

**Population Division
Department of Economic and Social Affairs
United Nations Secretariat**

ESA/P/WP.185
2 September 2003

ENGLISH ONLY

THE IMPACT OF AIDS

*Preliminary, unedited version prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. The final version will be published at a later date after revision of the paper is completed. This report may not be reproduced or reprinted without the express permission of the United Nations.

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Explanatory notes

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

The tables presented in this report make use of the following symbols:

Two dots (..) indicate that data are not available or are not separately reported.

An em dash (—) indicates that the amount is nil or negligible.

A hyphen (–) indicates that the item is not applicable.

A minus sign (-) before a figure indicates a decrease.

A full stop (.) is used to indicate decimals.

Use of a hyphen (–) between years, for example, 1995-2000, signifies the full period involved, from 1 July of the first year to 1 July of the second year.

Numbers and percentages in tables do not necessarily add to totals because of rounding.

The following abbreviations are used in the present report:

AIDS	Acquired Immune Deficiency Syndrome
CGE	Computable general equilibrium
EAMAT	Eastern Africa Multidisciplinary Advisory Team
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GNP	Gross national product
HIV	Human Immunodeficiency Virus
ILO	International Labour Organization
IRC	International Water and Sanitation Centre
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

THE IMPACT OF AIDS

**A publication of the
Population Division
Department of Economic and Social Affairs
United Nations**

EXECUTIVE SUMMARY

HIV/AIDS is the deadliest epidemic of our time. Over 22 million people have already lost their lives and more than 42 million are currently living with HIV/AIDS. Even if a vaccine for HIV were discovered today, over 40 million people would still die prematurely due to AIDS. In many countries, especially in Africa and the hardest-hit countries such as Botswana, Swaziland and Zimbabwe, the AIDS epidemic has spread rapidly, leaving illness, death, poverty and misery in its wake. In other countries the disease is still in its early stages. Notably, HIV/AIDS has now taken hold in the most populous countries of the world—the number of people infected with HIV has reached one million in China and six million in India; the destructive effects of the epidemic are already beginning to be felt in those countries.

The epidemic has not only killed people; it has imposed a heavy burden on families, communities and economies. The misery and devastation already caused by HIV/AIDS is enormous, but it is likely that the future impact will be even greater, as the list of significantly affected countries continues to grow. It is difficult to predict with certainty the future course of the epidemic. Much depends on:

- educating people about the dangers of the virus and persuading them to change their behaviour;
- finding effective ways to prevent the virus from spreading further;
- discovering new medicines and treatments; and
- mobilizing the financial and human resources necessary for accomplishing these tasks.

The Impact of AIDS, prepared by the Population Division of the Department of Economic and Social Affairs at the United Nations Secretariat, examines the impact of HIV/AIDS on populations. In addition to analyzing the demographic impact of HIV/AIDS, the report highlights the impact of HIV/AIDS on families and households, on agricultural sustainability, on business, on the health sector, on education, and on national economic growth. The HIV/AIDS epidemic has erased decades of progress in combating mortality and has seriously compromised the living conditions of current and future generations. The disease has such a staggering impact because it weakens and kills many people in their young adulthood, the most productive years for income generation and family caregiving. It destroys families, eliminating a whole generation crucial for the survival of the younger and older persons in society.

The demographic impact of HIV/AIDS

HIV/AIDS has already had a devastating demographic impact, especially in sub-Saharan Africa. The epidemic has resulted in terrible losses of life and population. Recent United Nations population projections show even more drastic losses over the coming decades.

The *2002 Revision* of the United Nations official world population estimates and projections incorporated the effects of HIV/AIDS for the 53 hardest-hit countries. These 53 countries are home to over 90 per cent of adults living with HIV. The annual number of excess deaths in these 53 countries reached one million by the early 1990s, 3 million by 2000 and over 4 million by 2003.

Thirty-eight of the 53 countries—three out of every four—are located in sub-Saharan Africa. About 100 million additional deaths are expected in these African countries by 2025 because of the toll of the HIV epidemic. By 2025, these countries will have 14 per cent fewer inhabitants than they would have had in the absence of AIDS.

Although the demographic effects of HIV/AIDS in countries outside Africa are relatively moderate and prevalence rates are lower, the human losses are still enormous. Before 2025, AIDS is expected to cause 31 million additional deaths in India and 18 million more deaths in China.

Mortality has surged in countries with high HIV prevalence rates, rising within a decade to levels not seen since the 1950s or 1960s. In the 38 most affected African countries, nearly ten years of life expectancy will have been lost by 2020-2025, and in the seven highest-prevalence countries, nearly 30 years will have been lost. Outside Africa, countries projected to experience a significant reduction of life expectancy include the Bahamas, Cambodia, the Dominican Republic, Haiti and Myanmar.

Botswana currently has the highest HIV prevalence rate in the world: more than one in every three adults is HIV positive. Life expectancy had reached 65 years in 1990-1995, but it dropped to 56 years by 1995-2000 and is currently around 40 years because of deaths related to AIDS. The population will likely begin to decline within a few years. Although the full economic impact of HIV/AIDS is still to come, population projections for Botswana show a severe deficit of working-age people by 2025.

The impact of HIV/AIDS on households and families

Households feel the immediate impact of the HIV/AIDS epidemic. Indeed, households and families bear most of the burden since they are the primary units for coping with the disease and its consequences. Families in which the infected person is the breadwinner suffer financially both from the loss of earnings and the increased expenditure for medical care. During the long period of illness, the loss of income and the cost of caring for a family member impoverish households. Studies document reduced levels of household consumption, including reduction in food consumption, resulting in malnutrition. The HIV/AIDS epidemic poses additional challenges in places where the disease carries a heavy social stigma.

As HIV infection is most common among young adults, a significant part of the generation of young parents is lost, and family composition undergoes rapid changes. Severely affected countries show increases in the percentage of female-headed households and grandparent-headed households, as well as households headed by young orphans. When a family

member dies, the household may be dissolved altogether, and the children may be sent to live with relatives, or even left on their own.

The death of a spouse has an especially severe impact in societies with a marked gender division of labour, because the surviving spouse cannot take on the work or responsibilities of the ill or deceased family member. In the Rakai district of Uganda, for example, AIDS deaths caused labour shortages for both farm and domestic work.

Already by 2001, 14 million children under age 15 had lost one or both parents to HIV/AIDS. Eleven million of these live in sub-Saharan Africa. These numbers will probably double by 2010. It is common for relatives to take orphans into their own homes, especially in African societies, but this rapid rise in the number of orphans would overwhelm the traditional support system of the extended family. Many of the households fostering orphans are themselves poor, and taking in orphaned children represents a significant burden.

The impact of HIV/AIDS on firms

The disease affects business enterprises in both the agricultural and non-agricultural sectors. Available studies on the impact of HIV/AIDS point to impacts on the size and quality of the labour force and on labour costs, as the most productive workers become too ill to work effectively, or to work at all, and eventually die. The loss of workers due to AIDS and the cost of providing health care benefits and death benefits have had serious effects on employers.

The impact on firms depends primarily on five factors: the number of employees infected; their role in the company; the structure of the production process and its ability to cope with the loss of employees; the health-care benefits provided by the company; and the effect of HIV/AIDS on the business environment. During the early stages of the disease, workers can often continue to work but take more sick days and leave time. Companies that provide health-care benefits for workers and their families may not be able to meet the costs of health care and the expensive drugs used to treat HIV/AIDS. A study in Malawi found, for instance, that worker deaths in one company increased more than 40 per cent over a five-year period, resulting in the payment of substantially higher death benefits.

Young adults in their prime working years are most likely to contract HIV, and younger workers are disproportionately more likely to die of AIDS. Depending on the positions held by infected workers, production and management suffer. Workers with exceptional skills and longer experience are hardest to replace. At the same time, demand for goods and services may decline because afflicted households have less income and lower consumption levels.

The impact of HIV/AIDS on agriculture

HIV/AIDS is having a crushing effect on agricultural production and the economic viability of small farms and commercial agricultural enterprises. The Food and Agriculture Organization (FAO) has found that in the ten African countries most severely affected by HIV/AIDS, the agricultural labour force will decline between 10 and 26 per cent by 2020. Botswana, Mozambique, Namibia and Zimbabwe are each expected to lose at least one fifth of their agricultural workers.

Among the consequences of the loss of farm workers are the reduction in land under cultivation, the shift to crops that require less labour, decline in crop yields, and a shortage of labour during periods of high labour demand. The epidemic also leads to a loss of knowledge

about farming methods and a reduction in skilled and experienced labour. A survey in Zimbabwe found that agricultural output declined by nearly 50 per cent among households affected by AIDS. Another study focused on the commercial agricultural sector of Kenya; it reported that AIDS-related morbidity and mortality had already imposed profound financial, economic and social costs.

The impact of HIV/AIDS on health systems

Health-care systems were already inadequate in many of the highly impacted countries even before HIV/AIDS struck. The HIV/AIDS epidemic has made enormous additional demands on these systems, straining health budgets and health insurance schemes. At the same time, health-care workers are also falling ill and dying. Thus, the supply of available health services is being depleted while the demand is increasing.

Expenditures have been rising for the treatment of AIDS and of the opportunistic infections that are common in persons whose immune systems have been compromised by HIV/AIDS. The allocation of scarce resources for treating HIV/AIDS has meant that other health concerns receive less attention. As Governments become increasingly hard-pressed in the face of the AIDS epidemic to provide health care through the public sector, health care costs must increasingly be borne by the private sector, households and individuals.

The impact of HIV/AIDS on education

HIV/AIDS is eroding the gains that have been made towards achieving universal primary education. AIDS weakens educational systems and hampers children's school attendance. In the long run, the AIDS epidemic may lead to a decline in the level and quality of education, diminishing human capital and delaying social and economic development.

Studies have found a high rate of HIV infection among teachers and school administrators, affecting both the amount and quality of educational resources. Trained, experienced teachers are difficult to replace. A study by UNICEF estimated that the number of teachers' deaths in Zambia in 1998 was equivalent to the loss of about two thirds of the annual output of newly trained teachers. Experienced teachers are, by necessity, replaced by less experienced teachers; the quality of education consequently declines. Quality is also compromised when absenteeism of teachers disrupts the learning process of their students.

At the same time, studies show that children in families with an infected member are less likely to remain in school. These children are needed at home to help in the house or to work. Less affluent families are unable to afford school fees. A study in a highly-infected district of Uganda found that total enrolments in three primary schools experienced a 60-per-cent drop from 1989 to 1993. Orphans who have lost both parents are also much less likely than other children to be in school. A household survey in Kampala, Uganda reported that in 1990, 47 per cent of households with orphans did not have enough money to send their children to school, compared with 10 per cent of other households.

The impact of HIV/AIDS on economic growth

The HIV/AIDS epidemic burdens the economy of any country. This is especially true for weak economies that are generally characteristic of countries with high levels of HIV prevalence. In many of the highly-affected countries, studies have been undertaken to model the impact of HIV/AIDS on economic growth. In some cases, estimates of the economic impact of HIV/AIDS

have been “small”. In other cases, annual reductions of 2-4 percentage points of gross domestic product per year have been found, compared to a hypothetical “no-AIDS” situation. Beyond its effects on gross domestic product, the HIV/AIDS epidemic is likely to exacerbate income inequality and increase poverty.

The longer-term impact of HIV/AIDS on welfare and development is certainly more serious than these economic analyses suggest. Estimates of AIDS’ impacts on economic performance usually take do not take into account the loss of “social capital” or of the long-term damage accruing to human capital, as children’s education, nutrition and health suffer directly and indirectly as a consequence of HIV/AIDS. The effects of lowered investment in the human capital of the younger generation will affect economic performance for decades to come, well beyond the timeframe of most economic analysis.

Conclusions

The United Nations General Assembly, at its twenty-sixth special session in June, 2001, adopted the Declaration of Commitment on HIV/AIDS. The Declaration noted that “...the global HIV/AIDS epidemic, through its devastating scale and impact, constitutes a global emergency and one of the most formidable challenges to human life and dignity, as well as to the effective enjoyment of human rights, which undermines social and economic development throughout the world and affects all levels of society—national, community, family and individual.”

Since the adoption of the Declaration of Commitment, the HIV/AIDS epidemic has worsened and become more widespread. The recent report of the Secretary-General to the fifty-eighth session of the General Assembly, on progress towards implementation of the Declaration of Commitment, emphasizes that assertive political leadership and effective action are required to prevent a major expansion of HIV/AIDS. The report recommends that all countries develop and implement national strategies to promote the delivery of comprehensive prevention, treatment, care and support to those people living with or affected by HIV/AIDS.

In order to conquer HIV/AIDS, considerably greater efforts and resources will be required. As Secretary-General Kofi Annan concludes in his report to the 58th session of the General Assembly, “to finance the global responses, ...annual funding for HIV/AIDS programmes must increase three-fold over current levels by 2005, and five-fold by 2007”.

The course of the HIV/AIDS epidemic is by no means pre-determined. The eventual course of the disease depends on how individuals, communities, nations and the world respond to the HIV/AIDS threat today and tomorrow.

INTRODUCTION

The health and mortality of those living with HIV and AIDS and the demographic effects of AIDS mortality are the focus of much research attention, but the wider implications of the epidemic are less well explored. HIV/AIDS will have long-term effects on families, communities, enterprises, agriculture and the well-being and economic future of society as a whole. Where the disease gained an early foothold and has had time and opportunity to spread, the consequences are already apparent. As more countries experience outbreaks of the disease, the effects in today's high-prevalence countries are likely to be played out in settings all over the world.

Since 1981, when the first cases of AIDS were diagnosed, AIDS-related mortality has reached orders of magnitude comparable to those associated with visitations of pestilence in earlier centuries. The Black Death of 1347-1351 killed more than 20 million people in Europe; by the end of 2002, 22 million people had lost their lives to AIDS, and more than 42 million were living with HIV/AIDS. The future course of the disease and its real magnitude remain unknown. Thus, it is of paramount importance to understand the impact of the pandemic, to present the current state of knowledge of this impact and to identify areas where research is vitally needed.

In many developing countries, the effects of the HIV/AIDS epidemic, combined with the economic recessions of the 1970s and 1980s, have erased decades of demographic and economic progress and have seriously compromised the living conditions of future generations (Nicoll and others, 1994). The disease has such a staggering impact because it weakens and kills many people in their young adulthood, the most productive years for income generation and family caregiving. It collapses and breaks up families by eliminating the generation that is important to the survival of society's youngest and oldest members.

The HIV/AIDS epidemic affects every aspect of human life. It has imposed heavy burdens on individuals, families, communities, and nations. The present publication documents the wide-ranging impacts of HIV/AIDS: on families and households; agricultural sustainability; business; the health sector; education, and economic growth. The study also shows that the AIDS epidemic will continue to have devastating consequences for decades to come for virtually every sector of society. In many countries, the epidemic is undermining the achievement of the Millennium Development Goals adopted by the United Nations General Assembly in 2000. Accordingly, immediate action and investments in policies and programmes can save millions of lives and mitigate the destructive consequences of an unchecked epidemic.

The publication is organized into ten chapters. The first chapter considers the data, sources and methods for studying the impact of the AIDS epidemic. The second chapter looks at the current and projected future demographic impact of the epidemic, particularly for the 53 most affected countries. The third chapter deals with the impact of HIV/AIDS on families and households, the units of society that are most directly affected when a member contracts the disease. The next two chapters address production sectors of the economy, namely, firms and agriculture. The loss of large numbers of workers due to illness or death disrupts the supply of food and manufactured goods and has ramifications for the functioning of the whole economy.

Chapters VI and VII discuss the education and health sectors, both areas of human capital investment important to a nation's future economic development. Education has already been adversely affected by the HIV/AIDS epidemic. Not only have many teachers and school administrators been stricken with the disease, but children have been forced to drop out of school to help care for family members who are ill or to replace the labour of those who can no longer

work. This loss of schooling for future generations may be the most long-lasting and crippling legacy of the disease. The health sector is most directly involved in dealing with the victims of HIV/AIDS, especially in caring for those infected but also in helping to prevent further transmission of the virus. Chapter VIII focuses on the impact of the AIDS epidemic on national economic growth, including the macroeconomic models that have been constructed to predict future economic growth in the age of HIV/AIDS. Chapter IX provides a summary and conclusions to the study. Chapter X provides descriptions and findings of selected studies used in preparing this report.

I. DATA, SOURCES AND METHODS

The studies described in this report use a wide variety of data, sources and methods to collect and analyse data and to arrive at conclusions concerning the impact of HIV/AIDS on particular sectors of the economy. Each methodology has its own strengths and limitations, as described below. The choice of methodology and research design has direct implications for the quality and usefulness of the results. Larger, more representative samples are more likely to produce findings that can be broadly generalized, whereas qualitative studies that rely on small samples and anecdotal accounts are on their own of less statistical value. The reader is cautioned that the quality of the studies reported on in this volume is uneven. Moreover, investigation of a subject as sensitive as HIV/AIDS presents problems for the researcher because people in many societies associate the disease with shame and stigma and are reluctant to discuss it. This underscores the difficulty of measuring the exact magnitude of the impact of HIV/AIDS and the need to design and implement more rigorous and more appropriate research.

This chapter reviews the types of methodologies common to studies of the impact of HIV/AIDS and identifies areas where future research is urgently needed. In some cases, the methodology was appropriate for only one sector; in other cases, the same methodology could be applied to measure the impact in several sectors. Some research combined several methodologies and assembled data from a variety of sources. Many studies, especially in the chapter on households and families, used retrospective interviews with subjects, although a few studies with longitudinal surveys were available. Data collection from official government records formed the basis for some investigations, especially in the education and health sectors. Studies on firms and agricultural enterprises focused mainly on company records of employment, productivity and health. In the macroeconomic studies of the impact of HIV/AIDS, virtually all efforts employed economic modelling, although the models differed according to inputs selected and assumptions underlying the model. Finally, a number of studies used evidence that was not easily verifiable or quantifiable, such as semi-structured interviews and focus groups. This approach was often a supplement to other lines of evidence.

Part I of this report is an attempt to provide a comprehensive survey of studies that were available in published and electronic sources, as conference papers, as United Nations reports and as communications from individual scholars. Some of the studies were preliminary reports on research in progress and were not formally reviewed and published or did not give a full account of the research carried out. Part II of the report presents summaries of selected studies, with particular attention to the methodology and scope of each study. The body of data is enormous and changes rapidly. As the implications of the epidemic for all facets of human life become ever more apparent, the need for research to guide policies and programmes escalates.

A. METHODOLOGIES OF STUDIES

Demography

For countries that are severely affected by HIV/AIDS, the demographic impact of HIV/AIDS is assessed by comparing population estimates and projections based on realistic assumptions about the course of the epidemic with hypothetical estimates and projections that make no allowance for the existence of AIDS. The latter are derived from the application of the United Nations Population Division standard computer projection program on the basis of assumptions regarding the future course of mortality that are similar to 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 explicitly incorporate the effect of HIV/AIDS is more complex and involves several steps (see Buettner and others, 2003). HIV and AIDS estimates are those of the Joint United Nations Programme on HIV/AIDS (UNAIDS) so that the results of the projections are consistent with the estimates produced by UNAIDS.

For the *2002 Revision* of the United Nations official world population estimates and projections (United Nations, 2003), the impact of the HIV/AIDS epidemic was explicitly modelled for 53 countries, up from 45 in the *2000 Revision*. In most of these countries, HIV prevalence in 2001 was estimated to be 2 per cent or more among the population aged 15-49. In addition, a few populous countries with lower prevalence levels were included because they had a large number of persons (at least one million) living with HIV.

Households and families

Most of the studies in this chapter were based on retrospective surveys, which use a single interview with respondents and require them to recall events that occurred in the past. If respondents forget some events, results may be biased. Retrospective studies also make it difficult to establish causality. For example, malnutrition in children may be associated with loss of income due to AIDS-related medical expenses, but it cannot be determined whether the children were already malnourished before the disease depleted the income of the household or whether the loss of income caused their malnourishment.

Longitudinal, or follow-up, surveys interview the same respondents at more than one point in time and thus allow timely recording of events, such as AIDS deaths. This reduces errors due to memory lapse, but longitudinal surveys are more expensive to conduct and are subject to attrition of respondents. Examples in this volume of follow-up surveys are a study of economic activities in households in Burundi, Côte d'Ivoire and Haiti conducted by the International Children's Centre in the early 1990s, and a study in Rakai, Uganda, which looked at the ownership of durable goods in households with and without an adult AIDS death. The use of a control group in the Rakai study was a methodological improvement that allowed comparison of the two groups of households and made it possible to show the actual effect of AIDS-related mortality on the economic fortunes of households. A study in Thailand further subdivided households into those with no death, those with an adult AIDS-related death and those with an adult death not related to AIDS. The study demonstrated that AIDS-related deaths were more costly to households than non-AIDS-related deaths, although both suffered the loss of earnings of the deceased.

A problem with the use of surveys when studying HIV/AIDS in households and families is that an adult death, particularly the death of the breadwinner, may cause the family to break up. Some family members may migrate out of the area and young children may be adopted by relatives, so families that have suffered AIDS deaths may no longer exist and may be underrepresented in the survey sample.

Firms

The methodology employed by most of the studies on firms includes examination of company records for information about employment, absenteeism and productivity; interviews with company officers, managers, supervisors and doctors; and economic modelling to determine future workforce needs. Most studies were commissioned by the company involved. There may be many additional studies of this type, but the results are generally not available to the public. The methodology is often not documented in detail, and the outcomes of interest are related to

company profitability and focus on such concerns as workers' insurance and benefit costs, medical care and costs of recruiting and training new employees to replace those who have died of AIDS.

Studies of firms may have empirical data on the HIV status of employees through medical insurance records and company-wide testing. This permits assessment of the actual impact of the HIV/AIDS epidemic. In some other sectors, where there is no independent confirmation of the HIV/AIDS diagnosis, the cause of death may only be assumed to be AIDS.

Company records can measure the direct costs of HIV/AIDS, but other indirect costs are less measurable and less quantifiable. They include morale and motivation of workers in a setting where their co-workers are becoming ill and dying.

