the cause, transmission, and disease progression of HIV.
- List factors that affect the risk of transmission of HIV and increase vulnerability to HIV infection.
- Outline the stages of HIV and the diseases and complications at each stage.
- Discuss strategies for caring for and supporting people living with HIV and the challenges faced in managing HIV.

NB. This topic should be updated regularly as the epidemic changes and new findings emerge.

### **Prerequisite knowledge**

- Basic science (biology and physiology)

**Estimated time:** 100 minutes

**Session guide** (slide 4)

<b>Content</b>	<b>Methodology</b>	<b>Activities</b>	<b>Estimated time (minutes)</b>
Magnitude, prevalence, and trends of HIV in Africa	Participatory lecture	Ask students to brainstorm the meaning of HIV and AIDS and summarize trends in the region.	10
Definitions of HIV and AIDS	Participatory lecture	Explain the meaning of HIV and AIDS.	5
Modes of HIV transmission and related factors	Participatory lecture	Summarize the modes of HIV transmission.	10
Factors affecting HIV transmission	Participatory lecture	Discuss factors that affect susceptibility to HIV transmission.	10
Phases of HIV infection	Participatory lecture	Summarize the phases of infection.	10
Disease recognition and testing	Participatory lecture	List and describe common testing methods.	5
Treatment of HIV and AIDS	Participatory lecture	Present information on antiretroviral therapy (ART) and treatment of opportunistic infections (OIs in the region.	10
Impact of HIV on demographic patterns, food security, health, and education in Africa	Participatory lecture	Briefly summarize the impact of HIV.	10
Comprehensive package of HIV programs	Participatory lecture	Summarize the components of HIV and AIDS programs.	15
Challenges of managing HIV and AIDS	Participatory lecture	Summarize the challenges in addressing HIV and AIDS in the region.	10
Discussion points	Group discussion	Facilitate large group discussion.	15
Conclusions			5
Review			5
Total time			120

## Required materials

- Flipchart stand and paper
- Writing pens
- Board and chalk or markers
- LCD or overhead projector
- PowerPoint 1

## Materials provided

- PowerPoint 1

## Preparation

- Review PowerPoint 1 and Lecture Notes 1.
- Be familiar with the prevalence and epidemiology of HIV and AIDS (if possible, disaggregating the data by geographic area and by sex), and HIV activities in the country.
- Review Discussion Points 1 to identify questions to help students master the concepts.

## Suggested reading

Family Health International. 2001. HIV/AIDS Prevention and Care in Resource-Constrained Settings: A Handbook for the Design and Management of Programs. Research Triangle Park, North Carolina, USA.

Fan, Ross H. F., R. F. Conner, and L. P. Villarreal. 2000. The Biology of AIDS, 4th edition. Boston: Jones and Bartlett Publishers International.

Fauci, A., D. Pantaleo, S. Stanly, and D. Weisman. 1996. Immunopathogenic Mechanisms of HIV Infection. *Annals of Internal Medicine* 124:653–4.

Joint United Nations Programme on HIV/AIDS (UNAIDS). 2007. AIDS Epidemic Update: Geneva: UNAIDS and World Health Organization.

Pilcher, C. D., H. C. Lein, J. J. Eron, P. L. Vernazza, S. Y. Leu, P. W. Stewart, G. Li-Ean, and M. Cohen. 2004. Brief but Efficient: Acute HIV Infection and Sexual Transmission of HIV. *Journal of Infectious Diseases*. 189(10):1785–92.

Royce, R. A., A. Sena, W. Cates, and M. Cohen. 1997. Sexual Transmission of HIV. *New England Journal of Medicine* 336(15):1072–78.

UNAIDS. 2008. Report on the Global AIDS Epidemic. Geneva,

WHO. 1997. Weekly Epidemiological Record 72:18–88. Geneva.

## Introduction

The global human immunodeficiency virus (HIV) pandemic killed approximately 2 million people in 2007, and an estimated 2.7 million people acquired HIV during this period. This brings the number of people living with HIV (PLHIV) around the world to approximately 33 million. The number increases each year and is expected to grow unless proven interventions are scaled up effectively and innovative approaches are applied.

Basic knowledge of HIV and its prevention has increased among young people in recent years. However, knowledge is still disturbingly low in many countries, especially among young women, suggesting that more intensive, focused education and behavior change efforts are needed.

### What are HIV and AIDS? (slides 5 and 6)

**HIV** is the virus that causes AIDS.

- **Human** (the virus infects human beings)
- **Immunodeficiency** (the effect of the virus results in deficiency or failure of the body's immune system)
- **Virus** (the organism is a virus)

**AIDS** stands for acquired immunodeficiency syndrome and is the last stage of HIV infection.

- **Acquired** (the condition must be acquired by the person and is not a disease transmitted by the genes)
- **Immune** (the disease affects the body's immune system, which is used to fight off germs such as bacteria and viruses)
- **Deficiency** (the disease keeps the immune system from functioning properly, generating a deficiency in the immune system)
- **Syndrome** (a person with HIV may experience a wide range of diseases and OIs when the immune system is deficient)

### Definitions and scope (slide 6)

HIV was first identified in 1981, and the scale of the epidemic has increased steadily. By the end of 2007, between 30 and 36 million people were estimated to be living with HIV (UNAIDS 2008). This makes HIV one of the largest epidemics of the 20<sup>th</sup> century. The epidemic varies in scale and impact among continents, regions, and countries.

