

# **HIV/AIDS in Southern Africa:**

Background, Projections, Impacts,  
and Interventions

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## **LIST OF ABBREVIATIONS**

<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>AIM</b>	AIDS Impact Model
<b>DALY</b>	Disability-adjusted Life Year
<b>DHS</b>	Demographic and Health Survey
<b>GDP</b>	Gross Domestic Product
<b>HAART</b>	Highly Active Anti-retroviral Therapy
<b>HIV</b>	Human Immunodeficiency Virus
<b>IEC</b>	Information, Education and Communication
<b>NGO</b>	Non Governmental Organizations
<b>PLWHA</b>	Persons Living with HIV/AIDS
<b>STDs</b>	Sexually Transmitted Diseases
<b>TB</b>	Tuberculosis
<b>UNAIDS</b>	Joint United Nations Programme on AIDS
<b>VCT</b>	Voluntary HIV Counselling and Testing

## INTRODUCTION

The HIV/AIDS epidemic has become a serious health and development problem in many countries around the world. The Joint United Nations Programme on AIDS (UNAIDS) estimates the number of HIV infections worldwide at about 36.1 million by the end of 2000. About 25.3 million infected people—70 percent of the total—were in sub-Saharan Africa. In 2000 alone, 5.3 million people became newly infected with HIV. Another 21.8 million persons have already died from the disease since the beginning of the epidemic, mostly in Africa. In 2000, about 600,000 children became newly infected with HIV, nearly all of whom were infants born to HIV-infected mothers. Nine of 10 newly infected infants were in sub-Saharan Africa.

The virus that causes AIDS has already infected and is infecting many Africans. About 20 percent of the entire adult population aged 15–49 is currently infected in nine southern African countries—Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe. This is a staggering level, and most of these people do not even know they are infected. From the beginning of the epidemic through 2000, about 4.4 million persons may have developed AIDS in southern Africa, although most of these have not been officially recorded. No cure is available for AIDS, and the disease threatens the social and economic well being of the countries.

However tragic the HIV/AIDS epidemic is for southern Africa, there is still occasion for hope. HIV is not spread by casual contact or by mosquitoes or in the air or water. Africans do not have to wait for expensive vaccines to be developed at some time in the unknown future to protect themselves. HIV is spread by certain types of human behaviours; therefore, it can be controlled by changes in those behaviours. What is needed is continued involvement from all sectors of society to promote interventions to reduce high-risk sexual behaviours, treat and control other sexually transmitted diseases, maintain a safe blood supply, ensure safe use of needles, care for those already infected, ensure that human rights are respected and mitigate the problems of those already infected with HIV or otherwise affected by the epidemic. Eighty percent of the adult population remains free of the infection and all of these people have the opportunity to protect themselves from the disease.

## **I. BACKGROUND**

The HIV/AIDS Pyramid

HIV Transmission Mechanisms

Incubation Period

Sentinel Surveillance Results

Current Estimates of HIV Prevalence

Patterns of Infection by Age and Sex

Age and Sex Distribution of Reported AIDS Cases

Knowledge of AIDS and Perception of Risk

Factors Affecting the Spread of HIV

## **The HIV/AIDS Pyramid**

By the end of 1998, about 200,000 cases of AIDS had been reported to the Ministries of Health in the nine southern African countries in this study. AIDS has spread throughout all of the countries; cases have been reported in almost every district. However, reported AIDS cases represent only the visible part of the epidemic. There is much more to the epidemic than the number of reported cases.

For several reasons, not all AIDS cases are reported:

- Some people never seek hospital care for AIDS;
- Some physicians or nurses may not want to record a diagnosis of AIDS because of the stigma attached to the disease;
- Some people with HIV infection may die of other diseases before they are ever diagnosed as having AIDS;
- Some rural hospitals and district health care facilities may not have the capability to test for HIV infection; and
- Most private laboratories do not report their figures.

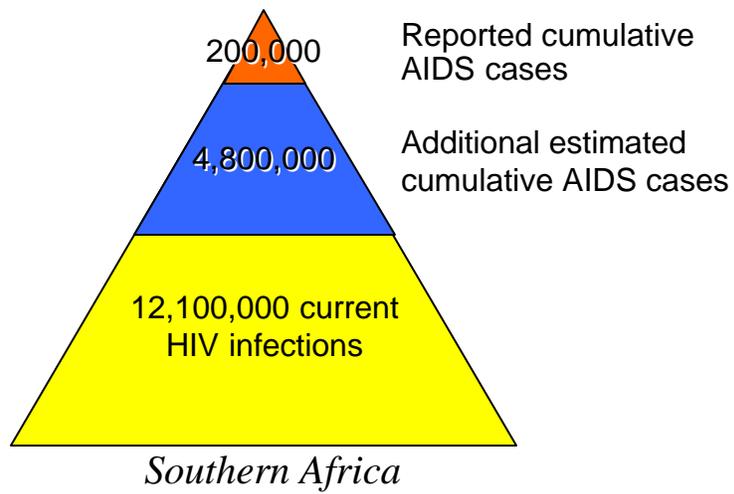
The true number of cumulative AIDS cases in southern Africa is not known, but according to the projection model used in this study, the total will be about 5 million by the end of 2001.

AIDS cases only show part of the problem. Many more people are infected with HIV, the virus that causes AIDS. They have not yet developed AIDS but will in the coming years. According to UNAIDS, in 1999 there were 9.4 million people infected with HIV in southern Africa.

**AIDS stands for Acquired Immune Deficiency Syndrome.  
It is a disease caused by the Human Immunodeficiency Virus or HIV.  
It acts by weakening the immune system, making the body susceptible to  
and unable to recover from other diseases.**

## The HIV/AIDS Pyramid

*Actual AIDS cases only show part of the problem.  
Many more people are infected with HIV but have not  
yet developed AIDS.*



## HIV Transmission Mechanisms

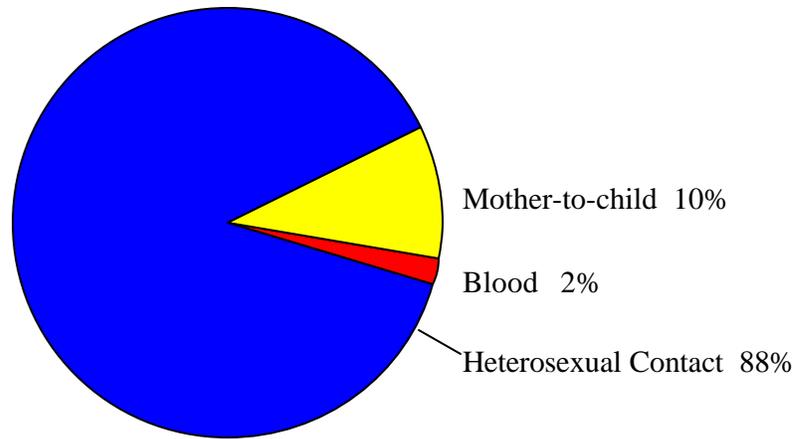
HIV can be transmitted from one person to another in a number of ways. In southern Africa, three transmission mechanisms are most important: heterosexual contact, mother-to-child transmission, and blood transfusions.

**Heterosexual contact** The majority of infections are transmitted through heterosexual contact. Although the probability of transmitting HIV in a single act of intercourse can be quite low, a number of factors increase the risk of infection dramatically. The two most important are the presence in either partner of a sexually transmitted disease (STD), like syphilis or gonorrhea, and having a large number of sexual partners. A significant number of southern African adults suffer from STDs and many have a number of sexual partners. As a result, about 88 percent of new HIV infections are due to heterosexual contact. Programs designed to slow the spread of HIV need to focus on reducing transmission through sexual contact.

**Mother-to-child transmission** Many children are infected perinatally; that is, they receive the infection from their mothers during pregnancy, at the time of birth, or through breastfeeding. About 25-40 percent of babies born to infected mothers will themselves be infected. The rest will not be infected, but are at risk of becoming orphans when their parents die from AIDS. About 10 percent of new HIV infections in southern Africa are due to perinatal transmission.

**Blood transfusion** Transfusion with infected blood will almost always transmit HIV. However, in much of southern Africa, blood is screened for HIV before transfusion. As a result, this mode of transmission is not significant, accounting for only a few percent of new HIV infections.

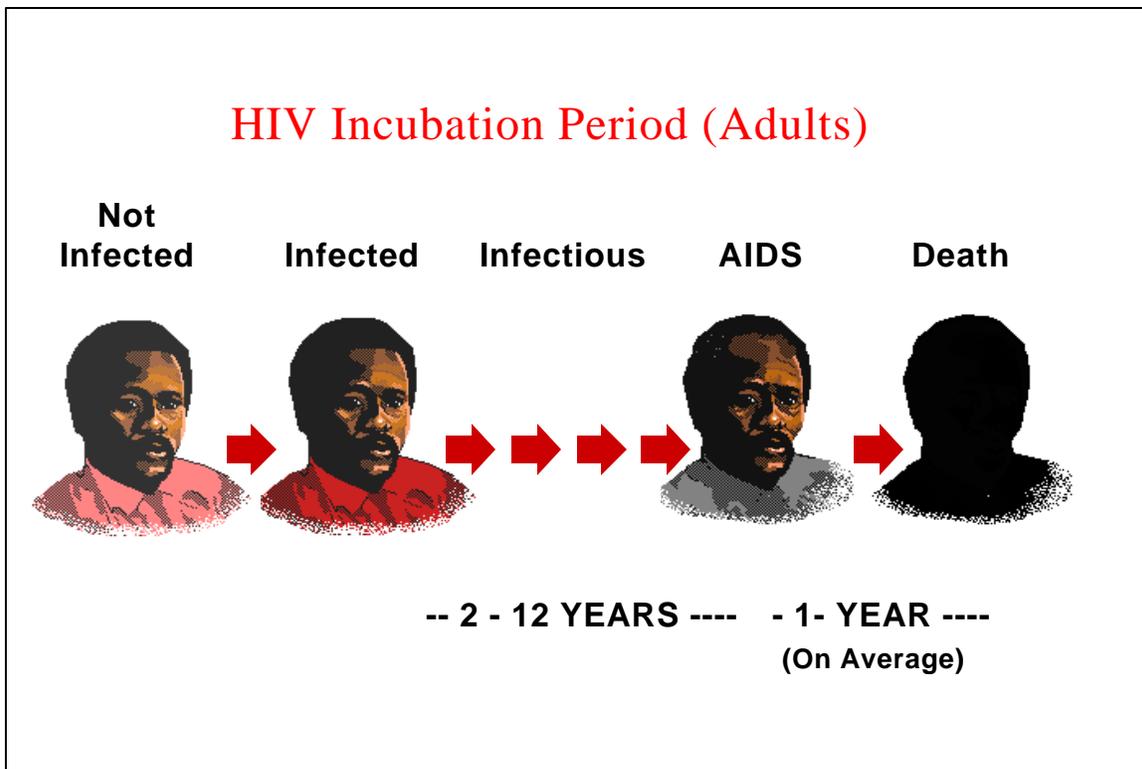
## HIV Transmission Mechanisms



## Incubation Period

After transmission of HIV, a person does not develop AIDS immediately. There is often a lengthy period from infection with HIV to development of the disease AIDS that may last from two to 12 years or even longer. Some people may survive longer than 12 years with an HIV infection while others may develop AIDS within two or three years and die soon thereafter. The average time from infection with HIV to the development of AIDS is about eight years. That is, on average, a person does not develop AIDS until eight years after becoming infected. For most of this period, the person may not have any symptoms and, therefore, may not even be aware that he or she is infected. This contributes to the spread of HIV, since the person can transmit the infection to others without knowing it. People with full AIDS, of course, remain infectious. For children the incubation period is much shorter because their immune systems are not yet fully developed. Most children who are infected at birth develop AIDS and die within five years.

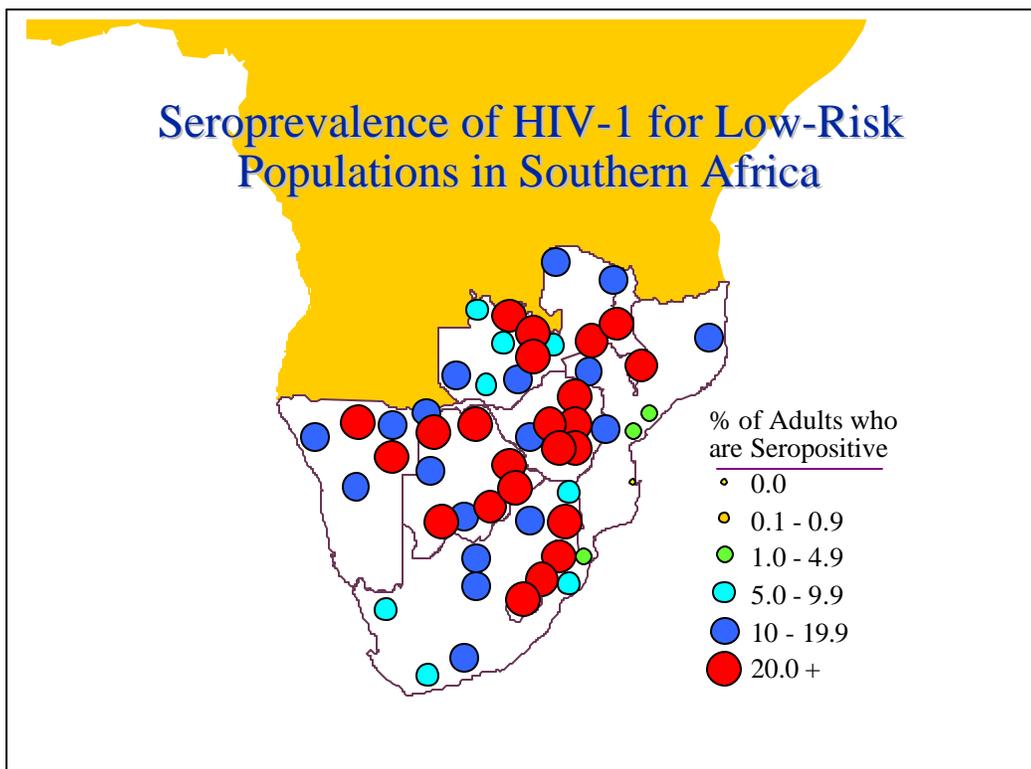
No one is quite sure why some infected individuals develop AIDS at a slower or faster pace than others. Countries where the overall health of the population is poor may have shorter incubation periods, on average, than countries with better health conditions.



## Sentinel Surveillance Results

Each of the nine southern African countries in this study has a sentinel surveillance system that provides data for estimating the extent of HIV infection. This system operates in both urban and rural settings. Each country has sites at antenatal clinics, where women go for care during pregnancy. Blood samples are tested anonymously there for HIV infection, and the results are used to understand the status of the epidemic. All of the countries, except Namibia, also test patients who come to be treated for STDs. In addition to these two population groups other groups may be tested in some countries. For example, Zambia also has tested prisoners, Zimbabwe tests sex workers, and Mozambique has tested military personnel, prisoners, and those displaced by war. Surveys among the general population have also been conducted in a few communities. The projections in this report use prevalence data from antenatal clinics for basic data, and use the data from other sources to validate patterns in individual countries.