Agriculture

Methodologies to measure the impact of HIV/AIDS on agriculture have included such approaches as household interviews and focus groups of farm owners and managers. In the case of agricultural enterprises, such as tea estates and sugar mills, the methodology is similar to that for firms. For example, a study of a sugar mill in rural South Africa used clinic and hospital records, employment records and household interviews. This was one of the most comprehensive research studies involving agricultural workers because of the combination of methodologies employed.

An approach unique to research in agricultural areas is known as Rapid Rural Appraisal (RRA). It is a qualitative survey methodology that uses a multidisciplinary team to formulate problems for agricultural research and development. Its chief characteristics are the short period of investigation, the use of informal data-collection methods and the relatively low cost of the research. RRA relies on expert observation coupled with semi-structured interviewing of farmers, local leaders and officials. This type of research has been carried out in Uganda, United Republic of Tanzania and Zambia, among other places. The principal advantage of this method is that it produces quick answers to research questions, but the disadvantage is that the superficial nature of data collection may lead to biased results.

Many studies of agriculture included no control group that would have allowed researchers to estimate what portion of the findings was due solely to the HIV/AIDS epidemic. For example, a study in Zimbabwe examined the impact of HIV/AIDS on the agricultural production of AIDS-affected households. But it did not include a sample of families not affected by AIDS, so the difference between the two types of households could not be measured. Another problem common in agricultural studies was the lack of knowledge of the HIV-status of individuals.

Education

The studies on education understandably focused on areas where data were available—supply of education (that is, numbers of teachers and resources available) and demand for education (numbers of children by age). Education quality was rarely assessed although it was implicit in some studies that experienced teachers provide higher-quality education, so their loss to AIDS compromised the quality of education. School records were an important source of data, as were interviews with school administrators, teachers and parents.

Focus group discussions were used in a number of studies. In Zambia, focus group discussions with members of AIDS-affected households explored the conditions that led parents to take their children out of school. Focus groups may help to understand the impact of HIV/AIDS as individuals directly affected by the epidemic perceive it. For example, a study in the Ondangwa East and Ondangwa West regions of Zambia used focus groups and in-depth interviews to examine the reality faced by teachers and school principals.

Modelling techniques helped to predict the impact of HIV/AIDS on education supply and demand. These methodologies require the projection of the demographic impact as a first step and take into account the age and sex structure of the projected population. This type of methodology was developed by UNICEF and was widely used to estimate the supply of teachers and the number of school-age children who would be without teachers because of HIV/AIDS.

A study of educator mortality in the KwaZulu Natal province of South Africa combined several methodologies, using an analysis of annual school survey data, a random sample survey of 100 schools and examination of mortality, pension and medical records of educators. Another study, in Botswana, Malawi and Uganda, used both qualitative and quantitative methods, including interviews with education managers, teachers, students and others; focus group discussions; and assessment of records on absenteeism, dropouts and grade repetition from a sample of 41 schools in the three countries.

Several studies used data from the Demographic and Health Surveys (DHS) in many countries to identify orphans in the samples and to compare their educational attainment with that of non-orphans. DHS data are particularly useful for cross-national comparisons because they used a similar research design and questionnaires. The Multiple Indicator Cluster Surveys sponsored by UNICEF also provide comparable information on education for a large number of countries.

Health

In the health sector, the most common methodologies used in the studies cited were the examination of hospital records, collection of data from ministries of health and household surveys. The studies in this sector focused on health expenditures related to HIV/AIDS, including public and private expenses; allocation of funds to treatment and prevention; and sources of donor funding. In several cases, workshops were organized to elicit expert opinion on costs and expenditures for treatment. In Côte d'Ivoire, for example, physicians, leaders of non-governmental organizations, epidemiologists, health economists, a traditional practitioner, and representatives of the National AIDS Control Programme met to discuss costs of treatment for various types of patients.

One study of five developing countries used a combination of methodologies that collected objective and subjective information about AIDS expenditures. The countries were Brazil, Côte d'Ivoire, Mexico, Thailand and United Republic of Tanzania. Sources of data for one or more of the five countries were financial reports of public expenditures or budgets; country workshops to estimate treatment costs; special health-sector analyses; a database of public hospital claims; and household surveys.

Household surveys were generally used to learn about private expenditures for care and treatment of AIDS patients paid for by members of the family.

Although the supply of health workers is a major issue in the battle against HIV/AIDS, no studies were available that examined the impact of the epidemic on the health workforce.

Economic growth

All the studies of the impact of HIV/AIDS on economic growth used economic modelling techniques. In general, the task is to estimate how the economy would have performed in the absence of AIDS and contrast this with an estimate of economic performance given the estimated or projected number of HIV/AIDS cases. The economic outcome studied is typically growth in total gross domestic product (GDP) per capita and/or growth in total GDP. Some studies employed cross-national data, either for a single time period or a time series. In those analyses, regression analysis was used to estimate the effects of one or more indicators of the volume of HIV/AIDS infections or deaths on economic outcomes, controlling for other variables that previous work had identified as having an important effect on economic growth. Other analysis employed an economic model fitted to the data of a particular country and, often, projected for 10 to 15 years in the future.

Some studies used a model that was further elaborated to posit a dual-sector economy, with a well-paying and productive formal sector and a low-wage, low-productivity informal sector. Other, more complex, variations of economic models have been used to analyze how impacts of HIV/AIDS on different sectors of an economy are related to the overall economic performance.

B. NEEDS FOR FURTHER RESEARCH ON THE IMPACT OF HIV/AIDS

An examination of studies that have been conducted so far reveals urgent needs for research that can shed more light on the effects of the HIV/AIDS epidemic. Where possible, longitudinal or follow-up studies with multiple rounds of interviews should be conducted to allow for ongoing examination of the cumulative effects of the epidemic. Larger and more representative samples of households and communities would make findings more useful, as would studies in urban and peri-urban areas, which are currently underrepresented in AIDS research. An effort should be made to design research studies with control groups to make it easier to isolate the effect of AIDS. Qualitative research methods, such as focus groups, can bring a useful added dimension to quantitative studies.

Study design is of paramount importance when investigating an epidemic such as AIDS, because its impact may not be observable and quantifiable until it begins killing large numbers of people. Studies should at least acknowledge the lag time of the disease and the future effects, insofar as it is possible to incorporate them into the research design.

Although numerous studies have been conducted over the last two decades on the effects of HIV/AIDS on a wide variety of topics, there are still enormous gaps in knowledge. An important need in future studies of HIV/AIDS is the determination of the HIV status of individuals. In most studies reported on, the actual cause of disease and death was not available, so it was often assumed that deaths were AIDS-related without having clinical evidence. In the meantime, as testing for HIV is not common in many areas, other ways of capturing HIV-status should be explored.

More efforts should be made to understand what happens when families dissolve after an adult AIDS death—whether and where they migrate, whether individually or as families. The fate

of children orphaned by AIDS needs special attention, especially with regard to their nutritional status, educational achievement and long-term welfare.

In the case of firms and businesses, studies commissioned by the company concerned need to be shared with planners and policy makers so that the results can contribute to solutions.

In the health sector, documentation of care and treatment is often available from hospitals and clinics, but this approach may miss AIDS victims who do not have access to health-care facilities or who cannot afford treatment. More information is needed about the allocation of resources between prevention and treatment of HIV/AIDS and between HIV/AIDS and other diseases. Data are also lacking on the costs of care and treatment being borne by households and families on the one hand and service providers on the other.

In the education sector, the effect of HIV/AIDS on the viability of school systems needs to be examined. The education sector competes for funds with other sectors, including the health sector, and the burgeoning demand for AIDS-related health care may squeeze education budgets and put all children at risk of receiving an inferior education.

There is also a need for more information to be analysed by gender. The death of a mother has very different implications for her young children than the death of the father. Gender data on orphans makes it possible to determine whether girls in families affected by HIV/AIDS are more disadvantaged than boys in terms of educational attainment and other indicators of well-being.

Finally, most of the available studies were carried out in sub-Saharan Africa. There are exceptions—for example, comparative studies of Demographic and Health Surveys and some studies in Thailand—but more research is needed in areas outside the African continent. The lack of such studies can be explained by the relatively low prevalence rates in countries in Asia and Latin America. However, studies in those regions are important for the insights they will provide on the spread and impact of AIDS under diverse socio-economic and cultural conditions.

The timely analysis and dissemination of the results of research is vitally important so that policy makers and programme officials can respond to the best available research. Improved knowledge and information about HIV/AIDS is an important step in conquering the epidemic, but conditions are changing so rapidly that failure to make studies available can render the results less valuable to planners.

II. DEMOGRAPHIC IMPACT OF AIDS

Since 1981, when the first cases of AIDS were diagnosed, the world has been facing the deadliest epidemic in modern history. Nearly 22 years after the start of the epidemic, mortality due to AIDS has attained orders of magnitude comparable to those associated with other visitations of pestilence. In Europe alone, it is thought that over 20 million people died during 1347-1351 because of the Black Death. In contrast, the human immunodeficiency virus (HIV) is a slow killer. However, UNAIDS (2002b) estimates that by the end of 2002 there were 42 million people living with HIV/AIDS, and that a further 22 million people had already lost their lives to AIDS.

In spite of the progress made in treating people infected with HIV, in particular in the more developed countries, AIDS remains an incurable disease, and, coupled with malnutrition, it is a fatal disease. UNAIDS estimated that 29.4 million of the 42 million persons infected with HIV were living in sub-Saharan Africa, 6 million in South and South-east Asia, and 2 million in Latin America and the Caribbean (UNAIDS, 2002b).

Because people infected with HIV remain healthy for long periods before showing overt signs of immunodeficiency, the first stages of the HIV epidemic are difficult to detect. However, social scientists and epidemiologists modeling the impact of the epidemic have long known that its cumulative impact can be serious. In its 2002 Revision of *World Population Prospects* (United Nations, 2003a), the United Nations Population Division has incorporated the impact of AIDS into the estimates and projections of the populations of 53 countries. In most of these countries, HIV prevalence is estimated to be 2 per cent or more among the adult population aged 15-49. In addition, a few populous countries with lower prevalence levels were included because of the large number of persons living with HIV (more than one million persons).

Table II.1 presents the countries for which the demographic impact of AIDS is incorporated in the 2002 estimates and projections. Of the 53 countries, 38 are in Africa, five are in Asia, eight are in Latin America and the Caribbean and one each is in Europe and Northern America. Of the 37.1 million adults in the world infected by HIV by 2001, 34.6 million, or 93 per cent, resided in these 53 countries.

In most of the countries that are severely affected by the epidemic, HIV/AIDS is responsible for stopping or even reversing the long-term health and mortality improvements that had been registered until recently. The spread of HIV has thus compromised the first stage of the epidemiological transition in developing countries—that is, the passage from high to low mortality as infectious diseases are brought under control and are no longer the major cause of death (Omran, 1971; 1982). Indeed, with the emergence of HIV/AIDS, several countries of sub-Saharan Africa, which already lagged behind in the epidemiological transition, have experienced a major setback in terms of combating infectious disease and avoiding premature death. Furthermore, the interaction of HIV with other infectious agents exacerbates its detrimental impact on longevity. The increasing incidence and lethality of tuberculosis in a number of developing countries is one instance of such interaction. In rural Malawi the incidence of tuberculosis doubled between 1986 and 1994, largely because HIV-positive persons are seven times more likely to develop tuberculosis than those who are not infected by HIV (Glynn and others, 1997).

TABLE II.1. COUNTRIES FOR WHICH THE DEMOGRAPHIC IMPACT OF HIV/AIDS IS EXPLICITLY INCLUDED IN THE 2002 REVISION OF THE OFFICIAL UNITED NATIONS ESTIMATES AND PROJECTIONS

	<i>Country</i>	<i>Prevalence in 2001 (adults 15-49)</i>
Africa		
1	Angola	5.5
2	Benin	3.6
3	Botswana	36.5
4	Burkina Faso	6.4
5	Burundi	8.3
6	Cameroon	11.8
7	Central African Republic	12.9
8	Chad	3.6
9	Congo	7.1
10	Côte d'Ivoire	9.6
11	Democratic Rep. of the Congo	4.9
12	Djibouti	7.1
13	Equatorial Guinea	3.4
14	Eritrea	2.8
15	Ethiopia	6.5
16	Gabon	3.6
17	Gambia	1.6
18	Ghana	2.8
19	Guinea	1.8
20	Guinea-Bissau	2.8
21	Kenya	15.0
22	Lesotho	30.1
23	Liberia	6.5
24	Malawi	16.1
25	Mali	1.6
26	Mozambique	12.8
27	Namibia	22.2
28	Nigeria	5.8
29	Rwanda	9.1
30	Sierra Leone	6.7
31	South Africa	21.3
32	Sudan	2.6
33	Swaziland	33.7
34	Togo	6.0
35	Uganda	4.4
36	United Republic of Tanzania	7.8
37	Zambia	21.6
38	Zimbabwe	33.9
Asia		
1	Cambodia	2.7
2	China	0.1
3	India	0.8
4	Myanmar	2.0
5	Thailand	1.8

TABLE II.1. (continued)

Country		Prevalence in 2001 (adults 15-49)
Latin America and the Caribbean		
1	Bahamas	3.5
2	Belize	2.1
3	Brazil	0.6
4	Dominican Republic	2.5
5	Guyana	2.7
6	Haiti	6.1
7	Honduras	1.6
8	Trinidad and Tobago	2.5
More developed regions		
1	Russian Federation	0.9
2	United States of America	0.8

Source: United Nations, World Population Prospects: The 2002 Revision, Highlights. (ESA/P/WP.180), 2003.

A. METHODOLOGY AND DATA

Estimating and projecting the impact of HIV/AIDS

This chapter assesses the impact of the epidemic in countries that are severely affected by HIV/AIDS by comparing population estimates and projections based on realistic assumptions about the course of the epidemic with hypothetical estimates and projections that make no allowance for the existence of 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 to 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 explicitly incorporate the effect of HIV/AIDS is more complex and is made in several steps. This estimation process is carried out by the Joint United Nations Programme on HIV/AIDS (UNAIDS) so that the results of the projections are consistent with the estimates produced by UNAIDS. The dynamics of the HIV/AIDS epidemic, as estimated by UNAIDS, are assumed to remain unchanged until 2010. Thereafter prevalence levels are assumed to decline in a manner consistent with modifications of behaviour that reduce the rates of recruitment into high risk groups as well as the chances of infection among those engaging in high risk behaviour.

It should be noted that, in many of the countries in table II.1, the prevalence of HIV was still rising at the time of the most recent observation. In most such cases, the projections assume that HIV prevalence will peak sometime during the period from 2002-2020. In about half of the 53 countries, the peak prevalence is estimated to have occurred already, between 1993 and 2001. However, in some of those cases the evidence remains weak that prevalence has indeed passed its peak. Only in Burundi, Congo, Côte d'Ivoire, Uganda, United Republic of Tanzania and Zambia is HIV prevalence estimated to have declined by 1.0 percentage point or more from the peak level reached, and only in Thailand and Uganda has prevalence declined by at least one quarter of its peak value. And even in those populations where prevention efforts have succeeded in lowering HIV prevalence, HIV infection is projected to remain a serious risk for the foreseeable future.

Current estimates indicate that the AIDS epidemic has already had a major impact on mortality. In the seven countries with an adult HIV prevalence of 20 per cent and above, more

than 20 years of life expectancy at birth have already been lost to the epidemic, and this effect is expected to intensify in the future. The following sections present in further detail the different facets of the demographic impact of HIV/AIDS.

Characteristics of the HIV epidemic

The HIV/AIDS epidemic is progressing rapidly and is affecting regions of the world unequally. As of the end of 2002, over 70 per cent of those infected were estimated to live in sub-Saharan Africa, and that region's share of the number of HIV infections worldwide was still growing. Within Africa, the most affected populations are found in Eastern and Southern Africa from Uganda through Rwanda, Burundi, Kenya and United Republic of Tanzania to Malawi, Zambia, South Africa and Namibia. The seven countries with an adult HIV prevalence of 20 per cent or more belong to those regions and were home to 74 million inhabitants in 2000 (see table II.2). The second group of countries exhibited an adult HIV prevalence of 10 to 20 per cent. Five countries, most of them in Middle Africa and Eastern Africa, belong to this group, and their total population was 79 million people in 2000. The third group consists of 14 countries with prevalence rates from 5 to 10 per cent and a total population of 293 million people in 2000. The 17 countries in the fourth group had prevalence rates of 2 to 5 per cent and were home to 216 million people, and the last group of 10 countries had an adult HIV prevalence rate below 2 per cent. India's share was 4 million of the 14 million adult infections in this group.

Within Africa, in the last 10 years, there has been a dramatic change in prevalence levels within Eastern and Southern Africa. In Eastern Africa, which recorded the highest prevalence until 1993, the level appears to have stabilized or fallen in Uganda and parts of United Republic of Tanzania. In contrast, adult HIV prevalence in Southern Africa has soared, overtaking Eastern Africa.

B. THE IMPACT OF AIDS

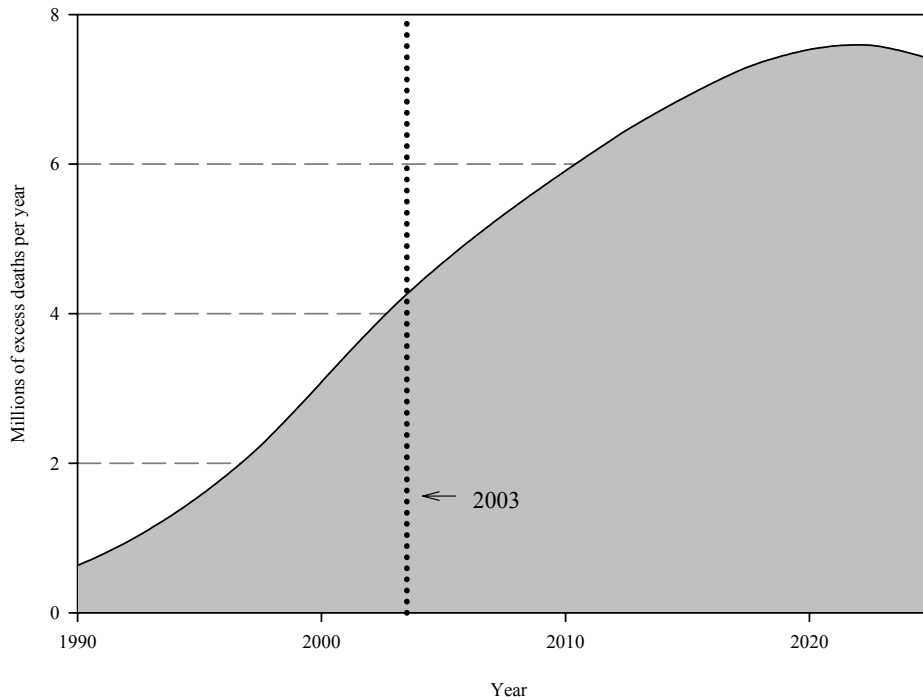
The demographic impact of AIDS has been assessed for each of the 53 countries listed in table II.1 by considering demographic variables such as total population size, additional deaths due to AIDS, the crude death rate, life expectancy at birth and infant and child mortality. Since 38 of the 53 countries considered are in Africa, the results are presented separately for these African countries as an aggregate. In addition, special attention is given to the seven countries where adult HIV is over 20 per cent, namely, Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. Because the countries are classified by region—38 countries in Africa, 5 in Asia and 8 in Latin America—the demographic impact of AIDS will be examined for each of these regions. The five prevalence groups (see table II.2) are also examined separately.

1. Number of deaths

Table II.3 and annex tables II.A.1 and II.A.2 present the projected number of deaths from 1995-2000 to 2020-2025 by country grouping, taking into account the impact of the HIV/AIDS epidemic. Also shown are the projected numbers of deaths if there were no epidemic. The difference between those two numbers is the additional number of deaths due to AIDS. The annual number of excess deaths in these 53 countries reached one million in the early 1990s, 3 million by 2000, and by 2003 was already over 4 million. The toll of deaths will become much larger in the years to come (figure II.1). The impact of AIDS on the number of deaths reaches its peak in 2020-2025. In the absence of AIDS, the total number of deaths in the 38 African countries considered would be expected to increase from 39 million in 1995-2000 to 46 million in 2020-2025. With AIDS, the total number of deaths is expected to rise instead to 64 million in

2020-2025, implying that the epidemic would cause almost 19 million (or 41 per cent) additional deaths during the latter period. In total, about 355 million deaths are projected to occur between 1995 and 2025 in the 38 African countries considered, a number 98 million higher than would have been expected in the absence of AIDS. (South Africa will account for the largest share of those deaths (15.9 million), followed by Nigeria (14.1 million), Kenya (8.9 million) and Ethiopia (8.1 million).

Figure II.1 Estimated and projected excess deaths due to AIDS in 53 countries, 1990-2025



Source: Based on Annex table II.A.1.

Figure II.1 shows the projected toll of AIDS based on evidence about how the epidemic has been evolving so far. The reality may prove to be either better or worse. For future years, especially after 2010, the projected excess mortality due to AIDS increasingly represents the early death of persons who, today, have not yet been infected. Whether this projection proves too optimistic, or too pessimistic, depends greatly on actions taken now to prevent the spread of the disease and to improve treatment of those who contract it.