### HIV and AIDS in Africa (slides 7–10)

Africa is the continent by far most affected by HIV and AIDS. Despite having just over 10 percent of the world's population, sub-Saharan Africa has 22 million of the 33 million PLHIV globally, and in 2007 had 1.5 million of the approximate 2 million deaths globally resulting from HIV and AIDS (UNAIDS 2008). At this rate, every minute two or three people die from AIDS in sub-Saharan Africa.

Approximately half of all HIV infections in the world are found among women. Moreover, evidence shows that women account for 59 percent of infections among adults in sub-Saharan Africa. Young women 15–24 years old bear the greatest burden of HIV: 3.2 percent are infected with HIV compared with 1.1 percent of men in the same age group (UNAIDS 2007; UNAIDS 2008).

The burden of HIV also has a profound impact on children. Approximately 2.5 million children under 15 years old are HIV infected, and 330,000 children died from AIDS in 2007. A growing number of children are orphaned by the death of a parent from AIDS. In sub-Saharan Africa approximately 11.6 million children have lost one or both parents to AIDS (UNAIDS 2007; UNAIDS 2008).

### **The disease** (slide 11)

HIV, which causes AIDS, belongs to a class of viruses that attack and weaken the immune system. Over a long time, the virus reduces the body's ability to fend off diseases. In a healthy person, white blood cells replicate and are dispersed throughout the blood, producing antibodies and destroying harmful micro organisms. HIV alters these cells and reduces their ability to fight infection.

When HIV enters the body, it attaches itself to the white blood cells with the help of a surface protein called CD4. This protein plays an important role in determining HIV disease progression. HIV alters components of the cell, causing the destruction of these CD4 proteins. The virus reduces the white blood cells' ability to fight infection and replicates itself so that it can infect new cells. The immune system tries to fight the virus like any other infection, but over time, the repeated change in white blood cells and increasing quantities of HIV circulating in the body gradually weaken the immune system. The infected person becomes vulnerable to a variety of life-threatening illnesses and is said to have AIDS, which is characterized by signs and symptoms of severe immune deficiency.

### **HIV transmission** (slide 12)

HIV can be transmitted from an infected person to another person through blood (including menstrual blood), semen, vaginal secretions, and breastmilk. Blood contains the highest concentration of the virus, followed closely by semen, followed by vaginal fluids. It is not enough to come into contact with HIV to become infected. HIV can enter the body only through an open cut or sore or contact with the mucous membranes in the genitals, anus, rectum, mouth, and eyes. HIV is NOT transmitted through the following:

- *Insect bites.* HIV is not transmitted by mosquitoes, flies, ticks, fleas, bees, or wasps. Blood-sucking insects do not transmit HIV, because the virus dies almost instantly in the stomachs of the insects. HIV can only survive in *human* cells.
- *Contact with saliva, tears, sweat, feces, and urine.* Although HIV may be present in sweat, tears, vomit, feces, and urine, there have been no reported cases of transmission from contact with these substances.

HIV is transmitted through three main routes: sexual, parenteral, and vertical. The risk of transmission varies by mode of transmission and context.

## **Sexual transmission**

According to WHO, male to female sexual intercourse accounts for most HIV infections. However, sexual transmission of HIV may also occur from male to male and female to female. While the percentage of global HIV infections through sexual transmission is not clear, studies suggest this is the primary route of transmission (Schmid et al 2004).

It is difficult to assess the exact risk of transmitting HIV through sexual intercourse because many factors influence sexual transmission. The probability of male-to-female transmission of HIV-1 during unprotected sex ranges from 0.0005 to 0.003 during non-acute infection, but a study by Pilcher et al (2004) found that the higher viral load during acute infection among men between 20 and 54 days after infection increases the probability of male-to-female sexual transmission eight- tenfold. In general, the probability of transmission increases during anal intercourse and menstruation and when a person has a sexually transmitted infection (STI) or (if male) is uncircumcised (UNAIDS 2004).

## **Parenteral transmission**

Parenteral transmission occurs when a person is exposed to HIV through means other than contact with mucous membranes, such as piercing the skin with contaminated objects. This form of transmission may occur through blood transfusion (the estimated risk of infection from a single unit of HIV-infected whole blood is over 90 percent) and the sharing of needles among infected intravenous or injecting drug users. Health workers have become infected with HIV through needle pricks. Risk of transmission by a needle that has been used on an HIV-infected patient is 0.3 percent (Schmid et al 2004).

Parenteral transmission is an important concept to understand because it can be reduced greatly through appropriate clinical precautions and guidelines. Unsafe medical practices such as improperly disposing of syringes or using them more than once, not testing all blood for transfusions, and inadequately containing blood-borne pathogens increase the chance of transmitting HIV from an infected person. Medical clinics and health staff should implement guidelines and take precautions to protect both health workers and patients from HIV infection.