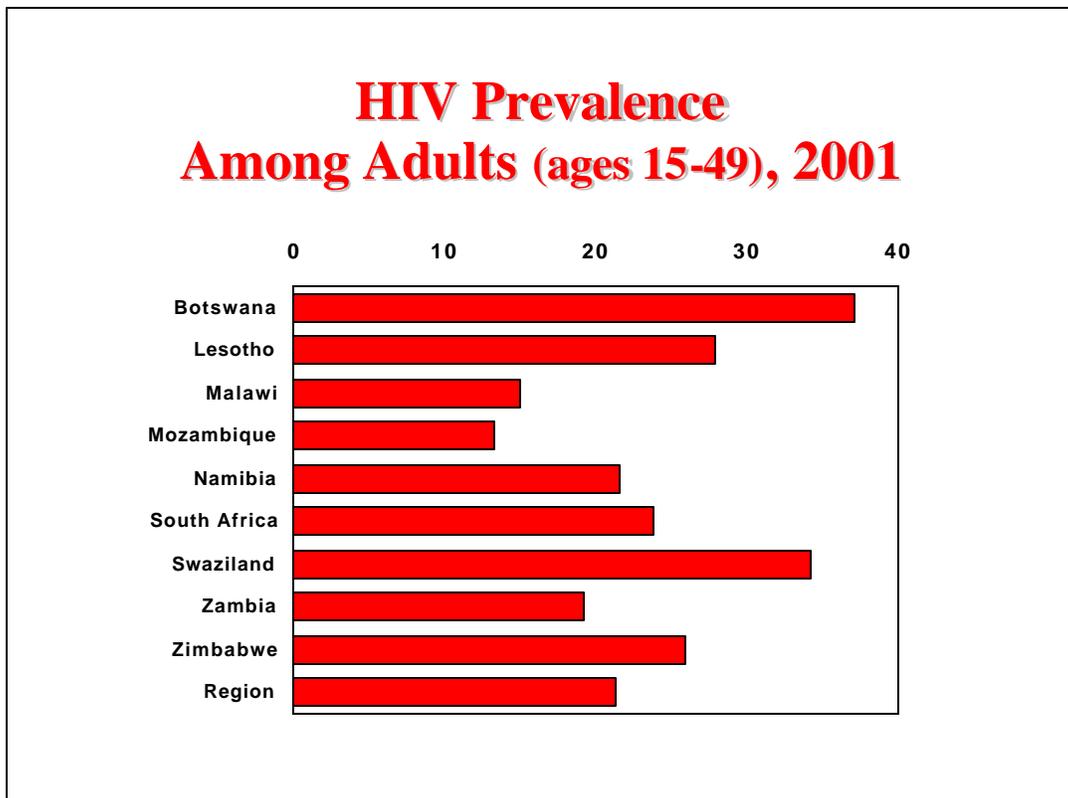
As can be seen in the map below, prevalence among pregnant women in the region ranges from 0 to more than 20 percent. Countries with the highest prevalence observed in these surveys include Botswana, Lesotho, Namibia, Swaziland, and Zimbabwe, with prevalence of at least 10 percent at each site, and most showing prevalence of 20 percent or more. There are still sites in Zambia and South Africa where prevalence is below 10 percent, but most sites are above that level. The lowest prevalence levels are observed in Malawi and Mozambique, although the rates in Mozambique range from 0 percent in one site to between 10 and 20 percent in some urban sites.



## Current Estimates of HIV Prevalence

One commonly used measure of the extent of HIV in a population is adult prevalence, or the percentage of adults aged 15-49 who are infected with HIV. Prevalence is estimated on the basis of surveillance results from antenatal clinics. Studies in a number of countries in Africa have shown that HIV prevalence among pregnant women is a good estimate of prevalence among all adults aged 15-49.<sup>1</sup>

Adult HIV prevalence for each country is shown in the graph below. The highest adult HIV prevalence is in Botswana at nearly 36 percent, with Lesotho, Swaziland, and Zimbabwe following closely with prevalence of about 25 percent each. In Namibia, South Africa and Zambia adult prevalence is about 20 percent. Finally, in Malawi and Mozambique prevalence is around 15 percent. The population-weighted average for the nine countries is 20 percent in 1999.

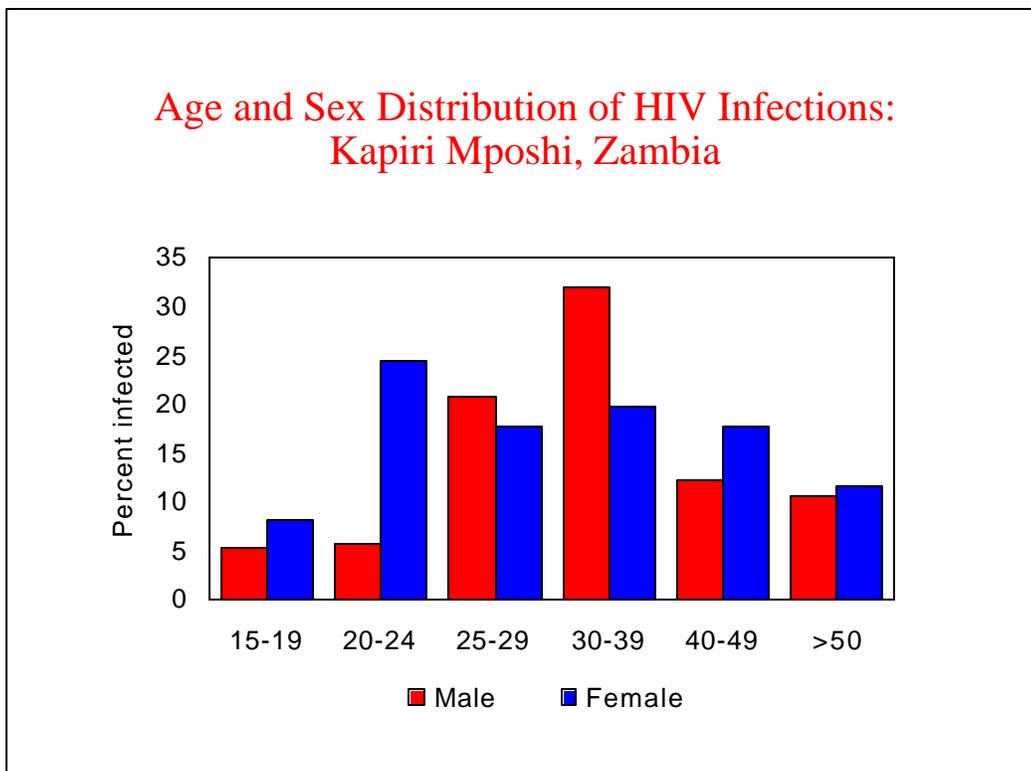


<sup>1</sup> Prevalence estimates from antenatal clinics tend to under-estimate prevalence among all women and over-estimate prevalence among men. They also over-estimate prevalence among young women and over-estimate among older women. These differences compensate for each other. As a result, prevalence among pregnant women is generally a good estimate of prevalence among all adults aged 15-49.

## Patterns of Infection by Age and Sex

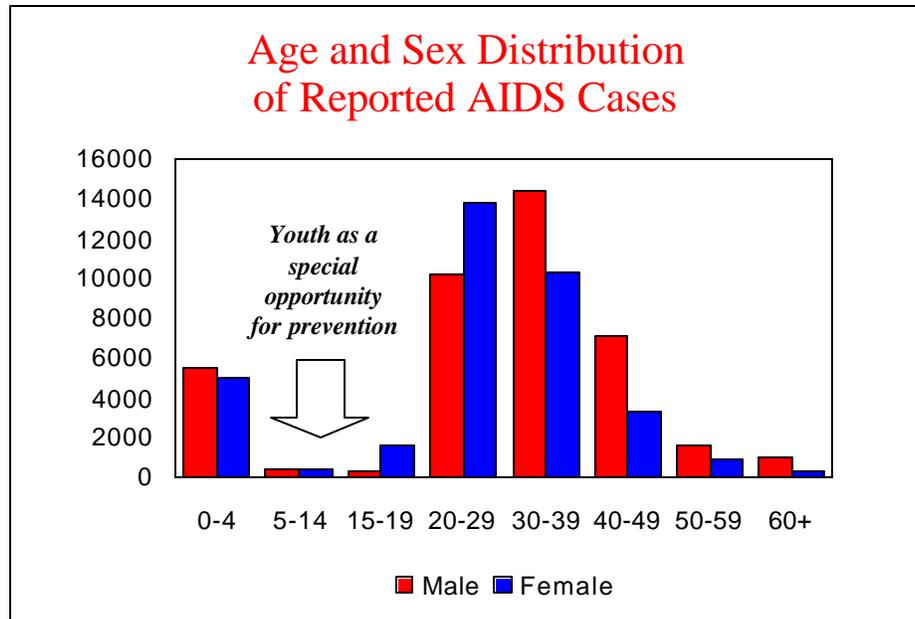
Since most new infections are transmitted by heterosexual contact, people are at risk of catching the infection as soon as they become sexually active. The chart below shows the results of a study in Kapiri Mposhi, Zambia, which illustrates the proportion of the population that is infected with HIV by age and sex, based on a population survey.

The pattern of infection that was discovered using the population survey is similar to the pattern found in antenatal clinic data in southern Africa. Infection levels are extremely high for girls and young women. The highest infection levels for women are in the 20-24 age group, while for men the highest infection levels are found in the 30-39 age group. Overall, prevalence for females was markedly higher than for males among those aged 15-24, while male prevalence was higher than female prevalence in the groups aged 25-39.



## Age and Sex Distribution of Reported AIDS Cases

The chart below shows the distribution of reported AIDS cases by age group and sex for the southern Africa region. These data are based on all available data reported to UNAIDS, thus the coverage may be more complete for some countries than for others. Reported cases represent only a small proportion of all AIDS cases; nevertheless, they provide useful information about the HIV/AIDS epidemic.



This bar chart illustrates several interesting facts:

- About three-quarters of AIDS cases are found among adults between the ages of 20 and 40. Since this is the most economically productive segment of the population, deaths in this age group are an important economic burden. Many productive years and much investment in education and training will be lost. These deaths also have significant family consequences since most people in this age group are raising young children.
- Although the total number of reported AIDS cases according to sex is about equal, the distribution by age group and sex is quite different. For females, cases are concentrated in the younger age groups; there are more than four times as many females as males reported to have AIDS in the group aged 15-19, while there are about one-third more females than males in the group aged 20-29. This pattern then reverses, where more males than females are reported to have AIDS in all of the groups aged 30 or more. Some of the difference may be due to transmission from older men to younger women, but young women may physiologically be more prone to HIV infection.
- A significant number of AIDS cases have been reported among young children. Virtually all of these children received the infection from their mothers.

- The small number of AIDS cases in the group aged 5-14 emphasizes the point that the main modes of transmission are through sexual contact or mother-to-child transmission. This group would have higher prevalence if mosquitoes or casual contact spread HIV. Since prevalence is so low among these young people, programs targeted at this group provide a special opportunity to affect the future course of the epidemic.

## **Knowledge of AIDS and Perception of Risk**

Information about personal knowledge of AIDS and risk behaviours was collected in the Demographic and Health Surveys (DHS) for four of the nine countries in the southern Africa region: Malawi, in 1996; Zambia, in 1996; Zimbabwe, in 1994; and Mozambique, in 1997. The results from these nationally representative surveys can be seen in the table below. In Malawi, Zambia, and Zimbabwe, nearly 100 percent of both men and women had heard of AIDS. In Mozambique, about 94 percent of the men had heard of AIDS in 1997, while only 82 percent of the women had.

Given the high percentage of people who had heard of AIDS, and the high rates of HIV prevalence, a very large number of those surveyed had little or no perception that they personally were at risk of getting AIDS. In Malawi, about one-half of the women who know about AIDS report that their perceived risk of getting AIDS is small or non-existent. Even more men than women feel this way in Malawi, with 83 percent of all men who know about AIDS reporting little or no perceived risk of getting AIDS. Some of this perception of low risk may be related to behaviour changes that both men and women report in Malawi; 92 percent of women and 98 percent of men surveyed stated that they had made some kind of change in their sexual behaviour after learning about AIDS. The most frequent type of behaviour change, for married women in particular, is to have only one sex partner.

This pattern is repeated in Zambia, where 70 percent of women and 87 percent of men who know about AIDS perceive that their risk of contracting AIDS is small or none at all. Again, many report changing at least one thing in their sexual behaviour after learning about AIDS—80 percent of women and 94 percent of men. Most report either decreasing the number of sexual partners, having only one partner, or using condoms as their main change in behaviour.

The situation is slightly different in Zimbabwe. Many people who know about AIDS still stated that they perceived little or no risk to themselves of contracting AIDS—77 percent of women and 88 percent of men. In contrast to Malawi and Zambia, however, only 21 percent of women and only 62 percent of men report changing their sexual behaviour in any way after learning about AIDS. Given the high prevalence setting in Zimbabwe, and the relatively fewer men and women changing their sexual behaviour, there is a surprisingly high number of people who perceive little or no risk of contracting AIDS.

The statistics for Mozambique are more difficult to interpret, as there were a large number of women who did not respond to the question about perceived risk. Of those who had heard of AIDS, two out of three men and at least one-half of the women perceive themselves to be at little or no risk of getting AIDS, while three out of four men and women report changing their behaviour in some way after learning about AIDS.

To summarize, although many people report changing their sexual behaviour in order to decrease their chances of getting AIDS, given the high prevalence in these countries, people seem to be overconfident in their ability to avoid getting AIDS.

## Knowledge of AIDS & Perception of Risk

	Malawi 1996 DHS	Zambia 1996 DHS	Zimbabwe 1994 DHS	Mozambique 1997 DHS
<b>Ever heard of AIDS</b>				
Women	96.7%	99.6%	98.7%	82.2%
Men	99.4%	99.5%	99.6%	93.9%
<b>Perceived risk of getting AIDS is small or none</b>				
Women	53.1%	69.5%	76.5%	85.7%
Men	83.4%	86.8%	87.5%	68.6%
<b>Percentage who reported making a change in behavior in order to avoid AIDS</b>				
Women	92.1%	80.1%	21.1%	77.0%
Men	97.9%	94.1%	62.4%	78.7%

## Factors Affecting the Spread of HIV

The HIV/AIDS epidemic is worse in southern Africa than anywhere else on the continent. Based on the adult prevalence rate, eight of the nine countries in this study represent the eight worst affected countries in Africa. The ninth country – Mozambique – is not far behind. Many of the factors that contribute to a rapid spread of HIV seem to have coalesced in a deadly combination in these countries in a way unparalleled elsewhere.

**High prevalence of other sexually transmitted diseases.** The probability of transmitting HIV during unprotected sex rises dramatically if either partner is infected with another STD, such as syphilis or chancroid. These infections form ulcers and sores that facilitate the transfer of the virus. Africa has the highest level of STDs in the world and the forms most common in southern Africa – syphilis and chancroid – are also the forms most likely to contribute to HIV transmission. A recent study in Ndola, Zambia, for example, indicated that 11.3 per cent of men and 14.0 per cent of women were infected with syphilis. Two of every three sex workers in the same study were found to be infected with a sexually transmitted disease. Because of poverty and weak health systems, these STDs often go untreated and uncured, further contributing to the spread of HIV. Women can be more vulnerable than men because STDs that bring on identifiable symptoms in men are often asymptomatic in women, and therefore remain untreated. Recent studies have indicated that HSV-2 may play an important role in facilitating HIV transmission in southern Africa.

**Multiple sexual relationships.** A second factor that contributes to the heterosexual spread of HIV is multiple sexual partnerships. This is especially true when these partnerships are concurrent. Many southern Africans have relationships with persons other than their regular partners. For example, the *Zambia Sexual Behaviour Survey 1998* reported that 39 per cent of sexually active men and 17 per cent of sexually active women had a non-regular partner within the past 12 months. The separation of partners or spouses for long periods of time – for instance, when men migrate to work in the South African mines – contributes to multiple sexual partnerships.

**Traditionally low use of condoms, even in high-risk sexual encounters.** When condoms are used consistently and correctly, they are a highly effective means of preventing the transmission of HIV and other STDs. Traditionally, condoms were shunned as a method of family planning or disease prevention. As HIV spread rapidly throughout the region, this meant that condoms were neither readily available nor commonly used. While the use of condoms has increased considerably in southern Africa in recent years in response to the epidemic, it is still inadequate given the extent of HIV in the population. The Demographic and Health Survey for Malawi, for example, reported that 38 per cent of men and 20 per cent of women used a condom in the last sexual relationship with a non-spouse. Evidence suggests that condom use remains relatively low even in commercial sex encounters.

**Poverty and the relatively low health status of much of the population, including widespread malnutrition.** Widespread poverty, high rates of unemployment and generally low returns from informal sector income-generating activities have been associated with high-risk sexual behaviour and the spread of HIV. The World Bank found that one quarter of the population of Zimbabwe lived below the national poverty line in 1991, and the proportion has increased since that time. About one-half of the population in Lesotho and Malawi and fully two-thirds of the population in Zambia lived under the national poverty line in the early 1990s.