TABLE II.2. COUNTRIES GROUPED ACCORDING TO THE LEVEL OF ADULT HIV PREVALENCE IN 2001

<i>20 per cent or more</i>	<i>10 to 20 per cent</i>	<i>5 to 10 per cent</i>	<i>2 to 5 per cent</i>	<i>Less than 2 per cent</i>
1 Botswana	1 Cameroon	1 Angola	1 Bahamas	1 Brazil
2 Lesotho	2 Central African Republic	2 Burkina Faso	2 Belize	2 China
3 Namibia	3 Kenya	3 Burundi	3 Benin	3 Gambia
4 South Africa	4 Malawi	4 Congo	4 Cambodia	4 Guinea
5 Swaziland	5 Mozambique	5 Côte d'Ivoire	5 Chad	5 Honduras
6 Zambia		6 Djibouti	6 Dem. Rep. of the Congo	6 India
7 Zimbabwe		7 Ethiopia	7 Dominican Republic	7 Mali
		8 Haiti	8 Equatorial Guinea	8 Russian Federation
		9 Liberia	9 Eritrea	9 Thailand
		10 Nigeria	10 Gabon	10 United States of America
		11 Rwanda	11 Ghana	
		12 Sierra Leone	12 Guinea-Bissau	
		13 Togo	13 Guyana	
		14 United Republic of Tanzania	14 Myanmar	
			15 Sudan	
			16 Trinidad and Tobago	
			17 Uganda	

TABLE II.3. ESTIMATED AND PROJECTED IMPACT OF HIV/AIDS ON MORTALITY INDICATORS

Indicator	All 53 countries			38 African countries			7 countries with prevalence of 20 per cent or more		
	1995-2000	2010-2015	2020-2025	1995-2000	2010-2015	2020-2025	1995-2000	2010-2015	2020-2025
Number of deaths (millions)									
Without AIDS.....	159	174	193	39	44	46	3	3	4
With AIDS.....	170	207	231	48	63	64	5	10	9
Absolute difference.....	11	32	38	8	19	19	2	6	5
Percentage difference.....	7	19	20	21	43	41	71	193	142
Life expectancy at birth (years)									
Without AIDS.....	63.9	68.4	70.8	52.7	58.3	62.1	62.3	67.0	69.6
With AIDS.....	62.4	64.2	65.9	47.0	47.1	51.3	50.2	37.6	41.0
Absolute difference.....	1.5	4.1	4.9	5.7	11.3	10.8	12.0	29.4	28.6
Percentage difference.....	2.4	6.1	6.9	10.9	19.3	17.4	19.3	43.9	41.1
Crude death rate (per 1,000)									
Without AIDS.....	9.0	8.1	8.0	13.6	10.2	8.5	8.0	6.7	6.5
With AIDS.....	9.6	9.8	10.1	16.8	16.0	13.6	14.1	24.9	23.3
Absolute difference.....	0.7	1.7	2.0	3.1	5.8	5.2	6.1	18.2	16.8
Percentage difference.....	7.5	21.5	25.0	22.9	57.1	61.4	75.6	273.6	259.6
Infant mortality rate (per 1,000)									
Without AIDS.....	66.4	49.8	40.9	98.5	75.2	60.9	55.4	40.7	32.9
With AIDS.....	67.5	51.3	42.1	102.6	79.9	65.1	66.1	54.6	45.4
Absolute difference.....	1.1	1.4	1.3	4.1	4.7	4.2	10.7	13.9	12.5
Percentage difference.....	1.7	2.9	3.2	4.2	6.3	6.9	19.2	34.2	37.9
Child mortality rate (per 1,000)									
Without AIDS.....	93.9	68.9	56.1	157.6	116.6	91.7	80.2	56.9	44.8
With AIDS.....	98.8	75.8	62.3	172.4	134.5	107.5	108.8	100.2	84.3
Absolute difference.....	5.0	6.9	6.2	14.9	17.8	15.8	28.7	43.3	39.6
Percentage difference.....	5.3	10.0	11.1	9.4	15.3	17.3	35.7	76.2	88.4

In the seven countries where adult HIV prevalence is above 20 per cent, the additional number of deaths due to AIDS will rise from 71 per cent in 1995-2000 to 204 per cent in 2005-2010. Overall, between 1995 and 2025, those seven countries will experience about 30 million (156 per cent) additional deaths. The proportional increase in the number of deaths to AIDS is highest in Botswana, where the number of additional deaths due to AIDS is expected to reach 223,000 in 2005-2010, more than four times the number of deaths without AIDS. In Zimbabwe, in that period, the number of deaths will be over 3 times as large as without AIDS, and in Swaziland and South Africa over twice as large.

Outside of Africa, AIDS will increase the number of deaths by more than 25 per cent in the Bahamas (43 per cent), Haiti (40 per cent) and Trinidad and Tobago (30 per cent). In terms of absolute numbers, India and China are expected to experience the highest numbers of additional deaths due to AIDS: 31 million in India between 1995-2025 and 18 million in China during that period.

2. Life expectancy at birth and crude death rate

Life expectancy at birth, a measure indicating the average number of years that a newborn child would live if mortality remained constant throughout his or her lifetime, is estimated for the country groupings considered. In the 38 African countries, life expectancy at birth is estimated at 47 years in 1995-2000, 5.7 years lower than it would have been in the absence of AIDS. Life expectancy is expected to decline in 2000-2005 before resuming an upward trend, but reaching only 51.3 years by 2020-2025. In the absence of AIDS, life expectancy at birth would have reached 62.1 years in 2020-2025, that is, 10.8 years higher without AIDS (table II.3, annex tables II.A.3 and II.A.4).

The effect of AIDS is more marked in the seven countries with adult HIV prevalence above 20 per cent. Life expectancy in those countries is estimated at 50.2 years in 1995-2000, about 12 years lower than it would have been in the absence of AIDS. By 2020-2025, the difference in life expectancy with and without AIDS is projected to reach 28.6 years.

Among the seven countries with the highest prevalence, Botswana, Zimbabwe, Namibia and Swaziland are affected the most. In Botswana, life expectancy at birth dropped from 65 years in 1990-1995 to 39.7 years in 2000-2005, a figure about 28 years lower than it would have been in the absence of AIDS. By 2010-2015, the loss of life expectancy at birth due to AIDS is expected to peak at 31.6 years. At that time, life expectancy at birth is expected to reach a low of 39 years.

In Namibia, life expectancy at birth dropped from 59.2 years in 1990-1995 to 44.3 years in 2000-2005. It is expected to drop further to 39.6 years in 2010-2015, 29 years less than the expected level in the absence of AIDS. In Zimbabwe, life expectancy was estimated at 53.3 years in 1990-1995 compared to 64.5 years in the absence of AIDS. It is projected to decrease to 31.2 years in 2005-2010. In the absence of AIDS, it would have been expected to rise to 69.1 years, a difference of nearly 38 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 expectancy was estimated at 61.8 years and had barely been affected by AIDS. By 2005-2010, life expectancy is projected to decrease to 41.5 years, 27 years lower than in the absence of AIDS. In other countries with high HIV prevalence, at least 20 years of life are expected to be lost to AIDS by 2020-2025: 32 years in Lesotho, 36 years in Swaziland and 23 years in Zambia.

Outside of the African region, the Bahamas, Cambodia, Dominican Republic, Haiti and Myanmar will also exhibit significant reductions in life expectancy. In the Bahamas, life expectancy at birth is estimated at 67.3 years in 1995-2000. By 2020-2025, it is expected to increase to 70.4 years—that is, 8 years less than it would have been in the absence of AIDS. In Haiti, the loss of life expectancy due to AIDS will reach 10 years by 2015-2020. In Cambodia, Dominican Republic, Guyana, Myanmar and Trinidad and Tobago, at least 4 years of life expectancy at birth will be lost to the HIV/AIDS epidemic by 2015-2020.

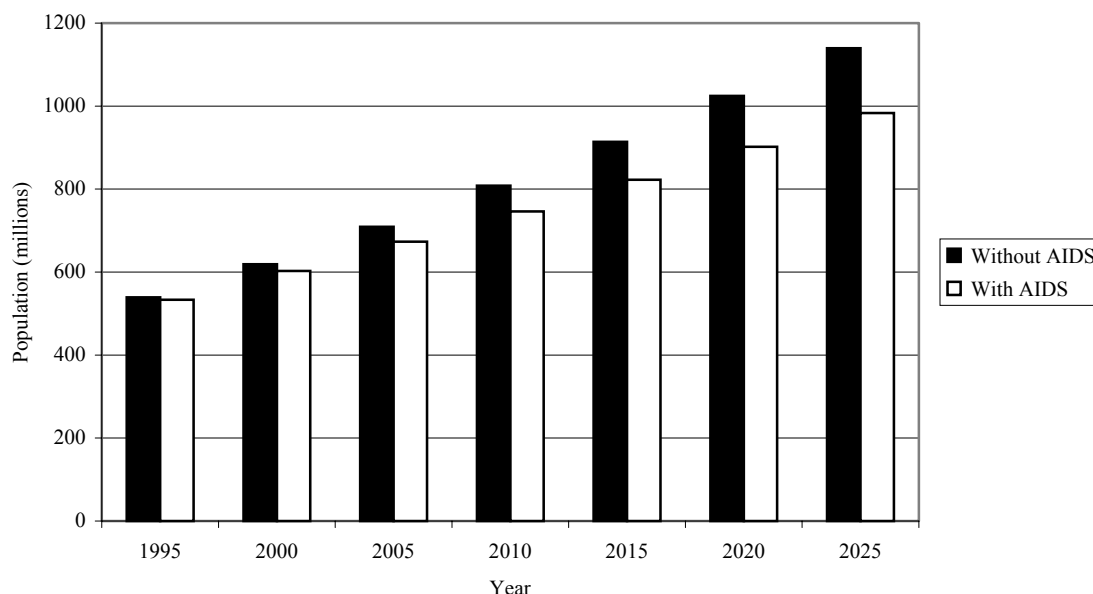
HIV/AIDS is having effects on the crude death rate (the annual number of deaths per thousand population) similar to those on the life expectancy at birth (table II.3, annex tables II.A.5 and II.A.6). In some cases, death rates that were projected to decline in the absence of HIV/AIDS will instead rise. For instance, in the absence of AIDS, the crude death rate for the 38 African countries considered was expected to decline from 13.6 deaths per 1,000 persons in 1995-2000 to 8.5 deaths per 1,000 in 2020-2025. AIDS will cause the crude death rate to increase from 16.8 deaths per 1,000 in 1995-2000 to 17.5 deaths per 1,000 in 2000-2005 before declining to 13.6 deaths per 1,000 in 2020-2025. 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, and by 2020-2025 AIDS will be responsible for a 60 per cent increase in the crude death rate.

3. Population size and growth

Figure II.2, table II.4, and annex tables II.A.7 and II.A.8 present the projected population size from 1995 to 2025 taking into account the demographic impact of AIDS as well as the hypothetical projected population in the absence of AIDS. The absolute difference between the projected population with and without AIDS indicates the cumulative impact of AIDS. For the 53 countries considered, the population is estimated at 3.4 billion as of mid-1995, about 9 million fewer than it would have been in the absence of AIDS. The proportional impact of AIDS on population size is more marked in Africa. In the 38 most affected African countries, the population size is estimated at 533 million in 1995, 5.6 million less than it would have been in the absence of AIDS. By 2025, the population of these 38 African countries will reach 983 million, that is, 156 million (or 14 per cent) fewer than in the absence of AIDS.

The impact of AIDS on population size is even more striking in the seven countries with an adult prevalence of 20 per cent or more (figure II.3, table II.4 and annex table II.A.8). In 1995, their population stood at 67.8 million, 1 per cent less than it would have been without AIDS. 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 10 per cent in 2005 and 35 per cent in 2025.

Figure II.2. Estimated and projected population size with and without AIDS, 38 African countries, 1995-2000 to 2020-2025



The impact of AIDS on the population size of the countries with prevalence rates of 10 to 20 per cent is also projected to be severe. By 2025, their population is projected to be 21 per cent lower than in the absence of AIDS. In the countries where adult HIV prevalence ranges between 5 and 10 per cent, there are projected to be 11 per cent fewer people in 2025 than in the absence of the HIV/AIDS epidemic, and in the group of countries with prevalence rates below 2 per cent, the population size is projected to be 2 per cent lower in 2025 than it would have been in the absence of AIDS.

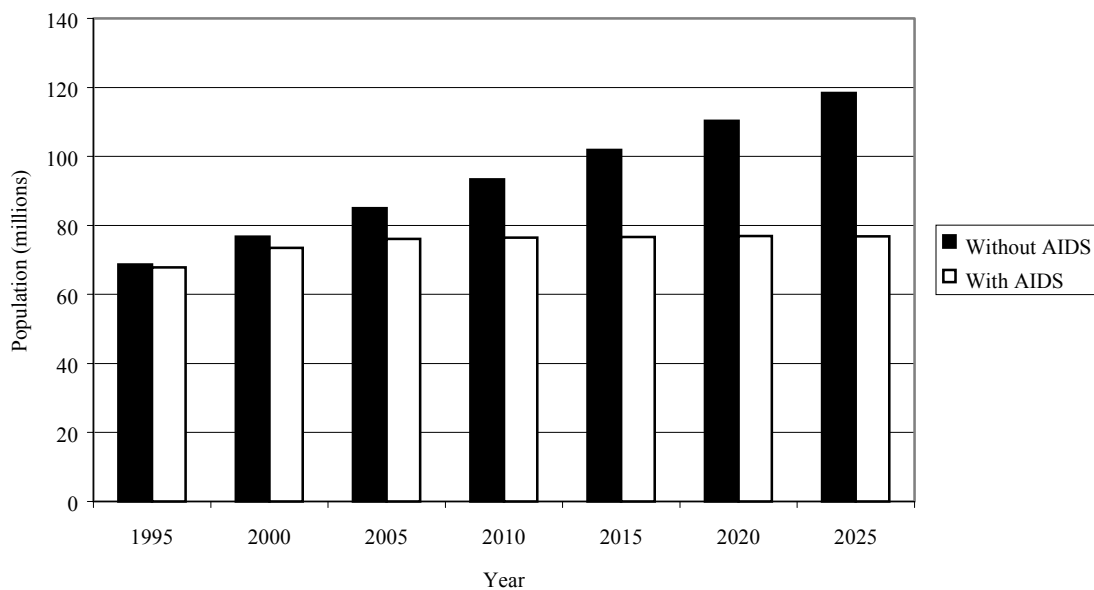
At the country level, by 2025, the populations of Botswana, Lesotho and Zimbabwe are expected to be more than 40 per cent lower than they would have been in the absence of AIDS. Indeed, in some countries, including Botswana, Lesotho and South Africa, the population size is expected to start declining after 2005.

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 2025, the populations of Cambodia and Myanmar will be 4 to 5 per cent smaller than they would have been without AIDS, and Thailand's population will be 3 per cent lower. The population of India is expected to be 3 per cent smaller than it would have been in the absence of AIDS, that is, 27 million fewer people. The largest effect will be in Haiti, where the 2025 population is expected to be 14 per cent lower than it would have been without AIDS. Because of their large populations, Brazil and India will experience a considerable shortfall in absolute terms, with their 2025 populations being, respectively, 2.7 million and 27.2 million less than would be expected without the effect of AIDS.

TABLE II.4. ESTIMATED AND PROJECTED EFFECTS OF HIV/AIDS ON
POPULATION SIZE AND POPULATION GROWTH

<i>Country grouping</i>	<i>Population size (millions)</i>			<i>Annual population growth (per cent)</i>	
	<i>1995</i>	<i>2015</i>	<i>2025</i>	<i>1995-2015</i>	<i>2015-2025</i>
All 53 countries					
Without AIDS	3 408	4 440	4 921	1.3	1.0
With AIDS	3 399	4 312	4 687	1.2	0.8
Absolute difference	9	129	235	0.1	0.2
Percentage difference	0	3	5		
38 African countries					
Without AIDS	539	914	1 139	2.6	2.2
With AIDS	533	823	983	2.2	1.8
Absolute difference	6	91	156	0.5	0.4
Percentage difference	1	10	14		
7 countries with prevalence of 20 per cent or more					
Without AIDS	69	102	118	2.0	1.5
With AIDS	68	77	77	0.6	0.0
Absolute difference	1	25	42	1.4	1.5
Percentage difference	1	25	35		

Figure II.3. Estimated and projected population size with and without AIDS in the 7 countries with the highest adult HIV prevalence, 1995-2025



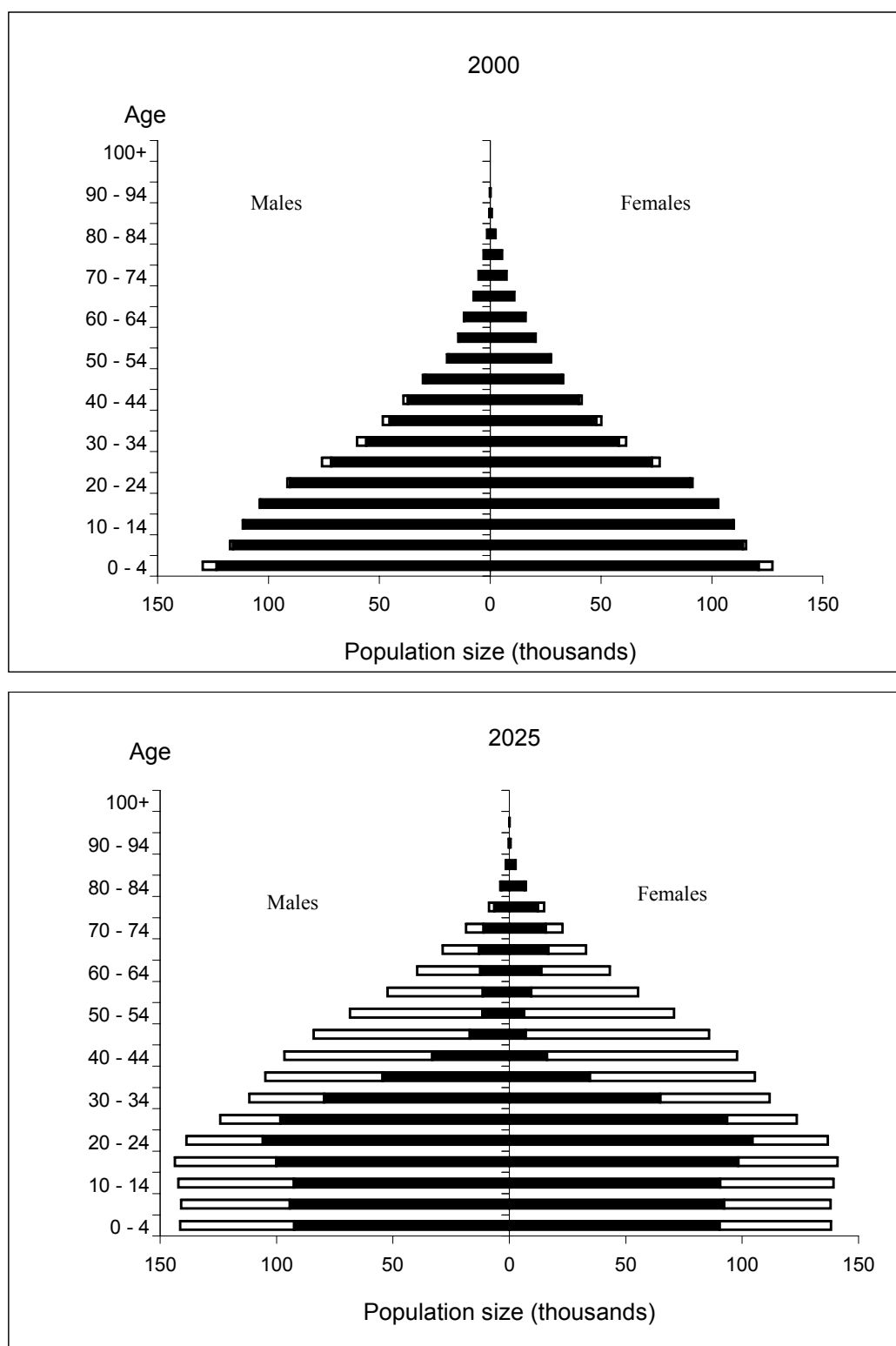
The adult population in the working-age group has been more affected than younger or older populations. The young adult years are the most productive for income generation and family caregiving, so the loss of these people to AIDS has far-reaching implications for households, the labour force, food production and the well-being of society. Figure II.4 displays the age pyramid of Botswana in 2000 and as projected for 2025 with and without AIDS. In 2000, the impact of AIDS on the age structure of Botswana's population is still mild. But by 2025, more than half of the potential population aged 35-59 would have been lost to AIDS. In comparison, one third of the population aged less than 15 years old is expected to be lost to AIDS. The impact of AIDS on adult females is also expected to be higher because of the higher adult HIV prevalence among women 15-49 years old.

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. Indeed, in the five most affected countries, the annual growth rate is expected to become negative in the near future. Figure II.5 shows that in the 38 African countries considered, the annual population growth will be significantly lower than it would have been in the absence of the AIDS epidemic. In the seven most affected countries, the expected reduction of the growth rate is even larger (figure II.6). In Botswana, Lesotho, South Africa, Swaziland and Zimbabwe the annual growth rate is expected to become negative by 2015. In Botswana, the country with the highest HIV prevalence, the average annual growth rate dropped from 3.3 per cent in 1980-1985 to 2.1 per cent in 1995-2000, and will drop to -0.6 per cent between 2010 and 2025, implying a decline in population size during that period. In the absence of AIDS, Botswana's population would have been growing at 2.5 per cent per year in 2000-2005 and 1.5 per cent per year in 2020-2025 (figure II.7). In Zimbabwe, the growth rate fell from 3.9 per cent in the early 1980s to 1.5 per cent per year in 1995-2000 and is expected to decline to -0.2 per cent by 2020. In the absence of AIDS, Zimbabwe's population would have been growing at a rate above 2 per cent through 2015.

4. Infant and under-five mortality

Approximately one fourth to one third of 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 II.3, and annex tables II.A.9 and II.A.10 present the infant and under-five mortality rates for groups of countries with and without AIDS. Even taking into account the impact of AIDS, infant mortality in the 38 African countries with moderate to high adult HIV prevalence is estimated to decline from 103 deaths per 1,000 live births in 1995-2000 to 65 deaths per 1,000 live births in 2020-2025, whereas under-five mortality is estimated to decline from 172 deaths per 1,000 live births to 108 deaths per 1,000 live births during the same period. In the absence of AIDS, the decline in both infant and under-five mortality rates would have been much steeper, from 99 deaths to 61 deaths per 1,000 live births and from 158 deaths to 92 deaths per 1,000 live births, respectively.