## **Vertical transmission**

Vertical (perinatal) transmission occurs when a mother passes HIV to her infant in utero, during labor and delivery, and/or through breastfeeding. In sub-Saharan Africa the risk of this means of transmission ranges between 10 percent and 30 percent. Sessions 6 and 10 provide further information about vertical/perinatal HIV transmission

## **Factors facilitating HIV transmission**

Vulnerability to HIV and AIDS seems to depend on several factors. Physical factors such as the type of HIV, the health of the host, hereditary resistance, and stage of infection play a role in HIV transmission. Society and culture also influence susceptibility to HIV significantly. All these factors must be taken into consideration for prevention and treatment of HIV.

## **Physical factors** (slide 13)

Nine physical factors have been identified as affecting HIV transmission.

### 1. Viral factors

Evidence suggests that the properties of HIV influence transmission. The two known types of HIV are HIV-1 and HIV-2. Both are transmitted by sexual contact, through blood, and vertically from mother to child. Both cause the same clinical AIDS.

HIV-1, the most common type worldwide, is divided into several groups and sub-types, which may differ by geography. The most common sub-types in Africa are A, C, O, and E. While differences in the efficacy of transmission between the various groups and sub-types of HIV-1 have been identified, the implications of these differences for medical practice are not yet documented (Duer et al 2000; Kunanusont et al 1995; Soto Ramirez et al 1996). HIV-2 is mainly found in West Africa. Evidence suggests that this type is less transmissible, especially vertically, and is associated with a lower viral load and a slower rate of clinical disease progression.

In addition to viral properties, evidence suggests that greater concentration of HIV in the blood is correlated with increased transmission by all routes (Busch et al 1996; Gray et al 2001; Pao et al 2005; Quinn et al 1993; St Louis et al 1993).

### 2. Host factors

A person's physical condition, including the presence of an STI, may affect the likelihood of HIV transmission. As mentioned before, viral entry into the white blood cells causes HIV infection. When a person has an illness, inflammation, or immune activation, the normal production of white blood cells may change, increasing the number of susceptible target cells or the receptivity of those cells to HIV. The presence of an STI or reproductive tract infection is strongly associated with susceptibility to HIV. Chlamydia, gonorrhea, and trichomoniasis infections are associated with a 60 percent relative increase in HIV prevalence in men and 40 percent in women (Royce et al 1997). Cytomegalovirus infection, gonorrhea, and seminal urethritis are also associated with increased detection of HIV in semen (Ibid). Studies have shown that treating urethritis diminishes the detection of HIV in the urethra and the excretion of HIV in semen (Cohen et al 1997).

Circumcised men have a significantly lower risk of HIV infection. Randomized clinical trials in Kenya, South Africa, and Uganda have indicated that circumcision reduces the risk of infection among men by 50 to 75 percent (Auvert et al 2005; Bailey et al 2007; Gray et al 2007).

Other STIs may cause microscopic erosions that give HIV direct access to the bloodstream. Ulcerative genital tract diseases are associated with a much higher susceptibility to HIV than non-ulcerative genital tract infections.

### 3. Stages of infection

The likelihood of HIV transmission is very high during the acute and late stages of infection. During more advanced stages of AIDS, HIV concentration in the blood increases, and CD4 count decreases (Royce et al 1997). Studies have shown that the viral level in semen at this stage of AIDS is similar to the elevated levels in the blood, increasing the risk of transmission. In fact, evidence suggests that at peak viral levels, the risk of transmitting HIV through heterosexual sex increases 8 to 10 times (Pilcher 2004). Increased infectivity is also associated with acute or primary infection, the stage between exposure to HIV and appearance of HIV antibodies.

### 4. Resistance to HIV

The results of recent studies suggest that some people have innate or acquired resistance to HIV infection. Some sex workers in Nairobi, Kenya, have been found to stay uninfected despite repeated unprotected sex with HIV-infected clients. This resistance is attributed to a variant cell type and the production of specific antibodies against HIV (Fowke et al 1996; Hoffman et al 1997; Kau et al 1999).

### 5. Social and demographic factors (slide 14)

Some population groups may be more vulnerable to HIV infection than others because of social norms that affect sexual practices, including patterns of sexual partnering, contraceptive choices, and the use of substances that lower sexual inhibitions.

### 6. Views about women

In many cultures women and men are not seen or treated equally. As a result, women often have limited choices in sexual relationships, are subjected to sexual violence, or are pressured to trade sex for food, increasing their vulnerability to infection. A significant problem for women engaged in sexual activities is limited control over using methods to help prevent transmission such as contraceptives, because men often determine the conditions for sex. Traditional perceptions about sexuality and STIs and the lack or late presentation of STI symptoms in women also decrease the likelihood that women will seek treatment when they are infected. This increases women's vulnerability to the impacts of HIV.

### 7. Youth

Young people are more vulnerable to HIV than adults because of unclear perceptions about what constitutes risky behavior and insufficient knowledge and incorrect information about sex, sexuality, and sexual health. This vulnerability is further complicated by traditional beliefs about what should be discussed and practiced during this stage of life. Such beliefs can limit the availability of correct information and increase susceptibility to infection. Moreover, traditional initiation ceremonies in some cultures may promote early engagement in sex as part of the sexual maturation process.

### 8. Transience and mobility

Some demographic factors, especially those that increase mobility, may affect the average rate of sex partner change, which in turn may affect HIV transmission rates.

Vulnerable groups include people on the move in emergency situations when their basic security of life is threatened, occupational groups who leave their homes and families for extended periods, and street children. As these people move from place to place, the potential for spreading HIV to new areas increases.

