Population Division
Department of Economic and Social Affairs
United Nations Secretariat

The Demographic Impact of HIV/AIDS

Report on the Technical Meeting
New York, 10 November 1998

Population Division, Department of Economic and Social Affairs, United Nations

The Joint United Nations Programme on HIV/AIDS (UNAIDS)

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*Prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. Unedited version.

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PREFACE

The Technical Meeting on the Demographic Impact of HIV/AIDS was held to discuss current approaches and future research needs for estimating the demographic impact of HIV/AIDS. AIDS has become one of the biggest challenges to development in the coming decades. In many countries, AIDS has erased decades of progress in reducing child mortality and increasing life expectancy. In addition to increasing mortality, AIDS can also affect demographic change by reducing the fertility of women who are infected with HIV and influencing age at marriage, sexual behaviour and contraceptive use.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) together with WHO and other partners produces estimates of the number of people infected with HIV for all the countries of the world. The Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat produces estimates and projections of population size and change for all the countries of the world. One purpose of this Technical Meeting was to review the results, methodology, data and assumptions concerning the demographic impact of HIV/AIDS in the recently released 1998 Revision of the official United Nations world population estimates and projections (United Nations, forthcoming). A second purpose was to review existing knowledge on factors related to the demographic impact of AIDS and to make recommendations on parameter values, approaches to sharing information and future research needs in order to improve future estimates and projections.

The meeting was organized by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat in cooperation with the Joint United Nations Programme on HIV/AIDS (UNAIDS). Acknowledgement is due to Mr. John Stover, Rapporteur of the meeting, who prepared a first draft of this report, which was then finalized by the Population Division in collaboration with UNAIDS.

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Symbols of United Nations documents are composed of capital letters combined with figures.

Details and percentage in tables do not necessarily add to totals because of rounding.

The term “billion” signifies a thousand million.

More developed regions comprise Northern America, Japan, Europe, Australia and New Zealand.

Less developed regions comprise all regions of Africa, Latin America and the Caribbean, Asia (excluding Japan), Melanesia, Micronesia and Polynesia.

The following abbreviations are used in the present report:

AIDS	Acquired immunodeficiency syndrome
DHS	Demographic and Health Surveys
EPIMODEL	Program that estimates the number of deaths due to AIDS
HIV	Human immunodeficiency virus
ICPD	International Conference on Population and Development
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children’s Fund
WHO	World Health Organization

PART ONE

REPORT OF THE TECHNICAL MEETING ON THE DEMOGRAPHIC IMPACT OF HIV/AIDS

The Population Division of the United Nations Secretariat convened a Technical Meeting on the Demographic Impact of HIV/AIDS on 10 November 1998 in New York to discuss data, methodology and research needs related to understanding and projecting the demographic impact of HIV/AIDS. The Technical Meeting was organized in cooperation with the United Nations Joint Programme on HIV/AIDS (UNAIDS). Attending the meeting were representatives of various United Nations organizations and prominent international experts in the demography of HIV/AIDS. The agenda of the Meeting and the list of participants are presented in annexes 1 and 2, respectively.

In her opening remarks to the Technical Meeting, Ms. Louise Fréchette, Deputy Secretary-General, called HIV/AIDS "a global human tragedy, which denies to the millions of its victims the benefits of humanity's greatest achievement— a healthy, long life. This indeed is one of the most serious threats and challenges for the next millenium." She noted that "the official population estimates and projections in the United Nations system provided by the Population Division show an alarming impact of AIDS. The Secretary-General and I believe that it is the responsibility of the international community to reverse these trends. It will require our collective capacity to radically slow this epidemic and to prevent tens of millions of infections over the next decade." Lastly she charged participants with the "responsibility to provide the international community and the public, reliable information in the magnitude and dynamics of the AIDS pandemic." The full text of the Deputy Secretary General's opening statement is presented in annex III to this report.

Opening remarks were also provided by Mr. Joseph Chamie, Director of the Population Division, and Dr. Bernhard Schwartländer, Senior Epidemiologist of UNAIDS, who charged participants with carefully reviewing the existing data and methodologies for assessing the demographic impact of HIV/AIDS and recommending improved approaches and future research needs.

I. THE DEMOGRAPHIC IMPACT OF HIV/AIDS: RESULTS FROM THE 1998 REVISION OF THE UNITED NATIONS WORLD POPULATION ESTIMATES AND PROJECTIONS

The first part of the Meeting was devoted to a presentation and discussion of the impact of AIDS according to the 1998 Revision of the official United Nations world population estimates and projections (United Nations, forthcoming). Mr. Victor Gaigbe-Togbe of the Population Division presented the paper entitled "AIDS, Mortality and Population Change" (see Part 2). The next three sections summarize his presentation and the final section in this chapter summarizes the discussion that followed.

A. BACKGROUND AND STATEMENT OF THE PROBLEM

Since the 1950s, mortality has been declining in both developed and developing countries. Life expectancy has been increasing and impressive gains have been made in reducing infant and child mortality. Recently, however, AIDS has caused a reversal of these trends in the most severely affected countries, particularly in sub-Saharan Africa. It is estimated by UNAIDS and WHO that more than 40 million people have been infected with HIV since the beginning of the epidemic and 13 million have progressed to AIDS. Beginning with the 1992 Revision, the Population Division of the United Nations Secretariat has made explicit allowance for the potential demographic impact of AIDS in preparing the population estimates and projections of countries where the epidemic has reached significant proportions. In the 1998 Revision the impact of AIDS is considered for 34 countries, all of which had populations of at least one million in 1995 and most of which had an estimated adult HIV prevalence of 2 per cent or higher in 1997. Brazil and India are countries included because, although their adult HIV prevalence is not yet above 2 per cent, their large populations imply that the number of HIV-infected persons is sizeable even at lower levels of prevalence.

B. METHODS AND SOURCES OF DATA

The number of HIV-positive adults in each of the 34 countries considered was provided by UNAIDS. These figures were used as input for the computer program called EPIMODEL (developed by Chin and Lwanga then at WHO) to estimate the annual number of newly infected adults over a given period. EPIMODEL uses a gamma distribution to fit the adult HIV-prevalence. For each country considered, the curve fitted depends on three input values: the year when the epidemic started and the estimated number of adults who are HIV-positive in 1994 and 1997. For most countries, the curve fitted approximates fairly well the 1994 and 1997 estimates of HIV prevalence among the adult population, but for a few countries, the estimated prevalence level for 1994 was found to be inconsistent with the 1997 level and was discounted in fitting the gamma curve. Once a gamma curve is fitted, EPIMODEL can estimate the number of newly infected adults for each year from the start of the epidemic to 2050. However, it was found that after the number of newly infected adults reaches a maximum value, the trajectory it follows is not always plausible. Consequently, in preparing projected numbers of newly infected individuals for the period 1995-2050, the Population Division adjusts the annual number of newly infected adults as produced by EPIMODEL so that there is a smooth decline from the maximum value yielded by the program to half that value over a period of 20 years. Once 20 years have elapsed after the maximum has been reached, the number of newly infected adults remains constant for the rest of the projection period (i.e., until 2050). That is, for projection purposes, it is assumed that the annual number of newly infected adults will stabilize at 50 per cent of its peak value for each of the countries considered.

On the basis of assumptions about the proportion of HIV-cases that occur among women, the age distribution of infected women and their age-specific fertility, EPIMODEL estimates the annual number of children born to HIV-positive women. Then, assuming that 35 per cent of the children born to HIV-positive women contract the disease (30 per cent in Cambodia and India; and 25 per cent in Brazil, Haiti and Thailand), the program estimates the number of new pediatric HIV-positive cases expected per year.

Once the numbers of newly infected children and adults are available for each year of the period that begins with the start of the epidemic and ends in 2050, it is possible to calculate the number of deaths expected by following each infection cohort through time and applying model probability schedules that encapsulate the chances of progressing from HIV-infection to AIDS and from AIDS to death. Different progression schedules are used for children and adults. Furthermore, for adults two schedules are used that differ from each other in the median survival time from infection to full-blown AIDS. For African countries and Cambodia, the adult progression schedule used has a median progression time of 8 years whereas for Brazil, Haiti, India and Thailand, the schedule used has a median progression time of 10 years. When the median survival time from AIDS to death is added, the procedure used assumes that median survival time from HIV-infection to death is 9 years in African countries and in Cambodia, and it is 11 years for the other countries in Asia as well as for Brazil and Haiti. These assumptions are consistent with those made by UNAIDS in estimating the global prevalence of HIV/AIDS.

EPIMODEL thus produces the number of AIDS deaths expected annually among children and among adults (i.e., persons aged 15 years or over). Then, another set of programs is used to distribute the AIDS deaths by five-year age groups and sex. In doing so, it is assumed that HIV infection and therefore AIDS affect as many women as men in sub-Saharan Africa but that both are more common among men than among women in other countries. Specifically, it is assumed that 50 per cent of AIDS deaths occur among men in sub-Saharan Africa; 67 per cent in Cambodia, India and Thailand; and 75 per cent in Brazil and Haiti.

Once the number of AIDS deaths by age and sex are available they are added to the number of deaths estimated for each country through the "normal" assumptions about the course of mortality in the absence of HIV infection. New life tables are produced that include the effects of AIDS and projections are carried out using these life tables and the standard assumptions about the future course of fertility according to the medium-projection variant. The availability of projections that coincide in all other respects but incorporate mortality assumptions that do not take explicitly into account the effects of AIDS provides a basis for assessing the impact of the latter.

C. RESULTS

A comparison of the estimates and projections with and without HIV/AIDS shows that the disease has already had and is likely to have a major effect on the population dynamics of the countries affected. The population of the 29 African countries with a high prevalence of HIV is estimated to have been 446 million in mid-1995, 5 million lower than it would have been in the absence of AIDS. By 2015, their population is projected to grow to 698 million, 61 million fewer than it would have been without AIDS. The most severely affected countries─Botswana, Namibia and Zimbabwe─will have a population 20 per cent lower in 2015 than it would have been without AIDS.

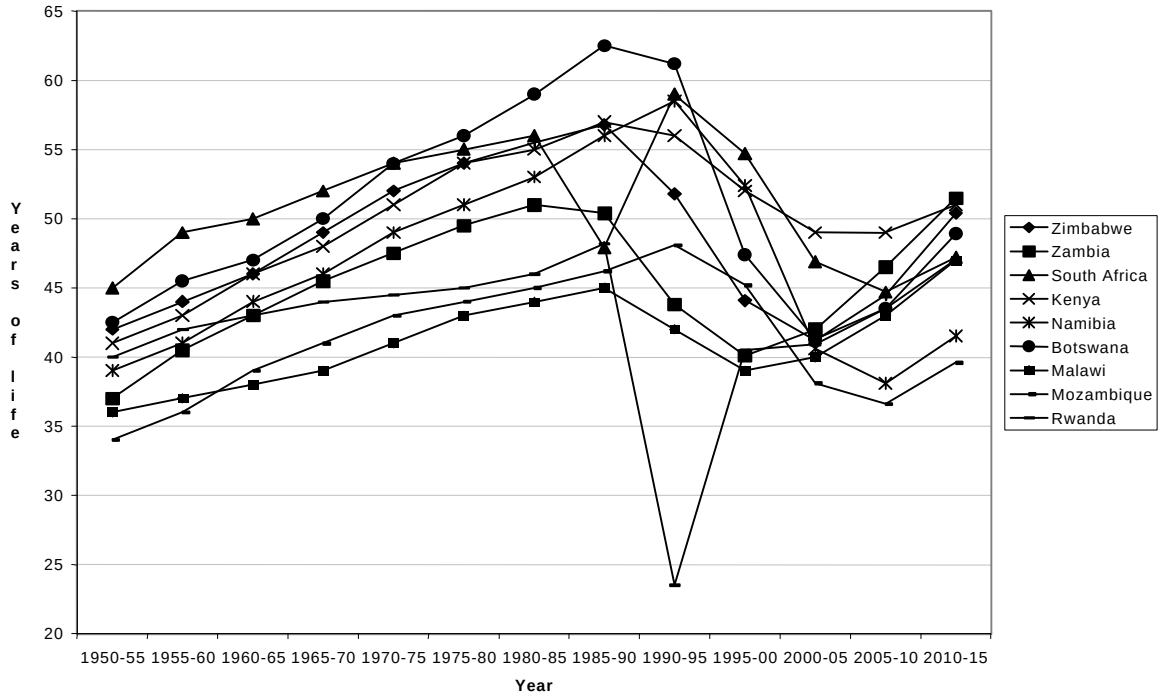
AIDS will have important effects on the annual rate of population growth in many countries. In the 29 African countries considered, the rate of growth is projected to decline from about 2.4 per cent today to 2.1 per cent by 2015. Without AIDS it would have declined from 2.8 today to 2.4 per cent in 2015. In the most severely affected countries, the impact of AIDS will be dramatic. In Zimbabwe the annual rate of growth is estimated to have fallen to 1.5 per cent today instead of being the 2.4 per cent expected if there were no AIDS, and it is projected to drop to just under one per cent by 2000-2005. In South Africa, the annual rate of growth is expected to decline to 0.4 per cent by 2005-2010 instead of the 1.5 per cent expected in the absence of AIDS. Although AIDS clearly will have a serious impact on population growth rates, it is not expected to lead to negative population growth in any country.