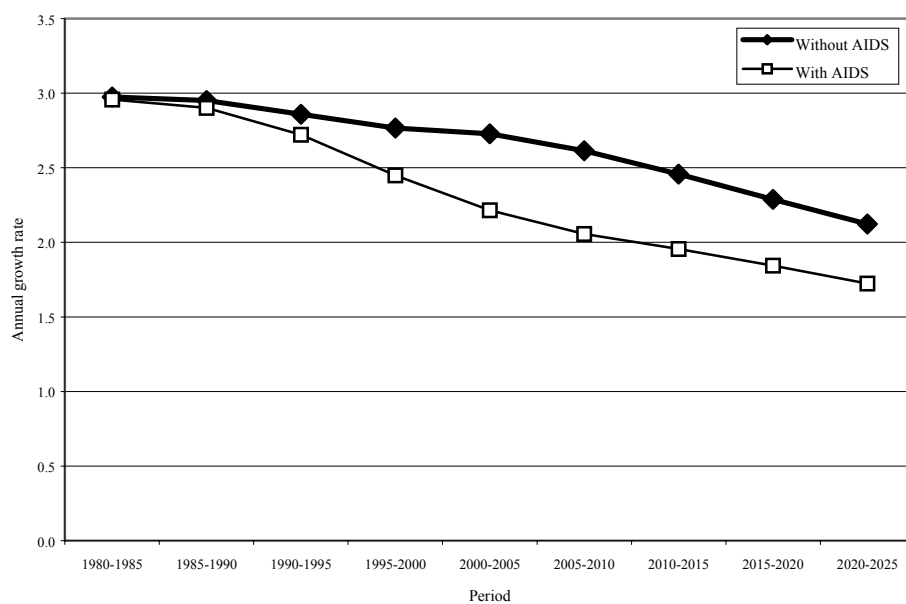
Figure II.4. Population size with and without AIDS, Botswana



Source: World Population Prospects: The 2002 Revision, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

NOTE: Unshaded bars represent the hypothetical size of the population in the absence of AIDS. Shaded bars represent the actual estimated and projected population.

**Figure II.5. Annual growth rate with and without AIDS, 1980-1985 to 2020-2025
38 African countries**



**Figure II.6. Annual rate of growth with and without AIDS, 1980-1985 to 2020-2025
7 most affected countries**

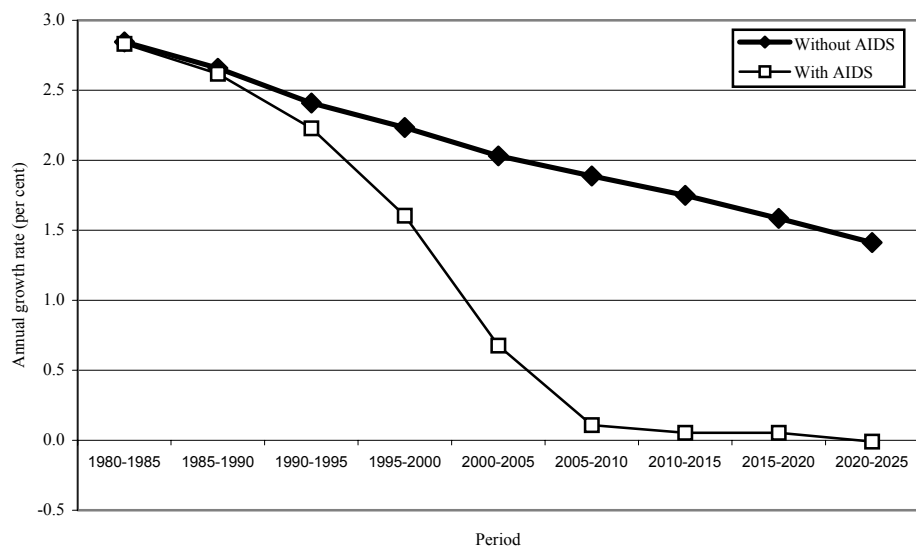
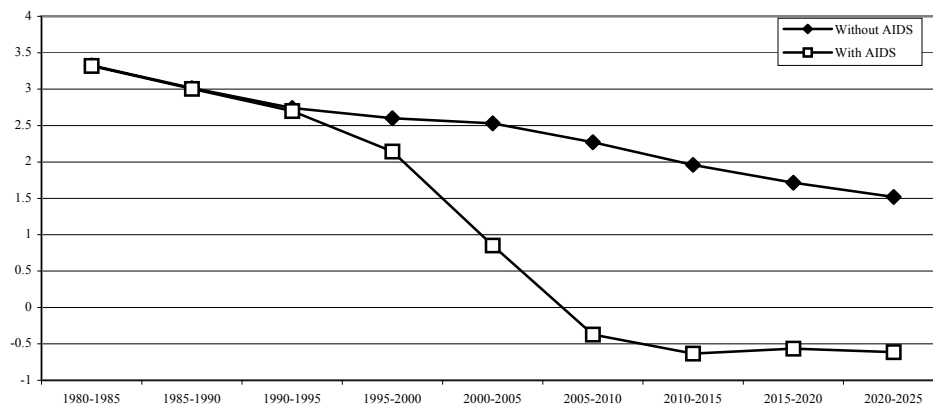


Figure II.7. Annual growth rate with and without AIDS, Botswana, 1980-1985 to 2020-2025



In the seven African countries with the highest adult HIV prevalence, infant and under five-mortality are estimated at 66 deaths and 109 deaths, respectively, in the presence of AIDS in 1995-2000, but only 55 and 80 deaths per 1,000 in the absence of AIDS. In other words, AIDS has already produced more than a 19 per cent rise in infant mortality and a 36 per cent rise in under-five mortality. By 2020-2025, the rise of mortality due to AIDS is expected to reach 38 per cent and 88 per cent, for infant and child mortality, respectively. At the country level, in Botswana, under-five mortality is expected to reach 104 deaths per 1,000 live births by 2000-2005, whereas in the absence of AIDS, it would have been expected to decrease to 45 deaths per 1,000. In Namibia, under-five mortality is projected at 107 per 1,000 in 2000-2005 instead of 67 per 1,000 in the absence of AIDS.

Outside of Africa, the impact of AIDS on infant and under-five mortality is less than in African countries. By 2020-2025, under-five mortality rate in the presence of AIDS is expected to be 8 per cent higher than in its absence in the five most affected Asian countries, whereas it is expected to be 9 per cent higher in the eight countries of Latin America and the Caribbean (annex table II.A.9).

As increasing numbers of young adults die of AIDS, they leave behind children without parents. UNAIDS defines AIDS orphans as children under the age of 15 who have lost one or both parents to AIDS. At the end of 2001, there were an estimated 14 million AIDS orphans worldwide, of whom 11 million lived in sub-Saharan Africa. In Nigeria, one million children were AIDS orphans, according to UNAIDS estimates. Other countries with large numbers of AIDS orphans were Ethiopia (990,000), Democratic Republic of the Congo (930,000), Kenya (890,000), Uganda (880,000) and United Republic of Tanzania (810,000).

5. Gender dimension of the HIV/AIDS epidemic

In the hardest hit countries of Africa, where more women than men are infected, the impact of AIDS on life expectancy is projected to be higher for women than for men. Table II.5

presents the loss of life expectancy due to AIDS and the percentage difference in life expectancy at birth by sex in the most affected countries. In Botswana, 27.5 years of male life expectancy will be lost to AIDS by 2000-2005, whereas 29.5 years of female life expectancy will be lost to the disease. By 2020-2025, these figures are expected to reach 34.3 years and 42.5 years, respectively. At that time, male life expectancy would be 48 per cent lower than it would have been without AIDS, whereas female life expectancy would be nearly 60 per cent lower than the expected level in the absence of AIDS. In other hardest hit countries, the impact of AIDS on life expectancy is also higher for females. By 2020-2025, females in Namibia, South Africa, Swaziland and Zimbabwe will all have lost at least 6 years of life expectancy more than their male counterparts.

TABLE II.5. LOSS OF LIFE EXPECTANCY AT BIRTH DUE TO AIDS BY SEX IN THE 7 COUNTRIES WITH THE HIGHEST ADULT HIV PREVALENCE, 2000-2005, 2010-2015 AND 2020-2025

<i>Country</i>	<i>Loss of life expectancy at birth due to AIDS (years)</i>		<i>Percentage difference</i>	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
<i>2000-2005</i>				
Botswana	27.5	29.1	41	42
Lesotho	25.1	22.8	44	38
Namibia	20.6	21.6	32	32
South Africa	17.9	19.7	28	28
Swaziland	26.6	29.1	44	45
Zambia.....	19.0	23.1	37	42
Zimbabwe.....	32.1	36.9	49	53
<i>2010-2015</i>				
Botswana	35.6	42.3	52	58
Lesotho	29.3	32.3	48	50
Namibia	26.5	32.2	40	45
South Africa	24.7	32.2	37	44
Swaziland	32.8	38.9	51	57
Zambia.....	19.8	24.6	36	42
Zimbabwe.....	35.5	42.0	52	58
<i>2020-2025</i>				
Botswana	34.3	42.5	48	57
Lesotho	29.3	34.6	45	51
Namibia	25.6	31.8	37	43
South Africa	23.3	31.1	34	42
Swaziland	32.9	39.7	49	56
Zambia.....	20.2	25.6	34	40
Zimbabwe.....	33.9	41.9	48	56

C. CONCLUSIONS

The present chapter documents the likely impact of HIV/AIDS in the 53 countries where adult HIV prevalence is already significant. The toll that the disease is having is already serious and is projected to worsen. By 2025, the population of the 38 most affected countries in Africa is expected to be at least 156 million lower than it would have been in the absence of AIDS. Between 1995-2025, some 98 million additional deaths are expected to occur in these countries because of AIDS, and about 58 million children will not be born because of the early deaths 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 is also projected to increase in the countries most affected by the HIV/AIDS epidemic. Taking one country as an example, in Botswana, the country with the highest HIV/AIDS adult prevalence rate, all indicators point to drastic demographic changes by 2025, as reflected in the distorted population pyramid shown in figure II.4. The size of the population will be more than 40 per cent lower than it would have been without AIDS, and the growth rate will turn negative, resulting in a declining population. The crude death rate will increase from 5.7 deaths per 1,000 population in 1995-2000 to 31.3 deaths in 2010-2015. Life expectancy at birth, which had reached 65 years in 1990-1995, will fall to only 39 years in 2010-2015.

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. 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 in the assumptions made regarding 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, all available data buttress the case for urgent action. The disease is already 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 of the seriousness of the HIV/AIDS epidemic and take necessary actions in order to prevent the epidemic from following the course that has been presented here.

ANNEX TABLES

TABLE II.A.1. ESTIMATED AND PROJECTED NUMBER OF DEATHS (MILLIONS), BY COUNTRY GROUPING, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>	<i>1995-2025</i>
All 53 countries							
Without AIDS	159	162	168	174	183	193	1 039
With AIDS	170	182	194	207	220	231	1 203
Absolute difference	11	20	27	32	37	38	164
Percentage difference	7	12	16	19	20	20	16
38 African countries							
Without AIDS	39	41	43	44	45	46	258
With AIDS	48	56	61	63	64	64	355
Absolute difference	8	15	18	19	19	19	98
Percentage difference	21	36	43	43	42	41	38
5 Asian countries							
Without AIDS	91	93	95	100	107	115	602
With AIDS	93	96	102	111	122	132	656
Absolute difference	2	3	6	11	15	17	55
Percentage difference	2	4	7	11	14	15	9
8 Latin America and the Caribbean countries							
Without AIDS	6	7	7	8	8	9	46
With AIDS	7	8	8	8	9	10	50
Absolute difference	0	1	1	1	1	1	4
Percentage difference	7	10	10	10	9	8	9
2 Developed countries							
Without AIDS	22	22	22	22	23	24	134
With AIDS	22	23	23	24	25	25	142
Absolute difference	1	1	1	2	2	2	8
Percentage difference	2	4	6	8	7	7	6

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.2. ESTIMATED AND PROJECTED NUMBER OF DEATHS (MILLIONS),
BY LEVEL OF ADULT HIV PREVALENCE, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>	<i>1995-2025</i>
7 Countries with prevalence of 20 per cent or more							
Without AIDS	3	3	3	3	3	4	19
With AIDS	5	8	10	10	9	9	50
Absolute difference	2	5	6	6	6	5	30
Percentage difference	71	155	204	193	167	142	156
5 Countries with prevalence 10 to 20 per cent							
Without AIDS	5	5	5	5	5	5	31
With AIDS	6	8	9	9	9	9	51
Absolute difference	2	3	4	4	4	4	20
Percentage difference	32	58	73	75	77	76	66
14 Countries with prevalence of 5 to 10 per cent							
Without AIDS	19	21	22	22	23	23	129
With AIDS	23	26	28	29	30	30	167
Absolute difference	3	5	7	7	7	8	38
Percentage difference	18	26	30	32	33	33	29
17 Countries with prevalence of 2 to 5 per cent							
Without AIDS	15	14	15	15	16	16	91
With AIDS	16	16	17	18	19	19	105
Absolute difference	1	2	2	3	3	3	14
Percentage difference	9	15	15	17	17	17	15
10 Countries with prevalence of less than 2 per cent							
Without AIDS	117	119	123	128	136	145	768
With AIDS	120	124	130	141	153	164	831
Absolute difference	3	5	8	12	17	18	62
Percentage difference	2	4	6	10	12	13	8

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.3. ESTIMATED AND PROJECTED LIFE EXPECTANCY AT BIRTH, BY COUNTRY GROUPING, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
All 53 countries						
Without AIDS	63.9	65.5	67.0	68.4	69.6	70.8
With AIDS	62.4	62.9	63.5	64.2	65.0	65.9
Absolute difference	1.5	2.6	3.5	4.1	4.6	4.9
Percentage difference	2.4	4.0	5.2	6.1	6.7	6.9
38 African countries						
Without AIDS	52.7	54.8	56.4	58.3	60.2	62.1
With AIDS	47.0	45.3	45.3	47.1	49.1	51.3
Absolute difference	5.7	9.5	11.1	11.3	11.1	10.8
Percentage difference	10.9	17.3	19.7	19.3	18.4	17.4
5 Asian countries						
Without AIDS	66.1	67.9	69.6	71.0	72.2	73.4
With AIDS	65.7	67.2	68.3	68.9	69.4	70.2
Absolute difference	0.4	0.7	1.3	2.1	2.8	3.2
Percentage difference	0.7	1.1	1.8	2.9	3.9	4.4
8 Latin America and the Caribbean countries						
Without AIDS	67.4	68.9	70.3	71.6	72.8	73.9
With AIDS	66.2	67.1	68.4	69.7	70.8	72.0
Absolute difference	1.3	1.7	1.9	1.9	1.9	1.9
Percentage difference	1.9	2.5	2.7	2.6	2.6	2.6
2 Developed countries						
Without AIDS	72.8	74.1	75.4	76.6	77.6	78.4
With AIDS	72.2	73.2	73.8	74.4	75.3	76.1
Absolute difference	0.6	1.0	1.6	2.2	2.3	2.2
Percentage difference	0.8	1.3	2.1	2.9	3.0	2.9

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.4. ESTIMATED AND PROJECTED LIFE EXPECTANCY AT BIRTH, BY LEVEL OF ADULT HIV PREVALENCE, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
7 Countries with prevalence of 20 per cent or more						
Without AIDS	62.3	63.7	65.4	67.0	68.4	69.6
With AIDS	50.2	41.3	37.3	37.6	39.2	41.0
Absolute difference	12.0	22.4	28.1	29.4	29.2	28.6
Percentage difference	19.3	35.1	43.0	43.9	42.7	41.1
5 Countries with prevalence 10 to 20 per cent						
Without AIDS	54.7	55.6	57.5	59.5	61.6	63.4
With AIDS	46.5	41.8	40.9	42.3	44.0	45.9
Absolute difference	8.2	13.8	16.6	17.2	17.5	17.6
Percentage difference	15.0	24.8	28.9	28.9	28.5	27.7
14 Countries with prevalence of 5 to 10 per cent						
Without AIDS	52.3	53.8	55.5	57.5	59.5	61.5
With AIDS	47.3	46.5	47.0	48.7	50.6	52.7
Absolute difference	5.0	7.3	8.5	8.8	8.9	8.8
Percentage difference	9.5	13.7	15.3	15.2	14.9	14.3
17 Countries with prevalence of 2 to 5 per cent						
Without AIDS	51.6	54.7	56.1	57.9	59.7	61.5
With AIDS	48.3	49.9	51.4	53.0	54.7	56.5
Absolute difference	3.3	4.8	4.7	4.9	4.9	4.9
Percentage difference	6.5	8.8	8.4	8.4	8.3	8.0
10 Countries with prevalence of less than 2 per cent						
Without AIDS	66.6	68.3	70.0	71.4	72.5	73.7
With AIDS	66.1	67.5	68.6	69.4	69.9	70.7
Absolute difference	0.5	0.9	1.3	2.0	2.6	2.9
Percentage difference	0.8	1.2	1.9	2.8	3.6	4.0

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.5. ESTIMATED AND PROJECTED CRUDE DEATH RATE, BY COUNTRY GROUPING, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
All 53 countries						
Without AIDS	9.0	8.5	8.3	8.1	8.0	8.0
With AIDS	9.6	9.7	9.7	9.8	10.0	10.1
Absolute difference	0.7	1.1	1.5	1.7	1.9	2.0
Percentage difference	7.5	13.2	17.8	21.5	24.1	25.0
38 African countries						
Without AIDS	13.6	12.3	11.3	10.2	9.2	8.5
With AIDS	16.8	17.5	17.2	16.0	14.8	13.6
Absolute difference	3.1	5.1	5.9	5.8	5.5	5.2
Percentage difference	22.9	41.8	52.6	57.1	60.0	61.4
5 Asian countries						
Without AIDS	7.8	7.4	7.3	7.3	7.4	7.7
With AIDS	8.0	7.7	7.8	8.1	8.6	9.0
Absolute difference	0.2	0.3	0.5	0.9	1.2	1.3
Percentage difference	2.4	4.0	7.2	11.7	15.5	17.0
8 Latin America and the Caribbean countries						
Without AIDS	6.8	6.7	6.6	6.7	6.9	7.1
With AIDS	7.3	7.4	7.4	7.5	7.6	7.9
Absolute difference	0.5	0.7	0.8	0.8	0.8	0.7
Percentage difference	7.8	10.9	11.6	11.5	11.3	10.4
2 Developed countries						
Without AIDS	10.2	10.0	9.8	9.6	9.6	9.8
With AIDS	10.4	10.4	10.4	10.5	10.5	10.6
Absolute difference	0.3	0.4	0.6	0.8	0.9	0.8
Percentage difference	2.6	4.0	6.3	8.6	8.9	8.3

Source: World Population Prospects: The 2002 Revision, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.6. ESTIMATED AND PROJECTED CRUDE DEATH RATE, BY LEVEL OF ADULT HIV PREVALENCE, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
7 Countries with prevalence of 20 per cent or more						
Without AIDS.....	8.0	7.5	7.0	6.7	6.5	6.5
With AIDS.....	14.1	20.7	25.0	24.9	24.0	23.3
Absolute difference.....	6.1	13.2	17.9	18.2	17.5	16.8
Percentage difference	75.6	175.4	255.3	273.6	269.4	259.6
5 Countries with prevalence 10 to 20 per cent						
Without AIDS.....	12.4	11.8	10.6	9.5	8.6	7.9
With AIDS.....	16.8	19.6	20.1	19.1	18.2	17.3
Absolute difference.....	4.3	7.8	9.5	9.6	9.6	9.4
Percentage difference	34.9	66.7	89.9	101.4	112.5	119.4
14 Countries with prevalence of 5 to 10 per cent						
Without AIDS.....	14.0	12.9	11.7	10.5	9.5	8.6
With AIDS.....	16.7	16.8	16.1	14.9	13.8	12.7
Absolute difference.....	2.7	3.9	4.4	4.4	4.3	4.2
Percentage difference	19.5	30.3	37.5	42.0	46.0	48.6
17 Countries with prevalence of 2 to 5 per cent						
Without AIDS.....	14.1	12.1	11.3	10.3	9.5	8.8
With AIDS.....	15.7	14.3	13.5	12.6	11.8	10.9
Absolute difference.....	1.6	2.2	2.2	2.3	2.3	2.2
Percentage difference	11.0	18.1	19.5	22.5	24.3	25.0
10 Countries with prevalence of less than 2 per cent						
Without AIDS.....	8.0	7.9	7.9	7.9	7.9	8.2
With AIDS.....	8.4	8.3	8.3	8.3	8.5	8.7
Absolute difference.....	0.4	0.4	0.4	0.5	0.5	0.6
Percentage difference	4.9	5.0	5.3	6.2	6.7	6.9

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.7. ESTIMATED AND PROJECTED POPULATION SIZE (MILLIONS) WITH AND WITHOUT AIDS,
BY COUNTRY GROUPING, 1995-2025

Country grouping	1995	2000	2005	2010	2015	2020	2025
All 53 countries							
Without AIDS	3408	3667	3923	4181	4440	4689	4921
With AIDS	3399	3644	3874	4096	4312	4510	4687
Absolute difference.....	9	23	49	84	129	180	235
Percentage difference.....	0	1	1	2	3	4	5
38 African countries							
Without AIDS	539	619	709	808	914	1025	1139
With AIDS	533	603	673	746	823	902	983
Absolute difference.....	6	16	36	62	91	123	156
Percentage difference.....	1	3	5	8	10	12	14
5 Asian countries							
Without AIDS	2267	2419	2558	2692	2821	2937	3034
With AIDS	2264	2414	2549	2676	2792	2892	2970
Absolute difference.....	2	5	9	16	29	45	65
Percentage difference.....	0	0	0	1	1	2	2
8 Latin America and the Caribbean countries							
Without AIDS	184	198	212	225	237	247	257
With AIDS	184	197	210	222	233	243	251
Absolute difference.....	0	1	2	3	4	5	6
Percentage difference.....	0	0	1	1	2	2	2
2 Developed countries							
Without AIDS	419	432	444	456	468	480	491
With AIDS	418	431	442	452	463	473	482
Absolute difference.....	1	1	2	3	5	7	9
Percentage difference.....	0	0	0	1	1	1	2

Source: World Population Prospects: The 2002 Revision, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.8. ESTIMATED AND PROJECTED POPULATION SIZE (MILLIONS) WITH AND WITHOUT AIDS,
BY LEVEL OF ADULT HIV PREVALENCE, 1995-2025