### 9. Established HIV presence

The length of time HIV has been present in a community may affect the probability of exposure. The number of people with HIV in different geographic areas may affect awareness, which influences both individual behavior and social response. The risk of new HIV cases can be described as a combination of how long people with HIV have been infected, how many sexual partners people have, and the efficiency of transmission (Anderson and May 1991).

### **Phases of HIV infection** (slide 15)

Once infected with HIV, a person rapidly becomes infectious and can transmit the virus to other people within a short time. This person will be infectious for the rest of his or her life, even if he or she does not show signs or symptoms of disease or look sick. Generally HIV disease has four phases: the acute phase, the asymptomatic phase, the symptomatic phase, and the late symptomatic phase (also referred to as full-blown AIDS).

#### 1. **Acute phase** (initial infection)

As soon as HIV enters the body, it replicates quickly. This rapid replication needs energy from the host's body. The virus relies entirely on the host for survival and will deplete the host of whatever it needs to multiply and survive. HIV infection may have a rapid onset, leading to hypermetabolism with catabolism. Although some infected people may not have any symptoms at this stage, the host's energy and nutrient requirements increase significantly, and food intake should increase accordingly. This period varies from 1 to 6 weeks.

### Seroconversion

After the first 6 weeks (sometimes up to 12 weeks), levels of the virus decrease, and the body produces antibodies to fight it. This is known as seroconversion. The body needs additional energy and begins to use its fat stores and muscle. Muscle is used to repair the cellular and tissue damage. If the additional energy and nutrients used are not replaced, the host loses weight and can gradually develop undernutrition that weakens the immune system and makes the body vulnerable to OIs

#### 2. **Asymptomatic phase**

This phase is the period of time between initial infection and the onset of signs and symptoms associated with AIDS. The length of the asymptomatic phase varies from person to person and may reach several years, depending on the health and nutritional status of the host. Even though there are no symptoms present during this phase, the asymptomatic phase is marked by hypermetabolism and increased energy needs.

### 3. Symptomatic phase

The onset of OIs, a sign of a weakened immune system, is the beginning of the symptomatic phase of AIDS. The HIV-infected person presents symptoms which may include fever, night sweats, tuberculosis, fungal infection of the mouth, chronic diarrhea, and weight loss. The body's response to infection can cause fever, which leads to increased energy expenditure, and anorexia, which decreases the intake of calories. The demand for additional nutrients combined with a loss of appetite exacerbates the problem of OIs and further weakens the immune system. The infections become more difficult to treat, and the person becomes more susceptible to new infections, speeding up the progression of the disease.

In addition to loss of appetite and added nutritional requirements, the onset of symptoms and OIs may cause malabsorption of nutrients, weight loss, and wasting. The persistence of these conditions leads to early immune failure and eventually to full-blown AIDS.

### 4. Late symptomatic phase (full-blown AIDS)

The late phase is marked by a heightened viral load and decreased CD4 count. People in this stage often experience intense metabolic alteration, weight loss, and wasting. Common infections during this phase include pneumonia, Kaposi's sarcoma, systemic fungal infection, bacterial infection, and cancer.

#### **Disease recognition and testing** (slides 16–18)

HIV is recognized primarily by testing for the presence of the antibodies formed to fight the virus. Other tests are available to determine presence of the virus itself, but they are very expensive and less common.

#### **HIV antibody tests**

HIV antibody tests include 1) blood tests, 2) urine tests, and 3) oral fluid tests. The test results may be negative during the first 3 months after infection.

Two tests are recommended. If results are conflicting, a third confirmatory test, which is usually a more accurate type of test, is done. If the initial test is negative, it should be repeated 3 months after the initial testing because seroconversion may not have occurred for a recently infected person.

Pregnant women normally pass on antibodies to their infants. As a result, an infant born to an HIV-infected mother might test positive for HIV antibodies without being infected.

#### 1. Blood tests

**Enzyme immune assay (EIA) and enzyme linked immunosorbent assay (ELISA)** are currently the most common, cost-effective, and accurate methods of testing for HIV infection. Confirmation of HIV requires two consecutive positive tests.

**Western blot** is considered the gold standard for validation of HIV. Three ELISA tests would be needed to have the accuracy of one Western blot test.

**Radioimmunobinding assay** is an expensive test that is used when antibody levels are low.

**Dot-blot immunobinding assay** is an inexpensive, rapid blood test used for screening.

## 2. Urine tests

**EIA or Western blot** (see above) can be used to test for antibodies in the urine, but urine tests are not as sensitive as blood tests.

## 3. Oral fluid (saliva) test

**EIA or Western blot** (see above) can be used to test for antibodies in oral fluids.

## Tests for HIV

The **polymerase chain reaction (PCR)** test measures HIV genetic information. This test is very useful for detecting infection during the acute stage and among children born to HIV-infected mothers.