**Low Status of women.** The low social and marginal economic status of women is an important contributor to high-risk sexual behaviour and vulnerability to HIV infection in the region. The low level of educational attainment for women reduces their access to jobs, even when jobs are available.

A common coping strategy for survival is for poor women and adolescent girls to exchange sex for money or gifts. Children and young people can be vulnerable to sexual exploitation by adults.

**Settlement patterns and worker migration.** Some of the southern African countries are relatively highly urbanized and/or the populations live in concentrated parts of the country. In Botswana, for example, most of the population lives in a narrow corridor between Francistown and Gabarone, well-connected by road and rail. This facilitates the spread of HIV. Urbanization and the accompanying transition from traditional to modern culture also give rise to new patterns of sexual behaviour. High levels of movement back and forth between town, countryside and mining areas help spread the virus throughout the region. Population dislocations brought about by drought and other causes have a similar effect.

**Cultural practices.** Certain traditional and emerging modern cultural practices may also contribute to the spread of HIV. For example, sexual activity begins at a young age for both females and males, either within marriage or outside of it. The Zambia Sexual Behaviour Survey 1998 reported that the average age of first sex is 16.3 years for females and 16.4 years for males. In Mozambique, the DHS found that the median age for first intercourse is 16.0 years for females and 18.3 years for females. The relationship between polygamy and HIV transmission is unclear, although some observers think it a contributing factor. In Mozambique, about 14 per cent of currently married men and women report being in polygamous unions, while about 16 per cent of currently married women in Zimbabwe state that they are in a polygamous relationship. The practice of dry sex in some countries has also been proposed as a contributing factor to HIV transmission. The use of drying agents can create lesions or sores that facilitate the transfer of the virus.

**Low levels of male circumcision.** Some observers point out that many of the same factors contributing to HIV transmission in southern Africa exist in West Africa as well. However, for the most part, adult HIV prevalence rates are much lower in western than in southern Africa. They suggest that one of the key factors leading to the more rapid spread of HIV in eastern and southern Africa is the relative low level of male circumcision in parts or all of the countries in the region. A population-based study in Ndola, Zambia found that only 7 per cent of men had been circumcised. Evidence is mounting that HIV is transmitted at a much higher rate in populations where a low proportion of males are circumcised.

## **II. PROJECTIONS**

Projected HIV Prevalence

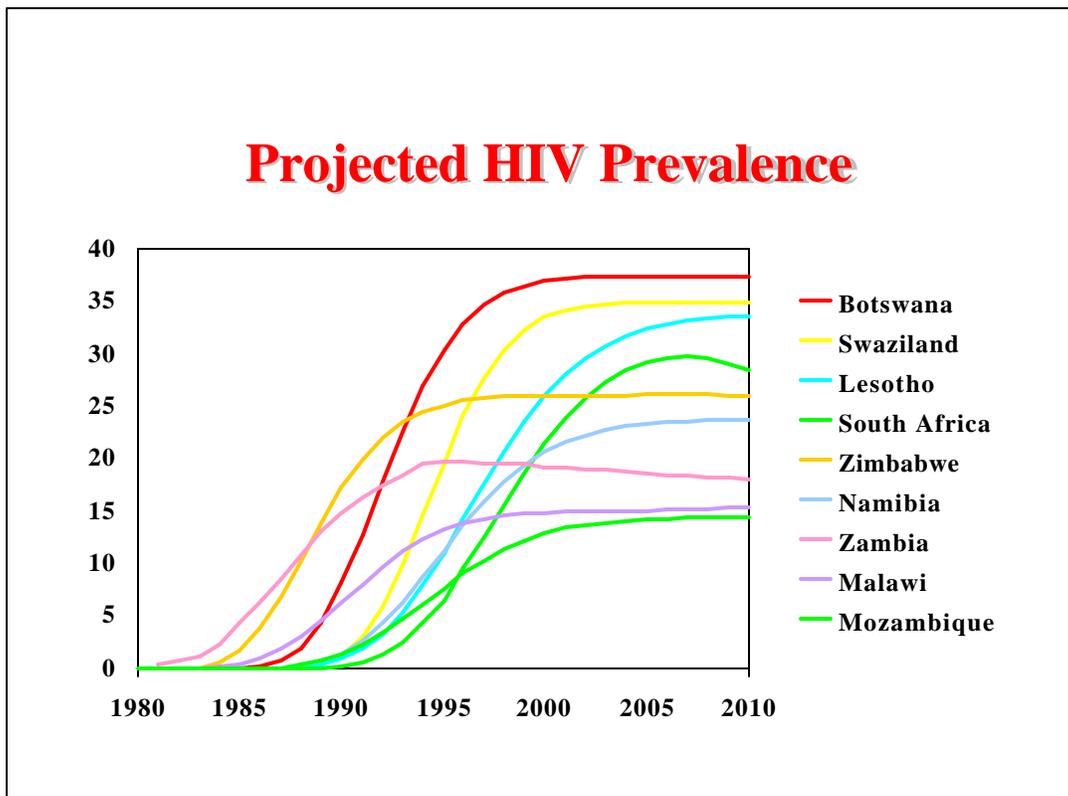
Number of People with HIV/AIDS

Number of New AIDS Cases

## Projected HIV Prevalence

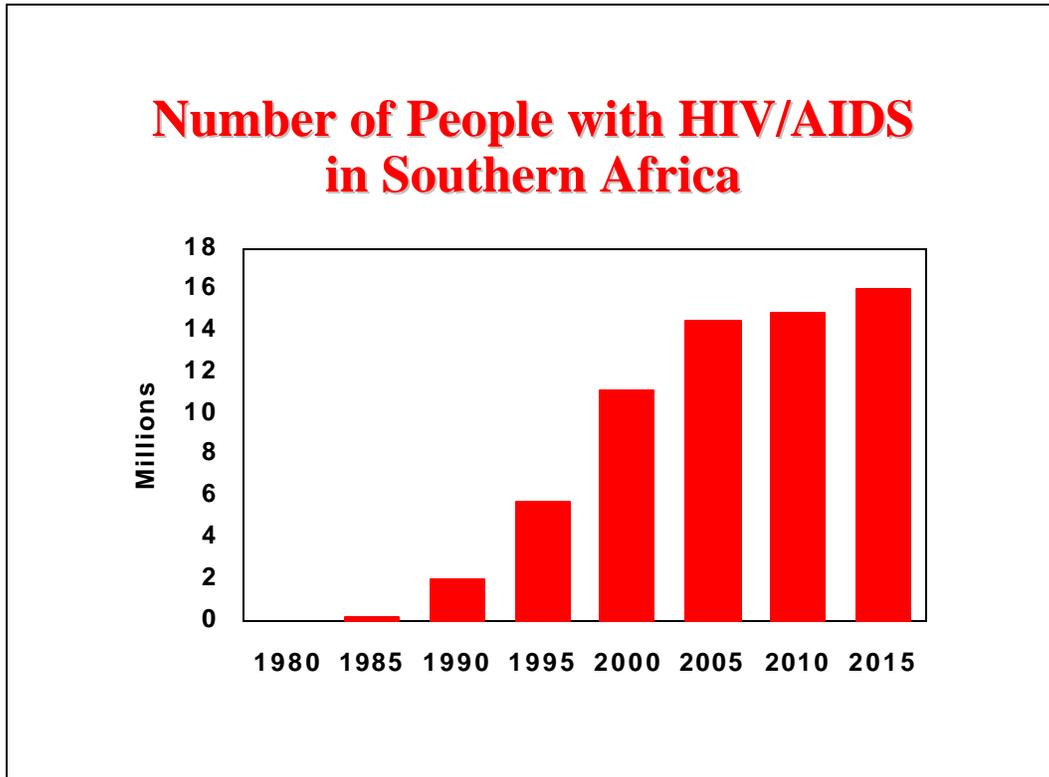
In order to project the number of new infections in the future, it is necessary to make an assumption about how rapidly HIV will continue to spread. Since prevalence is still increasing in some areas of southern Africa, it is likely that the increase for the region overall will continue for the next 15 years. The graph below shows the projections of HIV prevalence for each country to the year 2015. These projections assume that past trends continue into the future. The projections would be quite different if prevention programs could become more effective.

Projections for three of the countries indicate that HIV prevalence has already levelled off at almost 37 percent in Botswana and about 15 percent for Malawi. The patterns for Mozambique, Namibia and Swaziland indicate that the epidemics there may level off by about the year 2005, although again the ceiling prevalence level varies across countries. By 2005, prevalence will reach 14 percent in Mozambique, 24 percent in Namibia, 35 percent in Swaziland, and decline somewhat to 18 percent in Zambia. Prevalence may continue increasing to 33 percent in Lesotho. In Zambia prevalence reached about 18 percent and may be declining somewhat now. The latest projections from South Africa indicate that prevalence may reach about 30 percent by 2005 before starting to decline.



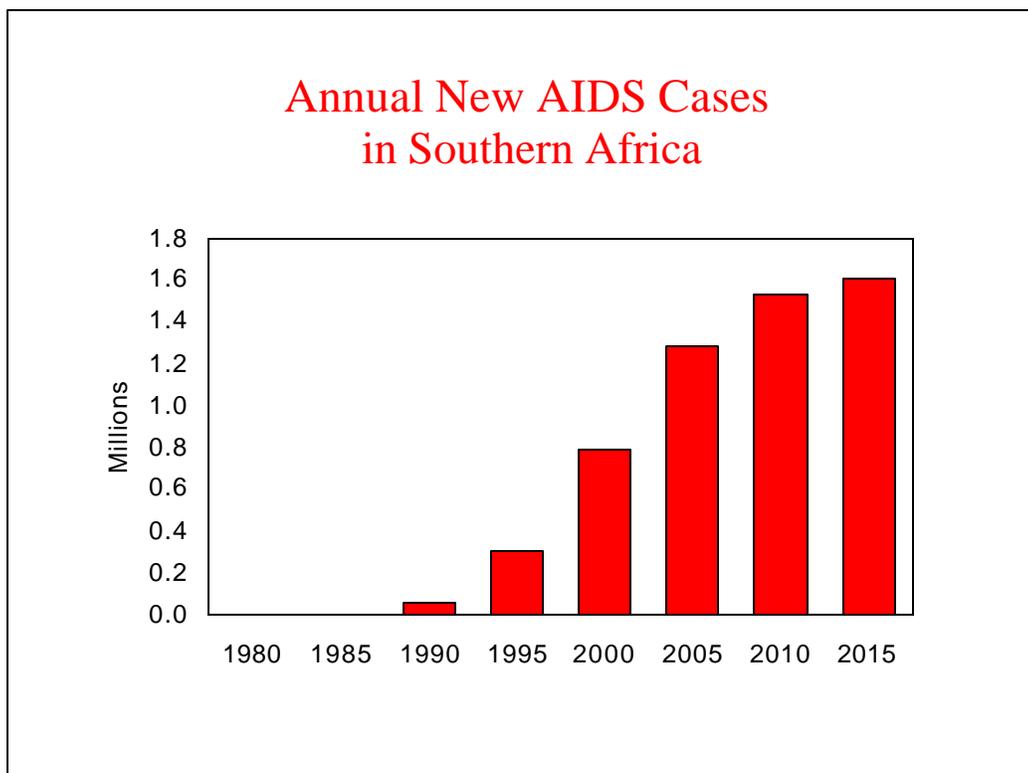
## Number of People with HIV/AIDS

If HIV prevalence does increase according to the projections shown above, then the number of infected people in the population would increase from 12.1 million in 2001 to 14.5 million in 2005, and reach a total of 16 million by the year 2015.



## Number of New AIDS Cases

The number of new AIDS cases developing each year from among those living with HIV will rise from 0.8 million in 2000 to almost 1.6 million by the year 2015. Most of these people will die within a year of developing AIDS. These deaths are a tragedy and will have severe consequences for relatives, communities, and the nations. These impacts are explored in the next two sections of this report.



### **III. THE DEMOGRAPHIC IMPACT OF AIDS**

Annual Adult Deaths

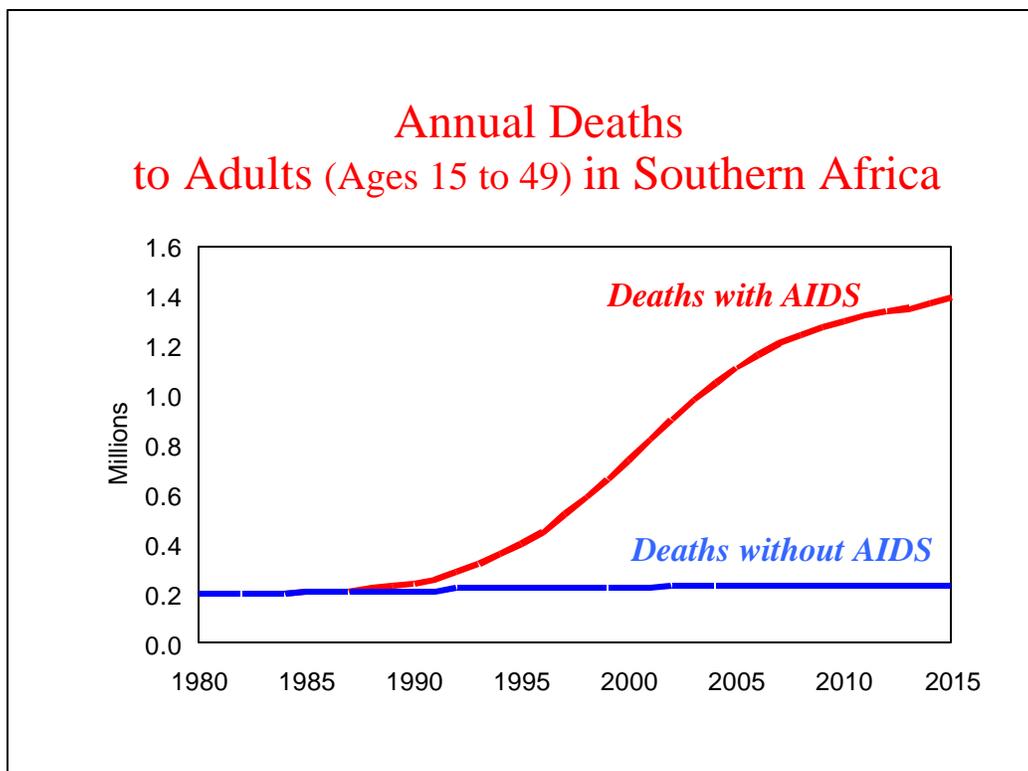
Childhood Survival

Life Expectancy

Population Size and Growth

## Annual Adult Deaths

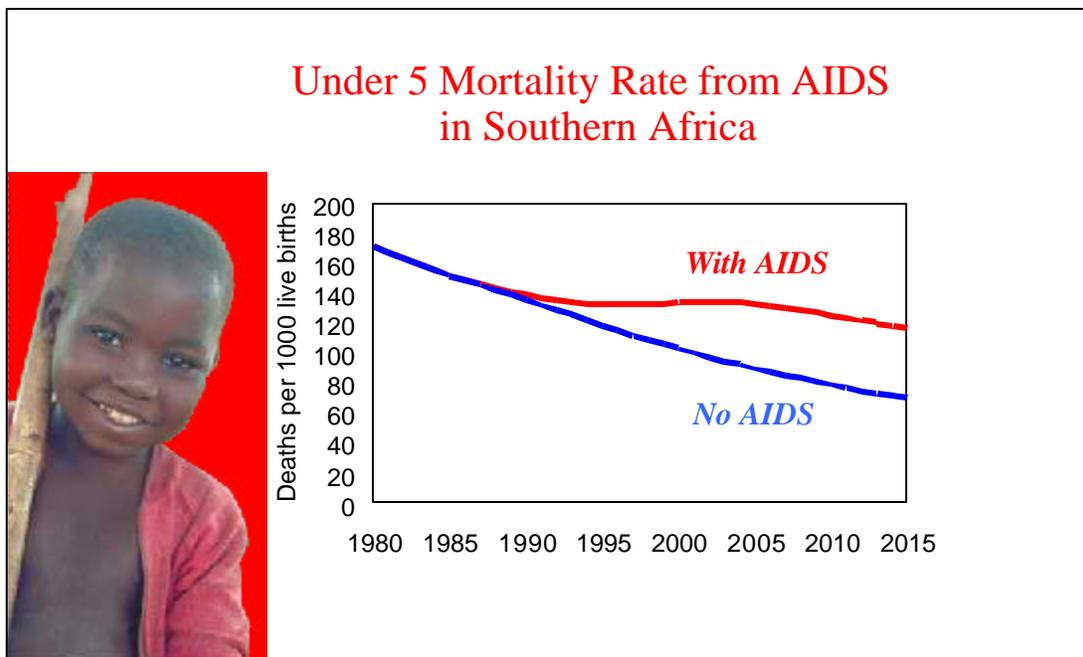
The epidemic will increase the death rate at all ages. However, the impact will be most severe among adults in the prime working ages and among children under the age of 5. Without AIDS, and assuming a gradual decline in death rates from other causes, the annual number of deaths among adults aged 15-49 would increase slowly after 2000 because of the growth of the population, from 225,000 to 230,000 in 2015. However, AIDS will more than triple the number of adult deaths, reaching 700,000 a year by 2000, increasing to 1.1 million a year by 2005, and reaching 1.3 million annual deaths by 2015. By 2015, AIDS will be responsible for more than four out of every five deaths in this age group, or about 2,900 deaths per day. This rapid increase in deaths in the productive age group could have serious consequences for the economic and social development of the country.