Country grouping	1995	2000	2005	2010	2015	2020	2025
7 Countries with prevalence of 20 per cent or more							
Without AIDS	69	77	85	93	102	110	118
With AIDS	68	74	76	76	77	77	77
Absolute difference	1	3	9	17	25	33	42
Percentage difference	1	4	10	18	25	30	35
5 Countries with prevalence 10 to 20 per cent							
Without AIDS	71	81	92	103	115	127	139
With AIDS	70	79	85	92	98	104	110
Absolute difference	1	2	6	11	17	23	30
Percentage difference	1	3	7	11	15	18	21
14 Countries with prevalence of 5 to 10 per cent							
Without AIDS	258	300	346	395	448	504	560
With AIDS	256	293	331	371	413	455	498
Absolute difference	2	7	14	24	36	48	62
Percentage difference	1	2	4	6	8	10	11
17 Countries with prevalence of 2 to 5 per cent							
Without AIDS	196	220	249	282	316	352	391
With AIDS	194	216	242	270	300	331	364
Absolute difference	2	4	8	11	16	21	27
Percentage difference	1	2	3	4	5	6	7
10 Countries with prevalence of less than 2 per cent							
Without AIDS	2815	2990	3151	3307	3459	3596	3713
With AIDS	2812	2983	3139	3287	3424	3543	3639
Absolute difference	3	6	12	20	34	53	74
Percentage difference	0	0	0	1	1	1	2

Source: World Population Prospects: The 2002 Revision, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.9. ESTIMATED AND PROJECTED INFANT AND UNDER-FIVE MORTALITY RATE, BY COUNTRY GROUPING, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
<i>Infant mortality</i>						
All 53 countries						
Without AIDS.....	66.4	60.7	55.4	49.8	45.3	40.9
With AIDS.....	67.5	62.0	56.7	51.3	46.7	42.1
Absolute difference.....	1.1	1.3	1.4	1.4	1.4	1.3
Percentage difference	1.7	2.2	2.5	2.9	3.1	3.2
38 African countries						
Without AIDS.....	98.5	89.5	82.8	75.2	67.9	60.9
With AIDS.....	102.6	94.3	87.6	79.9	72.5	65.1
Absolute difference.....	4.1	4.8	4.8	4.7	4.6	4.2
Percentage difference	4.2	5.3	5.8	6.3	6.7	6.9
5 Asian countries						
Without AIDS.....	59.0	52.5	46.2	40.4	36.2	32.1
With AIDS.....	59.1	52.8	46.6	41.1	36.9	32.8
Absolute difference.....	0.1	0.3	0.5	0.7	0.7	0.7
Percentage difference	0.2	0.5	1.1	1.6	2.1	2.3
8 Latin America and the Caribbean countries						
Without AIDS.....	43.1	38.8	34.4	30.4	26.4	22.9
With AIDS.....	43.5	39.3	34.9	30.9	26.9	23.3
Absolute difference.....	0.5	0.5	0.5	0.5	0.5	0.4
Percentage difference	1.1	1.3	1.5	1.8	1.9	1.9
2 Developed countries						
Without AIDS.....	9.5	8.6	7.9	7.3	6.7	6.2
With AIDS.....	9.5	8.8	8.2	7.6	7.0	6.6
Absolute difference.....	0.1	0.2	0.3	0.4	0.4	0.4
Percentage difference	0.8	2.2	4.0	5.0	5.7	6.4
<i>Under five mortality</i>						
All 53 countries						
Without AIDS.....	93.9	85.2	77.1	68.9	62.6	56.1
With AIDS.....	98.8	91.8	83.8	75.8	69.1	62.3
Absolute difference.....	5.0	6.6	6.7	6.9	6.5	6.2
Percentage difference	5.3	7.8	8.7	10.0	10.4	11.1
38 African countries						
Without AIDS.....	157.6	142.0	130.1	116.6	103.9	91.7
With AIDS.....	172.4	161.1	148.1	134.5	121.0	107.5
Absolute difference.....	14.9	19.2	18.0	17.8	17.1	15.8
Percentage difference	9.4	13.5	13.8	15.3	16.5	17.3

TABLE II.A.9. (continued)

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
5 Asian countries						
Without AIDS.....	75.3	65.3	56.0	48.2	43.6	38.4
With AIDS.....	76.8	67.3	58.8	51.5	46.4	41.3
Absolute difference.....	1.5	2.0	2.8	3.2	2.8	2.9
Percentage difference	2.0	3.1	5.0	6.7	6.3	7.5
8 Latin America and the Caribbean countries						
Without AIDS.....	52.3	47.0	41.7	36.9	32.3	28.1
With AIDS.....	55.2	49.9	44.7	39.8	35.0	30.6
Absolute difference.....	2.9	2.9	2.9	2.9	2.8	2.5
Percentage difference	5.5	6.1	7.0	7.8	8.5	8.8
2 Developed countries						
Without AIDS.....	11.7	10.7	9.9	9.1	8.4	7.8
With AIDS.....	12.0	11.4	11.2	10.5	9.4	8.8
Absolute difference.....	0.3	0.7	1.2	1.4	1.1	1.1
Percentage difference	2.4	7.0	12.4	15.0	12.7	13.5

Source: *World Population Prospects: The 2002 Revision*, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

TABLE II.A.10. ESTIMATED AND PROJECTED INFANT AND UNDER-FIVE MORTALITY RATE, BY LEVEL OF ADULT HIV PREVALENCE, 1995-2025

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
<i>Infant mortality</i>						
7 countries with prevalence of 20 per cent or more						
Without AIDS.....	55.4	50.9	45.5	40.7	36.6	32.9
With AIDS.....	66.1	64.7	59.5	54.6	50.0	45.4
Absolute difference.....	10.7	13.8	14.0	13.9	13.4	12.5
Percentage difference.....	19.2	27.2	30.8	34.2	36.7	37.9
5 countries with prevalence 10 to 20 per cent						
Without AIDS.....	91.9	87.9	79.9	72.0	64.2	57.1
With AIDS.....	98.5	95.7	87.6	79.8	72.1	64.5
Absolute difference.....	6.6	7.8	7.8	7.9	7.8	7.4
Percentage difference.....	7.2	8.9	9.7	11.0	12.2	13.0
14 countries with prevalence of 5 to 10 per cent						
Without AIDS.....	98.0	91.5	84.3	76.2	68.6	61.3
With AIDS.....	101.5	95.5	88.2	80.1	72.4	64.7
Absolute difference.....	3.5	3.9	3.9	3.9	3.7	3.5
Percentage difference.....	3.6	4.3	4.6	5.1	5.5	5.7
17 countries with prevalence of 2 to 5 per cent						
Without AIDS.....	105.9	90.3	84.2	76.8	69.6	62.6
With AIDS.....	107.5	92.0	85.9	78.5	71.2	64.0
Absolute difference.....	1.5	1.7	1.7	1.7	1.6	1.5
Percentage difference.....	1.4	1.9	2.0	2.2	2.3	2.3
10 countries with prevalence of less than 2 per cent						
Without AIDS.....	53.4	47.5	41.8	36.8	32.9	29.2
With AIDS.....	53.5	47.7	42.3	37.3	33.6	29.9
Absolute difference.....	0.1	0.2	0.4	0.6	0.6	0.6
Percentage difference.....	0.3	0.5	1.0	1.6	2.0	2.2
<i>Under five mortality</i>						
7 countries with prevalence of 20 per cent or more						
Without AIDS.....	80.2	73.0	64.5	56.9	50.5	44.8
With AIDS.....	108.8	114.2	108.0	100.2	92.7	84.3
Absolute difference.....	28.7	41.2	43.5	43.3	42.2	39.6
Percentage difference.....	35.7	56.4	67.5	76.2	83.6	88.4
5 countries with prevalence 10 to 20 per cent						
Without AIDS.....	145.8	138.5	124.1	110.0	96.2	83.8
With AIDS.....	166.2	162.7	150.0	136.1	122.4	108.7
Absolute difference.....	20.4	24.2	25.8	26.1	26.2	24.9
Percentage difference.....	14.0	17.5	20.8	23.7	27.2	29.8

TABLE II.A.10. (continued)

<i>Country grouping</i>	<i>1995-2000</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>
14 countries with prevalence of 5 to 10 per cent						
Without AIDS	157.4	145.7	132.9	118.8	105.4	92.6
With AIDS	172.7	161.5	148.5	134.3	120.4	106.7
Absolute difference	15.3	15.9	15.7	15.6	15.0	14.0
Percentage difference	9.7	10.9	11.8	13.1	14.2	15.1
17 countries with prevalence of 2 to 5 per cent						
Without AIDS	170.2	143.7	132.9	119.8	107.1	95.0
With AIDS	175.6	157.2	142.8	129.7	116.6	103.7
Absolute difference	5.5	13.5	9.8	9.9	9.5	8.7
Percentage difference	3.2	9.4	7.4	8.3	8.8	9.2
10 countries with prevalence of less than 2 per cent						
Without AIDS	67.8	58.9	50.8	44.0	39.9	35.3
With AIDS	69.3	60.8	53.4	47.0	42.5	37.9
Absolute difference	1.5	1.9	2.6	3.0	2.5	2.6
Percentage difference	2.2	3.3	5.1	6.8	6.4	7.4

Source: World Population Prospects: The 2002 Revision, CD-ROM (United Nations publication, Sales No. E.03.XIII.8).

III. IMPACT ON HOUSEHOLDS

The HIV/AIDS epidemic threatens the social fabric of the most affected countries. Of all units affected by the HIV/AIDS epidemic, individuals, households and families are the most affected. The evidence shows that the AIDS epidemic is having severe effects on households.

Many small-scale studies have documented these impacts. The first studies were conducted in Rakai, Uganda, one of the epicentres of the HIV epidemic in the 1980s. The present chapter presents a conceptual framework of the ways AIDS affects households and families, and then reviews the available evidence regarding the economic and social impacts.

A. CONCEPTUAL FRAMEWORK

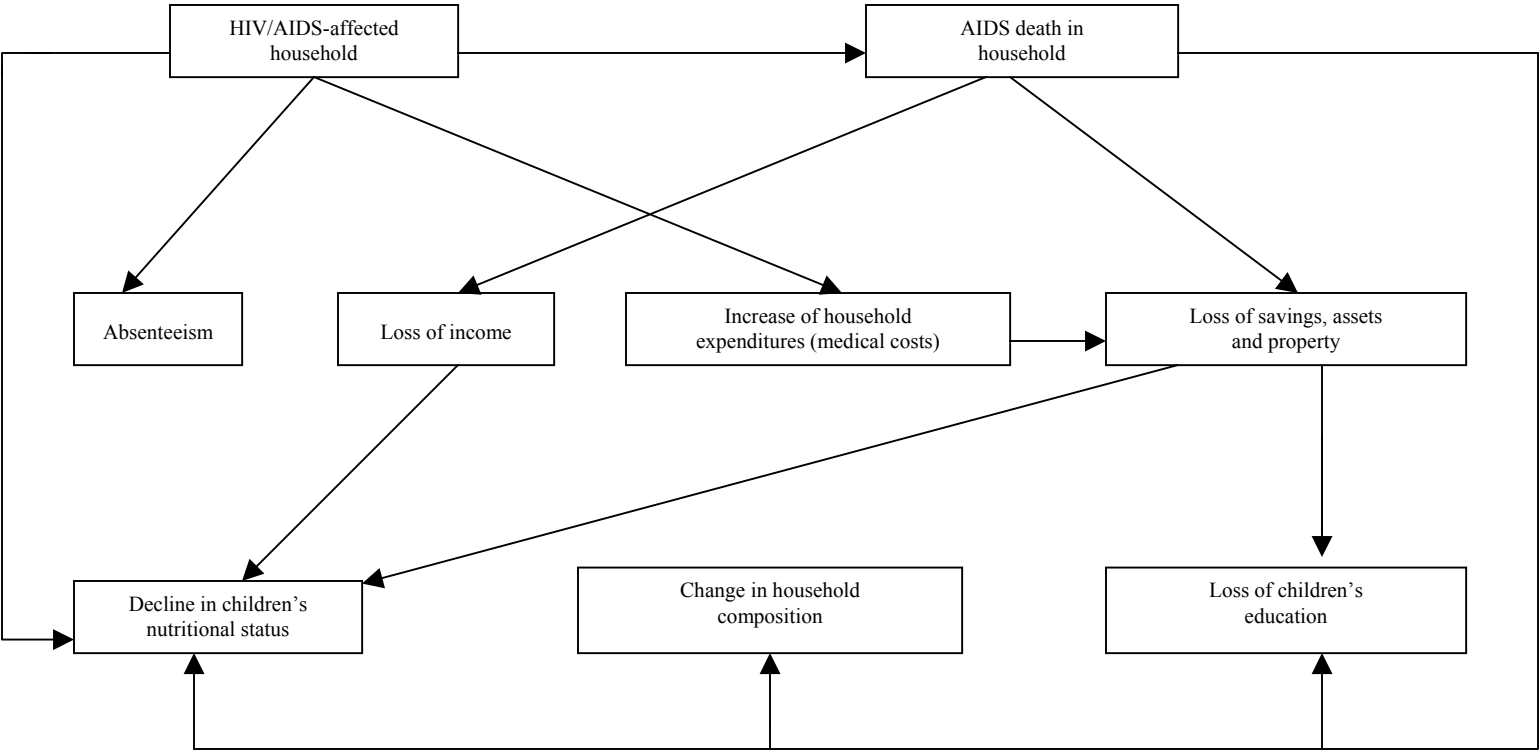
The household impact begins as soon as a member of a household starts suffering from HIV-related diseases. In addition to social and psychological consequences, three kinds of economic impacts can be distinguished. The first is the loss of the income of the family member, in particular if he or she is the breadwinner. The second impact is the increase in household expenditures to cover the medical costs. The third impact is the indirect cost resulting from the absenteeism of members of the family from work or school to care for the AIDS patient.

Figure III.1 diagrams the processes through which the HIV-related illnesses or the AIDS death of one of its members affect the household economically and socially:

- The illness of a family breadwinner may result in his or her absence from work. The absenteeism may result in the loss of income. When the person dies, the temporary loss of income becomes a permanent loss.
- The medical costs to care for AIDS-related illnesses may increase. The household may exhaust its savings or sell its assets to cover the medical costs, resulting in a lower level of production and consumption. This could lead to a reduction in the nutritional intake of children and cause them to become malnourished.
- If a household member dies from the disease, funeral, mourning and other costs may also add to the burden of the household. Mounting expenditures and loss of income of the AIDS patient may result in the impoverishment of the household.
- Poorer households may be more severely affected than better-off households. Indeed, the relationship between poverty and the costs of AIDS to households can be visualized at two levels. First, AIDS can push households into poverty. Second, a household that was already poor may become further impoverished.

Besides the economic impact that the HIV/AIDS epidemic may have on households and families, it may have social implications as well. The household is the first unit of socialization, and it may go through tremendous changes.

Figure III.1. Conceptual framework of the socio-economic impact of the HIV/AIDS epidemic on households



- The HIV/AIDS epidemic may lead to a change in household composition with the gradual disappearance of the parental generation and children being cared for by grandparents and other relatives. In some cases, the older children may act as surrogate parents for their younger siblings, thus leading to an increase in one-generation households headed by the older children.
- An adult death may lead to the dislocation or dissolution of the household, and children may be sent to live with relatives. Some of the children may withdraw from school if the family can no longer afford to pay fees or to buy supplies. Children may also drop out of school if they are needed at home, on the farm or in the marketplace.
- The number of impoverished female-headed households will increase when the male breadwinner of the household dies of AIDS. Where the AIDS victim in the household is female, the impact of the HIV/AIDS epidemic on the household can be especially severe, especially for the welfare of children. Indeed, the culturally determined position of women can affect the household impact of an illness such as AIDS in males.
- Community attitudes towards helping needy households will contribute either positively or negatively to the impact of the disease. Thus, in communities where social and financial supports are available, the HIV/AIDS-affected households may be able to cope more effectively with the epidemic than those in communities where stigmatization is attached to those infected with the virus.

B. EMPIRICAL EVIDENCE OF THE SOCIAL AND ECONOMIC IMPACT OF THE HIV/AIDS EPIDEMIC ON HOUSEHOLDS

Treatment and other direct costs

Perhaps the most direct cost to households of HIV/AIDS and the one that is usually measured by cost-of-illness studies is the cost of treatment and the cost of lost work time, although there are also substantial additional secondary costs such as funeral expenses.

AIDS-affected households often make a rapid transition from relative wealth to relative poverty. Haworth and others' (1991) survey of AIDS-affected families in Zambia found that the shift into poverty was most visible in families in which the deceased father was both the breadwinner and tenant of a house provided through his job. Many such families were forced to move after the death of the father, with a majority of those families reporting economic difficulties.

In the early 1990s, the International Children's Centre in Paris launched a multi-country field study of the socio-economic evolution of children and families affected by HIV/AIDS in three countries: Côte d'Ivoire, Burundi and Haiti. In each of these countries, about 100 households affected by HIV/AIDS were followed longitudinally for a year. In Côte d'Ivoire, the study showed that marked differences occurred in the economic activities of households, with a steady decline in the number of economically active household members throughout the course of the study (Béchu, 1997). In Haiti, the changes included an overall reduction in the number of household dependents, the cessation of paid employment, increased borrowing and the sale of

possessions as the disease became more serious. In addition, it was found that HIV/AIDS-affected persons were seeking less care even in circumstances when care was available.

In another longitudinal study, conducted in Rakai, Uganda between 1989 and 1992, the proportion of households owning a car, lorry, radio or bicycle decreased in households that experienced an adult AIDS death, while households in which there were no adult deaths saw an increase in ownership of durable goods (table III.1). The authors concluded that HIV-related adult illness and burial costs impose great financial burdens on households, leading to a depletion of economic resources (Menon and others, 1998).

TABLE III.1. CHARACTERISTICS OF HOUSEHOLDS WITH AND WITHOUT AN ADULT (15-49 YEARS) DEATH DURING THE PANEL STUDY IN RAKAI, UGANDA 1989-1992

<i>Characteristics</i>	<i>Households without an adult death</i>	<i>Households with an adult death</i>	<i>All households</i>
<i>Car/Lorry</i>			
First visit.....	1.1	1.6	1.1
Last visit	1.3	0.0	1.1
<i>Bicycle</i>			
First visit.....	33.9	38.6	34.4
Last visit	41.0	34.8	40.3
<i>Radio</i>			
First visit.....	29.7	39.7	30.8
Last visit	37.0	35.9	36.9

Source: Menon and others (1998).

Recently, Booysen (2003) found similar results in South Africa. Households that had experienced illness or death in the recent past were more than twice as likely to be poor than non-affected households, and they were more likely to experience long-term poverty.

In a study in Delhi, India (Basu, Gupta and Krishna, 1997), the larger extended family or kin group provided the main cushion for absorbing a crisis such as an AIDS-related illness or death. Poor households bore proportionately more of the costs. The most common response to loss of income to an illness or death was to seek loans, as most households did not have enough savings or assets to play a major role in coping, and most households could expect little help from government or employer benefits. In this setting, many women do not join the labour force after the death of a spouse because the society considers it inappropriate for a woman to work outside the home.

Two studies in Thailand and Sri Lanka assessed the direct and indirect costs of an adult HIV/AIDS-related death on rural households. In the Thailand study, 116 households with a HIV/AIDS-related death were compared with 100 households with a non-HIV/AIDS-related death and to 108 households with no death (Pitayanon and others, 1997). The study found that the economic impact of an HIV/AIDS-related death was substantial and generally greater than that for a non-HIV/AIDS-related death. The largest part of the economic costs was the loss of earnings of the deceased, but loss of household income from other sources was also important, as were decreases in household consumption. In order to cope with the loss of income resulting from the illness and death of a member of a household, households resorted to spending their savings,

borrowing and selling possessions including land, vehicles and livestock. The Sri Lanka study (Bloom and others, 1997) found that the direct costs per HIV/AIDS-related case were between US\$250 and US\$985, depending on the treatment regimen, whereas indirect costs ranged from US\$5,204 to US\$17,695. The bulk of the direct costs in the case of Sri Lanka were borne by the public sector, whereas indirect costs were more likely to be borne by persons living with HIV/AIDS and their families and caretakers.

Mushati and others (2003) studied the consequences for households of adult terminal illness and death in eastern Zimbabwe. Nearly 80 per cent of those who died were the primary income earners for their households, and 60 per cent lost their jobs during their illness. One in seven caregivers gave up a job to care for the sick person. Most health care costs were paid by the sick person and his/her spouse (42 per cent) and by other household members (41 per cent).

Impact on food consumption

The HIV/AIDS epidemic has had an impact on food consumption in households (Mutangadura, 2000). A study in Zimbabwe showed that households fostering maternal orphans had sold assets and switched from more expensive to cheaper commodities, and many households, especially in the urban area studied, reported decreased food consumption and switched to cheaper foods. The food security situation of the surviving family was poorer after the death of an adult female. Some children (aged 10-15 years) in urban areas were forced to seek casual employment in order to buy food.

In a Côte d'Ivoire study (Béchu, 1997) that tracked 107 households with at least one adult AIDS victim, per capita consumption dropped in households where the AIDS victim either died or moved away. In households where the AIDS victim remained relatively free of symptoms, per capita consumption remained stable over time.

Another study in Thailand (Janjaroen, 1997) found that the average expenditure per adult equivalent household member was lower in households with an adult death than in households without deaths, but the differences between the two classes of households were very small and not statistically significant. However, a regression analysis showed that AIDS deaths had a larger negative impact on consumption than did non-AIDS deaths. Furthermore, this was true even after controlling for the duration of the illness, which also had a strong negative effect.

TABLE III.2. PERCENTAGE OF HOUSEHOLDS INDICATING A DECREASE IN THE CONSUMPTION OF FOOD ITEMS AFTER A DEATH IN THE HOUSEHOLD IN ZIMBABWE, 2000

<i>Food item</i>	<i>Urban (101)</i>	<i>Rural (114)</i>
Maize meal	34	16
Meat	79	75
Bread	72	80
Milk	71	61
Kapenta fish.....	0	33
Cooking oil.....	50	64
Sugar	48	61
Vegetables	5	0
Eggs.....	70	65
Pulse	44	11

Source: Mutangadura, G., 2000.