## WHO guidelines for diagnosis of AIDS among HIV-positive people

WHO specifies the following guidelines for diagnosis of AIDS:

### Major signs

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- Weight loss > 10 percent of body weight
- Fever for longer than 1 month
- Diarrhea for longer than 1 month

### Minor signs

- Persistent cough for longer than 1 month
- General itchy skin disease
- Recurring shingles (herpes zoster)
- Thrush in the mouth and throat
- Long-lasting spreading and severe cold sores
- Long-lasting swelling of lymph glands
- Loss of memory
- Loss of intellectual capacity
- Peripheral nerve damage

## Treatment of HIV and AIDS (slides 19–21)

At present there is no cure for HIV, but medications and therapies exist to treat OIs and slow progression of the disease. The most effective treatment for HIV is ART, which uses antiretroviral drugs (ARVs) to prevent OIs and slow progression of AIDS. ART has been shown to reduce morbidity and mortality from AIDS and to prevent OIs such as tuberculosis (Tawfik et al 2002).

ART prevents HIV from replicating as fast in the body and destroying the immune system as quickly. The drugs help delay the onset of AIDS and help prevent additional infections, increasing the opportunity for a longer, healthier life. Highly active antiretroviral therapy (HAART) combines multiple ARVs in the treatment regimen to enhance the effectiveness of the drugs.

Although ART has been shown to prevent additional infections and prolong life for PLHIV, several challenges are associated with these drugs. ARVs can be expensive and difficult for patients to afford without financial assistance or government or donor subsidies. Some patients may find it difficult to continue treatment because ARVs must be taken daily for the rest of a patient's life. This becomes more challenging if the patient develops uncomfortable side effects sometimes associated with ART. Unfortunately, failure to comply with drug regimens may make a person worse over time and could lead to drug resistance. Therefore, people who are willing to start and continue ART and people at risk of OIs are prioritized for ARVs (Tawfik et al 2002).

ART may also require additional training of health workers and additional capacity of health systems for the distribution of drugs, laboratory tests, counselling, and patient follow-up.

Prevention and treatment of OIs is an important component of care for PLHIV. As the immune system is weakened, the body is more susceptible to bacterial, fungal, and viral infections. In addition to ART (or even when ART is unavailable) medical services and drugs should be provided to treat individual OI including pneumonia, tuberculosis, encephalitis, and STIs (Benson et al 2004).

Proper nutrition is also needed for treating and caring for PLHIV. PLHIV often have increased nutritional requirements as their bodies try to fight off infection. Various ARV regimens and OIs may change eating habits or nutrient absorption, requiring an enhanced diet to maintain good health.

## **The impact of HIV**

HIV affects mortality, food security, health, and education.

### **Demographic impact** (slides 22–24)

Approximately 33 million people around the world were living with HIV by the end of 2007 (UNAIDS 2008). HIV is now the leading cause of death in sub-Saharan Africa and the fourth-largest global killer (UNDP 2004). In the worst affected countries, HIV has reduced life expectancy by more than 20 years (UNAIDS 2008). In southern Africa the average life expectancy has dropped below 50 years, the same level as in the 1950s (UNAIDS 2008). In countries heavily affected by HIV, the infection is the cause of over one-third of child deaths (UNAIDS 2008). In the seven sub-Saharan African countries hardest hit by HIV, under-five mortality has increased by 36 percent as a result of the disease (WHO 2004)

### **Impact on food security** (slide 25)

HIV is a significant threat to food security. The illness and death of productive household members may reduce access to food. A study in Tanzania found that per capita food

consumption decreased by 15 percent after the death of an adult in the poorest households (FAO 2001).

HIV also causes farmers to reduce agricultural work or even abandon farms. With fewer people, households farm smaller plots of land or resort to less labor-intensive subsistence crops, which often have lower nutritional or market value. Session 7 provides more information about HIV and food security.

### **Impact on the health sector (slide 26)**

Health expenditure per capita in sub-Saharan Africa is generally low, and the demands of HIV further strain already over-stretched health budgets and systems. The impact varies depending on the level of services, the number of people who seek the services, the nature of the demand, and the capacity to deliver care. During early HIV infection, the demand is mostly for primary care and outpatient services. As the infection progresses to AIDS, demand for hospitalization increases. In some cases shortages of beds may lead to admission of HIV patients only at the later stage of the disease.

Besides the increased demand for hospitalization, the increased patient load and the toll the epidemic takes on health workers lead to staff shortages and burnout. The complex nature of some of the OIs associated with HIV demands more time and money to diagnose and investigate cases. The demand for specialized services such as counselling also increases.

### **Impact on the education sector (slide 27)**

A decline in school enrolment is one of the most visible effects of HIV. Research from South Africa showed a 20 percent drop in enrolment in the first year of primary school in parts of KwaZulu Natal Province between 1998 and 2001 (UNAIDS 2002). In the Central African Republic and Swaziland, school enrolment is reported to have fallen by 20–36 percent because of AIDS, with girls the most affected (2002). The following factors contribute to declines in school enrolment:

- Removal of children from school to care for parents and family members
- Inability to afford school fees and other expenses
- AIDS-related infertility and a decline in the birth rate
- Infection of children who do not survive through the years of schooling

Illness or death of teachers reduces the capacity to deliver the basic social mandate of education. Several studies have shown the magnitude of this problem, citing the high prevalence of HIV-infected teachers in sub-Saharan Africa (World Bank 2002). Education budgets are further strained by the need to train new teachers to replace those lost to AIDS, which affect the funds available for materials and infrastructure needed to provide quality education.

### **Comprehensive package of HIV and AIDS interventions (slides 28–30)**

Health professional, community members, and political, social, and cultural leaders should be engaged in developing a comprehensive package of interventions to address HIV. Such a package should include efforts to prevent infection, provide access to ART,

offer adequate care and support, mitigate the impact of HIV, reduce vulnerability to infection, and address cross-cutting issues such as participation and leadership.