## Childhood Survival

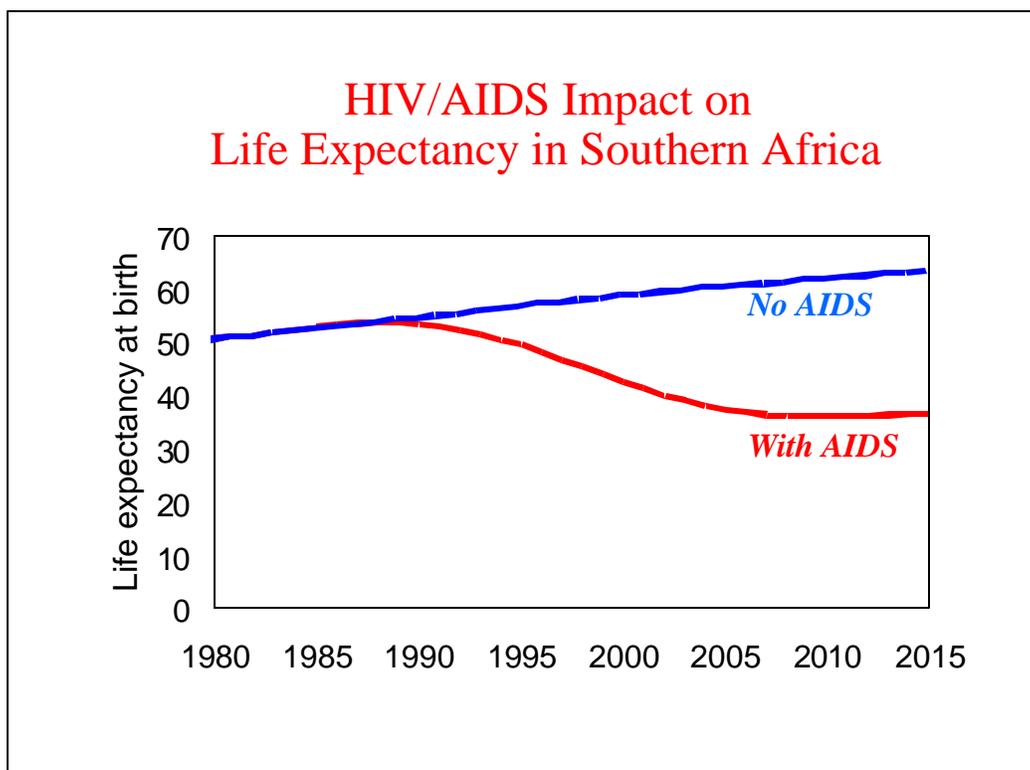
AIDS also affects child survival. About 25-40 percent of infants born to infected mothers will also be infected with HIV. Most of these babies will develop AIDS and die within two years. Few will survive past the age of five. AIDS is undoubtedly already a major cause of child death, one that threatens to continue to reverse many of the recent gains of child survival programs.

The infant mortality rate is the number of infants who die during the first year of life per 1,000 live births, while the child mortality rate is the number of children who die before reaching age 5 per 1,000 live births. Both rates seem to have either stagnated or declined only modestly for several years, instead of declining steadily as might have been expected. This trend is largely due to the impact of AIDS on child survival. It can be seen by looking at the under-5 mortality rate from AIDS—the number of AIDS deaths among children under the age of 5 for every 1,000 live births. According to our projections, the under-5 mortality rate would drop by almost one-half from about 130 per 1,000 births in 1990 to 70 by 2015 if there were no AIDS. However, because of AIDS it will remain constant through 2005 and then decline only slightly to about 124 by 2015.



## Life Expectancy

One dramatic impact of AIDS deaths is the resulting decline in life expectancy. As seen in the graph below, in 1985, before the impact of AIDS on life expectancy was observed, the average life expectancy for the southern Africa region was 53 years. After 1985, AIDS deaths began to have an impact. In the absence of AIDS, the average life expectancy would have increased to reach 56 years by 1990, further increased to 60 years by 2000, and reached 64 years by the year 2015. Estimates including the impact of AIDS deaths indicate that average life expectancy increased to only 53 years by 1990, instead of 56 years in the no-AIDS scenario. After 1990, life expectancy began to decrease even further because of the effect of AIDS. Life expectancy is estimated to have dropped to 43 years by 2000 and is projected to continue declining to about 36 by 2015. Thus by 2015, AIDS reduces the projected life expectancy by 28 years.

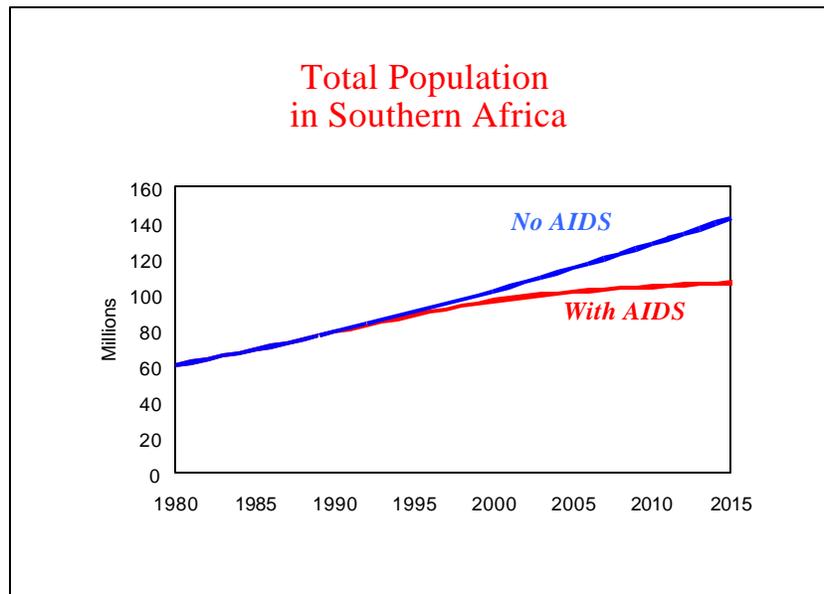


## Population Size and Growth

AIDS will have a large impact on population size. However, it will not cause population growth to stop or to become negative in the region as a whole. The following projection illustrates this point. The projection assumes that the total fertility rate for southern Africa (the average number of births per woman during her lifetime) continues to decline, from about 5 from 1990-1995 to 4.7 from 1995-2000, to 4.4 by 2000 and 3.4 by 2015. It also assumes that mortality from all causes other than AIDS continues to decline so that life expectancy would increase from about 60 years today to about 65 by 2015 if there were no AIDS deaths.

**With no AIDS**, the population for the region would have increased from about 93 million in 1995 to about 106 million by 2000 and to 149 million by 2015. By 2015 the population would have been growing at 2.1 percent per year.

**With AIDS causing increased deaths**, the total population of the region was 9 million smaller by 2000 and will be 41 million smaller by 2015. Thus, the combined impact of AIDS deaths and fewer births because of a smaller reproductive-age population would result in 41 million fewer people by 2015. However, by 2015 the population would still be growing at 0.5 percent per year. In the three countries with the lowest fertility rates and most severe epidemics (Botswana, South Africa, and Zimbabwe), however, the rate of natural increase would become negative by 2005-2015.



AIDS will have a significant impact on population size, but the population will still grow significantly by 2015. The AIDS epidemic, in addition to its direct impact on mortality, could have a secondary influence on death rates. For example, the large increase in the number of orphans, the economic disruption of households, the increase in mortality from tuberculosis and other causes, and additional factors could contribute to higher mortality and an even lower rate of population growth. In the

wake of rising mortality, however, fertility decline could be slower, which would result in a higher rate of population growth.

## **IV. THE SOCIAL AND ECONOMIC IMPACTS OF AIDS**

Maternal Orphans

Gender and AIDS

Costs of Health Care

HIV and Tuberculosis

Education Sector

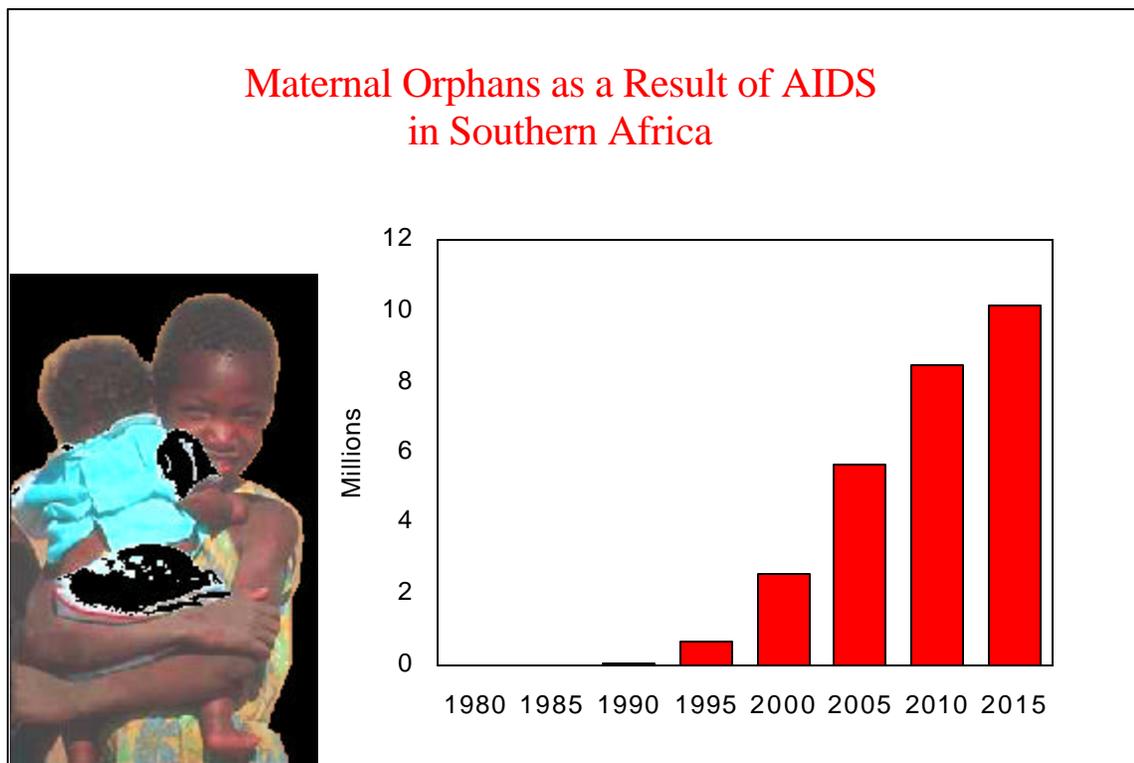
Economic Effects

## Maternal Orphans

One serious consequence of AIDS deaths to men and women in their prime childrearing ages is an increase in the number of orphans. An AIDS orphan is defined here as a child under the age of 15 that has lost its mother to AIDS. In reality, given the importance of heterosexual transmission in spreading the virus, many children will lose both parents. With this definition, the number of AIDS orphans in southern Africa would increase to 2.9 million by 2001 and to almost 10 million by 2015. Since a child leaves the population of orphans when he/she reaches the age of 15 or dies, the cumulative number of children orphaned by the epidemic is much higher than can be seen at any one point in time.

These children may lack the proper care and supervision they need at this critical period of their lives. There will be a tremendous strain on social systems to cope with such a large number of orphans.

- At the family level, there will be an increased burden and stress for the extended family that will try to care for these orphans. Many grandparents are left to care for young children. Some families are headed by children as young as 10 years old.
- At the community and national levels, there is an increased burden on society to provide services for these children, including orphanages, health care, and school fees. Many children go without adequate health care and schooling, increasing the burden on society in future years. There may also be an increase in the number of urban street children.



## Gender and AIDS

Although both men and women are vulnerable to infection and disease, the impact of HIV/AIDS affects the two sexes differently. For a long time, HIV/AIDS researchers and analysts believed that over the course of an epidemic, about equal numbers of men and women would become infected. Now, many believe that in a mature epidemic, more women than men will be infected. An expected ratio might be 1.2 to 1.3 infected women per infected man.

This imbalance in the sex ratio may occur in part because women are more prone to infection than men. Research indicates women are two to four times more vulnerable to HIV infection than men during unprotected intercourse because of the larger surface areas exposed to contact. Similarly, women are more vulnerable to other STDs, the presence of which greatly enhances the risk of HIV infection. STDs that bring on recognizable symptoms in men are often asymptomatic in women and, therefore, remain untreated. Whatever the exact dynamics, young women attain high HIV infection levels at notably younger ages than young men.

Generally, women lack complete control over their lives and are taught from early childhood to be obedient and submissive to males, particularly males who command power such as a father, uncle, husband, elder brother, or guardian. In sexual relations, a woman is expected to please her male partner, even at the expense of her own pleasure and well being. Dominance of male interests and lack of self-assertiveness on the part of women puts them at risk. Women are taught to never refuse having sex with their husbands, regardless of the number of partners he may have or his unwillingness to use condoms, even if he is suspected of having HIV or another STD. Also, to enhance male pleasure, a number of women continue to practice dry sex, which can increase vulnerability to infection through exposing genital organs to bruising and laceration.

Adolescent sexuality is increasingly becoming an important concern. Young women are at a higher risk because the physiological immaturity of their reproductive systems provides less of a barrier to HIV transmission. Exchange of sex for money or gifts is a coping strategy for dealing with poverty and may not be perceived as commercial sex work. Studies on adolescent reproductive health, including patterns of sexual behaviour, indicate this to be a frequent occurrence. Males are expected periodically to provide gifts and/or money to their partners. Failure to do so results in curtailment of the relationship and formation of a new one with someone else. The unstable and temporary nature of these relationships often results in multiple partners over time.

Care of the sick continues to be a responsibility of the women within the family. Since women are agricultural workers as well, this can have a substantial impact on food security. Women, also, are the immediate nurturers of orphaned children, many of whom are survivors of AIDS-affected households. Girls in the household also share or totally assume care-giving responsibilities for siblings and ailing parents, sometimes leaving school early in order to shoulder these responsibilities.

## Costs of Health Care

Today more than 9.4 million people in southern Africa are infected with HIV. Therefore, it is important to consider the kinds of care and treatment that are available and appropriate for people with an HIV infection or AIDS. As HIV infection progresses in an individual it produces a variety of increasingly severe problems. The first symptoms may be common complaints such as headaches and diarrhoea. Later opportunistic infections such as tuberculosis may appear. Eventually the immune system is weakened to the point where the person dies, often from one or more opportunistic infections. Three classes of treatment are available to address these problems: palliative care, prevention and treatment of opportunistic infections, and anti-retroviral therapy.