A study conducted in Uganda (Topouzis, 1994) found that malnutrition had risen in the village of Guru, especially among children, and kwashiorkor was the main reason for child admissions in the hospital in the last three years. Prior to this period, few cases of malnutrition were reported to the hospital. AIDS had also reduced the number of meals per day or limited diet to one or two staple foods.

Change in household composition and structure

Most studies have found that the epidemic tends to increase the number of female-headed households and the number of households in which grandparents are caring for children. For instance, a study in Uganda (Topouzis, 1994) found that HIV/AIDS contributes to the rise of female-headed households. Compared to women whose husbands die of other causes, AIDS widows tend to be younger and have dependent children who need to be looked after, which restricts their contributions to farm work and off-farm income-generating activities. A cohort study conducted in Uganda and covering 10,000 individuals in 15 villages (Mulder and others, 1995) found that the proportion of households headed by grandparents increased between the first and the sixth rounds. These households were characterized by a skipped generation structure, with missing adults in the economically active age groups. These skipped generation structures have the highest dependency ratio. A ten-year study in Malawi found that four out of five marriages in which one partner was HIV-positive at the baseline survey were no longer intact at follow-up (Floyd and others, 2003). Children with an HIV-positive parent at the time of the baseline survey were less likely to be alive and resident in the area and less likely to be living with either parent at the follow-up survey.

The loss of a breadwinner obviously tends to reduce the economic viability of the household that remains, and some households faced with this situation may disband, with the members dispersed to the homes of relatives. However, little is known about how frequently this occurs; most studies examine the current household configuration, and are not designed to follow up households or household members who move out of the study area. In one study of rural South Africa, Hosegood and others (2003) found that 5 per cent of households experienced at least one AIDS death during the one-year observation period, and these households were nearly three times as likely to dissolve as other households. Children aged under 15 in households with an adult death were more likely to migrate. A study in Uganda (Ntozi, 1997) inquired retrospectively about migration of the spouses of former household members who had died. The study also distinguished probable AIDS deaths from other causes of mortality. In total, 37 per cent of widows and 17 per cent of widowers had migrated from their original homes. For both sexes, migration was more common for younger spouses, and results suggested that those who were in worse health (possibly because of AIDS) were more likely to leave. In this setting, it is not surprising that a higher proportion of women would move away, because women are generally not entitled to inherit the husband's property, and the women's own kin are likely to live elsewhere.

Remarriage is potentially another way of coping with the economic as well as the emotional and social losses resulting from the death of a spouse. In some societies there are strong traditional expectations that widows will remarry. If the death was due to AIDS, however, the surviving spouse is quite likely to be infected, and remarriage poses a grave risk of spreading the disease. Little is known, however, about how marriage practices are actually changing in the face of this risk. In parts of Africa, it was traditionally expected that a widow, especially one still of reproductive age, would be "inherited" by the husband's brother or another male relative, and it was through that union that she and her children would continue to have access to property and other means of support. Data from Uganda in the early 1990s indicated that people were aware of

the risk of contracting HIV/AIDS from sexual intercourse, and the practice of widow inheritance was reported to be in decline. Households that had experienced the death of a married person were asked about the spouse's subsequent remarriage. About one fourth of widowed women and over half of men had remarried. Approximately half the reported deaths were believed to have been due to AIDS, but roughly three quarters of the surviving spouses were reported to be healthy. While the actual HIV infection status of those who remarried was not known, the results suggest that many people were basing their decisions about risks of remarriage on the appearance of health. But many of those who appeared healthy are likely in fact to have been infected by HIV (Ntozi, 1997).

Households may also try to adjust to the loss of an adult by sending some members, particularly children, to live with other relatives, or by taking in working-age relatives. The feasibility of doing this probably varies greatly between societies, depending on long-standing social customs, and, for individual households, depending on the availability of suitable kin. In some African societies, for example, there is frequent "circulation" of both children and adults between households, even in the absence of emergencies. A review of changes in household structure based on three follow-up studies in areas heavily affected by HIV/AIDS found that, in the cases of Tanzania and Uganda, many households added a member after a death occurred, with the result that the average household size following an adult death declined by less than one member, and the dependency ratio in affected households rose by only a modest amount. By contrast, in Thailand, where households were smaller to begin with than in the African cases, the households where an adult died remained one person smaller even two years after the death, and their dependency ratio nearly doubled (World Bank, 1999).

Impact of AIDS on older persons

As discussed above, one effect of the disease is to change the structure and composition of households. In many affected regions in developing countries, more and more older persons are taking care of AIDS orphans. Older parents may also provide end-stage care to their adult children afflicted with AIDS. A study conducted in Zimbabwe showed that older caregivers are under serious financial, physical and emotional stress due to their care-giving responsibilities (WHO, 2002). Other studies conducted in Thailand reached the same conclusion (Knodel and Imem, 2002a; Knodel and others, 2002b). The AIDS epidemic not only puts more stress on older persons, but it also impoverishes them at the very same time they themselves may need to be taken care of. This is especially true in societies where the younger relatives are responsible for the care of older persons.

Impact on children

The education and well-being of children also suffer when AIDS strikes the household. A significant finding of a study in Zimbabwe (Mutangadura, 2000) was that children were unable to go to school after an adult death in the household, primarily because of lack of money. In another study in Uganda, it was found that only one in every five children of AIDS-affected households in the village of Tororo remained in school. AIDS-affected families were often forced to take their children out of school either because they had no money for school fees or else because they needed the children's labour (Topouzis, 1994). This result was also confirmed by a study in Zimbabwe in both urban and rural areas, which showed that the percentage of children attending school decreased from 98 per cent to 80 per cent after the death of a mother in urban areas, and from 100 per cent to 93 per cent in rural areas (Mutangadura, 2000).

The impact of HIV/AIDS on children's education may also depend on the socio-economic status of the household. Thus, the poorer the household, the more likely the household is to take children out of the school system.

The impact of AIDS is also gender dependent. An adult woman's death may have especially far-reaching consequences for the household because women are the main caregivers in families. Women also tend to manage household budgets in ways that enhance the food and nutrition security of the entire household and of children in particular (Haddad, 1999). A study in Tanzania (Ainsworth, 1993) found that children were less likely to be enrolled in school when the household had experienced the death of a woman aged 15-50 in the previous 12 months. There was no association between school enrolments and the death of a man aged 15-50. This is because children tended to replace the dead woman's domestic roles in the short run and dropped out of school to do so (Ainsworth, 1993). In Indonesia, the loss of a father tended to have a larger impact on the economic situation of the family, whereas the loss of a mother had a larger effect on child mortality and health (Gertler and others, 2003).

Many children in AIDS-affected households are sent to live with other relatives, who may be able to provide them with better nutritional and economic conditions than they would have experienced had they remained in their original homes. In order to obtain a full picture of the impacts on children, it is therefore necessary to widen the view beyond the original household. The impact of a parent's death on children, especially children's education, is discussed further in the next section, which focuses on the status of orphans.

Impact on orphans

The HIV/AIDS pandemic has led to increased attention to the fate of the growing number of orphans. At the end of 2001, an estimated 14 million children aged under 15 years had lost one or both parents to HIV/AIDS, 11 million of whom lived in sub-Saharan Africa (UNAIDS, 2002a); the number is forecast to nearly double by 2010. Several recent studies have examined the relative welfare of orphans by comparing them to non-orphans in the same society with respect to levels of school enrolment, household economic status and, less frequently, nutritional and health status. A few studies have also tried to assess whether orphans' well-being differs depending on their living arrangements. Large-scale, nationally-representative studies of this sort have only recently begun to emerge, because information about the survival of children's parents has only recently begun to be gathered routinely in national-level surveys in developing countries. In most such studies it is not known whether particular children were orphaned due to HIV/AIDS, although, as would be expected, the percentage of children orphaned tends to be highest in the countries with the high levels of HIV prevalence in the adult population (Bicego and others, 2003). In 17 sub-Saharan African countries surveyed between 1995 and 2000, children under age 15 were, on average, more than twice as likely to have lost their father as their mother; about 10 per cent of those who had lost either parent had lost both (Bicego and others, 2003).

School attendance

In all of the 44 countries for which this information was available by mid-2003, orphans who had lost both parents were less likely to be attending school than children with both parents alive and living with at least one biological parent. Moreover, in the limited number of countries with trend data, the gap between the two groups of children was widening. In sub-Saharan African countries only 60 per cent of children aged 10-14 who lost both parents attended school, compared to 71 per cent of those with both parents still alive and living with at least one biological parent (United Nations Statistics Division, forthcoming). Orphans who have lost only

one parent have less consistently been found to be at an educational disadvantage, and when there is a disadvantage it is smaller than for children who have lost both parents (Monasch and Snoch, 2003; Bicego and others, 2003, Ainsworth and Filmer, 2002, Case, Paxson and Ableidinger, 2003). Monasch and Snoch (2003), in a study of survey data in 40 sub-Saharan African countries, found that orphans' educational advantage tended to be greatest in countries with low school attendance overall.

Girl children have a large educational disadvantage in many of the countries hard-hit by HIV/AIDS—does orphanhood have a disproportionate effect on the educational disadvantage of girls? Tentatively, the answer is no, in most cases. Although some studies have reported that girls were more likely than boys to be withdrawn from school to help care for an AIDS victim or because of lack of funds, two studies based on national data for a large number of countries have found that the gender gap in enrolment for orphans was approximately the same as the gap for all children. Thus, orphanhood appears usually to produce a similar amount of educational disadvantage for children of both sexes (Ainsworth and Filmer, 2002; Case, Paxson and Ableidinger, 2003).

Poverty

Orphans are more likely than other children to be living in poor households and in female-headed households. An analysis of surveys in 28 countries (of which 23 were in sub-Saharan Africa) found considerable diversity in the degree to which orphans were found in poor households. However, in countries where there was a statistically significant difference, orphans were more likely than other children to live in poor households (Ainsworth and Filmer, 2002). Case, Paxson and Ableidinger (2003) found that it was mainly loss of the father alone that was associated with greater poverty.

Orphans are likely to be disadvantaged in areas besides education and household poverty, although this is less extensively documented. Studies in Burundi and the United Republic of Tanzania have found that the loss of a parent leads to higher prevalence of malnourishment in children (Ainsworth and Semali, 2000; Subbarao, Angel and Plangemann, 2001). In the Tanzanian study, a recent death of other adults in the household also increased malnutrition. However, for children with better access to health care the adverse health effects were substantially reduced, showing that these ill effects can potentially be countered by appropriate health and nutrition policies (Ainsworth and Semali, 2000).

Living arrangements

The large majority of orphans live with the surviving parent, if there is one, or with other relatives, especially grandparents. Table III.3 shows the living arrangements of orphaned and non-orphaned children aged 6-14, averaged for 10 sub-Saharan African countries. Four per cent of double orphans (mother and father both deceased) were living in households headed by a non-relative, a situation that is associated with a large educational disadvantage, as is discussed below.

Long before the appearance of HIV/AIDS, child fostering was common in many African societies, not just as a means of providing for orphaned children, but as a normal part of an extensive network of exchanges of material and emotional support among kin. Sending a child to live for a while with relatives (or, less commonly, non-relatives) can be a way of providing a child with better access to education or other training, a way of helping to balance different households' composition to their labour needs, or a way of sheltering a child while also providing

companionship, household assistance and the prospect of future support to an older relative who would otherwise be alone. In some cases living with relatives may be a preferred option for children whose parents have divorced and remarried.

TABLE III.3. ORPHANHOOD AND THE RELATIONSHIP TO HOUSEHOLD HEAD

<i>Relationship to head</i>	<i>Non-orphans</i>	<i>Maternal orphans</i>	<i>Paternal orphans</i>	<i>Double orphans</i>
<i>Percentage</i>				
Son/daughter	78	48	48	0
Grandchild	12	23	20	32
Sibling	1	4	6	9
Other relative	6	18	16	29
Adopted/foster child ^a	2	4	7	25
Non-relative	1	2	2	4
Total	100	100	100	100

Source: Case, Paxson and Ableidinger (2003).

NOTES: Based on 164,689 observations in DHS surveys for 10 African countries: Ghana, Kenya, Malawi, Mozambique, Namibia, Niger, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. The data are for all children aged 6-14 whose orphan status could be determined. See data source for additional explanatory notes.

^a Information about the biological relationship is not available for this group.

The consequences of fostering for the children involved, as well as for the receiving household, may vary with the circumstances that gave rise to leaving the parental home. Faced with the crisis of parents' illness or death, most children may have relatives who will willingly take them in, but some may not. And foster children may continue to receive material support from parents who are living elsewhere, but orphans lack this additional support. It should also be noted that fostering of AIDS orphans in most of the affected societies is occurring within a context of widespread poverty. Frequently, even households whose members are spared by HIV/AIDS have trouble providing themselves with adequate nutrition and shelter, and lack the resources necessary to obtain health care and schooling for children. If these are the households available to take in orphaned children, inadequate resources will be further strained.

Some researchers have presented an optimistic assessment of the extended family to care for children orphaned by HIV/AIDS in the areas that they studied (for example, Urassa and others, 1997), but others have found signs that the traditional system was coming under severe strain as the number of orphans continued to grow and that many children were receiving inadequate support (for instance, Ntozi and others, 1999).

In Uganda, national-level data showed that, between 1992 and 1999/2000, the percentage of households that included a foster child under age 14 increased from 17 per cent to 28 per cent. Taking in a foster child often represented a significant burden. "Fostering households consume less, save less and invest less, with serious macro-economic impacts on aggregate savings and investment in the economy" (Deininger, Garcia and Subbarao, 2001, p. 1). This study also found evidence suggesting that the Government's adoption of policies in accordance with the goals of "Education for All" had decreased the amount of educational disadvantage faced by foster children during the 1990s. Conversely, during the same period access to health services such as vaccination deteriorated, and foster children had been particularly affected. These results support

the idea that broad-based policies aimed at increasing access to basic education, health care and other services have the potential to counteract much of the disadvantages faced by orphaned children. (Deininger, Garcia and Subbarao, 2001).

What of the consequences of child fostering for the children involved? One question that is of concern for policy is whether the educational disadvantage of orphans, noted above, is due to being in poorer households, or whether there is an additional disadvantage due to orphanhood itself. If the problem is household poverty alone, then resources and support targeted to poor households could compensate for the current educational disadvantage of all poor children, and no additional intervention would be required for orphans. However, if orphans are also disadvantaged relative to other children in similar economic circumstances, then directing resources to poor households may not be enough.

A study using nationally representative data for 10 sub-Saharan countries (Case, Paxson and Ableidinger, 2003) found that greater household poverty did not completely account for orphans' lower school enrolment. In "blended" households that contained both orphaned and non-orphaned children, orphans were less likely to be in school than were other children in the same household; children aged 6-14 years who had lost either the mother or the father were on average about 5 percentage points less likely than non-orphans to be in school, and double orphans were 16 percentage points less likely to be in school. Household poverty led to substantially lower enrolment for all children, but there was an educational disadvantage due to orphanhood that was separate from that due to poverty.

This study also found a child's degree of relatedness to the household head had an effect on whether the child was in school. Living with a grandparent was associated with the least disadvantage, relative to being with a parent, and children living with more distant relatives were more disadvantaged. The small percentage of children living in a household headed by non-relatives were at an enormous disadvantage in terms of school enrolment, having an estimated average enrolment rate 46 percentage points lower than that of children whose parent was the head of household. In some countries very few of such children attended school (Case, Paxson and Ableidinger, 2003).

Concern has frequently been voiced that, as the AIDS crisis worsens, orphaned children will be left without any guardian. This certainly does occur, for there are numerous anecdotal reports, but there is almost no evidence about the proportion of orphans involved, how long such situations persist or how the children fare over periods of several years. One study of a hard-hit area in Uganda found that 3 per cent of households had no resident adult aged 17 or more (Nalugoda and others, 1997). Another study of Ugandan households that had experienced a death in the preceding 10 years reported that about one per cent were headed by children under age 18 in both 1992 and 1995 (Ntozi and Zirimenya, 1999). A small study in Zimbabwe investigated the circumstances that had led to the establishment of households headed by a child aged under 18 (27 households) or a young adult aged 18-24 (16 households). For 30 per cent of the households there was no known relative who could have taken care of the orphans, and in most of the others relatives were reported to be unwilling to take the orphans in. In a minority of cases the children also did not want to live with the relative. Although in many cases relatives provided material support and visited regularly, about one third of the households known to have living relatives did not receive material support from them (Foster and others, 1997). It should be noted that large-scale surveys do not, in general, provide a good basis for studying the phenomenon of child-headed households. The Demographic and Health Surveys, for example, require that an adult be available for interviewing, which means that child-headed households would tend to be missed (Bicego and others, 2003).

There is also no reliable statistical information about trends in the number of children residing in orphanages in the AIDS-impacted developing countries. Orphanages are generally regarded as an undesirable option for providing shelter to the swelling population of AIDS orphans. Not only do most people in the developing countries affected view this as a culturally unacceptable arrangement, but orphanages are also viewed by experts on child-care as tending to provide a poor setting for child welfare and development. It is also very expensive to provide good-quality institutional care (see, for example, UNAIDS, 2002, pp. 133-135; UNICEF, 2002, p. 12). Nonetheless, orphanages are a last resort for children who have no family that can take them in, and a number of studies reviewed for the present report mention community-based, religious or other NGO-supported orphanages or group homes as an aspect of local responses to the problem (for instance, Phiri and Webb, 2002; UNICEF and UNAIDS, 1999; UNICEF, 2002; Ntozi and Nakayiwa, 1999).

In summary, recent studies have shown that orphans are at a substantial disadvantage. The amount of educational disadvantage is greatest for orphans that have lost both parents. Orphans' lower school enrolment is not entirely explained by the greater poverty of households where orphans live, although poverty itself confers a large disadvantage on orphans and non-orphans alike. Even though grandparent-headed households tend to be female-headed and poor, living with a grandparent is, on average, associated with higher educational enrolment for orphans than is living with other relatives, particularly more distant relatives. Orphans who live with a non-relative, though they are a small minority, are at an enormous educational disadvantage. Girl children have much lower enrolment ratios than boys in many of the countries impacted by HIV/AIDS; however, orphanhood by itself generally disadvantages boys and girls equally with respect to schooling. Available evidence also points to nutritional disadvantage for orphans. Taking in orphans represents a substantial economic burden for many of the receiving households, as well. Although many orphans live in households that are relatively well-off economically, in many settings orphans are disproportionately living in poor households.

C. CONCLUSIONS

The empirical evidence shows that the AIDS epidemic is having a huge impact on households. Indeed, households and families bear most of the burden since they are the primary units in which individuals cope with the disease.

- **Medical and health expenditures are increasing in HIV/AIDS-affected households.** Studies conducted in the United Republic of Tanzania, Uganda, Thailand and Sri Lanka, to name a few, showed that HIV/AIDS-related illnesses are putting a heavy financial burden on households affected by the epidemic.
- **Households affected by HIV/AIDS often move from relative affluence into poverty.** Studies in Burundi, Côte d'Ivoire, Haiti and Zambia showed that many changes occurred in the AIDS-affected households, including loss of paid employment, increasing borrowing and the sale of possessions. The decrease of revenue from loss of labour is an important impact of AIDS.
- **Food consumption decreases in many HIV/AIDS-affected households** leading to malnutrition, especially among children. In parts of Africa, households affected by HIV/AIDS tend to decrease their consumption and switch to cheaper goods. In Thailand, one third of households affected by HIV/AIDS reported an average decrease in household income of 48 per cent.

- **Family structure and household composition are changing.** Increasing numbers of households are headed by grandparents or by women without husbands.
- **AIDS adds stress to the lives of older persons.** It kills their adult children, who would have been responsible for their care in old age, and it thrusts them into the role of caregivers for their orphaned grandchildren.
- **The impact of AIDS on households is also gender dependent.** Deaths of adult men tend to have a larger impact on household income, while a woman's death has especially severe consequences for children because women are the main caregivers in families.
- **Children are leaving school prematurely** to care for ill parents and for economic reasons. Orphans who have lost both parents are much less likely than other children to be in school. Based on recent sample surveys, in sub-Saharan African countries only 60 per cent of children aged 10-14 who lost both parents attended school, compared to 71 per cent of those with both parents still alive and living with at least one biological parent.
- **Fostering orphans is a common cultural practice, especially in African societies, but the rapid rise in the number of orphans may overwhelm the traditional support system of the extended family.** Many of the households that are taking in orphans are themselves poor, and taking in orphaned children represents a significant burden.
- **Orphans suffer disadvantages in education, nutritional status and well-being.** Households where orphans live are, in many settings, more likely than others to be poor, but there is also an educational disadvantage due to orphanhood separate from that due to poverty alone. Orphans who live with non-relatives are at an enormous educational disadvantage. In some places—Burundi and the United Republic of Tanzania, for example—the loss of a parent is associated with a higher prevalence of malnutrition.