### **Prevention**

A strong focus on prevention is essential to reduce the spread and impact of HIV. Special attention has to be given to young people, because over 30 percent of PLHIV are under the age of 24. Efforts must also target vulnerable populations such as pregnant women and children. In addition, strategies should be developed to reach at-risk populations such as intravenous drug users and commercial sex workers. Prevention methods should include health and sex education to provide information and build life skills to reduce vulnerability; promoting the avoidance of multiple sexual partners and abstinence; providing access to female and male condoms; enhancing services for prevention of mother-to-child transmission of HIV (PMTCT); expanding access to circumcision; expanding demand and harm reduction programs for intravenous drug users; and increasing access to voluntary counseling and testing (VCT).

### **Treatment**

Countries should make an Intensive effort to gain access to ARVs for PLHIV. International (e.g., WHO) and national guidelines should be used to provide ART to vulnerable populations with compromised immune systems. Treatment of OIs is also necessary. Patients who cannot afford to pay for medical services should be given other options. Governments should establish continuity of care and access to ARVs to ensure that patients continue treatment and ensure that PLHIV are properly nourished with appropriate foods.

### **Care and support**

Prevention, treatment, and care and support for PLHIV should be linked to reverse the spread of the epidemic. Care and support strategies should clearly indicate the range of services to be provided and the standards to which they will adhere. In addition to the distribution of ARVs, interventions should include access to other health services and psychosocial support, management of symptoms and side effects, palliative care, counseling and care for orphans and vulnerable children (OVC), and promotion of nutritional programming. VCT is a vital component in this process because it is a point of entry for both prevention and care interventions. When done effectively, care and support interventions improve and prolong the lives of PLHIV, help overcome stigma and denial, and lead to better management of illnesses and OIs.

### **Mitigating the social and economic impact of HIV**

HIV increases poverty and vulnerability, which in turn deplete social and individual capacity to respond to the epidemic. Strengthening the livelihoods and improving the food security of HIV-affected people are important ways to mitigate the impact of the epidemic. Special attention should be given to the growing number of OVC. Interventions should aim to give children access to basic education, health, and social services and regular monitoring of care, health, and well-being.

## **Reducing vulnerability to infection**

The HIV epidemic is driven by forces of social and economic vulnerability that inhibit people's capacity to control their risk of infection. A comprehensive package of services should therefore include strategies to reduce vulnerability, particularly for women and girls, and people in conflict and other emergency situations. Such strategies include empowering people to combat poverty, hunger, and disease through education, life skills training, microfinance services, and legislative and policy measures to promote and protect basic human rights.

## **Cross-cutting issues**

Key cross-cutting issues relevant to services addressing HIV include promoting the full participation of PLHIV in designing and implementing services and affirming and strengthening community capacity to respond to the epidemic. Strong leadership is needed from the national level to the community level. Personal commitments from political and civil society leaders are vital to promote national and local understanding and cooperation, reduce denial and stigma associated with HIV, and assure that resources are committed and stakeholders held accountable.

## **Challenges of managing HIV and AIDS (slide 31)**

The global response to HIV/AIDS faces the following major challenges:

1. Political commitment is lacking at multiple levels of government, even in some of the most severely affected countries.
2. Global and national resources do not fund the full package of interventions required to address HIV, including access to ARVs by all who need them.
3. Human resources and health systems in many African countries do not have the capacity to meet the burden imposed by HIV. Governments cannot train and retain medical staff as quickly as needed, and weak health infrastructures cannot keep up with the demand for care.
4. Stigma and discrimination limit the impact of prevention and care interventions.
5. Scale-up of interventions to reach all vulnerable groups is limited by a lack of resources and the need to maintain quality. Many effective programs are still small and have been unable to reach large numbers of beneficiaries.
6. Lack of a vaccine remains a challenge. There is currently no cure for HIV and no effective preventive vaccine. Therefore, the best approach currently is to prevent new infections and treat and care for PLHIV.

## **Conclusions (slide 32)**

HIV stands for human immunodeficiency virus. AIDS, the last stage of HIV infection, stands for acquired immune deficiency syndrome. Africa is the continent most affected by HIV. HIV attacks and weakens the immune system, reducing its ability to fight infection. HIV can be transmitted through blood, semen, vaginal secretions, and

breastmilk and can enter the body only through an open cut or sore or contact with mucous membranes. The three main routes of transmission are sexual, parenteral (i.e., through blood transfusion or contaminated needles), and vertical (mother to child). The risk of transmission varies by mode of transmission and context. Generally HIV has four phases: acute, asymptomatic, symptomatic, and late symptomatic (full-blown AIDS). HIV is recognized mainly by testing antibodies formed to fight the virus. There is no cure for HIV, but ART can prevent OIs and slow progression of AIDS. Various ARVs and OIs may change eating habits or nutrient absorption, requiring an enhanced diet.

HIV affects food security as well as health and education. A comprehensive package of HIV and AIDS interventions should include preventing infection, providing access to ART, offering adequate care and support, mitigating the impact of HIV, reducing vulnerability to infection, and address participation and leadership.