Palliative care refers to the relief of symptoms that may be associated with HIV infection. These include diarrhoea, skin rash, cough, fever, headache, pain, nausea, and shortness of breath. People with an HIV infection may suffer from several of these problems at different times during the course of their illness. These symptoms can be treated with relatively inexpensive drugs, if the drugs are available.

Opportunistic infections are those that take advantage of the weakened immune system of people with HIV. These infections are usually rare or much less serious in people with healthy immune systems. Some of these infections can be treated with relatively inexpensive drugs. These infections include tuberculosis, pneumonia, thrush, and toxoplasmosis. Treatment of these infections can extend the life of an infected individual for a few years.

More expensive drugs are required to treat other opportunistic infections, such as cryptococcosis and herpes simplex virus. These infections are not only more expensive to treat, but they appear during the later stages of HIV/AIDS.

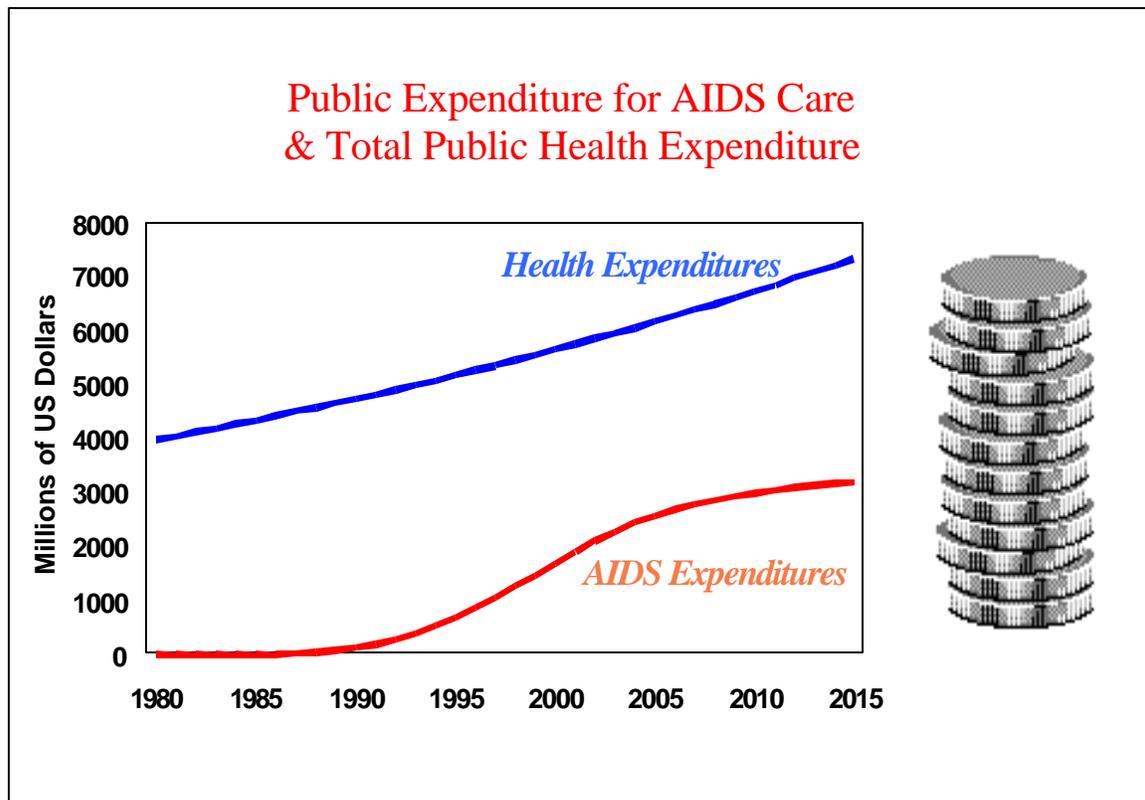
Anti-retroviral drugs have proven effective in the treatment of HIV infection. They have made a dramatic difference in the course of the disease and improved quality of life of people with HIV. The main handicap is the high cost of treatment. The costs of these treatments are prohibitive except for the very rich. In the industrialized countries the drugs themselves cost about US\$10,000-20,000 per year for each patient, apart from the other medical costs associated with the treatment. In Africa drug prices may eventually be much lower as a result of recent efforts by many actors to reduce prices. They could drop to as low as \$350 for a year of treatment, but the infrastructure costs of supporting advanced drug treatment will still be significant.

### Annual Cost of HIV/AIDS Treatment in Sub-Saharan Africa

Type of Treatment	Approximate Cost (US\$ per patient per year)
Palliative care	\$19
Opportunistic infections	
-inexpensive	\$33
-expensive	\$190
Anti-retroviral therapy	\$350 - 10,000

Source: World Bank, *Confronting AIDS*, p. 177

Assuming an average lifetime expenditure of US\$2,240 per person with AIDS in southern Africa, the total amount the nine countries in the region will pay to care for AIDS patients is shown in the graph below. The increase in expenditures begins slowly, growing from no expenditures in 1980 to US\$1,900 million in 2001 to US\$3,300 million by 2015. This represents almost 50 percent of the total public expenditure on health in southern Africa. Increasing expenditures on AIDS care threatens to divert spending from other important health care needs and will place an enormous burden on the districts as they assume responsibility for delivering the essential package of services under the health reforms.

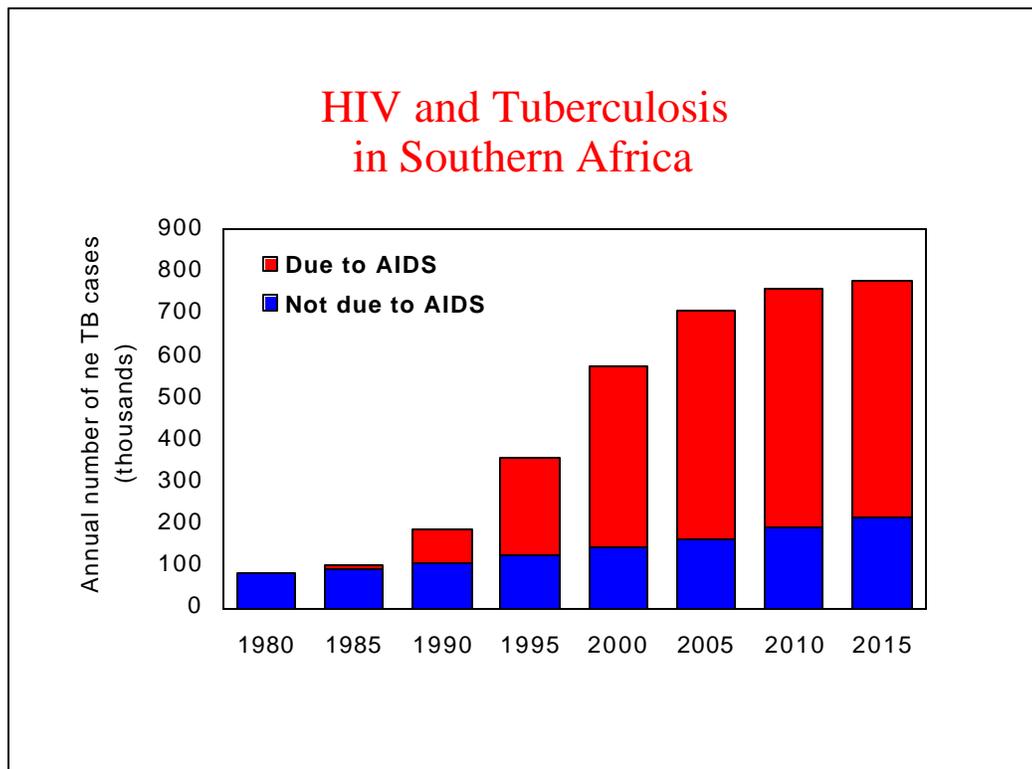


## HIV and Tuberculosis

Efforts in the past 20 years to control tuberculosis had been showing some success. However, recently the number of TB cases in southern Africa has been rising rapidly, due to the spread of HIV infection. HIV infection weakens the immune system of otherwise healthy adults. Many, perhaps one-half, of all adults carry a latent TB infection that is suppressed by a healthy immune system. When HIV weakens the immune system, it can no longer control the TB infection and overt TB can develop.

In the absence of HIV, the number of new TB infections would be limited to about 150,000 in 2001, based on the case rates seen in prior years. With AIDS, a number of new cases will develop. If we assume that among people with both HIV and latent TB infections, 8 percent develop TB each year, then the additional number of TB cases due to HIV infection would be about 530,000 by 2005. Even this is likely to be an under-estimation, since these new cases may transmit the disease to others and because of emerging drug-resistant strains.

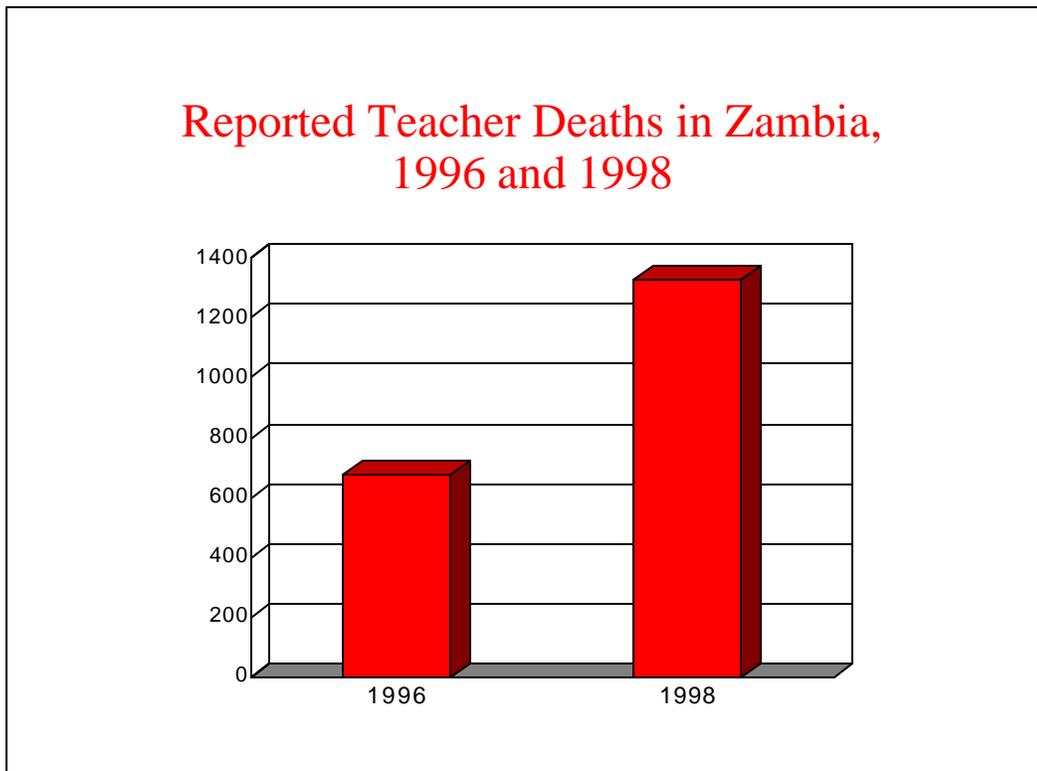
The consequences of a sharp rise in TB go beyond simple health concerns. Studies have shown that TB is the most costly disease to treat for some health services; rising TB infections will inevitably drain resources from other essential health and welfare services if quality services are to be maintained. A breakdown in TB treatment services that leaves patients half-treated may lead to the faster development of drug-resistant strains of the disease.



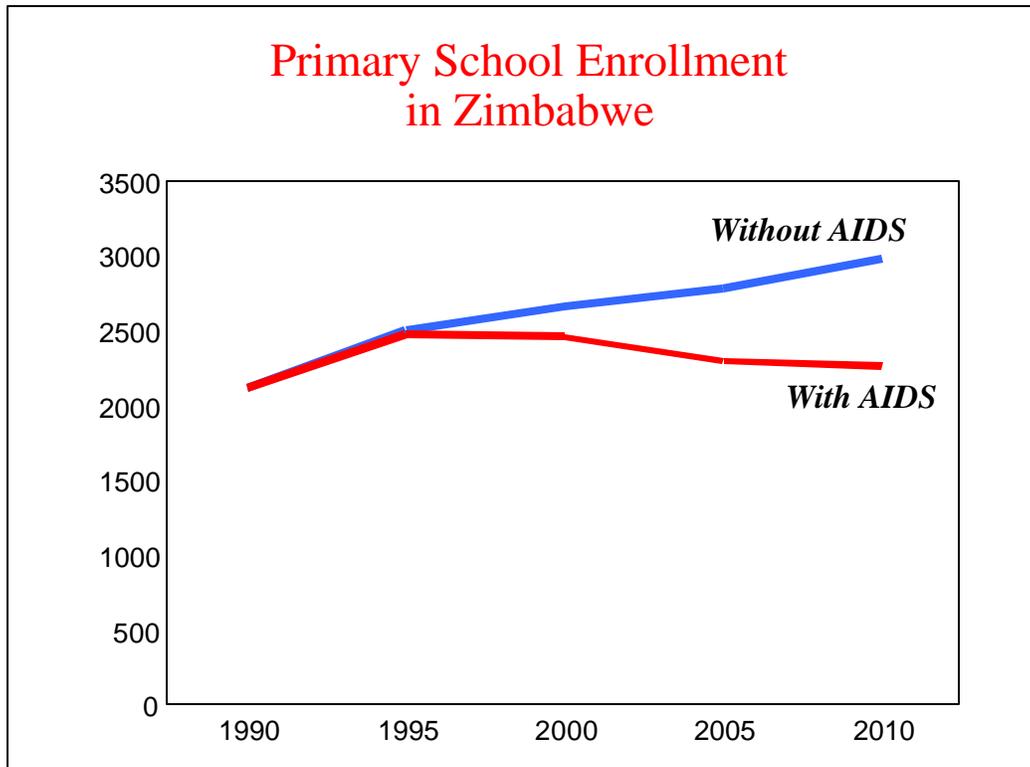
## Education Sector

The impact of HIV/AIDS will affect both the supply of and demand for educational services. For example, the supply of teachers decreases because of increasing absenteeism from AIDS. Training costs for teachers (and other education officers) rise to replace those lost to the epidemic. Less public finance will be available for the schools, in part because of the diversion of public funds to address the manifold impacts of the epidemic. The demand for schooling is also affected by AIDS. Because an AIDS death to an adult results in the loss of household labour and/or income, children are often required to leave school and remain at home or go to work to compensate for losses and to avoid school fees. Girls, in particular, may have to forfeit their educational opportunities. Orphans often lose the necessary financial, material, and emotional support that they need for successful schooling.

This graph below shows the number of teacher deaths in 1996 and 1998. There is a large leap in the number of teacher deaths during this time, from 680 in 1996 to 1,331 in 1998. This surge almost certainly reflects the impact of HIV/AIDS. These numbers suggest that the mortality rate for teachers in 1998 was around 40 per 1,000, while the overall mortality rate among all 15-49 year olds was about 23 per 1,000. This means that teacher mortality was more than 70 percent higher than general adult mortality. While not conclusive, this is at least one piece of evidence that teachers may be more prone to HIV infection than other adults. More conclusively, the numbers show that HIV/AIDS is affecting the supply of educational services in Zambia.



In Zimbabwe, a recent set of projections indicates that the number of primary students in the absence of AIDS would increase by about 12 percent, from 2.5 million in 1995 to 2.98 million in 2010. If the impact of AIDS is included, however, the primary education sector is actually shrinking in size over time. The number of primary students peaks at about 2.51 million in 1997, then drops to 2.27 million by 2010. This represents a decline of nearly 10 percent. By 2010, the number of primary students is nearly 24 percent smaller than it would have been in the absence of HIV/AIDS.



## Economic Effects

### Households

The economic effects of HIV/AIDS are felt first by individuals and their families. The household impacts begin as soon as a member of the household starts to suffer from HIV-related illnesses. Illness prevents the primary breadwinner from working, increases the amount of money the household spends on health care, and requires other household members to miss school or work in order to care for the patient. Death of the patient results in a permanent loss of income, either through lost wages and remittances, or through a decrease in agricultural labour supply. Households must also bear the costs of funerals and mourning, which in some settings are substantial. When children are withdrawn from school in order to save on educational expenses and increase the labour supply, the household suffers a severe loss of future earning potential.