The most dramatic effect of AIDS is on life expectancy at birth (the number of years a newborn child would be expected to live if the prevailing mortality conditions remained constant). In the 29 African countries considered, life expectancy has already been reduced by about 7 years due to AIDS and it is expected to remain constant at about 47 years for the next decade instead of rising to 56 years as expected in the absence

of AIDS. The most severe impacts are seen in Botswana and Namibia. In Botswana, life expectancy is expected to drop from 61 years in 1990-1995 to 41 years by 2000-2005, almost 29 years less than it would have been in the absence of AIDS. In Namibia, life expectancy is projected to fall from 58 years in 1990-1995 to 38 years in 2000-2005. Figure 1 shows the estimated and projected life expectancy for the nine countries with the most severe AIDS epidemics. By 2015, life expectancy is expected to be no higher than it was in 1965, implying that AIDS will effectively erase the progress made since then.

AIDS will also affect infant and child mortality. In the nine most severely affected countries in Africa AIDS has already increased the infant mortality rate by about 10 deaths per 1,000, from 76 to 86 infant deaths per 1,000 live births. By 2015, the infant mortality rate in these countries would have been expected to decline to 27 per 1,000 in the absence of AIDS, but because of the epidemic it is expected to drop only to 52 per 1,000.

FIGURE 1. LIFE EXPECTANCY AT BIRTH IN THE 9 COUNTRIES WITH THE HIGHEST HIV PREVALENCE IN 1997, 1950-1955 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming

D. DISCUSSION

Participants expressed their general satisfaction with the approach and results produced by the United Nations Population Division. It was noted that these and other estimates and projections play a major role in raising awareness among policy-makers about the seriousness of the AIDS epidemic. In particular, projections of significantly declining life expectancy in some countries have shocked many into recognizing that AIDS is eroding many of the development gains of the past decades.

Several key points were raised during the discussion that should be noted in future work.

- There was agreement that both the United Nations Population Division and the United States Census Bureau should provide descriptions of their methodologies and assumptions so that the process could be understood by both researchers and policy-makers.

- It was noted that EPIMODEL was developed in order to make short-term projections of the expected number of AIDS cases in African countries. It was not intended to be used for long-term projections. Several participants remarked that EPIMODEL has so far provided good fits to the beginning stages of the epidemic in most countries, when prevalence is still rising, but it is not clear whether it will be equally successful in approximating the course of the epidemic when incidence declines. All recognized, however, that no better alternatives exist at present.

- It was noted that the health systems in some countries were deteriorating and that the long-term increase in life expectancy witnessed during large part of the twentieth century might not have continued in some countries even in the absence of HIV/AIDS. In countries seriously affected by the epidemic, the increased burden on health-care systems associated with HIV/AIDS was further contributing to the deterioration of health services. In addition, the full impact of the rising number of deaths because of tuberculosis might not be captured by assuming that all of them were AIDS-related. Consequently, it might be necessary to re-evaluate the assumptions made about the evolution of non-AIDS mortality.

- The lack of adequate data on adult mortality that would permit a validation of the impact of HIV/AIDS on mortality levels and trends was stressed and deplored. It was stated that there were almost no recent studies of adult mortality that could be used to identify clearly the increases due to AIDS. It was noted, however, that techniques to estimate adult mortality from survey data (such as the sibling method) and to adjust incomplete data on registered deaths might be useful in obtaining further insights about the impact of the disease. It was noted that the Population Division had begun work in preparing a manual on the techniques available for the estimation of adult mortality.

II. DISCUSSION OF DATA AND METHODOLOGIES FOR ESTIMATING AND PROJECTING THE DEMOGRAPHIC IMPACT OF HIV/AIDS

The second part of the Technical Meeting was devoted to a detailed discussion of the most important issues in estimating the demographic impact of AIDS. The discussion was divided into three major sections: (a) the process of producing national HIV prevalence estimates; (b) data for the validation of prevalence estimates, and (c) projections of HIV prevalence.

A. THE PROCESS OF PRODUCING NATIONAL HIV PREVALENCE ESTIMATES

In the past, estimates of national HIV prevalence were prepared independently by several groups, including the Global Programme on AIDS at the World Health Organization, the United States Census Bureau and Harvard University. Since 1997, a single set of estimates has been prepared by UNAIDS with the participation of these and other groups. The process consists of five key steps:

1. *Compilation of all available information on HIV prevalence*. All available data on HIV prevalence are compiled, including data gathered at antenatal clinics, data referring to high-risk populations (e.g., persons seeking treatment for sexually transmitted diseases), or obtained through community surveys and ad hoc studies.

2. *Expert review of the most useful data*. Efforts are focussed on determining how well these data represent the situation in the general adult population and on adjusting the data as necessary to make them more representative. For low-prevalence countries there is more reliance on studies among high-risk populations. In these cases, it is also necessary to estimate the size of the populations engaging in high-risk behaviours.

3. *Re-analysis of past estimates*. Previous estimates of prevalence are re-examined in light of the most recent data and adjustments are made as necessary.

4. *Use EPIMODEL to fit available estimates of HIV prevalence*. EPIMODEL is used to derive annual estimates of prevalence over time on the basis of the available information on HIV prevalence.

5. *Calculation of other indicators*. EPIMODEL is used to calculate, for each country, the cumulative number of persons infected since the beginning of the epidemic, the number of AIDS cases and the number of AIDS deaths.

Because data from antenatal clinics are the most commonly available, a key assumption made in the process of deriving national estimates of prevalence over time is that surveillance data from those clinics is representative of HIV prevalence in the general adult population. However, it is recognized that surveillance systems based on antenatal clinics were not designed for the purpose of attaining such representativeness.

In most developing countries nearly all antenatal clinics chosen for sentinel surveillance are in urban areas. As a result, little information is available on rural areas. Since most of the countries that are severely affected by the epidemic have a majority of their populations living in rural areas, perhaps the largest source of uncertainty regarding the adequacy of national estimates is the lack of reliable information about prevalence levels of HIV in rural populations.

The national representativeness of the data collected at antenatal clinics is also affected by the fact that only pregnant women are covered by such clinics. Several recent studies have shown that fertility is generally lower among women infected by HIV. Therefore, other things being equal, HIV-positive women would be less likely than non-infected women to receive care at antenatal clinics and hence to be part of the clinic

sample tested for HIV. Additional information that might permit an assessment of the types of biases involved is, however, scarce. One set of data, referring to the Masaka district in Uganda, indicates that compensating deviations in fertility rates by age in conjunction with the young age distribution of the population may result in similar total fertility among both HIV-positive women and women that are not infected (see figure 2). Thus, although at most ages HIV-positive women exhibit lower fertility than their non-infected counterparts, at young ages (under 20 years) HIV-positive women have considerably higher fertility than non-infected women. Since the number of young women is large relative to other age groups, the difference in estimated total fertility over the reproductive age range between HIV-positive and HIV-negative women turns out to be small. Similar patterns in fertility differentials by age between HIV-positive and non-infected women have been found in Rakai district, Uganda; the city of Lusaka and Mposhi district in Zambia; and Mwanza town in Tanzania. Higher fertility among young HIV-positive women is related to the fact that they are more likely to be married than their non-infected peers and are also more likely to be sexually active. The differences in fertility observed suggest that an estimate of overall HIV prevalence among women 15-49 derived from women attending antenatal clinics may be adequately representative of all women since the likely under-estimation of prevalence at older ages groups (due to lower fertility of the HIV-positive women) may be offset by the over-estimation of prevalence at younger ages (due to the higher fertility of young HIV-positive women).

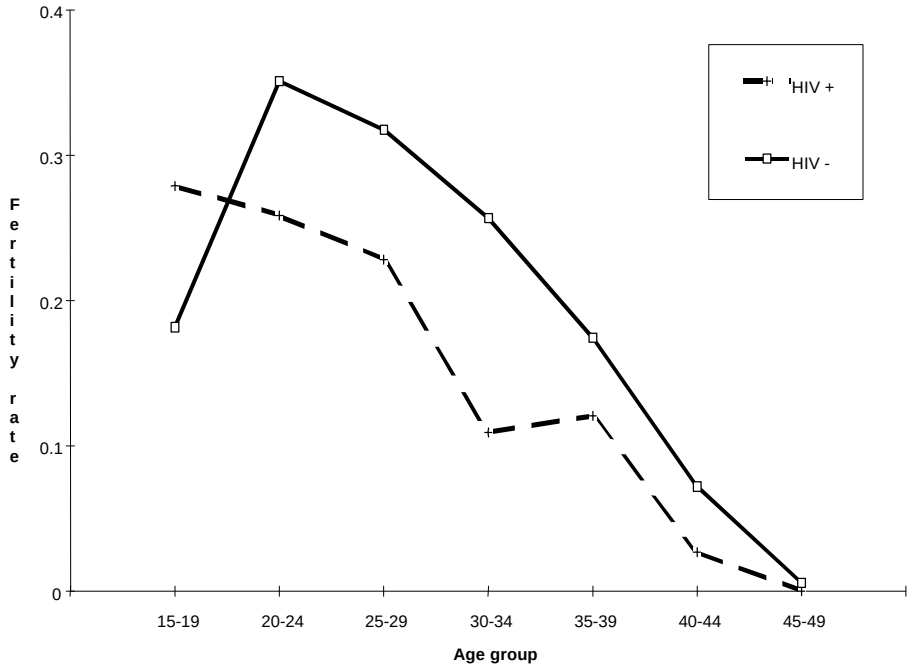
B. Data for the validation of prevalence estimates

Despite the care taken in deriving existing estimates of HIV prevalence, there is no guarantee of their absolute accuracy. It is important to consider, therefore, any avenues open for their validation on the basis of independent evidence. One possible source of corroborating evidence would be information on the number of deaths due to AIDS. On the basis of assumptions about the probability of progressing from HIV infection to AIDS and from AIDS to death, EPIMODEL produces estimated numbers of annual deaths due to AIDS that are consistent with the estimated HIV prevalence levels. If data on mortality by cause were available and reliable in the countries most affected by the epidemic, a comparison of the number of registered deaths caused by AIDS with those estimated via EPIMODEL would help validate the estimates of HIV prevalence. Unfortunately, the collection of mortality data has lagged far behind the collection of data on fertility. In many developing countries, civil registration systems, which are the traditional sources of data on deaths by cause, are underdeveloped. When they exist, their coverage and the quality of the information they gather are often deficient. In particular, recording cause of death with sufficient accuracy has always posed a challenge in societies with limited health-care coverage. Furthermore, because of the stigma that is often attached to AIDS, it is likely that people will be reluctant to report it as a cause of death.

Yet the availability of even limited information on mortality, such as the number of deaths classified by age and sex, may allow the use of indirect estimation techniques to estimate an overall level of mortality and to derive adjusted age-specific mortality rates. Then, because of the distinctive pattern of mortality by age associated with AIDS, it might be possible to assess whether the expected effect of the disease on mortality rates is present. In Zimbabwe, for instance, the analysis of the pattern of age-specific mortality derived from information on deaths by sex and age for 1982, 1992 and 1997 indicates that there has been a sharp increase in the mortality of adults in the reproductive ages. Assessments of the exact magnitude of the increase are, however, still too tentative to permit a validation of the estimates derived from EPIMODEL. Boerma and colleagues (1998) have also reported the existence of sharp increases in adult mortality in other countries of Africa (sometimes mortality rates for particular age groups have more than doubled). In Thailand as well, mortality among men aged 25-34 doubled between 1989 and 1996 at the national level and has increased by as much as ten times in some regions

There are opportunities to use nationally representative surveys to collect data relevant for the estimation of adult mortality data. Thus, information on the number of deaths occurring in a household over a given period together with the age and sex of the diseased or information on the survivorship status of siblings has

FIGURE 2. AGE-SPECIFIC FERTILITY RATES IN MASAKA DISTRICT, UGANDA, 1989-1996



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

the potential of yielding valuable insights on the evolution of mortality and of providing a crucial element for the validation of more detailed estimates about the course of the HIV/AIDS epidemic. In this regard, participants supported the recommendations of the thirty-first session of the Commission on Population and Development which recommended "that countries lacking adequate vital statistics systems give due consideration to the collection and analysis of data in the 2000 round of population censuses for the estimation of levels of mortality" (Commission on Population and Development, 1998).

C. PROJECTIONS OF HIV PREVALENCE

Projecting the future demographic impact of AIDS requires a sound methodology for projecting the number of future HIV infections and for determining the impact of those infections on the future pattern of adult and child deaths. The participants examined this issue in detail and made suggestions for future improvements.

In projecting HIV infections into the future there are several key questions that ought to be addressed:

1. What will happen in countries, such as Uganda and Thailand, where HIV incidence appears to have passed its peak? Will incidence continue to decline? If so, by how much will it decline?