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### **Discussion points**

1. What factors in your country are likely to influence transmission of HIV?
2. What factors in your country are likely to increase vulnerability to HIV infection and the impact of HIV?
3. Which HIV tests are known to be available and currently used in your country?
4. Discuss the main impact of the HIV epidemic on your country.
5. Which elements of a comprehensive HIV and AIDS package are most likely to affect the nutrition of people affected by or infected with HIV?

## Session One: Basics of HIV and AIDS



## Purpose

Provide basic information about HIV and AIDS, including causes, transmission, progression, knowledge, and challenges.

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## Learning Objectives

- Know basic facts about the impact, trends, definition, and causes of HIV.
- Understand the factors that affect the risk of transmission and vulnerability to HIV infection
- Discuss strategies to prevent and treat HIV and AIDS and care for people with HIV (PLHIV).
- Describe the challenges of managing HIV and AIDS.

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## Session Outline

- Magnitude, prevalence, and trends of HIV in sub-Saharan Africa
- Definitions of HIV and AIDS
- Modes of HIV transmission and related factors
- Factors affecting HIV transmission
- Phases of HIV infection
- Disease recognition and testing
- Treatment of HIV and AIDS
- Impact of HIV on demographic patterns, food security, health, and education in Africa
- Comprehensive package of HIV programs
- Challenges of managing HIV and AIDS

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## What is HIV?

- Human immunodeficiency virus
- Responsible for causing AIDS

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## What is AIDS?

- Acquired immuno deficiency syndrome
- Characterized by signs and symptoms of severe immune deficiency
  - Weight loss of more than 10% of body weight
  - Diarrhea lasting longer than 1 month
  - Fever lasting longer than 1 month
  - Other signs

Source: WHO

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## Relevance to Public Health

- First recognized in 1981
- One of the largest epidemics of the 20<sup>th</sup> century
- Approximately 33 million people living with HIV by the end of 2007
- 2.7 million people infected with HIV in 2007

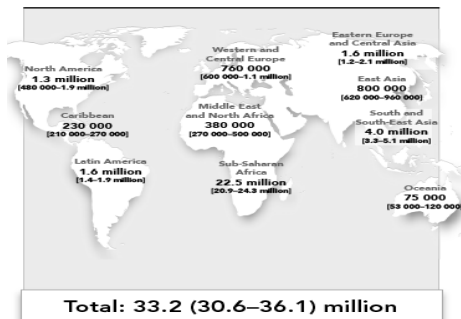
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## Global Summary of HIV, December 2007

- Number of people with HIV
  - Total: 33.2 million
  - Adults: 30.8 million
  - Women: 15.4 million
  - Children under 15: 2.5 million
- New infections in 2007
  - Adults: 2.2 million
  - Children: 370,000
- AIDS deaths in 2007
  - Total: 2.0 million
  - Adults: 1.7 million
  - Children: 330,000

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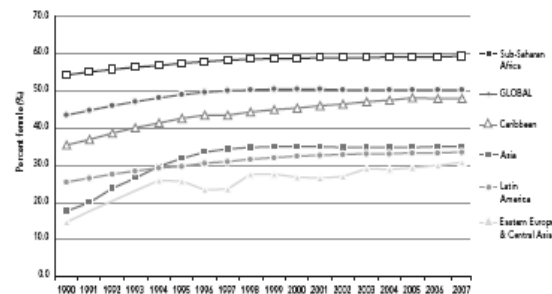
## Adults and Children with HIV in 2007



Source: UNAIDS AIDS Epidemic Update 2007

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## Percentage of Adults with HIV Who are Women, 1990–2007



Source: UNAIDS 2008

## Effects of the Virus

- Attacks white blood cells that fight infection in healthy people
- Changes the composition of white blood cells and enables HIV to replicate itself
- Weakens the immune system
- Increases vulnerability to life-threatening illnesses

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## Main Routes of HIV Transmission

### Sexual

- Main mode of transmission
- Accounts for 70–80% of all HIV infections

### Parenteral

- Blood transfusions (estimated risk from a single unit of HIV-infected whole blood is > 90%)
- Contaminated needle pricks
- Needle sharing among HIV-infected drug users

### Vertical (perinatal)

- In utero, during labor and delivery, and through breastfeeding

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## Physical Factors Affecting Transmission and Vulnerability

### Viral

- Strain of HIV
- Viral load

### Host

- Presence of sexually transmitted infections
- Stage of infection
- Circumcision
- Hereditary resistance to HIV

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## Social and Demographic Factors in Transmission and Vulnerability

### Social

- Views toward women
- Youth perceptions of sex and risky behavior

### Demographic

- Mobile and vulnerable populations influencing frequency of sex partner change
- Established presence of HIV in the community

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## Phases of HIV Infection

### Acute

- HIV replicates quickly
- Energy requirements increase

### Asymptomatic

- No symptoms

### Symptomatic

- Onset of opportunistic infections
- Further increase in nutritional requirements

### Late symptomatic (full-blown AIDS)

- Heightened viral load
- Intense weight loss and wasting
- Opportunistic infections taking control

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## HIV Recognition and Testing

- May be negative during first 3 months after infection (window period)
- Two tests required plus a third to confirm if results conflict
- Repeated test recommended 3 months after initial test
- False positives very possible in children under 18 months old

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## Types of HIV Tests

### Blood tests for antibodies against HIV

- Most common: Enzyme immune assay/enzyme-linked immunosorbent assay (ELISA)
- Gold standard: Western blot (more specific than ELISA and used as a confirmatory test)
- Radio-immunobinding assay (expensive, used as a confirmatory test when antibodies low)
- Dot-blot immunobinding assay (cost-effective rapid screening blood test)
- Polymerase chain reaction (PCR) (measures HIV genetic information)

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## Types of HIV Tests, Cont.