In a recent study of two areas in Kafue, Zambia, researchers found that caregivers in the less affluent community reported lost earnings of 10,000 kwacha (K) per month, where one-half of the sample earned less than K100,000 per month. Those in the more affluent area had lost earnings of about K25,000 per month, where more than 85percent of the sample had an annual income of over K1,000,000. The average cost for a visit to a clinic ranged from K8,500 to K16,500 for the two areas. In general, households that were affected by AIDS reported annual income levels of 30-35 percent less than unaffected households. The affected households also reported selling off assets such as bicycles and radios in order to pay costs such as health and funeral expenses.

In Zimbabwe in 1995, 62 percent of the national population existed below the national consumption poverty line of 2,132.33 Zimbabwean dollars (Z\$) per person per year. A bedridden AIDS patient is an additional burden; one study found that the additional cost of this care ranged between Z\$185-280 per month. Funeral costs can be as much as Z\$4,500, with the coffin alone costing from Z\$400-\$1,500. In low-income households, additional expenditures on transport, food and medical costs meant cutting down on meals.

- **In Zambia, households affected by AIDS reported annual income levels of 30-35 percent less than unaffected households**
- **In Zimbabwe, funeral costs can be as much as Z\$4,500, twice the annual per capita poverty line. In 1995, 62 percent of the population existed below this poverty line.**

## Agriculture

Agriculture is the largest sector in most African economies, accounting for a large portion of production and a majority of employment. Studies have shown that AIDS will have adverse effects on agriculture, including loss of labour supply and remittance income. The loss of a few workers at the crucial periods of planting and harvesting can significantly reduce the size of harvests. Additionally, a loss of agricultural labour is likely to cause farmers to switch to less labour-intensive crops. In many cases this may mean switching from export crops to food crops. Thus, AIDS could affect the production of cash crops and, as a result, affect foreign exchange earnings. Production may also suffer as the timing of general agricultural tasks is disrupted as workers fall ill and as others need to take time off to care for them.

### Reduction in Marketed Output Due to AIDS Deaths in Selected Farms in Zimbabwe

Crops	Reduction in Marketed Output
Maize	61%
Cotton	47%
Vegetables	49%
Groundnuts	37%
Cattle Owned	29%

A study sponsored by the Zimbabwe Farmers Union compared production levels of various crops across households in a small sample that both had and had not experienced an AIDS death. Results showed that the death of a breadwinner due to AIDS cut the marketed production of maize in small-scale farming and communal areas by 61 percent. Similar results were obtained for other crops, such as cotton, vegetables, groundnuts,

and the number of cattle owned. Note that declines in marketed produce were greater than overall production declines. The main reasons given for the decline in production were a lack of labour input, a shortage of purchased inputs, and a lack of time available from the surviving members of the household. The households citing an AIDS death also reported a loss of remittance income.

In Malawi, 10 percent of GDP is derived from estate agriculture. A recent study evaluated the costs of HIV/AIDS on a tea estate there. During the fiscal year 1995/96, a total of 14,675 British pounds was spent on HIV-related costs, including medical services, funeral costs, death benefits, and absenteeism. Overall, the costs related to HIV accounted for 3.4 percent of the estate's gross profit. The study found that the level of the costs is determined by the levels of both employee benefits and of skilled labour necessary for production. It predicted that, in the longer term, the negative impact on the supply of labour would be the strongest effect of HIV/AIDS. It will become increasingly difficult to recruit skilled people, even at the national level.

### Cost of HIV/AIDS on a Tea Estate in Malawi

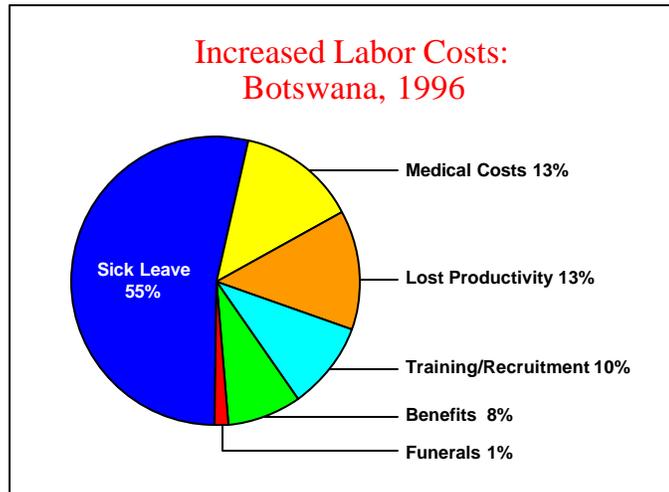
Description	Total Cost ( £ )	Related to HIV ( % )	Cost of HIV (£)
Provision of medical services	22,275	25	5,569
Funeral costs	928	75	696
Death in service benefits	4,691	100	4,691
Absence	14,875	25	3,719
<b>Total</b>	<b>42,769</b>		<b>*14,675</b>

\* 3.4% of gross profit

## Firms

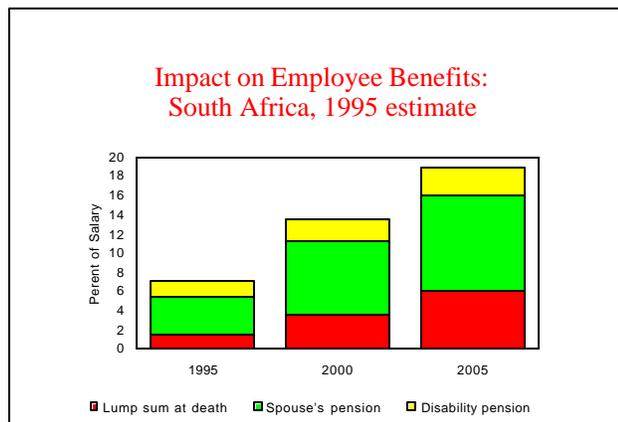
HIV/AIDS may have a significant impact on firms. AIDS-related illnesses and deaths to employees affect a firm by both increasing expenditures and reducing revenues. Expenditures are increased for health care costs, burial fees, and training and recruitment of employees to replace those who are ill or who died. Revenues may be decreased because of absenteeism due to illness or attendance at funerals and time spent on training. Labour turnover can lead to a less experienced labour force that is less productive. A study conducted at a sugar mill in South Africa found that HIV+ workers incurred an average of 55 additional sick days during the last two years of their life.

A recent study of five firms in Botswana found that the most important impact of HIV/AIDS on firms to date was the increase in sick leave associated with AIDS-related illnesses. This accounted for more than one-half of the total impact, while medical costs and lost productivity each accounted for 13 percent of the total impact. The study found further that the impact of HIV/AIDS depended on the type of business, the skill level of employees, the types of benefits provided, and the amount of savings held. The transport sector was the most affected, while the financial sector was the least affected. None of the five firms had intervention programs in place to deter further HIV infection. The study estimated that between 1996 and 2004, the impact of HIV/AIDS will increase sevenfold to equal 4.9 percent of the wage bill.



The study estimated that between 1996 and 2004, the impact of HIV/AIDS will increase sevenfold to equal 4.9 percent of the wage bill.

A study in South Africa examined the expected impact of HIV/AIDS on employee benefits, and thus on corporate profits. It found that at current levels of benefits per employee, the total costs of benefits would rise from 7 percent of salaries in 1995 to 19 percent of salaries by 2005. Since these additional costs will have to be paid at the same time that productivity is declining, due to AIDS, the net impact on profits could be significant.

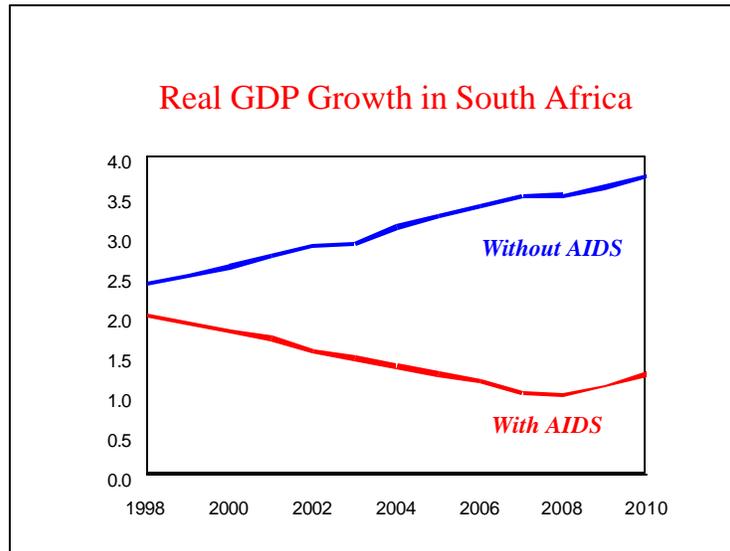


### Macroeconomic Effects

The macroeconomic impact of AIDS is difficult to assess. Most studies have found that estimates of the macroeconomic impacts are sensitive to assumptions about how AIDS affects savings and investment rates and whether AIDS affects the best-educated employees more than others. There are several mechanisms by which AIDS affects macroeconomic performance. AIDS deaths lead directly to a reduction in the number of workers available, and less experienced workers replace those who died, leading to lower productivity. A shortage of workers leads to higher wages, which leads to higher domestic production costs, and a loss of international competitiveness. Reduced savings because of greater health care expenditures and a loss of worker income can cause a significant drop

in savings and capital accumulation. This leads to slower employment creation in the formal sector, which is particularly capital intensive.

Recent research using a macroeconomic model of South Africa found significant effects of HIV/AIDS on the economy. Two scenarios were estimated: a base case scenario that does not include the impact of AIDS, and another that does include this impact. The difference in the growth rate of real GDP between the two scenarios, as shown in the graph at the right, reaches a maximum of 2.6 percentage points. By 2010, the level of GDP in the “With AIDS” scenario is 17 percent lower than in the base case scenario, “Without AIDS.”



Furthermore, the research found that almost one-half of the loss in GDP is due to the government’s increasing health expenditures, while about one-third of the loss is due to lower productivity for both labour and capital.

In contrast to the significant impact HIV/AIDS is projected to have on the South African economy, a recent study found less impact of HIV/AIDS on macroeconomic growth in Botswana. Projections indicated that GDP growth would fall from an average rate of about 3.9 to 3.1 percent over 25 years. This result is partly due to the fact that the minerals sector, a major source of both export earnings and government revenue in Botswana, is not greatly affected by the epidemic. Further research shows, however, that although the macroeconomic impact may not be great, there will be a significant effect on household poverty and inequality. The table shows that, in the results for the

<b>Impact of HIV/AIDS on Poverty in Botswana</b>			
<b>Outcomes</b>			
	Household Poverty Count	Individual Poverty Count	Income Dependency Ratio
Without AIDS:	37.7%	47.8%	5.4
With AIDS:	43.7%	51.9%	6.4
Difference	6.0%	4.0%	1.0
% Difference	16%	8%	20%

initial set of simulations including the effect of AIDS, the number of households in poverty increases by 16 percent, from more than 37 percent to more than 43 percent of all households in Botswana. The number of people in poverty increases by 8 percent, with more than one-half of all individuals in the country living in poverty in the base case. Finally, the number of dependents each household head must support would increase by one, from 5.4 dependents to 6.4 dependents.

## **V. INTERVENTIONS TO CONFRONT THE AIDS EPIDEMIC**

Human Rights

Treatment and Vaccines

Signs of Success

What can be done?

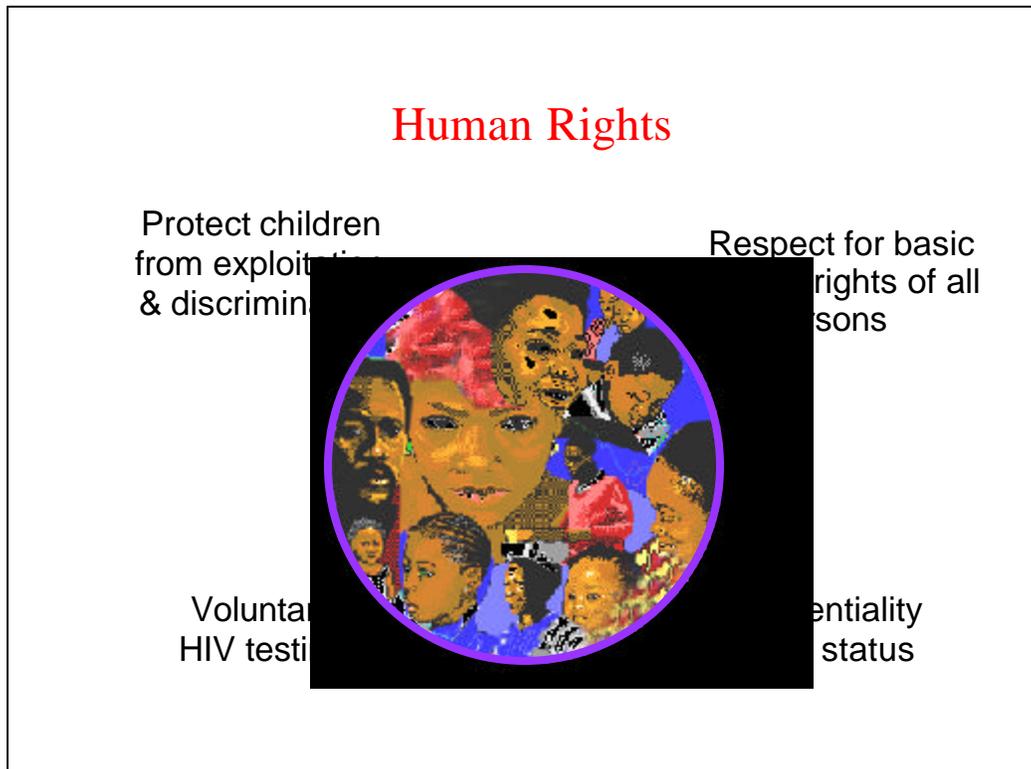
## Human Rights

The stigma and discrimination that are often associated with HIV/AIDS can lead to violations of basic human rights. Special efforts need to be taken to ensure that the human rights of all individuals are respected. Protection of human rights is important by itself. It also fosters a climate of caring and security that is crucial for the success of efforts to prevent the further spread of HIV.

Some of the key elements to ensure that this respect occurs are:

- **Human rights.** A recognition and respect for basic human rights of all persons, and especially those living with HIV/AIDS, is vital. All forms of discrimination against people with AIDS should be outlawed.
- **Stigma.** Social ostracism and alienation that lead to deterioration of civil, economic, or political rights can be a consequence of the stigma associated with HIV/AIDS. A common problem experienced in many countries in addressing this epidemic is that people often avoid learning about or admitting to being infected with HIV because of the stigma attached to the disease and fear of discrimination. Such avoidance limits diffusion of knowledge about HIV in the general population and increases the risk of transmission to loved ones and others.
- **Children.** Children infected and affected by HIV/AIDS should be protected from exploitation and discrimination using existing laws.
- **Voluntary HIV testing.** Given the proven impact of voluntary counselling and testing (VCT) on changing sexual behaviour, the use of counselling and testing centres should be encouraged. However, the HIV testing undergone by both men and women should be voluntary, or the use of such services may decline.
- **Testing and confidentiality.** Information from the population-based surveys indicates that one reason more people do not have themselves tested is concern that the results will not be kept confidential. Stigma and discrimination often follow when HIV status is disclosed. Voluntary HIV testing needs to be done with informed consent and clients need to be confident that the results will remain private. In turn, HIV-positive individuals have a responsibility to notify spouses and other sexual partners.
- **Employment.** Discrimination in the workplace based on HIV/AIDS status may include such consequences as (1) not having an opportunity to apply for a job, (2) mandatory testing at recruitment, (3) questions on recruitment forms/interview related to HIV status, (4) unjustified restrictions due to HIV status relating to promotion, job location, or employment benefits, or (5) dismissal from the job. Again, people will be less likely to learn about or admit their status if they fear serious economic consequences.
- **Information.** The right to freedom of expression and information entitles persons to seek, receive, and impart openly HIV-related prevention and care information. Programs should support the dissemination and free exchange of prevention and care information.
- **Confidentiality of HIV status.** Once the HIV testing has been performed, ethical codes regarding the confidentiality of AIDS status should be enforced, where applicable.