2. What will happen in countries, such as some of those in West Africa and Central America, where HIV prevalence has been relatively low for a long time? Will HIV prevalence remain low or will it suddenly start to increase rapidly?

3. What will happen in countries such as India and China, where HIV appears to be growing rapidly in certain sub-populations? Will the epidemic remain confined to high-risk populations or will it spread rapidly through the general population as well?

4. How will the epidemics develop in countries where it is estimated that at least 20 per cent of the adult population is already infected? In such countries HIV will undoubtedly have a substantial impact on population dynamics that are likely, in turn, to have feedback effects on the evolution of the epidemic itself. The possible feedback effects are not well understood today.

There was agreement among participants that there is as yet insufficient information and understanding of the intricacies of HIV/AIDS transmission in different societies so as to predict with any reliability the likely future of the epidemic in the various settings identified in the questions posed above. The best that can be done at this moment is to produce plausible future scenarios. The United Nations projections provide one such scenario, intended to aid in the assessment of the potential effects of the epidemic in the long run. Given the uncertainty surrounding many of the assumptions made in both estimating and projecting the course of the epidemic, some participants suggested that two or three variants could be prepared.

The future course of the epidemic depends in large part on its current state. It will be different in countries that have a single epidemic that affects the entire country, as in the case of Zimbabwe, than in those with multiple epidemics, each among a distinct population group, as in the case of India. Another important factor is whether or not there is replacement of high-risk populations. If the size of the high-risk population diminishes as people die from AIDS, then the peak prevalence may be expected to be low and incidence will decline over time as the average risk of infection decreases. If high-risk populations are replenished by new people adopting high-risk behaviour and thus replacing those who die from AIDS, then incidence may remain high or perhaps decline moderately at first but eventually remain stable.

One key element in estimating the demographic impact of AIDS is the assumption made about the pace of progression from HIV infection to AIDS and ultimately to death. If progression happens rapidly (i.e., the expected period between infection and death is short) then the same level of HIV prevalence will produce a higher death rate (and a larger demographic impact) than if the survival period is longer. Although the probabilities of progression have been estimated with reasonable accuracy in the developed world, there is insufficient information to estimate the probabilities of progression to which infected individuals are subject in developing countries. The best evidence for the developing world emanates from a cohort study in Masaka, Uganda. Although the cohort studied has not yet been followed long enough to determine the median time of progression from infection to death, the information to date seems to suggest that it will be between 9 and 9.5 years. However, it may be that communities where such studies take place, like Masaka, provide better treatment of opportunistic infections than is available to most populations. If this is the case, studies such as this may over-estimate the survival period of infected individuals. In addition, the period of survival may depend on the age at infection, with those infected at younger ages tending to survive longer. Thus, as the epidemic progresses and the average age at infection declines, longer survival periods may become more common. Furthermore, since the average age at infection is usually lower for women than for men, it may be appropriate to use progression schedules having different mean survival times for females than for males.

III. RECOMMENDATIONS

This Technical Meeting discussed a number of issues related to the demographic impact of AIDS. The participants agreed on the following actions:

- All organizations publishing national HIV/AIDS estimates and projections should document in detail the estimation methods used and the assumptions made so as to enhance understanding of their strengths and limitations.

- The urgent need for better adult mortality data was underscored. Participants added their support to Recommendation 1998/1 of the thirty-first session of the Commission on Population and Development which states "…that countries lacking adequate vital statistics systems give due consideration to the collection and analysis of data in the 2000 round of population censuses for the estimation of levels of mortality ...". Nationally representative surveys can be used to estimate adult mortality by gathering information on the survival of siblings. Survey and census data on the number of deaths occurring in each household over a given period, together with information on the age and sex of the deceased, can be adjusted for under-reporting and provide a useful basis for the estimation of adult mortality.

- Participants recognized that current United Nations estimates and projections of HIV prevalence and, consequently, of the demographic impact of the epidemic represent but one plausible scenario regarding the evolution of the epidemic. It was recommended that in preparing a new set of projections, two or three variants or scenarios about the future course of the epidemic could be considered.

- Participants agreed that it was important to continue the effort to prepare such estimates and projections. The availability of such estimates and projections was thought essential in aiding decision-makers to understand the magnitude of the AIDS problem and in supporting efforts to improve prevention and health-care programmes.

- Surveillance data referring to the clients of antenatal clinics were judged to be the cornerstone for the derivation of national estimates of HIV prevalence in countries with generalized epidemics and were likely to remain so in the near future. Although those data appeared to reflect reasonably well the situation among adult women of reproductive age, there were a number of factors that could affect their representativeness. In particular, participants emphasized the need to understand better the effects of HIV infection on fertility and the biases these effects may cause in antenatal clinic data. Participants called for further research on how best to use antenatal clinic data to estimate HIV prevalence in the general adult female population.

- Sentinel surveillance systems that provide data on HIV prevalence among clients of antenatal clinics were not originally designed to develop national estimates of HIV prevalence or to monitor the epidemic by estimating HIV incidence. Nevertheless, in many countries these are the best data available for those purposes. Participants called for a review of the design of sentinel surveillance systems to explore ways in which they might be improved so as to produce data that would be more adequate for estimating HIV incidence and prevalence at the national level.

- A major source of uncertainty in national estimates is the lack of good information about HIV prevalence in rural areas. Greater efforts should be made to collect surveillance data from rural sites.

- The scarcity of direct information about HIV prevalence among men was also identified as a major source of uncertainty in the estimates for many countries. For the few countries that had information on prevalence among both men and women, there was no consistent pattern of differences between the sexes. In some countries men exhibited higher prevalence while in others women had higher

prevalence levels. In countries affected by more generalized epidemics, women did tend to show higher prevalence than men. A systematic effort to gather information leading to estimates of HIV prevalence among men was thought necessary.

- Estimates of the demographic impact of AIDS are dependent on the survival time from HIV infection to death. Current evidence suggests that the median survival time is 9 to 10 years. However, there is a need for more studies that validate those estimates in developing contexts.

- Reports of HIV prevalence from different organizations have caused confusion because the definition of prevalence varies. Some publications report prevalence in terms of the HIV-positive population in the 15-49 age group whereas others report it in terms of all adults (those aged 15 years or older) or of the total population. Some reports of prevalence include people living with AIDS while others do not. It is recommended that the standard definition of HIV prevalence include people living with AIDS and that the reference group for HIV prevalence be the population aged 15-49 since the number of infected persons aged 50 years or older is generally small. When prevalence is expressed in terms of proportions, it is recommended that it be calculated as the total number of HIV-positive persons (including those that have progressed to AIDS) aged 15 and over divided by the total population aged 15-49.

The Technical Meeting considered that the recommendations made had the potential of leading to further improvements in methodology and guiding future research. It was underscored that despite current uncertainties, AIDS was clearly having a devastating effect on development in many countries. Adult and child mortality had already increased dramatically in a number of populations, on occasion reversing over a short period the progress made in decades. There was no longer any question that in the worst affected countries the demographic impact of AIDS was severe. National and international organizations needed to improve their efforts to reverse current trends, prevent tens of millions of new infections in the coming years and, in the process, render current projections invalid.

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Annexes

Annex I

Agenda

1. Opening statements:

   - Ms. Louise Fréchette, Deputy Secretary-General
   - Mr. Bernhard Schwartländer, Senior Epidemiologist, UNAIDS
   - Mr. Joseph Chamie, Director, Population Division

2. The demographic impact of HIV/AIDS: Presentation of the results of the *1998 Revision* of the United Nations population estimates and projections.

3. Data and methodologies for estimating and projecting the impact of HIV/AIDS: Presentation of the strategy followed by UNAIDS to estimate the prevalence and incidence of the disease.

4. Discussion.

5. Future activities.

Annex II

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Annex III

Statement of Ms Louise Fréchette, Deputy Secretary-General
at the Opening of the United Nations Technical Meeting
on the Demographic Impact of HIV/AIDS

Mr. Chamie, Distinguished Experts, Colleagues,

I am grateful for the opportunity to address this technical meeting, and to reiterate to the international community the seriousness of the HIV/AIDS epidemic which the world is facing. The HIV/AIDS epidemic continues unabated, especially in developing countries and in particular in sub-Saharan Africa. It is a global human tragedy, which denies to the millions of its victims the benefits of humanity's greatest achievement -- a healthy, long life. This indeed is one of the most serious threats and challenges for the next millennium.

According to the UNAIDS report released in June of this year, well over 30 million people are currently infected by the human immuno-deficiency virus (HIV). More than two thirds of those infected reside in Sub-Saharan Africa. In the last three years alone, many countries have seen the number of persons living with HIV double.

In many African countries, AIDS has increased infant and child mortality and reduced life expectancy at birth to levels observed in the 1960s or even the 1950s. The United Nations Population Division, which has incorporated the demographic impact of HIV/AIDS into each of its biennial Revisions of world population estimates and projections since 1992, projects that sub-Saharan Africa will lose more than 60 million people to AIDS by the year 2015. In this region, AIDS is now threatening the economic and social development gains that have been so painfully achieved during the past 30 years.

Recently, President Nelson Mandela has said that the South African economy is shrinking by one per cent a year because of AIDS. This is indeed staggering. However the costs are not just a matter of economics. The AIDS tragedy is a disease of profound personal and family dimensions, undermining the social structure of societies -- it sends orphaned children searching for work and turns grandparents into parents.

The long lag between HIV infection, AIDS and death -- more than 10 years on average -- may explain why many countries have yet to experience the enormous impact the epidemic can have on their social and economic fabric and on their family structures. The Joint United Nations Programme on HIV/AIDS (UNAIDS) has been at the forefront in the fight against the disease, and has achieved many successes in raising the awareness on the seriousness of the AIDS epidemic and in involving Government authorities in this issue. As stated by Dr. Peter Piot, Executive-Director of UNAIDS "it would be a mistake for anyone to underestimate the magnitude of the effort required to bring the epidemic under control. But it would be an even bigger mistake to assume that we are not in a position to mobilize the necessary global response"

The Secretary-General, in his address to the Administrative Coordination Committee, reiterated the importance he attaches to the fight against HIV/AIDS. As stated by the Secretary-General: "the fight against AIDS has to be energized. We cannot, as a system, not react".

Ladies and Gentlemen, you should therefore understand the importance of technical meetings such as this. The Secretary-General has stressed the importance of the HIV/AIDS epidemic, especially in African countries, and the need for a stronger response in the fight against the disease. As technical experts, it is your responsibility to provide the international community and the public, reliable information on the magnitude and dynamics of the AIDS pandemic.

The official population estimates and projections in the United Nations system provided by the Population Division show an alarming impact of AIDS. The Secretary-General and I believe that it is the responsibility of the international community to reverse these trends. It will require our collective capacity to radically slow this epidemic and to prevent tens of millions of infections over the next decade.

We wish you success in this meeting.

PART TWO

AIDS, MORTALITY AND POPULATION CHANGE

Since the 1950s, mortality has been declining in the more developed countries as well as in the developing countries. Life expectancy at birth in the world as a whole has increased and in many parts of the world, populations have started enjoying the benefits of longevity. However, since the appearance of the AIDS pandemic in the late 1970s and early 1980s, the gains in longevity so painfully achieved in many developing countries, in particular those in sub-Saharan Africa, are in serious jeopardy.

As of late 1997, it is estimated that 29.4 million adults and 1.1 million children were infected by HIV (UNAIDS, 1998). During 1997 alone, 5.8 million people became infected. Since the beginning of the AIDS epidemic, 11.7 million people have already lost their lives to AIDS. Overall, more than 90 per cent of these HIV cases occurred in developing countries: 21 million in sub-Saharan Africa, 6.2 million in Asia and 1.3 million in Latin America and the Caribbean (UNAIDS, June 1998) [1]

Because many people have already died from HIV/AIDS since the beginning of the epidemic, it is estimated that, cumulatively, more than 40 million people have already been infected. At the world level, more than one million AIDS cases had been reported to WHO. However, taking into consideration such factors as under diagnosis, underreporting and delays in reporting, and based on the estimated number of HIV infections, UNAIDS estimates a cumulative 13 million people who have progressed to AIDS (UNAIDS, 1998). Of these, about a million are pediatric AIDS cases resulting from mother to child transmission, mostly in sub-Saharan Africa.

This paper provides the first results concerning the demographic impact of AIDS from the *1998 Revision* of the United Nations population estimates and projections (United Nations Population Division, forthcoming); additional analyses will be done as part of the *1998 Revision*. After the presentation of the methodology and the sources of data, the paper considers the impact of AIDS on population size, population growth, the number of deaths, the crude death rate, life expectancy at birth and infant mortality.

[1] These numbers were recently updated in December 1998. According to UNAIDS, 33.4 million people are currently infected by HIV.