### Urine tests

- Test for antibodies in urine
- Not as sensitive as blood tests
- Enzyme immune assay (EIA)
- Western blot

### Oral fluid tests

- Test for antibodies in oral fluids
- EIA
- Western blot

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## Treatment of HIV and AIDS

- No cure
- Treatment can help slow progression to AIDS, reduce OIs, and minimize malnutrition.
- The most effective treatment is antiretroviral therapy (ART) using antiretroviral drugs (ARVs)

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## ART

- Combination of ARVs
- Proven to limit replication of HIV in the body, delay onset of AIDS, and prevent additional OIs
- Challenges
  - Expensive
  - Must be taken for the rest of the person's life
  - Uncomfortable side effects

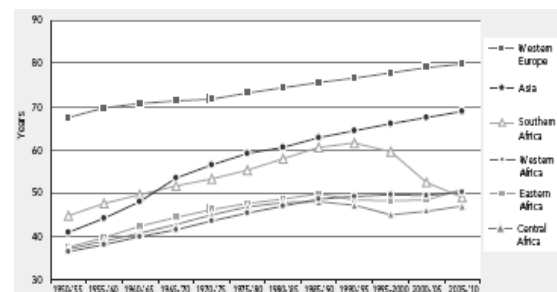
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## Demographic Impact of HIV and AIDS

- In the worst-affected countries, HIV has reduced life expectancy by over 20 years.
- In southern Africa, life expectancy has dropped below 50.
- In the worst affected countries, HIV causes over one-third of child deaths.
- In the seven countries hardest hit by HIV, under-five mortality has increased by 36%.

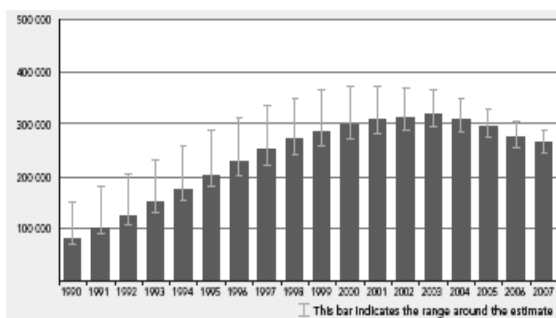
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## Life Expectancy in Selected Regions, 1950–2010



Source: UNAIDS 2008

## Child Deaths from AIDS, 1990–2010



Source: UNAIDS 2008

## Impact of HIV on Food Security

- Decreased availability of food
  - Falling production
  - Loss of family labor, land, livestock, and other assets
- Decreased access to food
  - Low income

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## Impact of HIV on the Health Sector

- Straining of already meager health budgets
  - Overall public health spending less than US\$10/person (UNAIDS)
- Heavy demands on health system
  - Increased need for medical supervision
  - Longer hospital stays
  - Health workers shortages and burnout

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## Impact of HIV on the Education Sector

- Declining school enrolment
- Illness and death of teachers
- Increased Cost of training new teachers to replace those lost to AIDS

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## Comprehensive Package of HIV and AIDS Programs

- Prevention
  - Health and sex education
  - Expansion of behavior change and harm reduction strategies
  - Increased access to VCT
  - PMTCT
- Treatment
  - Secure access to ARVs for PLHIV
  - Treatment of OIs
  - Proper nutrition

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## Comprehensive Package of HIV and AIDS Programs, Cont.

- Care and support
  - Synergy with prevention interventions
  - Health services
  - Psychosocial support
  - Management of ARV side effects
- Mitigation of social and economic impact
  - Care of OVC
  - Access to basic needs, rights, and general well-being

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## Comprehensive Package of HIV and AIDS Programs, Cont.

- Reduction of vulnerability
  - Services for women, girls, PLHIV, and people in war and conflict
  - Economic empowerment and life skills training
- Cross-cutting issues
  - Participation and acceptance of PLHIV
  - Strong leadership from community to national level

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## Strategies to Prevent and Control Undernutrition

- Improve household food security.
- Improve diversity of diet.
- Improve maternal nutrition and health care.
- Improve child feeding practices.
- Ensure child health care (immunization, medical care, growth monitoring).
- Provide nutrition rehabilitation.

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## Challenges

- Political commitment
- Funding
- Human resources in health system
- Discrimination against PLHIV
- Scale and quality of interventions
- Lack of vaccine

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## Conclusions

- HIV attacks and weakens the immune system, reducing its ability to fight infection.
- Main transmission routes are sexual, parenteral, vertical.
- The four phases of HIV disease are acute, asymptomatic, symptomatic, and full-blown AIDS.
- HIV is recognized mainly by testing antibodies formed to fight the virus.
- ART can prevent OIs and slow progression of AIDS.
- A comprehensive package of HIV and AIDS interventions should include infection prevention, ART, care and support, and mitigation of the impacts of HIV on food security, health, and education.

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