IV. IMPACT ON FIRMS

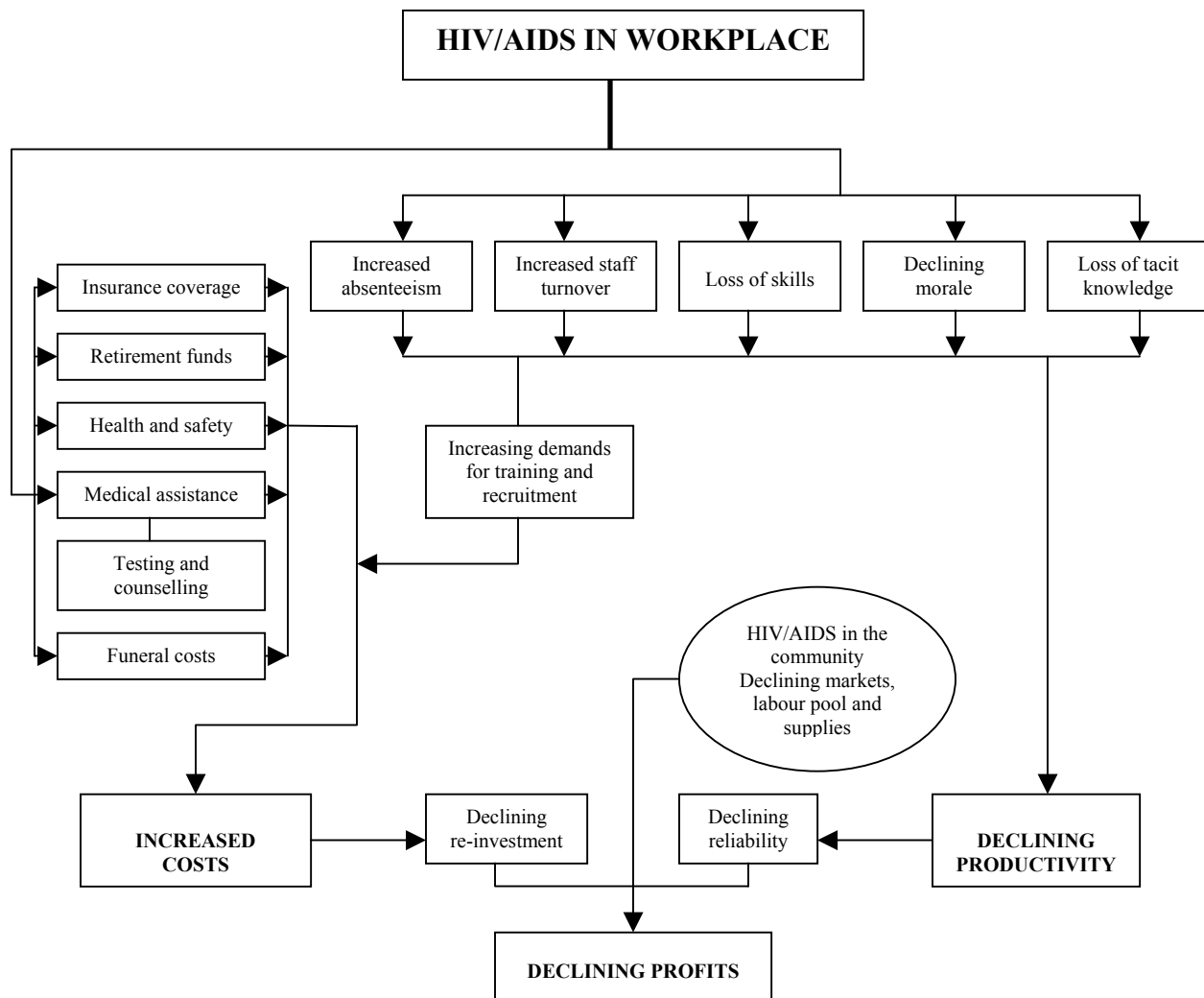
The impact of the HIV/AIDS epidemic goes far beyond the household level. Firms and businesses may also be affected as HIV-infected people are usually in the prime working years and are involved in the process of production. If HIV prevalence reaches a high level in a country or indeed within a firm, the impact of the disease may be dramatic for the business or firm involved. The current chapter presents a conceptual framework for the analysis of the impact of HIV/AIDS on firms. It then assesses the empirical evidence available on costs, productivity and profitability. It also discusses the response of firms to the epidemic.

A. CONCEPTUAL FRAMEWORK OF THE IMPACT OF THE HIV/AIDS EPIDEMIC ON FIRMS

As HIV infection progresses to AIDS, affected workers are likely to be absent from the workplace more and more often. These periods of absenteeism may affect the productivity of the firm, especially if the worker occupies an important position in the firm and consequently is more difficult to replace. The following framework (figure IV.1) "maps out" the processes through which HIV/AIDS affect firms:

- AIDS deaths may lead directly to a reduction in the number of available workers, since the deaths occur predominantly among workers in their most productive years. As younger, less experienced workers replace experienced workers, worker productivity may be reduced.
- The impact of AIDS will also depend on the skills of affected workers. In the event that skilled workers who occupy important positions in the firm become sick or die from AIDS, the company may lose its institutional memory—that is, the "know-how" accumulated through many years of experience.
- Firms that have a health programme may find themselves responsible for substantial medical costs. The insurance scheme of the firm may become more expensive as insurance companies increase the costs of coverage as a response to high HIV prevalence rates in firms. This could impede saving for investment. HIV/AIDS in the workplace may also lead to increased funeral expenses for workers.
- Morale and productivity of the remaining workers may also suffer as co-workers fall ill and die. Equally important in the increase of costs may be the increasing demands for training and recruitment to replace the ailing personnel of the firms.
- Another impact of the HIV/AIDS epidemic in the community is the impoverishment of households, which will lead to a decline in the demand for some types of goods. The companies producing these goods may find themselves with a shrinking market, which may eventually lead to declining profits for the firms involved in the production of these goods.

FIGURE IV.1. CONCEPTUAL FRAMEWORK OF THE SOCIO-ECONOMIC IMPACT OF THE HIV/AIDS EPIDEMIC ON FIRMS



Source: UNAIDS (2000a).

To sum up, the HIV/AIDS epidemic is likely to result in increased costs and declining productivity for firms, which ultimately will lead to declining profits. But the magnitude of the impact of HIV/AIDS will depend primarily on five factors (Loewenson and Whiteside, 1997):

1. The number of people infected in the firm;
2. Their role in the company;
3. The structure of the production process and its ability to cope with absenteeism;
4. The benefits provided by the company; and
5. The effect on the business environment of HIV/AIDS in other companies and the government.

The following section presents the evidence available on the impact of AIDS on firms and companies.

B. EMPIRICAL EVIDENCE OF THE IMPACT OF HIV/AIDS ON FIRMS

Many companies have undertaken studies on the impact of AIDS on their workforce and productivity. Unfortunately, the results of most of these studies are not available to the public. Nevertheless, the few studies whose results are available point to a serious impact of HIV/AIDS on companies.

Absenteeism and deaths

High levels of absenteeism seem to be one of the characteristics of the impact of HIV/AIDS on firms. For example, a study of 15 different establishments in Ethiopia found that these companies were experiencing considerable absenteeism. The number of HIV/AIDS-related illnesses was 53 per cent of all reported illnesses, totalling 15,363 incidents over a five-year period (Bersufekad, 1994). Out of 19 individuals interviewed in detail, 11 lost 30 days over one year due to HIV/AIDS-related illnesses, 7 lost on average 60 days, while one person said he had been absent for 240 days because of AIDS. The study was not able to quantify the impact of HIV/AIDS on the productivity of these establishments.

Indeed, because of the absenteeism of infected workers, which ultimately is followed by their deaths, the impact of AIDS can be devastating in some companies. A study illustrated how quickly the number of AIDS-related deaths can increase in a sugar estate in Swaziland, sapping the progress made by these companies and resulting in declining productivity. The study showed that 25 per cent of the estate's workforce was infected with the HIV virus and would die within the next 10 years (Morris and others, 2000).

In Namibia, NamWater, the largest water purification company, announced in 2000 that HIV/AIDS was "crippling" its operations (Angula, 2000). They reported a high staff turnover due to HIV-related deaths, increasing absenteeism and a general loss of productive hours.

A study on Lonrho companies in Malawi found that deaths-in-service benefits increased by more than 104 per cent between 1991 and 1996 (Ntirunda and Zimda, 1998). The study also found that AIDS-related costs were 1.1 per cent of the total costs and 3.4 per cent of gross profits of these companies in 1992. Another study of five firms in Botswana found that the impact of HIV/AIDS depended on the type of business, the skill level of employees, the types of benefits provided, and the amount of savings held (Stover and Bollinger, 1999).

A study of 18 firms in Lusaka, Zambia, showed that, of 68 deaths in a 10 month-period in 1993, 37 per cent were general workers, 30 per cent were from lower management, 21 per cent were from middle management and 12 per cent were from top management. AIDS-related symptoms accounted for 56 per cent of deaths in general workers and 62 per cent of top management (ILO EAMAT, 1995). The study showed an association between HIV/AIDS and longer periods of absenteeism, but the loss of staff and its impact on productivity is only one part of the impact of HIV/AIDS.

The impact of HIV/AIDS on firms depends on the age structure of the workers in the firm. For example, a study conducted in Zambia in Barclays Bank showed that mortality peaked in the 30-39 age group. The death rate rose from 0.4 per cent to 2.2 per cent between 1987 and 1991, and the bank paid more than ZK 10 million (US\$ 58,140) in payments to the families of employees who died from HIV/AIDS (Smith and Whiteside, 1995). The study also showed that medical expenses and training costs were on the increase whereas man-hours were reduced.

Costs to the companies

Most available studies have reached the conclusion that the HIV/AIDS epidemic causes an increase in costs of production and a decrease in revenues. Table IV.1 presents the costs to companies of the HIV/AIDS epidemic in six companies. It is important to point out that companies offering health benefit packages (as opposed to firms offering no health provision) suffer the greatest loss.

TABLE IV.1. COST TO SELECTED COMPANIES OF THE HIV/AIDS EPIDEMIC IN AFRICA
(US dollars)

<i>Company name</i>	<i>Total annual cost of AIDS</i>	<i>Annual cost of AIDS per employee</i>
Botswana Diamond Valuing	125 941	237
Botswana Meat Commission.....	370 200	268
Côte d'Ivoire food processing.....	33 207	120
Côte d'Ivoire packing firm	10 398	125
Muhoroni Sugar, Kenya.....	58 398	49
Uganda Railway Corporation.....	77 000	300

Source: Stover and Bollinger, 1999.

The cost of HIV/AIDS to companies depends on the type of company. In Kenya, AIDSCAP, a USAID-funded project, conducted a study on the costs of HIV/AIDS per employee by type of industry and found that wood processing and sugar estates are the two industries where HIV/AIDS-related costs consume much of the profits (table IV.2). The differences observed in the costs are probably due to the way in which the companies treat their employees. Although wages in the sugar industry and wood processing plants are lower than those in heavy industry and transport, employees tend to be housed on estates and provided with many benefits, such as medical care. Projections of the costs in the near future show a three-fold increase in costs in the wood processing industry and sugar estates between 1992 and 2005, rising from US\$115 to US\$331 and US\$237 to US\$720, respectively.

TABLE IV.2. COSTS OF HIV/AIDS PER EMPLOYEE IN KENYA
(US dollars)

<i>Type of industry</i>	<i>1992</i>	<i>2005</i>
Heavy industry.....	16.45	39.03
Transportation.....	30.83	75.12
Wood processing	114.62	331.09
Sugar estate.....	237.81	720.05

Source: AIDSCAP, 1996.

Not only do HIV-affected firms lose their workers due to absenteeism or AIDS-related deaths, but they also witness an increase in their medical benefits and costs. At this moment, it is difficult to measure the impact, as most countries are still in the early stages of the epidemic.

In Tanzania, a survey of six firms found that the annual average medical and burial costs per employee increased 3.5 times and 5.1 times, respectively, between 1993 and 1997 because of AIDS (Clancy, 1998). Another survey of three businesses in Abidjan, Côte d'Ivoire, calculated AIDS-related costs, including medical care, HIV screening, prevention, funeral attendance and

lost productivity. The average annual cost as a percentage of wages ranged from 0.8 per cent to 3.2 per cent in the three firms, depending on the firm's social policies (Aventin and Huard, 1997).

In a recent cost-benefit analysis of six firms in Botswana and South Africa, Rosen and others (2003) estimated that AIDS was responsible for 1 to 6 per cent of labour costs per year and concluded that investment in prevention and treatment would result in a net gain for most companies.

Models of the costs of AIDS in Zimbabwe estimated that costs to the Zimbabwe mining industry would increase 12-fold between 1995 and 2010 and that training costs to replace skilled workers would increase five-fold by 2000 (Forgey, 1993). Another study has evaluated the costs of AIDS as a percentage of wages, production or profits and found that the cost of AIDS was between 0.8 per cent and 3.2 per cent in Abidjan in 1997 (Aventin and Huard, 1997).

While many studies have focused on the total additional costs due to HIV/AIDS, fewer have attempted to measure the share of costs incurred by firms by the type of costs. Table IV.3 presents the HIV-related costs by comparing the findings of three surveys in Zambia, Kenya and Makandi (Zimbabwe). In Zambia and Kenya, absenteeism seems to account for the largest share of the costs, whereas medical costs are more important than any other costs in the Makandi study. Deaths seem to take the second largest share of the costs in Zambia and Makandi, where they represent 16 and 32 per cent of the total costs, respectively. In the 1992 Zambia study, replacement of managers or skilled workers by expatriate workers is responsible for 13 per cent of all costs due to HIV/AIDS.

TABLE IV.3. HIV/AIDS RELATED COSTS: A COMPARISON OF VARIOUS SURVEYS
(Percentage)

	<i>Zambia 1992</i>	<i>Kenya 1994</i>	<i>Makandi 1995-1996</i>
Absenteeism.....	31.8	54.3	25.2
Expatriate employment.....	12.7	--	--
Medical service.....	14.7	12.0	37.8
Funerals	5.1	10.1	4.7
Deaths-in-service	15.9	--	32.3
Travel.....	12.5	--	--
Training/recruitment.....	7.3	26.3	--
Total.....	100	100	100

Source: Loewenson and Whiteside, 1997.

The impact of HIV/AIDS on small size firms may be even more devastating. As pointed out by Loewenson and Whiteside (1997), "anecdotal evidence indicates that the consequences may be even more significant for small enterprises. They do not have the human or financial resources to weather the impact and may, as a result collapse".

3. Impact on productivity and profitability

A study of 992 firms in five sub-Saharan African countries (Ghana, Kenya, United Republic of Tanzania, Zambia and Zimbabwe) used data collected in 1994 from the World Bank's Regional Program on Enterprise Development to examine the attrition of workers due to illness or death and the cost to firms of replacing them (Biggs and Shah, 1997). The attrition of

workers was found to be lower than expected on the basis of national HIV seroprevalence rates, perhaps because most infected workers had not yet developed full-blown AIDS. Attrition due to illness or death constituted a relatively small proportion of total work force attrition, about 3 per cent in Ghana and Tanzania and 12-13 per cent in the other countries. Three quarters (76 per cent) of the workers who left because of illness or death were classified as unskilled or semi-skilled, and search costs were low for these workers. As the skill level increased, search costs were higher. Because of economic conditions, many firms chose not to replace workers who left: employers did not replace 38 per cent of professionals and 51 per cent of unskilled workers. The authors conclude that worker attrition significantly affected firm performance, but AIDS-related attrition had not yet had a significantly negative effect on African firms.

Few studies have attempted to quantify the effects of HIV/AIDS on workers' productivity or efficiency. A study of a tea estate in western Kenya (Fox and others, 2003) provided some of the first empirical estimates of the impact of HIV/AIDS-related morbidity on labour productivity. Company records showed lower output in kilograms of tea leaves plucked and higher use of leave time on the part of HIV-positive workers as compared with non-infected workers. Productivity continued to decline as the disease progressed. In the last year of life, workers who died of AIDS produced 38 per cent less tea and took nearly twice as much leave time as others. These figures were almost certainly underestimates because workers often brought unrecorded "helpers" to assist them and prevent them from losing their jobs.

Studies concerning the impact of AIDS on profitability in Africa have had mixed results. Studies completed in South Africa (Morris and others, 2000) and Kenya (Roberts and others, 1996) suggested that the economic impact of HIV/AIDS on profitability was likely to be substantial. On the contrary, studies in Zambia (Smith and Whiteside, 1995), Malawi (Jones, 1996) and Botswana (Greener, 1997) indicated that the impact of HIV/AIDS on profitability was not substantial.

Indirect impact of HIV/AIDS on firms

In addition to the direct effect due to increased costs and loss of productivity, firms confronted with a high level of adult HIV prevalence may be faced with other, less quantifiable effects. For example, HIV/AIDS can result in a substantial decline in morale among workers. As employees witness the deaths of their co-workers, they may adopt a fatalistic attitude towards work and life in general, which may have a detrimental impact on the production of firms.

Absenteeism may also result in extra work for healthy workers who have to stand in for sick colleagues. In some companies, healthy workers were increasingly working extra hours to compensate for the time lost by their sick colleagues. The result was that companies not only paid more extra hours but also exhausted the healthy workers. Working long hours can produce stress among employees, which may result in a decline in both the quantity and quality of the final product.

Business response to HIV/AIDS

The response of businesses to the HIV/AIDS epidemic has taken many forms. Some companies have increased medical care and instituted prevention programmes to help workers avoid contracting the virus. As noted above, a cost-benefit study by Rosen and others (2003), concluded that company investment in prevention and treatment would result in a net gain for most companies. Other companies have taken the opposite approach. Some have changed hiring practices to screen out high-risk and infected applicants or have dismissed workers who are

suspected of having HIV/AIDS. Some firms have reduced employee benefits, restructured employment contracts, outsourced less skilled jobs and changed production technologies to require fewer workers. Some of these practices are illegal, and much of the information is anecdotal (Rosen and Simon, 2002). Firms are also hiring and training older workers, who are less likely to have HIV/AIDS (Engel, 2002). The private sector has greater scope than Government, households and non-governmental organizations to shift the burden and avoid the costs of the disease.

In South Africa, more than two thirds of large employers have recently reduced health care benefits or required larger contributions by employees. A survey of 56 large South African employers in 1999 found that 78 per cent had restructured their health care benefits in the previous two years, mainly by capping company contributions, reducing benefit levels and increasing employees' share of the cost. As a result, 36 per cent of employees with access to company-sponsored medical plans had opted out, mainly because of the cost (Rosen and Simon, 2002).

Many companies are attempting to cut costs and prevent new HIV infections at the same time. Prevention programmes usually include AIDS education for workers and their families, treatment of sexually transmitted diseases (STDs) and distribution of condoms (Simon and others, 2000). Reliable information about the success of prevention efforts is scarce.

Studies on the impact of HIV/AIDS conducted within companies will be beneficial to policymakers only if the results of these studies are made available. Hence, efforts should be made to disseminate results while protecting the privacy of infected persons within the company. Many companies regard this information as too sensitive to release.

C. CONCLUSIONS

Available studies of the impact of HIV/AIDS on firms point to an impact of the epidemic on the labour force, costs and productivity, depending on the skills of those who are affected and whether they are replaceable or not. The following effects have been established:

- **Firms and companies are facing substantial cost increases due to HIV/AIDS that threaten their viability** as documented in Botswana, Kenya and Uganda. The annual cost of AIDS per employee was estimated to range from US\$49 for a Kenyan sugar firm to US\$300 for the Uganda Railway Corporation.
- **The impact of HIV/AIDS on firms depends on the age structure of the workers in the firm.** For example, in the Barclays Bank in Zambia, mortality peaked in the 30-39 age group.
- **The extent to which people living with HIV/AIDS will continue to be part of the workforce depends largely on the type of work performed, the stage of the disease and the existing policies in the relevant companies.** Workers in physically demanding jobs may find it more difficult to maintain their jobs when they become ill. Depending on the work legislation available, certain companies may be required by government to continue to offer benefits for the employees who fall ill. Hence, these companies are more vulnerable to the impact of HIV/AIDS. However, this depends both on the types and costliness of the

benefits offered and on the value the business gets back in terms of healthier workers and the firm's ability to attract and retain qualified employees.

- **The impact of the HIV/AIDS epidemic on companies may be concealed by the economic structural adjustments that many African countries are undergoing.** In some cases, these programmes lead to a downsizing of the workforce or, in other cases, the closing down of the companies. In this environment, some managers may view the loss of staff as not necessarily a bad thing. As a result, it is sometimes difficult to separate the impact of HIV/AIDS on the workforce from the impact due to other forces.
- **The varying levels of the impact of HIV/AIDS on firms may also reflect the production structures and benefits packages of these firms.** Firms that are more labour intensive and those that provide substantial benefits are likely to be the hardest hit.

V. IMPACT ON AGRICULTURE

The great majority of the population in the countries most affected by HIV/AIDS live in rural areas. In many African countries, farming and other rural occupations provide a livelihood for more than 70 per cent of the population. Hence, it is to be expected that the HIV/AIDS epidemic will cause serious damage to the agriculture sector in these countries, especially in countries that rely heavily on manpower for production. This chapter discusses the issues related to the impact of HIV/AIDS on agriculture. First, a conceptual framework of analysis of the impact of HIV/AIDS on agriculture is presented based on previous work by the Food and Agriculture Organization (FAO) of the United Nations. This is followed by a presentation of the evidence available on the impact of HIV/AIDS on agriculture.

A. CONCEPTUAL FRAMEWORK OF ANALYSIS OF THE IMPACT OF HIV/AIDS ON AGRICULTURE

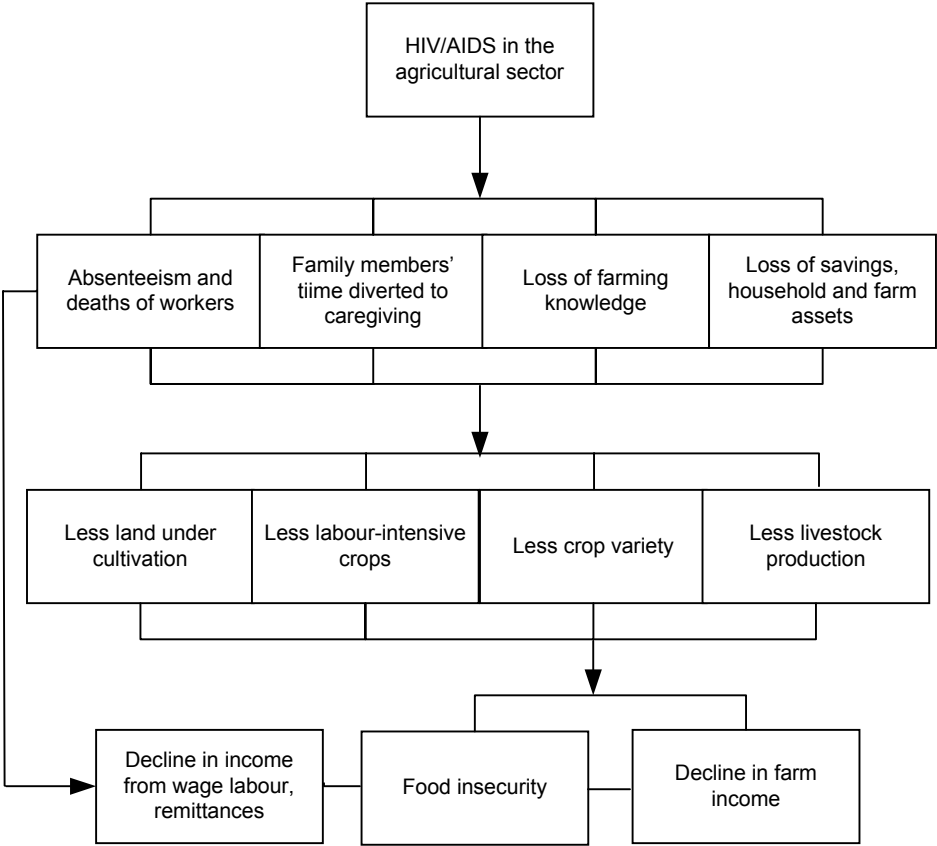
HIV/AIDS can affect agriculture in many ways (figure V.1):

- Absenteeism due to HIV-related illnesses and the loss of labour due to AIDS-related death may lead to the reduction of the area of land under cultivation and to declining yields resulting in reduced food production and food insecurity.
- The loss of labour may also lead to declines in crop variety and to changes in cropping systems, particularly a change from more labour-intensive systems to less intensive systems. Livestock production may become less intensive, and weeding and pruning may be curtailed. A shift away from labour-intensive crops may result in a less varied and less nutritious diet.
- The reduction in labour supply through the loss of workers to HIV/AIDS at crucial periods of planting and harvesting could significantly reduce the size of the harvest, affecting food production.
- Loss of knowledge about traditional farming methods and loss of assets will occur as members of rural households are struck by the disease and are not able to pass on their know-how to subsequent generations.
- Loss or reduction of remittances is likely to occur in areas where agricultural workers send money home while working abroad. When these workers become sick, they can no longer earn money to send home.