I. METHODS AND SOURCES OF DATA

Beginning with the *1992 Revision*, the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat has incorporated the demographic impact of AIDS into its biennial world population estimates and projections. The impact of the epidemic was explicitly taken into account in carrying out the projections of the 16 countries with an adult HIV prevalence of 1 per cent or more in both the *1992 Revision* and the *1994 Revision*. In the *1996 Revision*, allowance for the impact of HIV/AIDS was made for the 28 countries with an adult HIV prevalence of 2 per cent or more, plus Brazil and India, and in the *1998 Revision*, those countries plus a further six that had passed the threshold of an adult HIV prevalence of 2 per cent by 1997 were considered (table 1 shows the full list of countries). Each of the 34 countries considered had a population of at least 1 million by 1995. Among them, 29 are in Africa, three in Asia, and two in Latin America and the Caribbean.

It is estimated that those 34 countries had 26 million HIV-positive persons in 1997, accounting for 85 per cent of the total HIV-positive persons in the world (30.6 million) and for 89 per cent of the number of infected persons in the less developed regions. The 29 African countries included in that group had 20 million HIV-positive persons, representing 94 per cent of the total number of persons infected with HIV in Africa (21 million). At the country level, adult HIV prevalence ranged from less than 1 per cent in Brazil and India to about 22 per cent in Botswana and Zimbabwe (table 1).

The demographic impact of HIV/AIDS is assessed by comparing estimates and projections that make allowance for the impact of AIDS with estimates and projections that hypothetically exclude AIDS. The latter are derived from the application of the United Nations Population Division standard projection program on the basis of assumptions regarding the future course of mortality that are similar and consistent with those made with respect to countries that are still largely free from the HIV/AIDS epidemic. The process to derive estimates and projections that incorporate explicitly the effect of HIV/AIDS is more complex and will be described briefly here.

The estimation and projection of the impact of HIV/AIDS is made in several steps. First, models are used to estimate the annual incidence of the disease on the basis of recent estimates of prevalence, that is, the annual number of newly infected individuals is derived from information on the total number of HIV-positive individuals at particular points in time. Second, making assumptions about the probability of progressing from HIV infection to AIDS and from AIDS to death, estimates of the annual number of deaths caused by AIDS are obtained. Third, those deaths are added to the deaths expected in the absence of AIDS and revised life tables are calculated that reflect the impact of the disease. Lastly, those life tables are used to project the population.

The first two steps are carried out by using a version of the program called EPIMODEL, developed in the early 1990s by the Global Programme on AIDS of the World Health Organization (WHO) (Chin and Luanga, 1991) and revised in 1995. EPIMODEL uses a gamma distribution to fit adult HIV prevalence. Specifically, for the *1998 Revision*, three points provide the basis for fitting the distribution: the year when the epidemic started (i.e., a point in time when prevalence was assumed to be virtually nil), and the estimated numbers of HIV-positive adults in 1994 and 1997. All these estimates were provided by the Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS estimates current HIV prevalence for about 90 countries. For most of those countries, the gamma curve fitted approximates fairly well the estimated prevalence levels in both 1994 and 1997 but for a handful of countries the 1994 estimates appeared to be inconsistent with those relative to 1997 (in that the gamma curve could not fit the two adequately). In those cases, the 1994 estimates were discounted in favour of those referring to 1997.

Once a distribution is fitted to the estimated prevalence, it is possible to derive annual projected values of adult HIV prevalence for any period and to obtain also estimated and projected values of the annual number of newly infected adults over the period (i.e., values of annual incidence). EPIMODEL was used to produce those

TABLE 1. COUNTRIES FOR WHICH THE DEMOGRAPHIC IMPACT OF HIV/AIDS IS EXPLICITLY INCLUDED IN THE *1998 REVISION* OF THE OFFICIAL UNITED NATIONS ESTIMATES AND PROJECTIONS

	Country	*Adult HIV prevalence 1997*	*Per cent of adult population*	*Year when widespread transmission began*
AFRICA				
1.	Benin	52,000	1.76	1968
2.	Botswana	190,000	22.09	1985
3.	Burkina Faso	350,000	6.00	1974
4.	Burundi	242,000	7.02	1976
5.	Cameroon	310,000	3.99	1968
6.	Central African Republic	170,000	8.61	1972
7.	Chad	83,000	2.20	1976
8.	Congo	95,000	6.37	1976
9.	Côte d'Ivoire	670,000	8.49	1978
10.	Democratic Republic of the Congo	900,000	3.55	1974
11.	Eritrea	49,000	2.57	1983
12.	Ethiopia	2,500,000	7.73	1980
13.	Gabon	22,000	3.12	1974
14.	Guinea-Bissau	11,000	1.71	1974
15.	Kenya	1,600,000	10.43	1974
16.	Lesotho	82,000	6.66	1983
17.	Liberia	42,000	2.96	1978
18.	Malawi	670,000	12.51	1975
19.	Mozambique	1,200,000	11.92	1985
20.	Namibia	150,000	16.12	1985
21.	Nigeria	2,200,000	3.41	1974
22.	Rwanda	350,000	11.16	1970
23.	Sierra Leone	64,000	2.59	1978
24.	South Africa	2,800,000	11.80	1985
25.	Togo	160,000	6.85	1978
26.	Uganda	870,000	8.14	1976
27.	United Republic of Tanzania	1,400,000	8.21	1976
28.	Zambia	730,000	16.62	1976
29.	Zimbabwe	1,400,000	21.52	1976
ASIA				
30.	Cambodia	120,000	1.98	1987
31.	India	4,100,000	0.65	1986
32.	Thailand	770,000	1.81	1985
LATIN AMERICA AND THE CARIBBEAN				
33.	Brazil	570,000	0.51	1980
34.	Haiti	180,000	4.08	1976

Source: UNAIDS, 1998; United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

those values for the period ranging from the start of the epidemic to the year in which the number of new infections reached half of its maximum value, and from there until 2050 the number of new infections was maintained constant. However, for the 9 countries that had an HIV prevalence above 10 per cent in 1997, EPIMODEL produced sharply declining numbers of new infections after the maximum was reached, an outcome that was judged implausible. Consequently, in projecting the number of future infections for those countries, the gamma estimates were used until the maximum was reached and for the next 20 years the

projected number of new infections was made to decline linearly to half the maximum level. Then, as for the other 25 countries, the projected number of new infections was kept constant at half the maximum level until 2050.

To complete the derivation of the overall number of newly infected persons per year, it is necessary to estimate the number of pediatric HIV cases. Using for each country an estimate of the proportion of HIV cases that occur among women, in conjunction with the likely age distribution for the total number of infected women and a set of age-specific fertility rates consistent with the experience of the country concerned, the number of children born to HIV-positive women is calculated. Then, assuming that 35 per cent of the children born to HIV-positive women contract the disease (30 per cent in the cases of Cambodia and India; and 25 per cent in the cases of Brazil, Haiti and Thailand), EPIMODEL estimates the annual number of HIV-positive children expected.

Once the numbers of newly infected children and adults are available for each year of the period that begins with the start of the epidemic and ends in 2050, EPIMODEL calculates the number of deaths expected by following each infection cohort through time and applying model probability schedules that encapsulate the chances of progressing from HIV-infection to AIDS and from AIDS to death. Different progression schedules are used for children and adults (tables 2 and 3). Furthermore, for adults two schedules are used that differ from each other in the median survival time from infection to full-blown AIDS. For African countries and Cambodia, the adult progression schedule used has a median progression time of 8 years whereas for Brazil, Haiti, India and Thailand, the schedule used has a median progression time of 10 years. When the median survival time from AIDS to death is added, the procedure used assumes that median survival time from HIV infection to death is 9 years in African countries and in Cambodia, and it is 11 years for the other countries in Asia as well as for Brazil and Haiti. These assumptions are consistent with those made by UNAIDS in estimating the global prevalence of HIV/AIDS.

EPIMODEL thus yields the number of AIDS deaths expected annually among children and among adults (i.e., persons aged 15 years or over). Then another set of programs is used to distribute the number of AIDS deaths by five-year age group and sex. In doing so, it is assumed that HIV infection and therefore AIDS affect as many women as men in sub-Saharan African countries but that both are more common among men than among women in other countries. Specifically, it is assumed that 50 per cent of AIDS deaths occur among men in sub-Saharan Africa; 67 per cent in Cambodia, India and Thailand; and 75 per cent in Brazil and Haiti.

The resulting AIDS deaths classified by age group and sex are added to the number of deaths calculated for each country by using the standard assumptions about the future course of mortality that underlie the United Nations projections in countries not affected by HIV/AIDS. The adjusted number of deaths is then used to derive new life tables that are in turn the basis for a modified projection of the total population that thus incorporates explicitly the effect of AIDS.

TABLE 2. CUMULATIVE SCHEDULES INDICATING THE PACE OF PROGRESSION FROM HIV TO AIDS AND FROM AIDS TO DEATH, SUB-SAHARAN AFRICAN AND CAMBODIA

Year	*Adult HIV to Adult AIDS*	*Adult AIDS to Adult Death*	*Pediatric HIV to Pediatric AIDS*	*Pediatric AIDS to Pediatric Death*
0	0.0	50.0	33.0	95.0
1	1.0	100.0	54.0	100.0
2	4.0	100.0	66.0	100.0
3	13.0	100.0	76.0	100.0
4	21.0	100.0	84.0	100.0
5	31.0	100.0	90.0	100.0
6	40.0	100.0	94.0	100.0
7	50.0	100.0	96.0	100.0
8	60.0	100.0	97.0	100.0
9	70.0	100.0	97.0	100.0
10	76.0	100.0	97.0	100.0
11	81.0	100.0	97.0	100.0
12	86.0	100.0	97.0	100.0
13	90.0	100.0	97.0	100.0
14	90.0	100.0	97.0	100.0
15	90.0	100.0	97.0	100.0
16	90.0	100.0	97.0	100.0
17	90.0	100.0	97.0	100.0

Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

TABLE 3. CUMULATIVE SCHEDULE S INDICATING THE PACE OF PROGRESSION FROM HIV TO AIDS AND FROM AIDS TO DEATH, BRAZIL, HAITI, INDIA AND THAILAND

Year	*Adult HIV to Adult AIDS*	*Adult AIDS to Adult Death*	*Pediatric HIV to Pediatric AIDS*	*Pediatric AIDS to Pediatric Death*
0	0.0	50.0	33.0	95.0
1	0.5	100.0	54.0	100.0
2	3.0	100.0	66.0	100.0
3	9.0	100.0	76.0	100.0
4	15.0	100.0	84.0	100.0
5	22.0	100.0	90.0	100.0
6	29.0	100.0	94.0	100.0
7	36.0	100.0	96.0	100.0
8	43.0	100.0	97.0	100.0
9	50.0	100.0	97.0	100.0
10	54.0	100.0	97.0	100.0
11	58.0	100.0	97.0	100.0
12	62.0	100.0	97.0	100.0
13	66.0	100.0	97.0	100.0
14	70.0	100.0	97.0	100.0
15	74.0	100.0	97.0	100.0
16	78.0	100.0	97.0	100.0
17	82.0	100.0	97.0	100.0
18	86.0	100.0	97.0	100.0
19	90.0	100.0	97.0	100.0

Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

II. THE IMPACT OF AIDS

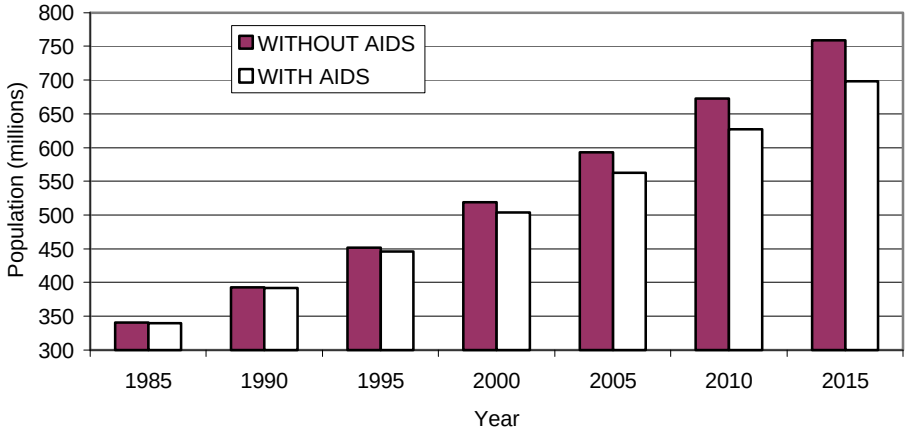
The impact of HIV/AIDS is assessed for each of the 34 countries listed in table 1 by considering demographic variables such as total population size, additional deaths due to AIDS, the crude death rate, the life expectancy at birth and infant mortality. Since 29 of the 34 countries considered are in Africa, the results are presented separately for African countries as an aggregate. In addition, special attention is given to the plight of the 9 countries where adult HIV prevalence is over 10 per cent, namely, Botswana, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Africa, Zambia and Zimbabwe. Results for that group of most affected countries are also presented separately.