Recognizing and respecting the human rights of persons living with HIV/AIDS (PLWHA), as well as other persons affected by the epidemic, makes good sense. Protecting the human rights of PLWHA promotes openness, tolerance, and involvement of the public in HIV prevention programs, which can reduce opportunities for the spread of HIV and eventually bring the epidemic under control.



Governments and their legislatures can go beyond supporting general discussions and advocacy efforts about respecting basic human rights and ensure that these rights are guaranteed within the legal system. Some of the legal and regulatory issues that a legislature can address are

- **Employer-employee rights.** The legislature can ensure that the employer does not have the right to know the HIV status of an employee without the consent of the employee. Furthermore, if that status is positive, the employer can be prevented from discriminating against the employee.
- **Insurance.** The government can work closely with insurance companies to establish guidelines pertaining to policies and benefits for people affected or infected with HIV. The guidelines would ensure that compensation is available to all those who were not infected prior to the issuance of their insurance policy.
- **Counselling and testing.** Codes for counselling and testing procedures can be developed that will take into account the need for voluntary testing and confidentiality.
- **Drugs.** Clear legal provisions can be designed that will regulate drug trials and provide sanctions against those peddling, cutting up for sale, and advertising substances that have no proven curative value against HIV.

## Treatment and Vaccines

**Treatments.** Highly active anti-retroviral therapy (HAART) has received much international publicity in recent years. HAART uses combinations of drugs and can inhibit the spread of HIV within a person's body. For some HIV-infected persons, HAART has been an effective way to prevent the onset of AIDS and prolong life. However, several considerations need to be taken into account when considering HAART in the context of developing countries. Most importantly:

- Many HIV-infected persons cannot tolerate the side effects of the drugs; for them the combination therapy treatments are useless. Only about one-half of prospective users can tolerate the therapy.
- The drugs have to be taken under the strictest conditions, including time of day and with meals or on an empty stomach. Even small variations from the prescribed pattern can render the treatment ineffective. Patients also need constant access to sophisticated medical laboratories to track viral counts in the body.
- Perhaps most importantly, the costs of these treatments are prohibitively high, around US\$8,000-\$10,000 per patient per year in a developing country setting and even more in the industrialised countries. As a result of recent efforts it is possible that drug costs could drop to as low as \$350 per patient per year, but the infrastructure costs to support this treatment would still be significant.

The new combination drugs are important in that for the first time a medical treatment has proven effective against HIV. This creates hope for the future. But for the moment, even in the most developed countries, this is a highly expensive experiment with an unknown outcome affecting a minority of HIV-infected individuals. In developing countries, the first experimental programs are just beginning.

It is possible to treat, for a long time, many of the opportunistic infections that develop because of the weakened immune system. These treatments can improve the quality of life and delay the death of a person with AIDS.

**Vaccines.** For many HIV/AIDS researchers and policymakers, the real hope is for a safe, effective and widely available vaccine that can prevent HIV infection in the first place. Research on vaccines continues in many laboratories around the world. To date, while several dozen vaccines initiatives have been undertaken around the world, only one vaccine has reached the final level (Phase III) of clinical testing in humans and little optimism exists that this vaccine will prove effective. New vaccine candidates for Phase I studies have also been in short supply.

More international, government and foundation support for vaccine research, a better scientific understanding of how HIV functions, and greater involvement of the large pharmaceutical companies have led to some optimism that the development of an effective vaccine can be accelerated. Regardless, most scientists believe that vaccines are not likely to be available for at least the next six to 10 years, if then. The African AIDS Vaccine Programme (AAVP), a network of African scientists working to promote and facilitate HIV vaccine research and evaluation in the region, shares this view.

Even if a vaccine does eventually become available, it will take time and a sustained public health effort to produce large quantities and deliver the vaccine to large numbers of people.

Experience with other immunization programmes shows how difficult mass coverage can be in Africa. It is also possible that vaccine(s) may be only partially effective and may protect only a portion of those persons who use them from HIV infection.

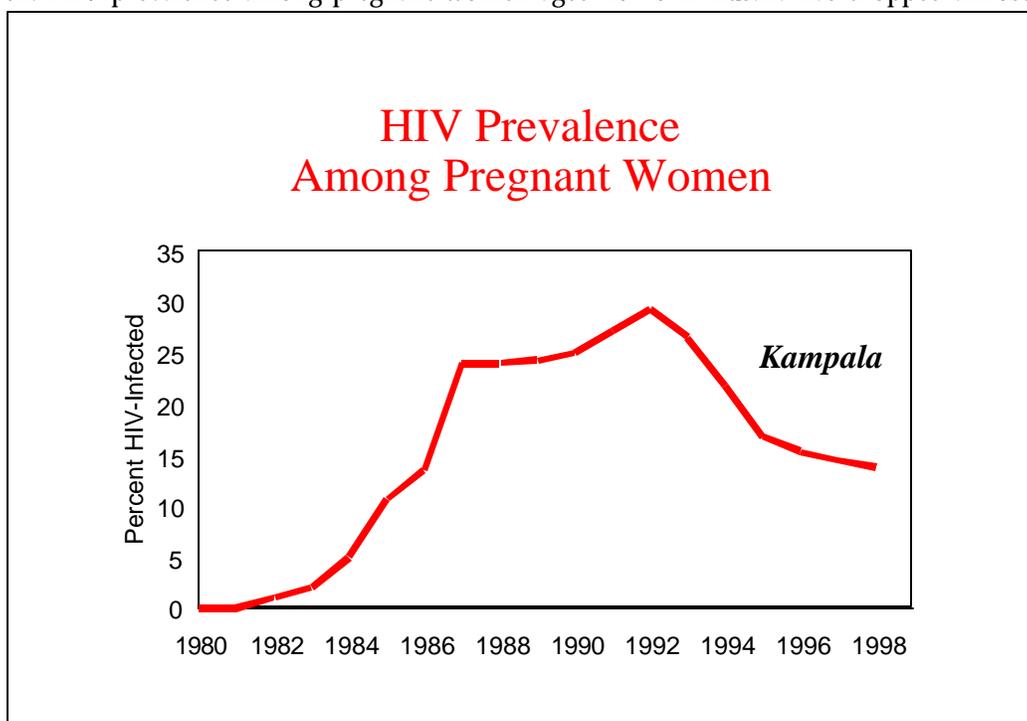
HIV vaccine research is potentially of great importance to long-term efforts to defeat the epidemic throughout the region, and southern African countries should continue to be supportive of these efforts. At the same time, little promise exists that vaccines will be available for many, many years, if ever, and the hope for an effective vaccine should not detract from the need for other prevention programmes.

## Signs of Success

Signs of success have been seen in some countries, particularly Thailand and Uganda, where programs have apparently been successful in reducing the prevalence of HIV infection. Recent trends in Uganda are a sign of hope for other countries with high levels of HIV infection. Reports from sentinel surveillance sites and other sources indicate a downward trend in HIV prevalence. Of particular note, the evidence indicates that HIV incidence (annual new infections) and prevalence among 15-19 year olds have levelled off in rural areas and are declining in urban areas. Survey results from the early 1990s and mid-1990s suggests that behaviour has been changing within this age group, most notably by a later onset of sexual activity among teens and a decline in the proportion of adolescents with multiple sex partners. There has also been greater use of condoms in high-risk sexual encounters by members of this age group.

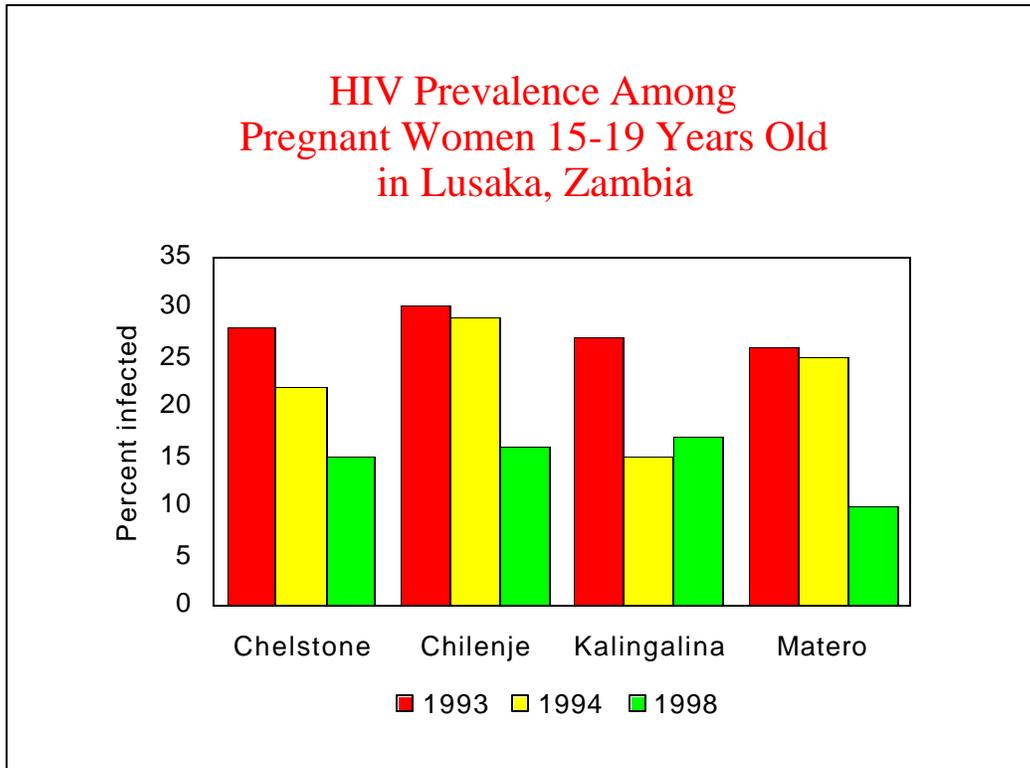
The reasons for the behavioural changes are unclear. Some data indicate that people are likely to change their behaviour if a close friend or relative dies from the disease. This suggests rising mortality as a grim catalyst for changing sexual practices. More positively, President Museveni and other Ugandan leaders have given strong support to AIDS control efforts. The AIDS Support Organization (TASO) and other community-based organizations have provided care and support to people living with HIV/AIDS and their families. Numerous research studies have contributed to increasing knowledge about the epidemic. Knowledge about AIDS, its risks and consequences, and means of prevention have been widely diffused throughout the country. These have all contributed to an open environment where people talk about AIDS with their family and friends and, as a result, may be more likely to change their behaviour to protect themselves.

Recent evidence from Zambia indicates that HIV prevalence may be declining among adolescent women. HIV prevalence among pregnant women aged 15-19 in Lusaka has dropped almost one-



half in the last six years. Information from studies of sexual behaviour conducted since 1990 indicate that fewer young women were having sex before marriage.

Whatever the reasons for the changing behaviour, it is encouraging to witness, at last, a downward trend in HIV prevalence in some areas of African seriously affected by the AIDS epidemic.



## What can be done?

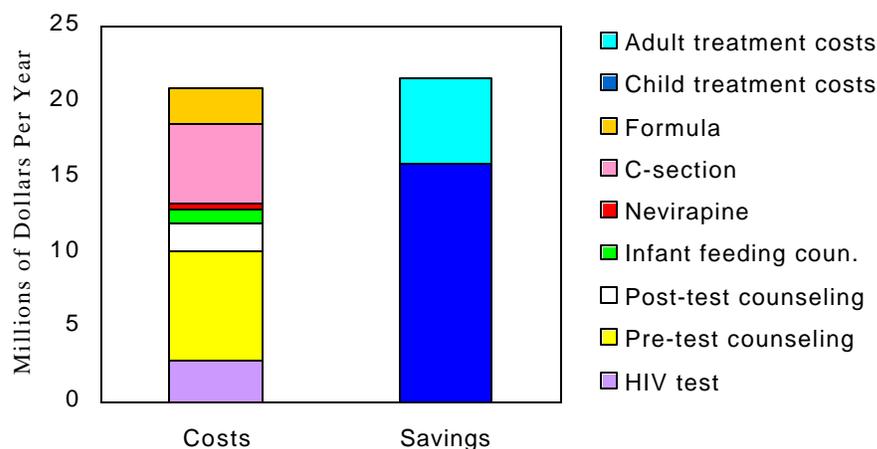
AIDS has the potential to cause severe deterioration in the well being of the populations of southern Africa. However, this is not inevitable. There is much that can be done now to keep the epidemic from getting worse and to mitigate the negative effects. Among the responses that are necessary are the following:

**Prevent new infections.** The most effective response will be to support programs to reduce the number of new infections in the future. After more than a decade of research and pilot programs, we now know how to prevent most new infections. An effective national response should include limiting transmission through heterosexual contact, prevention of mother-to-child transmission, voluntary counselling and testing, blood screening, and efforts to protect human rights and reduce stigma and discrimination. Workplace-based programs can prevent new infections among experienced workers. Governments, non-governmental organizations (NGOs), and the commercial sector working together in a multi-sectoral effort can make a difference.

**Heterosexual contact.** The major mode of transmission is through heterosexual contact; it is especially in this area that interventions must be intensified. Interventions include promoting reductions in the number of sexual partners, encouraging delays in the onset of sexual activity among adolescents, promoting the correct and consistent use and availability of condoms, strengthening programs for STD control, and encouraging voluntary counselling and testing. These can be done through a combination of mass media, counselling, and education programs. Delays in the onset of sexual activity among adolescents can have a significant impact on the spread of HIV. Reducing the overall number of sexual partners, but especially limiting the number of concurrent partners, can also have an effect. Given the extremely high rates of HIV infection among commercial sex workers, a reduction in the number of men who have unprotected sexual contact with prostitutes and bar girls can be important in bringing the epidemic under control. Condom use can be promoted through IEC programs and through increasing the availability of condoms through expanded public distribution, social marketing programs, and programs in the workplace. Given the vulnerability of women, greater availability and use of female condoms could help control the spread of the disease. Also important is the control of STDs such as syphilis, gonorrhoea, and chancroid. A study in Mwanza, Tanzania, for example, found that an improved STD prevention and treatment program was associated with a reduction in the number of new HIV infections of 42 percent. Services to detect and control STDs can be critically important for managing the HIV/AIDS epidemic.

**Mother-to-child Transmission.** A mother who is infected with HIV has a 25-40 percent chance of transmitting the virus to her newborn child. To reduce mother-to-child transmission, it is important that young women know whether they are infected. If they are HIV-positive, they may wish to use family planning to avoid pregnancies. Voluntary counselling and testing needs to be available for couples where one or both of the partners is infected to help them understand the HIV test and the choices facing them. Other interventions include reducing transmission through anti-retroviral drug therapy, either zidovudine or nevirapine; performing delivery by Caesarean section; and reducing transmission through breastfeeding. Breastfeeding should be discouraged only if safe alternatives are available. The following graph shows that a program to prevent vertical transmission in South Africa, using Nevirapine, Caesarean sections, and formula feeding, results in a benefit-cost ratio of more than one; that is, the savings from the program are greater than the costs.

## Benefits and Costs of a Program to Prevent Mother-to-Child Transmission\*



\* Illustrative analysis of costs and benefits of using Nevirapine, replacement feeding and Cesarean delivery.

**Voluntary counselling and testing.** One proven method to bridge the gap between knowledge and behaviour change is VCT. Since 1990, the AIDS Information Centre in Uganda (AIC) has served over 380,000 clients. Services include same-day HIV testing and counselling (since 1997), a “Post Test Club,” STD and TB treatment, peer education training, family planning, condom distribution, and community outreach. In 1992 and 1993, a survey was performed to measure self-reported condom use before and after VCT (see table below). When a respondent tested positive for HIV, there was a marked change in behaviour, with self-reported condom use increasing from 10 percent before VCT to 89 percent with a steady partner after VCT, and 100 percent with other partners. When the respondent had tested negative for HIV, there was again a marked increase in self-reported condom use, particularly with respect to other partners. Before VCT, 34 percent of men and 15 percent of women reported using condoms with non-steady partners; whereas after VCT, 93 percent of men and 94 percent of women began using condoms with non-steady partners. This change in behaviour extended to steady partners as well, with both males and females increasing condom use with steady partners by about 20 percentage points, to 38 percent and 34 percent, respectively.