A. POPULATION SIZE

Figure 1 presents the projected population size from 1985 to 2015 taking into account the demographic impact of AIDS as well as the hypothetical projected population excluding the impact of AIDS. The absolute difference between the projected population with and without AIDS indicates the cumulative impact of AIDS. For the 29 African countries considered, the population is estimated at 446 million as of mid-1995, about five million fewer or 1.2 per cent lower than it would have been in the absence of AIDS. By 2015, their population is expected to be 698 million, 61 million (or 8.1 per cent) less than it would have been in the absence of AIDS.

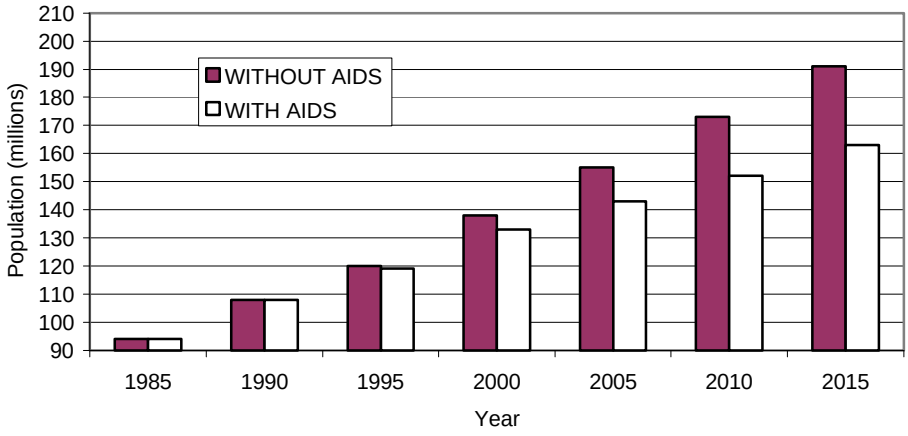
The effect on population size due to the AIDS epidemic is even more striking in the nine most affected African countries. In 1995, their population stood at 119 million, 1.3 million or 1.1 per cent less than it would have been without AIDS. Furthermore, since the impact of the epidemic is projected to increase, the difference between the projected population with and without AIDS rises, in relative terms, to 7.8 per cent in 2005 and reaches 14.6 per cent in 2015 (figure 2).

FIGURE 1. POPULATION SIZE WITH AND WITHOUT AIDS FOR THE 29 AFRICAN COUNTRIES WITH MODERATE TO HIGH ADULT HIV PREVALENCE, 1985-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 2. POPULATION SIZE WITH AND WITHOUT AIDS IN THE 9 COUNTRIES WITH THE HIGHEST ADULT HIV PREVALENCE, 1985-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

At the country level, by 2015, the populations of Botswana and Namibia are expected to be 20 per cent lower than they would have been in the absence of AIDS and Zimbabwe's population will be 19 per cent lower (see table 1 of Annex 5). In South Africa, a country facing one of the most rapidly rising epidemics, the population is expected to be 16 per cent lower than in the absence of AIDS. In the other countries where adult HIV prevalence is already above 10 per cent, the population in 2015 is also expected to be significantly lower because of AIDS (by 12 per cent in Malawi and 15 per cent in Mozambique, for instance).

Outside of Africa, because adult HIV prevalence is generally lower, the impact of AIDS on population size is expected to be more moderate in relative terms. By 2015, the population of Cambodia will be just 2.5 per cent smaller than it would have been without AIDS, that of Thailand would be 2.4 per cent lower, and for India and Brazil the difference would be around 1 per cent. The largest effect will be in Haiti, where the 2015 population is expected to be 3.8 lower than it would have been without AIDS. However, because of their large population, Brazil and India will experience a considerable shortfall in absolute terms, with their 2015 populations being, respectively, 1.7 million and 13 million less than they are expected to be without the effect of AIDS.

Although AIDS has a very serious relative effect on population size over the long run, in none of the 34 countries considered is population expected to decline during the projection period. Table 2 reveals that even with AIDS, the population of the 29 African countries with a significant adult HIV prevalence is projected to increase by more than half during 1995-2015, from 446 million to 698 million. Even in the 9 countries with the highest prevalence, the population is expected to be nearly one and half times as high in 2015 as in 1985 (figure 2). The remarkably high population growth expected in African countries in spite of the HIV/AIDS epidemic is primarily due to the persistence of high fertility in most of the region. Even in a low fertility country, such as Thailand, the population is expected to continue growing under the impact of AIDS, though

overall growth will be 24 per cent between 1995 and 2015 rather than the 26 per cent estimated in the absence of the disease.

B. NUMBER OF DEATHS

Table 5 and table 2 of Annex 5 present the projected number of deaths from 1985-1990 to 2010-2015 taking into account the impact of the HIV/AIDS epidemic. Also shown are the projected numbers of deaths assuming that there is no such epidemic. The difference between those two numbers is the additional number of deaths due to AIDS. The tables show that the impact of AIDS on the number of deaths reaches its peak in most countries around 2000-2005 or 2005-2010 and declines thereafter. The ensuing decline reflects the assumption that the number of new infections will eventually stabilize. In the absence of AIDS, the total number of deaths in the 29 African countries considered is expected to increase from 29 million in 1985-1990 to 32 million in 2005-2010. With AIDS, the total number of deaths is expected to rise instead to 44 million in 2005-2010, implying that the epidemic would induce almost 12 million (or 37 per cent) additional deaths. In total, about 169 million deaths are projected to occur between 1995 and 2015 in the 29 African countries considered, a number 41 million higher than the 128 million deaths that would have been expected in the absence of AIDS.

The impact of AIDS is projected to be more severe in the 9 African countries where adult HIV prevalence is above 10 per cent. The additional number of deaths due to AIDS in those countries will rise from 12 per cent in 1990-1995 to 46 per cent in 1995-2000, 88 per cent in 2000-2005 and 96 per cent in 2005-2010. Overall, between 1995 and 2015, those 9 countries will experience about 21 million (76 per cent) additional deaths due to AIDS. South Africa will account for the largest share of those deaths (7.4 million), followed by Kenya (4.3 million), Nigeria (4.3 million), Ethiopia (4.1 million), Mozambique (3.4 million), the United Republic of Tanzania (3.1 million) and Zimbabwe (2.4 million).

The proportional increase in the number of deaths due to AIDS is highest in Botswana, where the epidemic will cause the total number of deaths between 1995 and 2015 to rise by 208 per cent. In Zimbabwe, AIDS will induce a 139 per cent rise in the cumulative number of deaths during that period, while in Namibia the increase will be of 135 per cent, 107 per cent in South Africa, 97 per cent in Kenya and 19 per cent in Uganda.

Outside of Africa, Thailand and Haiti are the only two countries where the additional number of deaths due to AIDS between 1995 and 2015 will reach 15 per cent. In terms of absolute numbers, India is expected to experience the highest number of additional deaths due to AIDS: 9.1 million between 1995 and 2015. Furthermore, because the epidemic started relatively late in India (in the late 1980s), the additional number of deaths due to AIDS is projected to peak after 2010, so that during 2010-2015 there will be 3.7 million additional deaths due to AIDS, almost 9 per cent more than expected in the absence of the disease.

C. POPULATION GROWTH

Partly because of the increase in mortality brought about by the HIV/AIDS epidemic, the rate of population growth has declined and will continue to do so in the countries affected. Figure 3 shows that in the 29 African countries considered, the annual population growth will be significantly lower than it would have been in the absence of AIDS. In the 9 most affected countries, the expected reduction of the growth rate is even larger. In Botswana, for example, the growth rate, which stood at 2.9 per cent per year in 1990-1995 is expected to be cut by more than half to reach 1.2 per cent per year in 2000-2005 (figure 4). In the absence of AIDS, Botswana's population would have been growing at more than 2.5 per cent per year through 2005.

As in Botswana, the impact of AIDS on the growth rate of Zimbabwe is staggering. Estimated at 3.3 per cent annually in the early 1980s, the growth rate fell to nearly 2 per cent per year in 1990-1995 and is expected to decline to less than 1 per cent per year in 2000-2005 (figure 5). In the absence of AIDS, Zimbabwe's population would have been growing at 2.2 per cent per year in 2000-2005. South Africa's annual rate of population growth is also expected to decrease significantly, passing from 1.9 per cent in 1990-1995 to 0.3 per cent in 2005-2010 (figure 6), instead of remaining at a moderate 1.5 per cent in the absence of AIDS.

TABLE 4. ESTIMATED AND PROJECTED POPULATION SIZE WITH AND WITHOUT AIDS, BY COUNTRY GROUPING, 1985 TO 2015

Country grouping	*1985*	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*
ALL 34 COUNTRIES							
With AIDS	1308176	1461908	1615622	1768457	1916004	2059478	2203860
Without AIDS	1308380	1463494	1622103	1786294	1952813	2117930	2282750
Absolute difference	206	1586	6480	17836	36808	58451	78890
Percentage difference	0.0	0.1	0.4	1.0	1.9	2.8	3.5
29 AFRICAN COUNTRIES							
With AIDS	340454	392019	446459	503891	562796	627010	697782
Without AIDS	340573	393263	451820	518750	592697	673452	759252
Absolute difference	119	1244	5361	14858	29901	46443	61470
Percentage difference	0.0	0.3	1.2	2.9	5.0	6.9	8.1
3 ASIAN COUNTRIES							
With AIDS	826372	915033	1002257	1086229	1163648	1231924	1294941
Without AIDS	826410	915260	1003053	1088494	1169360	1242244	1310202
Absolute difference	38	227	795	2265	5712	10320	15262
Percentage difference	0.0	0.0	0.1	0.2	0.5	0.8	1.2
2 LATIN AMERICAN COUNTRIES							
With AIDS	141349	154856	166906	178337	189561	200544	211137
Without AIDS	141397	154971	167230	179050	190756	202233	213295
Absolute difference	48	115	324	713	1195	1689	2158
Percentage difference	0.0	0.1	0.2	0.4	0.6	0.8	1.0
9 COUNTRIES WITH MORE THAN 10 PER CENT PREVALENCE							
With AIDS	94478	107812	119085	132982	142782	152321	162903
Without AIDS	94511	108059	120432	137967	154837	172698	190643
Absolute difference	33	247	1348	4986	12055	20377	27740
Percentage difference	0	0.2	1.1	3.6	7.8	11.8	14.6

Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

D. CRUDE DEATH RATE

Table 6 and table 3 of Annex 5 present the average annual crude death rate per five-year period, from 1985-1990 to 2010-2015, and for the two projections, with and without AIDS. In the absence of AIDS, the crude death rate for the 29 African countries considered was expected to decline from 16 deaths per 1,000 persons in 1985-1990 to 9 deaths per 1,000 in 2010-2015. AIDS will cause the crude death rate to remain stable at 16 deaths per 1,000 until 2000-2005 before declining somewhat to 13 deaths per 1,000 by 2010-2015. The ratio of the crude death rate according to the projections with AIDS and that yielded by the projections without AIDS will rise over time, peaking in 2005-2010 when AIDS will be responsible for a 46 per cent increase in the crude death rate. At that point, the crude death rate is projected to be 14.9 deaths per 1,000 with AIDS instead of 10.2 deaths per 1,000 if there were no AIDS (figure 7).

The impact of AIDS on the crude death rate is even more severe in the 9 African countries with the highest adult HIV prevalence. In the absence of AIDS, the crude death rate is projected to decline from 12.9 deaths per 1,000 in 1990-1995 to 8.5 deaths per 1,000 in 2005-2010, whereas with AIDS the crude death rate, which starts at 14.6 deaths per 1,000 in 1990-1995, is projected to reach 18.6 deaths per 1,000 in 2005-2010 (figure 8). That is, by 2005-2010, the crude death rate with AIDS is expected to be more than 118 per cent higher than it would have been in the absence of AIDS.

Botswana will experience the largest rise in the crude death rate. If AIDS had not spread, the crude death rate in that country would have been 5.6 deaths per 1,000 in 1995-2000 and would have declined further to 4.4 deaths per 1,000 in 2005-2010. Because of the AIDS epidemic, the crude death rate is estimated to be 8 deaths per 1,000 in 1990-1995 and is projected to rise to 19.9 deaths per 1,000 in 2000-2005 before falling to 17.7 deaths per 1,000 in 2005-2010. Thus, between 2000 and 2010, AIDS is expected to account for a four-fold rise of the crude death rate in Botswana in relation to the value it would have had in the absence of AIDS.

In Zimbabwe, the crude death rate is estimated at 17.7 deaths per 1,000 in 1995-2000, 135 per cent higher than it would have been in the absence of AIDS (7.4 deaths per 1,000), and it is projected to be 20 deaths per 1,000 in 2000-2005 and 17.5 deaths per 1,000 in 2005-2010, about three times the levels projected in the absence of AIDS (6.5 and 5.8 deaths per 1,000, respectively). In Namibia, as well, AIDS would multiply the crude death rate by three or more by 2005-2010.

In Haiti and Thailand, the AIDS epidemic has markedly affected the crude death rate. In both countries, the crude death rate in 2000-2005 would be raised by over one-fifth due to AIDS. In the absence of AIDS, Haiti would have experienced a moderate decline in mortality over time with the crude death rate reaching 9.0 deaths per 1,000 in 2005-2010 but, because of AIDS, the decline is expected to be slower and the crude death rate during that period would be somewhat higher at 10.8 per 1,000. In Thailand, partly because of population ageing, the crude death rate was expected to remain constant or even rise somewhat even without AIDS. The existence of the epidemic will make the crude death rate rise further. By 2000-2005, it is expected to reach 7.2 deaths per 1,000, a level 27 per cent higher than it would have been in the absence of AIDS

E. LIFE EXPECTANCY AT BIRTH

Life expectancy at birth, a measure indicating the average number of years that a newborn child would live if mortality remained constant throughout his lifetime, is estimated for each of the 34 countries considered (see table 7 and table 4 of Annex 5). During 1995-2000, life expectancy in the 29 African countries with a significant adult HIV prevalence is estimated at around 47 years, 7 years lower than it would have been in the absence of AIDS, and that level is expected to remain largely unchanged until 2000-2005 when, in the absence of AIDS, life expectancy would have been 56 years (figure 9). However, there is considerable variation among countries.

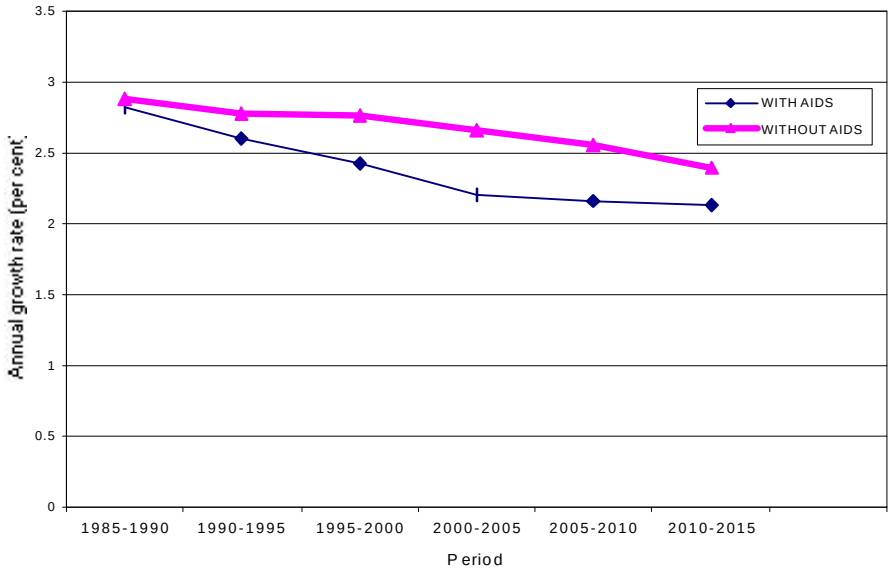
TABLE 5. ESTIMATED AND PROJECTED NUMBER OF DEATHS WITH AND WITHOUT AIDS, BY COUNTRY GROUPING, 1985-1990 TO 2010-2015

Country grouping	*1985-1990*	*1990-1995*	*1995-2000*	*2000-2005*	*2005-2010*	*2010-2015*
ALL 34 COUNTRIES						
With AIDS	83652	86929	90900	97076	99359	99520
Without AIDS	82565	83293	82267	82495	83143	85336
Additional deaths	1087	3636	8633	14581	16216	14184
Percentage difference	1.3	4.4	10.5	17.7	19.5	16.6
29 AFRICAN COUNTRIES						
With AIDS	29650	34084	38557	43289	44393	42548
Without AIDS	28783	30901	31007	31587	32304	32826
Additional deaths	867	3183	7550	11702	12089	9722
Percentage difference	3	10.3	24.3	37	37.4	29.6
3 ASIAN COUNTRIES						
With AIDS	48095	46743	45901	46956	47728	49324
Without AIDS	47935	46474	45163	44510	44046	45276
Additional deaths	161	269	738	2446	3682	4047
Percentage difference	0.3	0.6	1.6	5.5	8.4	8.9
2 LATIN AMERICAN COUNTRIES						
With AIDS	5907	6101	6442	6832	7238	7648
Without AIDS	5848	5918	6097	6398	6793	7234
Additional deaths	59	184	345	434	444	414
Percentage difference	1	3.1	5.7	6.8	6.5	5.7
9 COUNTRIES WITH MORE THAN 10 PER CENT PREVALENCE						
With AIDS	6734	8305	9820	12883	13726	12559
Without AIDS	6567	7396	6704	6864	6988	7128
Additional deaths	167	909	3116	6019	6738	5431
Percentage difference	2.5	12.3	46.5	87.7	96.4	76.2

Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

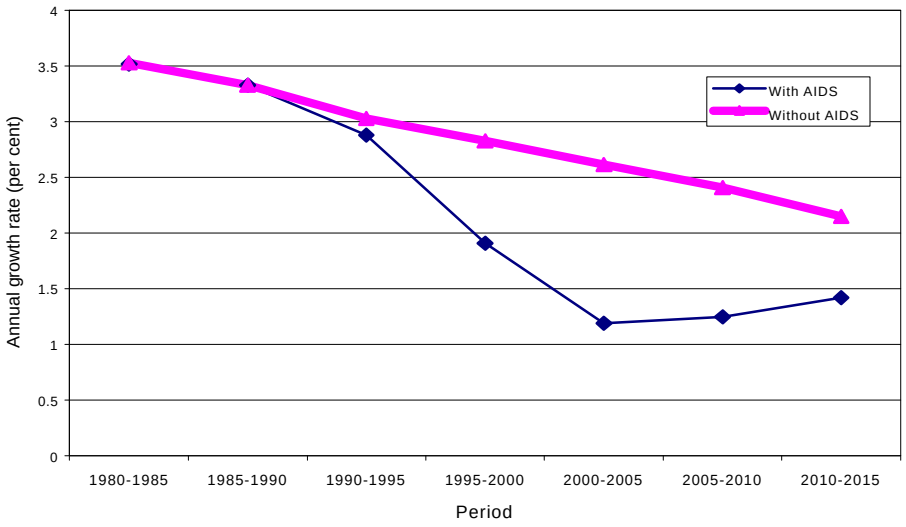
As a result of the increasing mortality due to AIDS, life expectancy has stagnated or declined in several African countries and this trend is likely to continue through 2010. The effect of AIDS is more marked in the 9 countries with the highest HIV prevalence. Thus, life expectancy in those countries is estimated at 48 years in 1995-2000 instead of the 58 years it would have been in the absence of AIDS, a loss of 10 years of life (figure 10). By 2005-2010, the difference in expected life expectancy with and without AIDS is projected to reach 18 years.

FIGURE 3. ANNUAL RATE OF POPULATION GROWTH WITH AND WITHOUT AIDS, 29 AFRICAN COUNTRIES, 1985-1990 TO 2010-2015



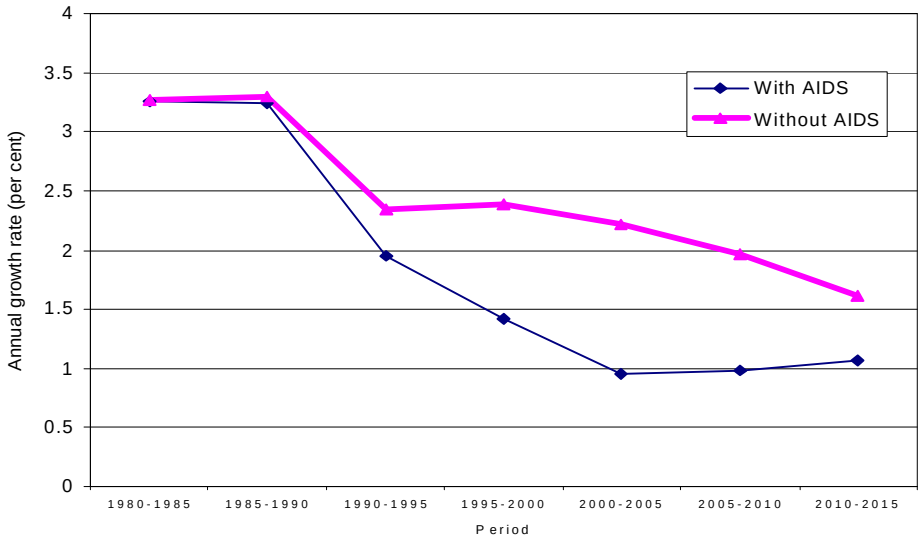
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 4. ANNUAL RATE OF POPULATION GROWTH WITH AND WITHOUT AIDS, BOTSWANA, 1980-1985 TO 2010-2015



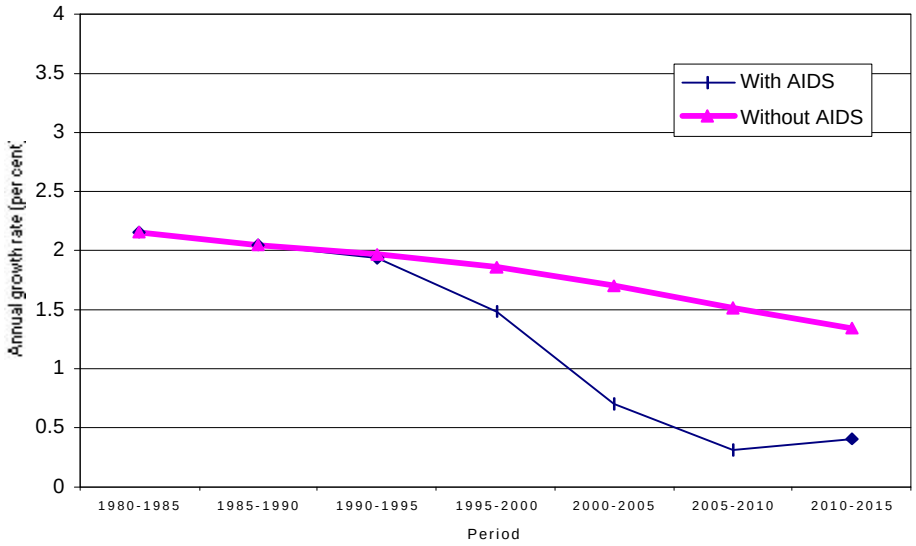
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 5. ANNUAL RATE OF POPULATION GROWTH WITH OR WITHOUT AIDS, ZIMBABWE, 1980-1985 AND 2010-2015



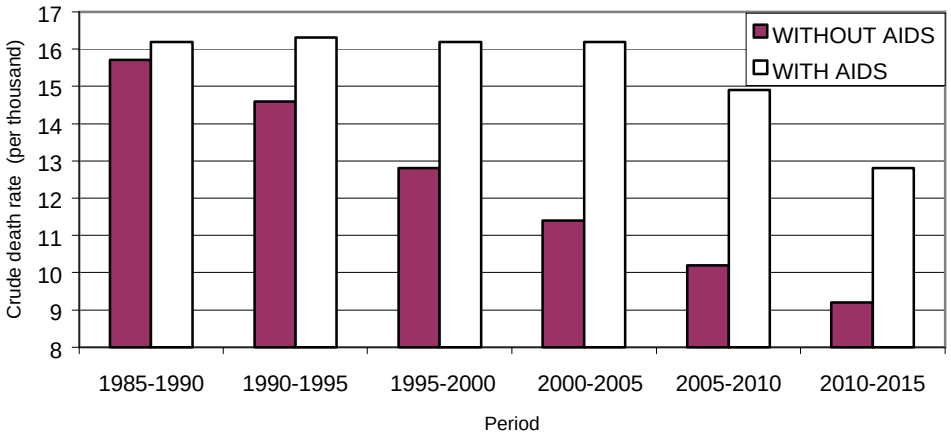
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 6. ANNUAL RATE OF POPULATION GROWTH WITH AND WITHOUT AIDS, SOUTH AFRICA, 1980-1985 TO 2010-2015



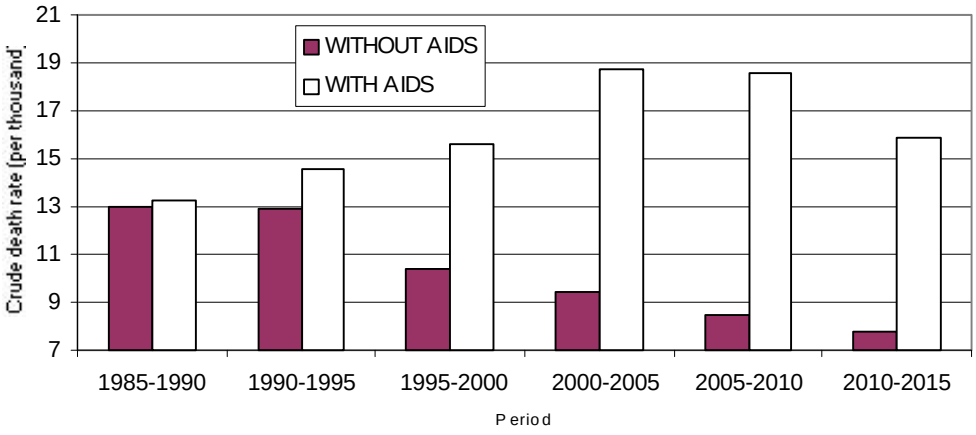
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 7. CRUDE DEATH RATE WITH AND WITHOUT AIDS, 29 AFRICAN COUNTRIES, 1985-1990 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 8. CRUDE DEATH RATE WITH AND WITHOUT AIDS, 9 COUNTRIES WITH HIGHEST PREVALENCE, 1985-1990 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