## Effect of Voluntary Counseling & Testing on Risk Reduction: Uganda, 1992-93

<i>Self-reported Condom Use</i>			
	Before VCT	After VCT	
<b>HIV +</b>	10%	89%	with steady partner
	10%	100%	with nonsteady partner
<b>HIV - male</b>	16%	38%	with steady partner
	34%	93%	with nonsteady partner
<b>HIV - female</b>	15%	34%	with steady partner
	14%	94%	with nonsteady partner

Studies in Kenya, Tanzania, and Trinidad have shown that VCT is effective in promoting behaviour change and that the cost per infection averted is similar to other effective prevention interventions.

**Blood screening.** To avoid infection through blood transfusion, the blood supply needs to be made as safe as possible. This means screening blood through laboratory tests and screening potential blood donors through interviews in order to reject donors that have a high probability of being infected. Unnecessary blood transfusions should be discouraged and autologous transfusions for planned operations should be encouraged.

**Design major development projects appropriately.** Some major development activities may inadvertently facilitate the spread of HIV. Major construction projects often require large numbers of male workers to live apart from their families for extended periods of time, leading to increased opportunities for commercial sex. A World Bank-funded pipeline construction project in Cameroon was redesigned to avoid this problem by creating special villages where workers could live with their families. Special prevention programs can be put in place from the very beginning in projects such as mines or new ports where commercial sex might be expected to flourish.

**Programs to address specific problems.** Special programs can mitigate the impact of AIDS by addressing some of the most severe problems. Reduced school fees can help children from poor families and AIDS orphans stay in school longer and avoid deterioration in the education level of the workforce. Tax benefits or other incentives for training can encourage firms to maintain worker productivity in spite of the loss of experienced workers.

**Mitigate the effects of AIDS on poverty.** The impacts of AIDS on households can be reduced to some extent by publicly funded programs to address the most severe problems. Such programs

have included home care for people with HIV/AIDS, support for the basic needs of the households coping with AIDS, foster care for AIDS orphans, food programs for children, and support for educational expenses. These programs can help families and particularly children survive some of the consequences of an adult AIDS death that occur when families are poor or become poor as a result of the costs of AIDS. The costs of these programs can vary widely.

**Cost-Effectiveness of interventions.** Although many interventions are feasible and effective, it is important to try and understand which interventions are most cost-effective; that is, which will provide the most benefit for the least amount of money. Unfortunately, comparable data are not available for the various interventions; the table below shows some of the data that are available. All data are in U.S. dollars.

Syndromic STD control is one of the most cost-effective interventions on this table, with a cost of

<b>Annual Costs of Programs to Mitigate the Household Impacts of AIDS, Kagera, Tanzania, 1992</b>	
Type of Program	Annual Cost (US\$)
Home care for people with AIDS	\$227 per patient
Orphanage care	\$1,063 per child
Foster care	\$185 per child
Feeding post	\$69 per child
Basic needs support	\$47 per household
Educational support	\$13 per child

Source: World Bank. *Confronting AIDS*.

about \$10 per Disability-Adjusted Life Year (DALY) saved in the Mwanza, Tanzania project, and local running costs of a new project in seven West African countries of less than \$1 per DALY saved. The Mwanza project also examined the cost relative to the number of HIV infections averted, calculating the cost per HIV infection averted to be \$218. The cost per HIV infection averted in the West African study would be much less, although those costs include local running costs only.

Interventions to ensure the safety of the blood supply compare favorably with interventions to manage STDs; the overall cost per HIV infection averted in Uganda was \$172. The only other intervention that has data on HIV infections averted is the voluntary counselling and testing program in Kenya and Tanzania; there, they calculate a cost of \$241 per HIV infection averted in Kenya, and \$303 per HIV infection averted in Tanzania. This figure is likely to be lower in Uganda, where the cost per client was about \$13, compared to a cost per client of \$27-29 in Kenya and Tanzania.

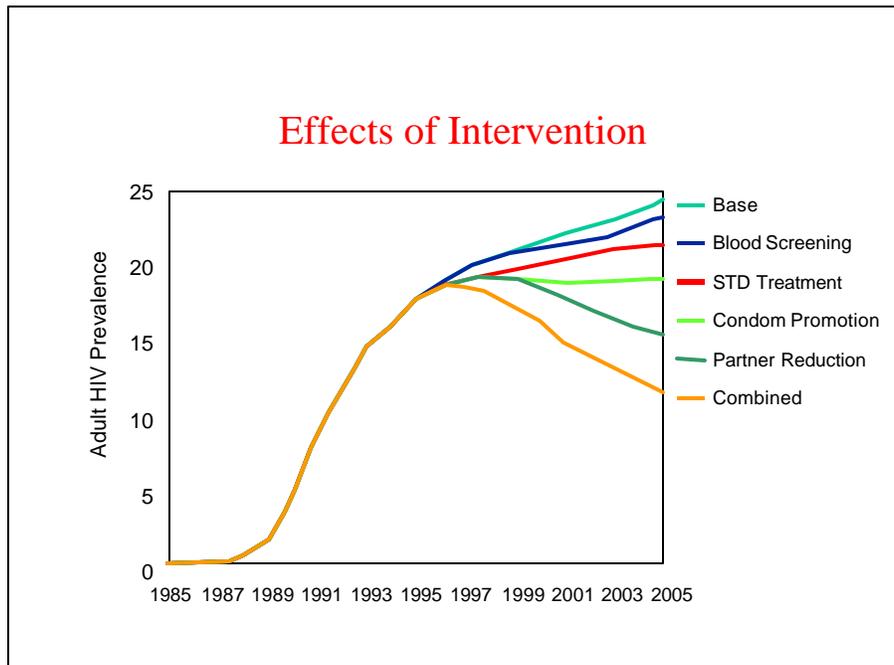
Finally, there are some basic statistics available for both condom programs and home care visits. The cost for two different condom programs varies from \$0.10 per condom distributed in Zimbabwe in the early 1990s, to between \$0.11-\$1.82 per condom sold for a social marketing program in southern Africa. The costs for home care visits appear to be very responsive to changes in the magnitude of the program. Between 1993 and 1998, the number of home care visits provided by Family AIDS Caring Trust (FACT) increased from 562 to 11,623. During this time, the average cost of a home care visit declined from \$20 to \$1. Note that this program uses a large number of volunteers, trained by the organization.

<b>Cost-effectiveness of Interventions</b>	
<b>Intervention</b>	<b>Result</b>
<b>Syndromic STD Control</b>	\$0.39/client served, \$217.62/HIV infection averted, \$10.33/DALY saved in Mwanza, Tanzania  > 13 million DALYs saved over 10 yrs., local running costs < \$1/DALY saved in 7 West African countries
<b>Safe blood supply</b>	\$172/HIV infection averted in Uganda
<b>Voluntary counseling &amp; testing</b>	\$27/client, \$241/HIV infection averted in Kenya \$29/client, \$303/HIV infection averted in Tanzania  Cost per client was \$13.39, broken down into \$5.46 of variable cost, \$7.93 of fixed in Uganda
<b>Condom social marketing</b>	\$0.11-\$1.82/condom sold in Southern Africa
<b>Peer education/ Condoms for CSWs</b>	\$0.10/condom distributed, \$0.47/client in Bulawayo, Zimbabwe
<b>Home care visits</b>	Decrease from \$20 to \$1/visit due to scaling up from 1993-98 in Zimbabwe

**Combined interventions.** Each of the intervention packages described above can make an important contribution to controlling the spread of HIV. Alone, none is likely to solve the problem completely; some people will respond to or be affected by one type of intervention, while others will respond to or be affected by another. Computer simulations suggest that a much larger effect can be achieved by implementing all the interventions together in a broad attack on the epidemic.

The information on the graph below shows the expected impact of interventions in an illustrative African city. In the absence of interventions—the base projection or the top line on the graph—adult HIV prevalence continues to rise over time. An effective blood-screening program, represented by the second line from the top, reduces prevalence only modestly. However, an effective STD control program brings expected prevalence down by about 12 percent, and condom promotion and partner reduction interventions reduce HIV prevalence even more. Most importantly, when all four interventions are implemented simultaneously, the projected prevalence is nearly 55 percent less in 2005 than it would have been in the absence of interventions.

The fundamental message is a hopeful one. With a concerted effort on a number of fronts, a country can turn the rising prevalence curve downwards and start to bring the HIV/AIDS epidemic under control.



Overall, there are several important lessons to be learned concerning prevention interventions.

- Pilot tests have shown that interventions can be successful in significantly reducing the spread of HIV.
- It is important to intervene as early as possible with a comprehensive mix of proven and effective interventions to reach the largest possible number of people and have the maximum impact.
- The most effective interventions are those that focus on population groups that have the most sexual partners. This is true at all stages of the epidemic.
- Prevention through behaviour change, condom promotion, and STD treatment is many times more cost-effective than either providing hospital treatment for AIDS patients or trying to prevent the spread of the virus with anti-retroviral therapy.
- Applying interventions on a large scale is costly and success is difficult to measure. Nonetheless, there is now evidence from Uganda and Thailand that significant reductions in HIV incidence and prevalence can occur at a national level. Both countries recognised the seriousness of the epidemic early and implemented strong national programs to reduce the spread of HIV and to provide support for people with AIDS and their families.

## VI. SELECTED SOURCES

“AIDS: The Heavy Toll on the Economy.” 1997. *Southern African Economist* (April 15-May 15), 3-8.

- Arndt, Channing and Jeffrey D. Lewis. 2000. "The Macro Implications of HIV/AIDS in South Africa: A Preliminary Assessment." Presented at the IAEN Economics of AIDS Symposium, Durban, South Africa, July 2000.
- Bernstein, Robert S., David C. Sokal, Steven T. Seitz, Bertran Auvert, John Stover, and Warren Namaara. Forthcoming. "Simulating the Control of a Heterosexual HIV Epidemic in a Severely Affected East African City: Computational Modeling of Single vs. Combined Intervention Strategies with the iwgAIDS and SimulAIDS Models." *Interfaces*.
- Botswana Institute for Development Policy Analysis. 2000. "Macroeconomic Impacts of the HIV/AIDS Epidemic in Botswana: Interim Report: Aggregate Macroeconomic Impacts of HIV/AIDS." Gaborone: Botswana.
- Botswana Institute for Development Policy Analysis. 2000. "Impacts of HIV/AIDS on Poverty and Income Inequality in Botswana." Gaborone: Botswana. Presented at the IAEN Economics of AIDS Symposium, Durban, South Africa, July 2000.
- Buve, A. et al. "The multicentre study on factors determining the differential spread of HIV in four Africa cities: summary and conclusions" *AIDS* 2001, 15 (suppl 4):S127-131.
- Ching'ambo, Lloyd J., Kamima Mwanza, Denny H. Kalyalya, Martin F. Phiri, and Simeon W.M. Kunkhuli. 1995. *The Socio-Economic Impact of HIV/AIDS on Selected Sectors and Industries in Zambia*. A study commissioned by the Swedish International Development Agency (SIDA), World Health Organisation (WHO) and the Ministry of Health of the Republic of Zambia.
- Demographic and Health Surveys: -Malawi (1996), Mozambique (1997), Zambia (1996) and Zimbabwe (1994). Macro International.
- Drinkwater, Michael. 1993. *The Effects of HIV/AIDS on Agricultural Production Systems in Zambia: A Summary Analysis of Case Studies Conducted in the Mpongwe Area, Ndola Rural District and Teta Area, Serenje District*. Ministry of Agriculture, Food and Fisheries.
- Forgy, Larry and Allast Mwanza. 1994. *The Economic Impact of AIDS in Zambia*. Lusaka: Ministry of Health and USAID-.
- Fylkesnes, K., Z. Ndhlovu, K. Kasumba, R. Musonda, and M. Sichone. 1998 "Studying Dynamics of the HIV Epidemic: Population-Based Data Compared with Sentinel Surveillance in Zambia." *AIDS* 12 -: 1227-1234.
- Goliber, Tom. 2000. "Exploring the Implications of the HIV/AIDS Epidemic for Educational Planning in Selected African Countries: The Demographic Question." Draft ACTAFrica Occasional Paper. The World Bank-.
- Greener, Robert. 1997. "Impact of HIV/AIDS and Options for Intervention: Results of a Five Company Pilot Study Paper Written for the Botswana National Task Force on AIDS at the Workplace." BIDPA Working Paper #10. Gaborone: Botswana.
- Hammeijer, J. 1997. "The Economic Impact of HIV/AIDS on Households in Zimbabwe." Waterford Kamhlala, United World College of Africa.

- Hansen, K, G. Woelk, H. Jackson, R. Kerkhoven, N. Majanjori, P. Maramba, J. Mutambirwa, N. Ndimande, E. Vera. 1997. "The Cost of home-based care for HIV/AIDS patients in Zimbabwe." *AIDS Care* 10(6): 751-59.
- Harries, A.D. 1990. "Tuberculosis and Human Immunodeficiency Virus Infection in Developing Countries." *Lancet* 335:387-390.
- Jones, C. 1997 "What HIV cost a tea estate in Malawi." *AIDS Analysis Africa* 7(3): 5-7.
- Kwaramba, P. 1997. "The Socio-Economic Impact of HIV/AIDS on Communal Agricultural Systems in Zimbabwe." Zimbabwe Farmers Union, Friedrich Ebert Stiftung Economic Advisory Project, Working Paper 19, Harare, Zimbabwe.
- Loewenson, Rene and Alan Whiteside. 1997. *Social and Economic Issues of HIV/AIDS in Southern Africa: A Review of Current Research*. SFAIDS Occasional Paper Series No. 2, edited by Helen Jackson. Harare, Zimbabwe: Southern Africa AIDS Information Dissemination Service.
- Mukuka, L. and W. Kalikiti. 1995. *The Impact of HIV/AIDS on Education in Zambia*. Lukaka: Ministry of Health.
- Mutangadura, G. and D. Webb. 1998. "The socio-economic impact of adult mortality and morbidity on urban households in Zambia." *AIDS Analysis Africa* 9(4).
- Ncube, J. 1997. "Death as a profitable business venture." *AIDS Analysis Africa*.
- Over, Mead, Martha Ainsworth, et al. 1996. *The Economic Impact of Adult Mortality from AIDS and Other Causes on Households in Kagera, Tanzania*. World Bank.
- Over, Mead. 1992. "The Macro-Economic Impact of AIDS in Sub-Saharan Africa." Population and Human Resources Department. Washington, DC: The World Bank.
- Stoneburner, Rand L. and Manuel Carballo. 1997. *An Assessment of Emerging Patterns of HIV Incidence in Uganda and Other East African Countries*. Final Report of Consultation for Family Health International, AIDS Control and Prevention Project (AIDSCAP). Geneva: International Centre for Migration and Health.
- Sukwa, Thomas T. Y., Frederick A.D. Kaona, and Rosemary M. Musonda. 1999. *Preliminary Report on Multicentre Study on Factors Determining Differential Spread of HIV in African Towns (Ndola Site)*. Ndola: Tropical Diseases Research Centre.
- Sweat, Michael, Steven Gregorich, Gloria Sangiwa, Colin Furlonge, Donald Balmer, Claudes Kamenga, Orga Grinstead, and Thomas Coates. 2000. "Cost-effectiveness of voluntary HIV-1 counselling and testing in reducing transmission of HIV-1 in Kenya and Tanzania" *Lancet* 356: 113-121.
- UNAIDS. 2000. *Report on the global HIV/AIDS epidemic, June 2000*. Geneva: UNAIDS.
- U.S. Census Bureau. 2000. *HIV/AIDS Surveillance Data Base*. U.S. Department of Commerce, Economic and Statistics Administration, U.S. Census Bureau, Population Division..

World Bank. 1997. *Confronting AIDS: Public Priorities in a Global Epidemic*. New York: Oxford University Press.

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