TABLE 6. ESTIMATED AND PROJECTED CRUDE DEATH RATE WITH AND WITHOUT AIDS, BY COUNTRY GROUPING, 1985-1990 TO 2010-2015

Country grouping	*1985-1990*	*1990-1995*	*1995-2000*	*2000-2005*	*2005-2010*	*2010-2015*
ALL 34 COUNTRIES						
With AIDS	12.1	11.3	10.7	10.5	10	9.3
Without AIDS	11.9	10.8	9.7	8.8	8.2	7.8
Absolute difference	0.2	0.5	1.1	1.7	1.8	1.6
Percentage difference	1.4	4.6	11.3	19.4	22.4	20.4
29 AFRICAN COUNTRIES						
With AIDS	16.2	16.3	16.2	16.2	14.9	12.8
Without AIDS	15.7	14.6	12.8	11.4	10.2	9.2
Absolute difference	0.5	1.6	3.4	4.9	4.7	3.7
Percentage difference	3.2	11.2	27	42.8	46.2	40.2
3 ASIAN COUNTRIES						
With AIDS	11	9.8	8.8	8.3	8	7.8
Without AIDS	11	9.7	8.6	7.9	7.3	7.1
Absolute difference	0	0.1	0.2	0.5	0.7	0.7
Percentage difference	0.3	0.6	1.8	5.9	9.1	10
2 LATIN AMERICAN COUNTRIES						
With AIDS	8	7.6	7.5	7.4	7.4	7.4
Without AIDS	7.9	7.3	7	6.9	6.9	7
Absolute difference	0.1	0.2	0.4	0.5	0.5	0.5
Percentage difference	1.1	3.2	6	7.3	7.3	6.7
9 COUNTRIES WITH MORE THAN 10 PER CENT PREVALENCE						
With AIDS	13.3	14.6	15.6	18.7	18.6	15.9
Without AIDS	13	12.9	10.4	9.4	8.5	7.8
Absolute difference	0.3	1.7	5.2	9.3	10.1	8.1
Percentage difference	2.7	13.1	50.2	99.3	118	103.1

Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

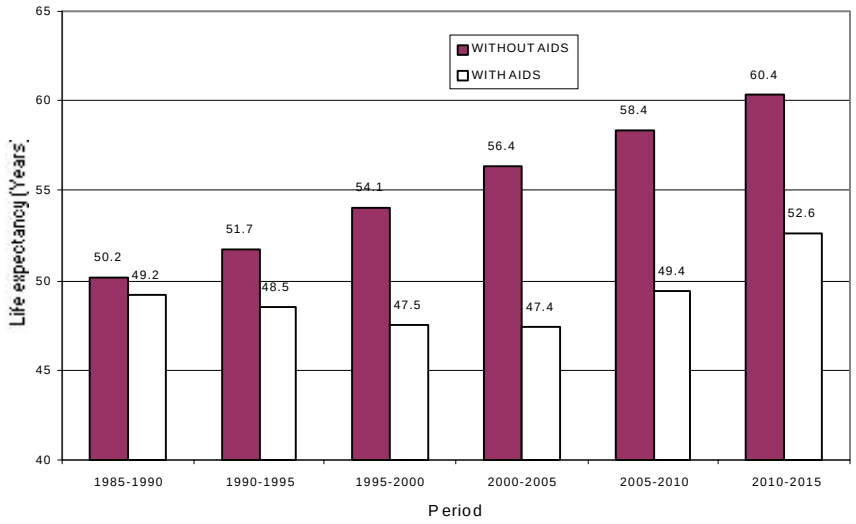
As a result of the increasing mortality due to AIDS, life expectancy has stagnated or declined in several African countries and this trend is likely to continue through 2010. The effect of AIDS is more marked in the 9 countries with the highest HIV prevalence. Thus, life expectancy in those countries is estimated at 48 years in 1995-2000 instead of the 58 years it would have been in the absence of AIDS, a loss of 10 years of life (figure 10). By 2005-2010, the difference in expected life expectancy with and without AIDS is projected to reach 18 years.

TABLE 7. ESTIMATED AND PROJECTED LIFE EXPECTANCY AT BIRTH WITH AND WITHOUT AIDS, BY COUNTRY GROUPING, 1985-1990 TO 2010-2015

Country grouping	*1985-1990*	*1990-1995*	*1995-2000*	*2000-2005*	*2005-2010*	*2010-2015*
ALL 34 COUNTRIES						
With AIDS	55.4	56.4	57.0	57.4	58.7	60.7
Without AIDS	55.8	57.7	59.7	61.7	63.4	65.1
Absolute difference	0.4	1.2	2.8	4.3	4.7	4.4
Percentage difference	0.7	2.2	4.6	6.9	7.5	6.7
29 AFRICAN COUNTRIES						
With AIDS	49.2	48.5	47.5	47.4	49.4	52.6
Without AIDS	50.2	51.7	54.1	56.4	58.4	60.4
Absolute difference	1.0	3.2	6.6	9.0	9.0	7.8
Percentage difference	2.0	6.1	12.1	15.9	15.4	12.9
3 ASIANCOUNTRIES						
With AIDS	57.9	60.5	62.7	64.2	65.9	67.4
Without AIDS	58.0	60.6	63.0	65.2	67.3	69.0
Absolute difference	0.1	0.1	0.3	0.9	1.4	1.6
Percentage difference	0.2	0.2	0.4	1.5	2.1	2.3
2 LATIN AMERICAN COUNTRIES						
With AIDS	63.8	64.9	65.9	67.0	68.2	69.5
Without AIDS	64.0	65.5	67	68.3	69.7	70.9
Absolute difference	0.2	0.6	1.1	1.4	1.4	1.4
Percentage difference	0.3	0.9	1.6	2.0	2.1	2.0
9 COUNTRIES WITH MORE THAN 10 PER CENT PREVALENCE						
With AIDS	53.4	50.7	47.6	43.4	43.8	47.1
Without AIDS	54.2	54.5	58.0	59.9	61.8	63.4
Absolute difference	0.9	3.8	10.4	16.5	18.0	16.3
Percentage difference	1.6	7.0	17.9	27.5	29.1	25.6

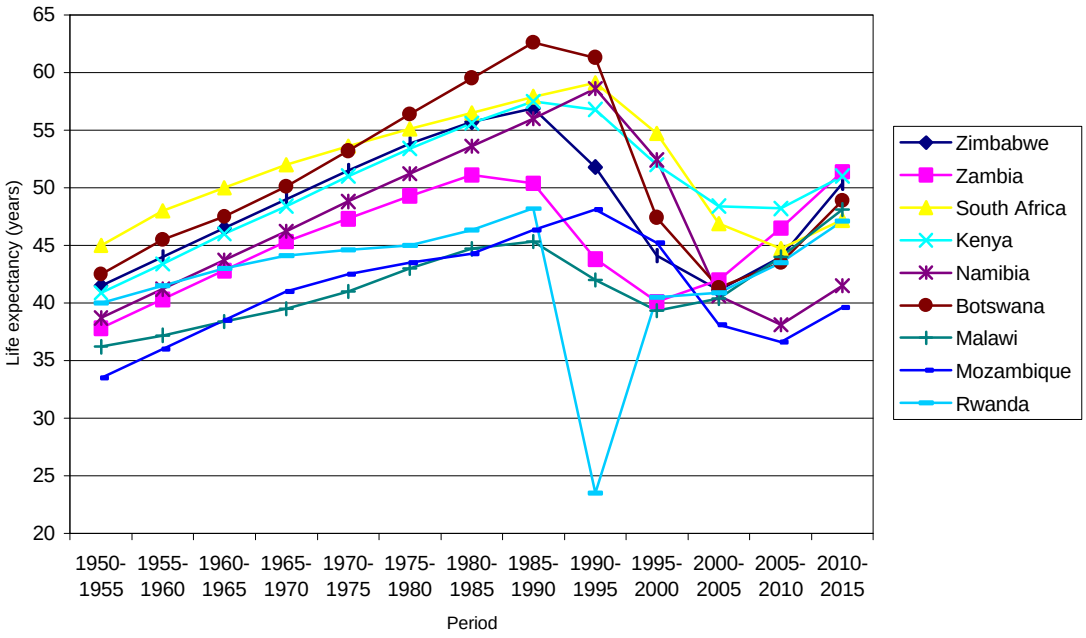
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming

FIGURE 9. LIFE EXPECTANCY AT BIRTH WITH AND WITHOUT AIDS, 29 AFRICAN COUNTRIES, 1985-1990 AND 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 10. LIFE EXPECTANCY AT BIRTH WITH AND WITHOUT AIDS, THE 9 COUNTRIES WITH THE HIGHEST PREVALENCE, 1950-1955 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

Among the 9 countries with the highest adult HIV prevalence, Botswana, Namibia and Zimbabwe are affected the most. In Botswana, life expectancy at birth is expected to drop from 61 years in 1990-1995 to 47 years in 1995-2000 and then to 41 years in 2000-2005. In the absence of AIDS, life expectancy would have been 65 years in 1990-1995, 67 years in 1995-2000 and over 69 years in 2000-2005.

In Namibia, life expectancy is expected to drop from 58 years in 1990-1995 to 38 years in 2000-2005, 28 years less than it would have been in 2005-2010 in the absence of AIDS. In Zimbabwe, life expectancy was estimated at 52 years in 1990-1995 compared to 61 years in the absence of AIDS. It is projected to decrease to 44 years in 1995-2000 and 41 years in 2000-2005. In the absence of AIDS, it would have been expected to rise to 66 years by 2000-2005, a difference of 25 years.

In South Africa, where the epidemic started later than in Zimbabwe, life expectancy at birth is also expected to decrease drastically. In 1990-1995, the average life span was estimated at 59 years, barely affected by AIDS. By 2005-2010, life expectancy is projected to decrease to 45 years; 21 years less than the expected level in the absence of HIV/AIDS. In other countries with high HIV prevalence, at least 15 years of life are expected to be lost to AIDS by 2005-2010: 20 years in Kenya; 18 years in Mozambique, and 15 years in Zambia. A substantial number of years of life expectancy would also be lost by several other countries in Africa, such as Lesotho (12 years), and Cameroon, Central African Republic and Côte d'Ivoire (10 years in each).

Outside the African region, Cambodia, Haiti and Thailand will also exhibit significant reductions of life expectancy. In Cambodia, life expectancy at birth is estimated at 53 years in 1995-2000. By 2000-2005, it is expected to increase by just one year, to 54 years, 3 years less than it would have been in the absence of AIDS. In Haiti, because of AIDS the average life-span is projected to stagnate at about 54 years between 1985-1990 and 1995-2000 and rise to just 55 years in 2000-2005, whereas in the absence of AIDS, life expectancy would have been 59 years in 2000-2005. Similarly, in the absence of AIDS, the life expectancy at birth in Thailand in 2000-2005 would have reached 73 years, while it is projected to be only 69 years with AIDS. Lastly, in Brazil and India, the impact of AIDS on average life expectancy is relatively small, amounting to a reduction of about a year in Brazil between 1995 and 2015 or of about the same magnitude in India between between 2005 and 2015.

F. INFANT MORTALITY

Approximately one-fourth to one-third of the children born to HIV-positive women are likely to acquire the infection from their mothers. Pediatric HIV infection is expected to have a substantial impact on mortality during infancy and childhood, particularly among older children (above age one). Table 8 and table 5 of Annex 5 present the infant mortality rates for groups of countries and for each of the 34 countries countries considered, both taking into account the impact of AIDS and in the absence of it. Even taking into account the impact of AIDS, infant mortality in the 29 African countries with moderate to high adult HIV prevalence is estimated to decline from 103 deaths of infants under age 1 per 1,000 live births in 1985-1990 to 78 per 1,000 in 2005-2010. However in the absence of AIDS, the decline would have been much steeper, from 102 deaths per 1,000 live births to 70 per 1,000 (figure 11).

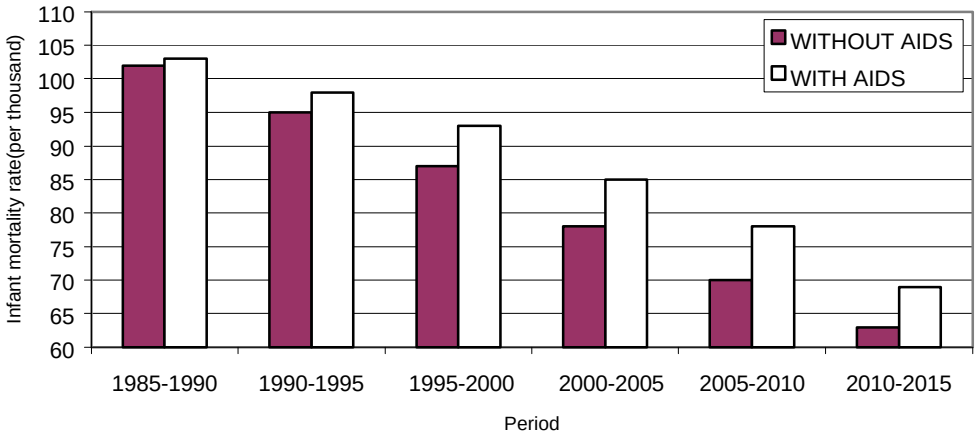
In the 9 African countries with the highest adult HIV seroprevalence, infant mortality in 1995-2000 is estimated at 86 deaths per 1,000 live births in the presence of AIDS, but only 76 per 1,000 in the absence of AIDS, that is, AIDS has already produced more than a 10 per cent rise in infant mortality (figure 12). Among those countries, Botswana has been the most affected, with infant mortality in 1995-2000 being estimated at 58 deaths per 1,000 instead of the 39 per 1,000 estimated in the absence of AIDS (figure 13). By 2005-2010, infant mortality is expected to fall slightly, to 52 per 1,000, a level nearly double that which would have been attained in the absence of AIDS (27 per 1,000). By 2000-2005, in Namibia, South Africa and Zimbabwe (figures 14 and 15), infant mortality is expected to be at least 40 per cent higher than it would have been in the absence of AIDS.

TABLE 8. ESTIMATED AND PROJECTED INFANT MORTALITY RATE, WITH AND WITHOUT AIDS, BY COUNTRY GROUPING, 1985-1990 TO 2010-2015

Country grouping	*1985-1990*	*1990-1995*	*1995-2000*	*2000-2005*	*2005-2010*	*2010-2015*
ALL 34 COUNTRIES						
With AIDS	92	82	78	71	64	57
Without AIDS	92	81	75	68	60	54
Absolute difference	0	1	2	3	4	3
Percentage difference	0.2	1.2	3.1	4.7	5.8	5.9
29 AFRICAN COUNTRIES						
With AIDS	103	98	93	85	78	69
Without AIDS	102	95	87	78	70	63
Absolute difference	0	3	6	7	7	6
Percentage difference	0.4	2.7	6.5	9.2	10.3	9.8
3 ASIAN COUNTRIES						
With AIDS	91	77	71	63	56	49
Without AIDS	91	77	71	63	55	48
Absolute difference	0	0	0	1	1	1
Percentage difference	0.1	0.2	0.5	1	1.5	2
2 LATIN AMERICAN COUNTRIES						
With AIDS	58	49	44	40	36	32
Without AIDS	58	49	44	40	35	31
Absolute difference	0	0	0	0	1	1
Percentage difference	0	0.1	0.6	0.7	2	2.3
9 COUNTRIES WITH MORE THAN 10 PER CENT PREVALENCE						
With AIDS	90	87	86	85	79	72
Without AIDS	89	84	76	69	62	56
Absolute difference	1	4	10	16	17	16
Percentage difference	0.8	4.6	13.8	23.9	28	28.3

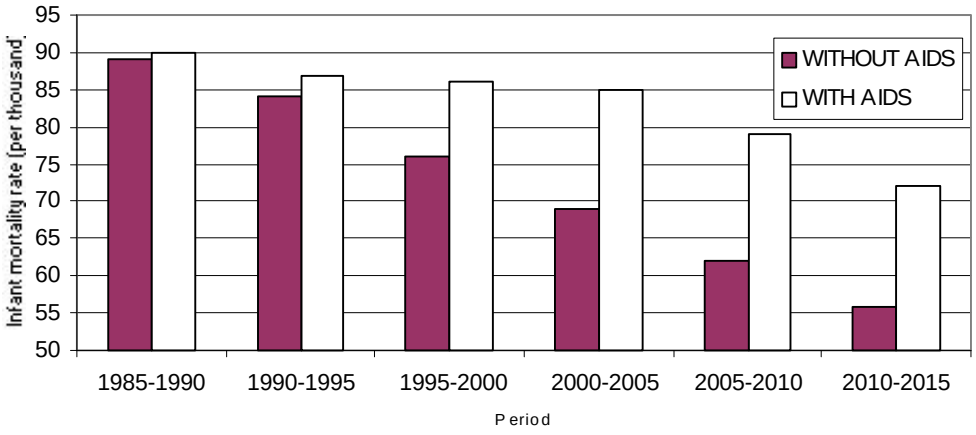
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 11. INFANT MORTALITY RATE WITH AND WITHOUT AIDS, 29 AFRICAN COUNTRIES, 1985-1990 TO 2010-2015



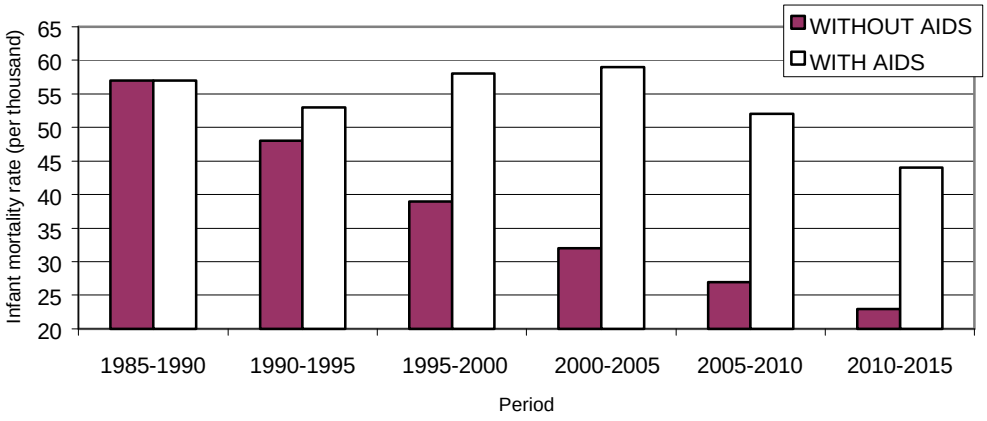
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 12. INFANT MORTALITY RATE WITH AND WITHOUT AIDS, THE 9 COUNTRIES WITH HIGHEST HIV PREVALENCE, 1985-1990 TO 2010-2015



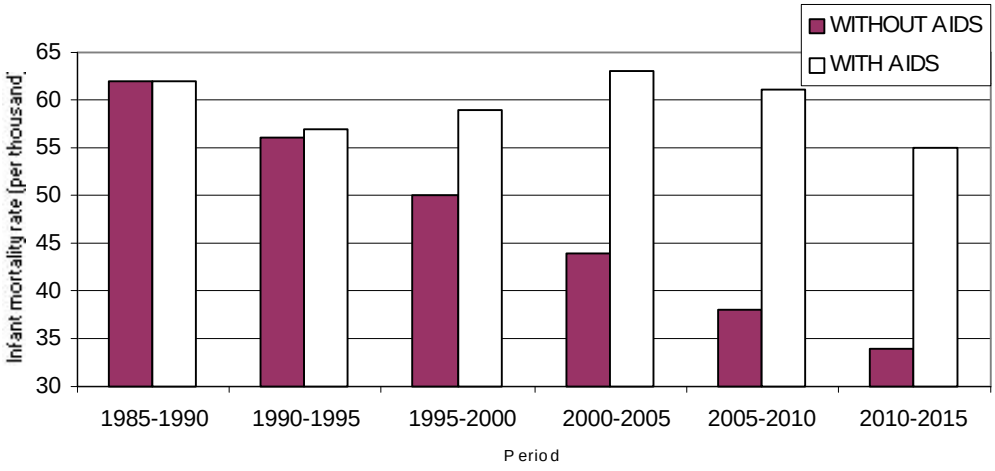
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 13. INFANT MORTALITY RATE WITH AND WITHOUT AIDS, BOTSWANA, 1985-1990 TO 2010-2015



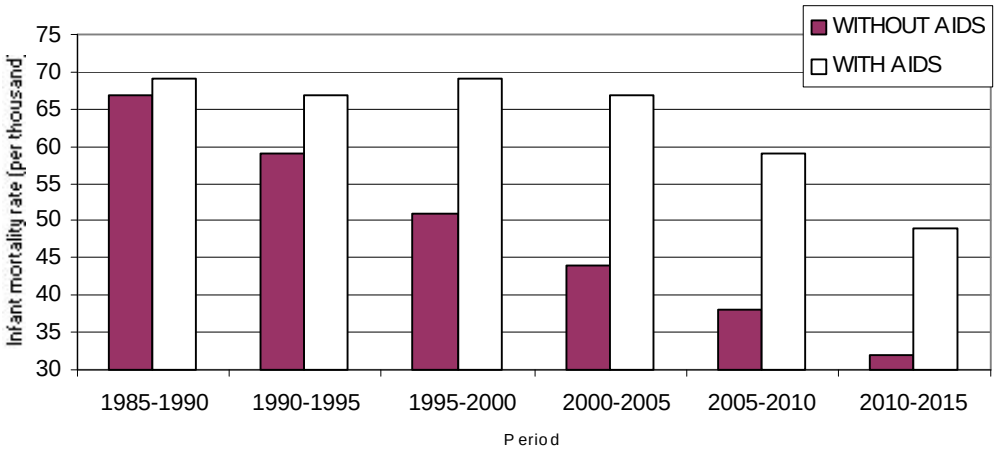
Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 14. INFANT MORTALITY RATE WITH AND WITHOUT AIDS, SOUTH AFRICA, 1985-1990 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

FIGURE 15. INFANT MORTALITY RATE WITH AND WITHOUT AIDS, ZIMBABWE, 1985-1990 TO 2010-2015



Source: United Nations, *World Population Prospects: The 1998 Revision*, forthcoming.

III. CONCLUSION

The present paper documents the likely impact of HIV/AIDS in the 34 countries where adult HIV prevalence is already significant. The toll that the disease is having is already serious and is projected to worsen in the short-term. By 2015, the population of Africa is expected to be at least 60 million lower than it would have been in the absence of AIDS. Between 1985 to 2015, some 47 million additional deaths are expected to occur because of AIDS and about 15 million children will not be born because of the early dead of women of reproductive age.

The increase in mortality because of AIDS has reached major proportions in several countries. In Botswana, Mozambique, South Africa, Zambia and Zimbabwe, life expectancy at birth has already plummeted, dropping within a decade to levels last recorded in the 1950s and early 1960s. Infant and child mortality are also projected to increase in the countries most affected by the HIV/AIDS epidemic. In Botswana, for instance, infant mortality is expected to reach 59 deaths per 1,000 live births by 2000-2005 whereas in the absence of AIDS, it would have been expected to decrease to 32 deaths per 1,000. In Namibia, infant mortality is expected to reach 72 per 1,000 in 2005-2010 instead of 45 per 1,000 in the absence of AIDS.

In assessing the impact of HIV/AIDS, it is important to bear in mind that, although the epidemic is already having a clearly devastating effect in a few countries, its precise magnitude is difficult to determine in the best of circumstances, as there is a general lack of information on the many factors that determine the ultimate impact of the disease. Thus, there is still considerable uncertainty surrounding the distribution of the time of progression from HIV infection to AIDS and from AIDS to death. Small changes on the assumptions made regarding that progression time have important effects on the ultimate impact of the epidemic on mortality. There is also controversy and uncertainty about the type of effect that HIV infection has on fertility. If fertility is considerably lower among HIV-positive women, available estimates of HIV prevalence may be downwardly biased (Gregson and Zaba, 1998). Yet another area of considerable uncertainty is the level of prevalence among men, since most data on seroprevalence surveillance are obtained from antenatal clinics serving pregnant women. Even with respect to women, data from antenatal clinic surveillance, which are the cornerstone of national estimates of HIV prevalence, need to be improved to permit a more solid estimation of HIV prevalence at the national level.

Despite the uncertainties surrounding any measure of the impact of HIV/AIDS, it is important to underscore that all available data buttress the case for concern. The disease is already fairly widespread in some countries and shows few signs of being controlled in others. The list of affected countries has been increasing consistently since 1990. According to the estimates and projections discussed above, AIDS is expected to have major detrimental effects on the population dynamics of all countries affected and its impact might turn out to be even worse than expected if effective measures to prevent the continued rapid spread of the disease are not taken. Government authorities , the international community and civil society urgently need to raise people's awareness on the seriousness of the HIV/AIDS epidemic and take necessary actions in order to prevent that the epidemic follows the course that has been presented here.

The fight against the AIDS pandemic requires greater efforts and political commitment at all levels . As the Secretary General of the United Nations, Mr. Kofi Annan, put it in his address before the United Nations Administrative Committee on Coordination in November 1998, "The fight against the HIV/AIDS epidemic has to be energized, more needs to be done. A concerted effort has to be devised to mobilize the necessary resources and political will and to harness all capacities available to the system to address the needs of the affected countries".

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