Consequently, the important impacts of the HIV/AIDS epidemic on agriculture are food insecurity due to the reduction of production, and loss of income from household members employed in this sector.

The HIV/AIDS epidemic may also affect the traditional coping mechanisms that are often found in rural areas. Traditionally, local residents have joined together to offer assistance to those in need during periods of shock or crisis. Indeed, community-based initiatives have become one of the outstanding features of the epidemic and a key coping mechanism for mitigating the impact of HIV/AIDS (UNAIDS, 2002a). However, as the number of HIV/AIDS cases increases, the need for assistance may overwhelm the support system, and these traditional coping mechanisms may begin to break down.

Figure V.1. Conceptual framework of the impact of the HIV/AIDS epidemic on agriculture



B. EMPIRICAL EVIDENCE OF THE IMPACT OF HIV/AIDS ON AGRICULTURE

Many of the studies assessing the impact of HIV/AIDS on agriculture were conducted under the auspices of FAO. Indeed, of the AIDS impact studies conducted so far, the majority have dealt with the rural world, that is, agriculture and livestock.

Impact on food security and changes in cropping patterns

One of the main impacts of HIV/AIDS on agriculture is its impact on food security. For example, production loss in AIDS-affected households was estimated in a survey conducted in 1997 in Zimbabwe, a country with an adult prevalence rate of more than 25 per cent. This survey, conducted by the Zimbabwe Farmers' Union, found that agricultural output declined by nearly 50 per cent in the households affected by AIDS (Kwaramba, 1997). Maize production by smallholder farmers and commercial farms declined by 61 per cent because of illness and deaths from AIDS (table V.1). These production losses could result from a number of factors, including shifting production patterns. But according to the same author, at that time Zimbabwe data did not indicate a dramatic switch from cash to subsistence crops.

TABLE V.1. REDUCTION IN OUTPUT IN AIDS-AFFECTED HOUSEHOLDS, ZIMBABWE

<i>Crop</i>	<i>Production loss (percentage)</i>
Maize.....	61
Cotton.....	47
Vegetables.....	49
Ground nuts.....	37
Cattle.....	29

Source: Kwaramba, 1997.

By contrast, in Côte d'Ivoire, a 1997 study found that switching to food crops rather than cash crops led to drops in production of two thirds of previous levels (Black-Michaud, 1997). In addition, reduced remittances due to illnesses or deaths of migrant workers were found in Burkina Faso, whose nationals migrate to Côte d'Ivoire as seasonal agricultural workers.

In a study conducted in Burkina Faso in 1997, it was found that in two villages, Sanguie and Boulkiembe, shifting work patterns and an overall reduction in food production had occurred as a result of the HIV/AIDS epidemic. The same study found that net revenues from agricultural production had decreased by 25 to 50 per cent (FAO, 1997). The government of Swaziland also reported a 54 per cent drop in agricultural production in households where at least one adult member died because of AIDS (Wall Street Journal, 9 July 2003).

A study in Tanzania showed that a woman whose husband was sick was likely to spend 45 per cent less time in agriculture than if the husband were healthy. In Kagera, a survey showed that, on average, adults in households that experience a death spent five hours less in farming during the previous week than those without a death (Mutungadura, 2000).

In Kenya, a study found that the commercial agricultural sector is facing a severe social and economic crisis due to the impact of HIV/AIDS (Rugalema, 1999). The loss of skilled and experienced labour to the epidemic is a serious concern. But it was difficult to quantify the impact of the epidemic in terms of increasing costs.

In Namibia, worker-deficient households cultivate less land and have fewer cattle and less non-farm-related cash income (Mutangadura and Mukurazita, 1999).

Absenteeism and loss of labour

In countries or areas heavily affected by the HIV/AIDS epidemic, the time required to care for the sick and seek medical assistance often impacted on time available for agricultural production. The outcome might be less timely farming practices resulting in reduced yields and, over time, a general decline in household welfare.

A study conducted in Ethiopia showed the reduction in agricultural labour time as a result of HIV/AIDS: the number of hours per week in agriculture fell from 33.6 hours in non-afflicted households to between 11 and 16 hours in afflicted households (Black-Michaud, 1997).

The impact of AIDS is expected to increase in the future. FAO has estimated that, between 1985 and 2000, in the 27 most affected countries in Africa, 7 million agricultural workers had died from AIDS, and that 16 million more deaths were likely to occur in the following two decades. In the ten most affected African countries, labour force decreases ranging from 10 to 26 percent are anticipated (table V.2). Namibia is expected to suffer the most in terms of loss of labour force by 2020 (26 per cent of its labour force), followed by Botswana.

TABLE V.2. ESTIMATED AND PROJECTED LOSS OF LABOUR FORCE IN 2000 AND 2020
(Percentage)

<i>Country</i>	<i>2000</i>	<i>2020</i>
Namibia.....	3.0	26.0
Botswana.....	6.6	23.2
Zimbabwe.....	9.6	22.7
Mozambique.....	2.3	20.0
South Africa.....	3.9	19.9
Kenya.....	3.9	16.8
Malawi.....	5.8	13.8
Uganda.....	12.8	13.7
United Rep. of Tanzania.....	5.8	12.7
Central African Rep.....	6.3	12.6
Côte d'Ivoire.....	5.6	11.4
Cameroon.....	2.9	10.7

Source: FAO, 2001.

Another feature of the HIV/AIDS epidemic is that its impact may be observable only when the epidemic reaches the mortality stage of AIDS, with people dying in large numbers. It is therefore important to design measures that allow the prediction of the impact of the epidemic in the future as well as in the present. One study conducted by the United States Department of Agriculture addresses this concern by projecting the impact of AIDS on production (Shapouri and Rosen, 2001). The study found that in the most affected countries in Africa, a slow growth in agricultural productivity and the overall economy resulted in growing food insecurity, with a substantial gap between production and needs projected for 2010 in many countries (table V.3). Food insecurity is measured by the nutrition gap, which represents the difference between projected food supplies and the amount of food needed to meet per capita nutrition standards at

the national level (USDA, 2001). In Kenya, for example, grain production in 2010 is projected to be 12.1 per cent less than the amount needed (table V.3). Increasing reliance on imported grain and food aid will be necessary to meet nutrition requirements (Shapouri and Rosen, 2001).

TABLE V.3. GRAIN MARKET PERFORMANCE FOR SELECTED AFRICAN COUNTRIES

	<i>Annual production growth</i>		<i>Projected nutrition gap^a</i>
	<i>1980-1999</i>	<i>1989-1999</i>	<i>2010</i>
	<i>Percentage</i>		
Eastern Africa			
Kenya	0.44	-1.04	12.1
Tanzania	2.03	0.00	33.6
Uganda	2.18	1.29	0.0
Southern Africa			
Malawi	1.83	4.14	18.1
Zambia	-1.22	-3.63	69.9
Zimbabwe.....	-1.06	-0.10	2.4

Source: Adapted from Shapouri and Rosen, 2001.

^aAs a percentage of grain production.

Outside of Africa, very few studies of the impact of HIV/AIDS on agriculture are currently available. This may be due to the lower HIV prevalence in Asia and Latin America and to the lower percentage of employment in the agricultural sector, which may lead to a lower impact. Nonetheless, it is still important to conduct studies in these regions to investigate the likely impact of HIV/AIDS on agriculture and how the social and physical environment may contribute to lessening the impact. Indeed, a study conducted in Thailand reached the conclusion that “one third of the rural families affected by AIDS experienced a halving of their agriculture output” (cited in UNAIDS, 2000).

One study in Thailand of the impact of AIDS on rural families showed that the agricultural families and the poorest families in the northern provinces of Thailand, where more AIDS cases were found, were also the most vulnerable to the economic impact on agriculture. The study found that the economic impact of an adult AIDS death is sizeable despite all the coping strategies employed. The least able to cope were the poorest and the least educated agricultural workers (Pitayanon, and others, 1997).

Gender implications

HIV/AIDS frequently has severe consequences for rural widows of AIDS victims. In sub-Saharan Africa and Asia, women contribute to more than half the food production and usually are involved in the most labour-intensive farming activities (UNAIDS, 2002a). However, in areas where women are not permitted to inherit property, they may lose access to land and other assets when their husband dies (FAO/UNAIDS, 2003). In some cases, the cultural division of labour makes it impossible for women to assume the farming tasks previously performed by their husbands, and they are forced to abandon farming. Inequality in access to credit, employment, education and information all make women more vulnerable to the negative impacts of HIV/AIDS (Stokes, 2003). Moreover, the stigma of the disease may inhibit widows from seeking community and extended-family support, which are vital safety nets in rural areas.

Box 1: Key Points on the Socio-Economic Impact of HIV/AIDS on Agriculture and Rural Development

The following factors should be borne in mind when analyzing AIDS impact in rural areas:

What distinguishes HIV/AIDS from other fatal diseases is that: a) **it primarily affects the most productive age group of men and women between 15 and 49 years**—the main breadwinners and heads of households raising families and supporting the elderly—**and their children**; b) its full impact is revealed only gradually (given a median survival period of around 9 years in developing countries); and c) there is no cure while drugs that can prolong life are not available to the large majority of infected people in developing countries.

The stigma attached to HIV/AIDS is a distinguishing characteristic of the epidemic with adverse consequences for response measures. As a result of this stigma, it is more difficult to address HIV/AIDS than other diseases.

Countries in Southern and Eastern Africa have increasing urban-to-rural equalization of HIV prevalence. Moreover, given the predominantly rural composition of many of these countries, in terms of absolute numbers, the number of people living with HIV/AIDS may be higher in rural than in urban areas.

The impact of HIV/AIDS is cross-sectoral and systemic. Agriculture is a dynamic, integrated and interdependent system of productive and other components operating through a network of inter-related sub-sectors, institutions and rural households with linkages at every level of activity. The efficiency and effectiveness of each sub-sector, institution and household, depends, to a large extent, on the capacity in other parts of the system. If this capacity is eroded through HIV, then the system's ability to function will be diminished.

The impact of HIV/AIDS on agricultural production systems and rural livelihoods must be disaggregated into its spatial and temporal dimensions. Geographic and ethnic factors, gender, age, agro-ecological conditions and livelihood strategies play a role on the impact of HIV/AIDS on agricultural production and livelihood systems.

HIV/AIDS disproportionately affects sectors that are highly labour-intensive or have large numbers of mobile or migratory workers, including agriculture, transportation and mining.

The magnitude of the epidemic is such that one can no longer categorise households as afflicted, affected and unaffected. **Nearly all households within a community are likely to be directly or indirectly impacted by the epidemic.**

It has been argued that **those rural people whose activities are not counted by standard measurements of economic performance and productivity are among the most vulnerable to the impact of HIV/AIDS.** The effects of the epidemic on the resources, time and labour of those working in subsistence agriculture, in rural households (particularly women) and in the informal sector are for the most part invisible in quantitative terms.

The cost of HIV/AIDS is largely borne by rural communities. Many HIV infected urban dwellers return to their village of origin when they fall ill. Rural households (particularly women) provide most of the care for AIDS patients. In addition, food, medical care costs and funeral expenses are primarily borne by rural families.

The burden of the socio-economic impact of HIV/AIDS disproportionately affects rural women. Widows tend to become poorer as they lose access to land, property, inputs, credit and support services. HIV/AIDS stigmatisation compounds their situation further, as assistance from the extended family and the community—their only safety net—is often severed. Widowers tend to re-marry soon after losing their wives, thus cushioning their families from AIDS impacts.

The impact of HIV/AIDS on children is severe as widespread orphanhood and fosterage are bringing the coping mechanisms of many extended families to the breaking point. Withdrawal from school, a decrease in food intake, a decline in inherited assets and less attention from caretakers are among the adverse effects of the epidemic on children.

Excerpt from FAO/UNAIDS (2003). Addressing the impact of HIV/AIDS on Ministries of Agriculture: Focus on Eastern and Southern Africa. Rome: FAO.

C. CONCLUSIONS

The evidence on the impact of HIV/AIDS on agriculture remains scattered and incomplete. Most studies cover small areas, and many do not include a control or comparison group of households not affected by HIV/AIDS. Moreover, little is known about the effects of the epidemic over time. Nonetheless, the current evidence demonstrates that HIV/AIDS is having a crushing effect on agricultural production and the economic viability of AIDS-affected households in diverse areas of Africa. Commercial agricultural enterprises are also being seriously impacted.

The future impact of HIV/AIDS on agriculture will depend, among other things, on finding ways to reduce the amount of labour required, including introducing less labour-intensive methods of production and increasing yields with non-labour inputs. In many of the countries most affected by HIV/AIDS, the agriculture sector was already under stress from desertification and government neglect of the traditional farming sector. The epidemic is intensifying labour shortages, increasing malnutrition and adding to the burden of rural women, especially those who head farm households.

The major findings of the chapter are as follows:

- **The HIV/AIDS epidemic has led to significant reductions in food production in AIDS-affected households.** In two villages in Burkina Faso, for example, revenues from agricultural production declined by 25-50 per cent because of AIDS. The Government of Swaziland reported a 54-per-cent drop in agricultural production in AIDS-affected households.
- **HIV/AIDS has caused a decline in the supply of labour for food and livestock production,** because of the illness and deaths of people living with AIDS and because of the time spent by household members in caring for sick relatives. In Tanzania, for example, a study found that a woman whose husband was sick spent 45 per cent less time on agricultural tasks than a woman whose husband was healthy. Even larger declines have been documented for Ethiopia.
- **HIV/AIDS has caused shifts of production from cash crops to food crops in AIDS-affected households,** resulting in lower household incomes and lack of funds to buy non-food essentials or non-labour inputs necessary to maintain agricultural yields.
- **The HIV/AIDS epidemic is leading to a loss of knowledge about farming methods and a reduction in skilled and experienced labour,** as documented, for example, in Kenya. Farmers who die of AIDS do not live long enough to pass their know-how to subsequent generations.

VI. IMPACT ON EDUCATION

Like every other sector of the social and economic life of an AIDS-afflicted country, the education sector has felt the impact of the HIV/AIDS epidemic. Indeed, an increasing number of countries in sub-Saharan Africa face a shortage of teachers. Deaths and illnesses have also affected the education sector administrators, planning and finance officials. At the same time, children in AIDS-affected households are delaying school entry or dropping out of school. Hence, the HIV/AIDS epidemic is seriously threatening the achievement of the goals of Education for All (EFA) adopted by the international community at the April 2000 World Education Forum in Dakar, Senegal, as well as the United Nations Millennium Development Goals.

Education is a major engine of economic and social development. The expansion of educational systems became a high priority for many Governments in the decades following World War II, as evidence accumulated that investment in human capital, particularly health and education, had important economic benefits for the whole society. The percentage of the population aged 15 and over who had completed primary school increased from 23 to 43 per cent between 1970 and 2000 in 73 developing countries (as estimated by Barro and Lee, 2000). Improvement in sub-Saharan African countries, however, lagged behind that of most other regions. In 1970, only 16 per cent of the adult population in 22 sub-Saharan African countries had completed primary school or more, and this figure had increased only to 28 per cent by 2000. Most of the improvement occurred in the 1970s. Poorly performing economies in the 1980s resulted in no overall gain during that decade and even declines in enrolments in some countries. Although there is substantial variation among sub-Saharan countries, progress in educational attainment for the region was slow even before the HIV/AIDS epidemic became established. With the added burdens and costs of the disease, the task of maintaining the educational system and making it accessible to all children presents a daunting challenge.

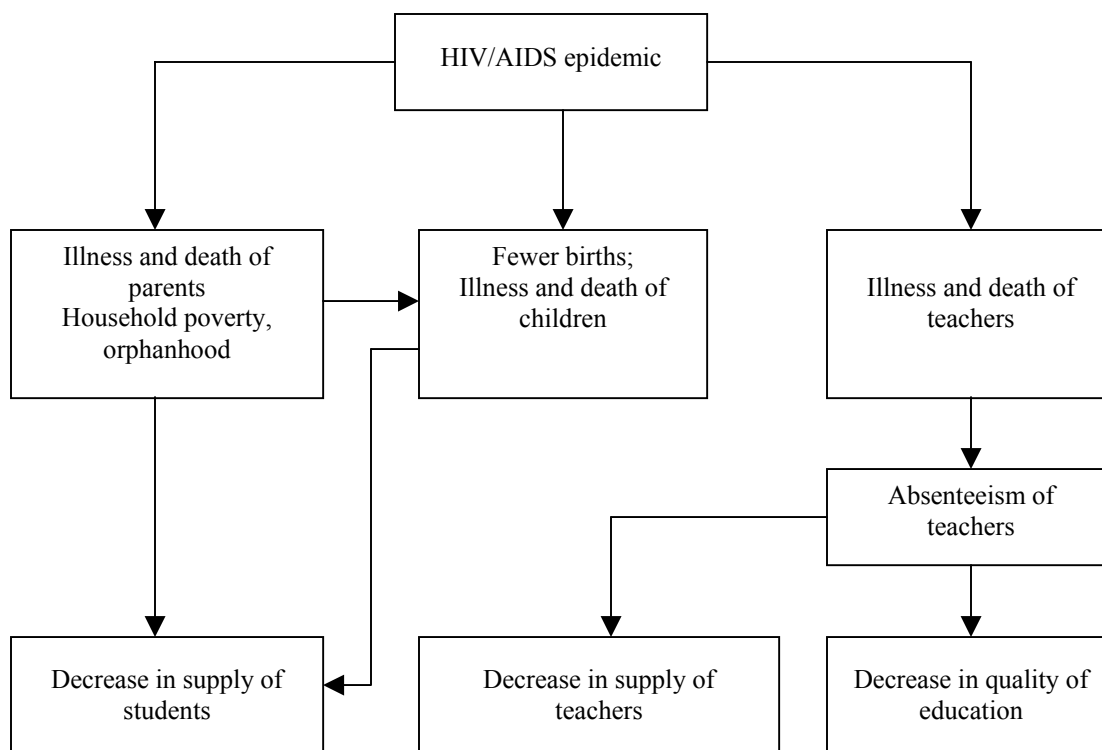
This chapter examines the impact of the HIV/AIDS epidemic on the supply of education, the demand for education and the quality of education. The first section proposes a conceptual framework of the impact of HIV/AIDS on education, mapping the processes through which the education sector is affected. It is followed by an examination of the available evidence of the impact of the AIDS epidemic on education. The final section presents the conclusions.

A. CONCEPTUAL FRAMEWORK OF THE IMPACT OF HIV/AIDS ON EDUCATION

The HIV/AIDS epidemic may affect the education sector in at least three ways (figure VI.1): the supply of education through the availability of teachers, the demand for education (total number of children and the number enrolled and staying in school), and the quality of education (supply of experienced teachers). In sum, due to HIV/AIDS, fewer children are able to enrol in school and receive the basic skills and knowledge they need, fewer teachers are available to teach them, and the quality of the education they receive is consequently diminished.

The absenteeism of teachers from school and ultimately their deaths affect the teaching resources available. Teachers who are infected with the HIV virus may try to transfer to another area or, once visibly ill, disappear (Katahoire, 1993). Other teachers may also want to transfer out of heavily affected areas or refuse to be posted to them, thus decreasing the number of teachers available in the region.

Figure VI.1. Conceptual framework of the impact of the HIV/AIDS epidemic on education



The deaths of children or parents will affect school enrolment, as a smaller number of children will be entering the school system and more children will be dropping out of school to take care of sick parents or siblings after the death of their parents. The number of children entering the school system will diminish if AIDS orphans do not enrol, delay enrolling, or leave school in large numbers.

Some school-aged children may be infected with HIV/AIDS or suffer from AIDS-related illnesses. This may cause them to be absent from school frequently and it may interfere with their ability to learn and their academic performance. Children who acquire the HIV virus from their mothers during childbirth or breastfeeding usually do not survive long enough to enrol in school.

Equally important is the possible decrease in the quality of education as teachers may be absent from school or too ill to provide the same quality of schooling they were providing before becoming sick. The quality of education may also decrease if less money is invested in the education sector, as countries with high prevalence of HIV/AIDS struggle to fight this epidemic.

The HIV/AIDS epidemic may also affect education resources because of the costs that it imposes on the system. In order to compensate for the loss of teachers, schools may hire temporary staff at the same time that costs of employee benefits, recruitment and training may rise. In some countries, employee benefits may be paid to teachers until they die. Hence, the education system may continue to pay a large number of non-working persons in addition to the financial costs of replacements.

Over time, as teachers fall victim to AIDS, and the costs of training new staff mount, the school system may rely more and more on less qualified teachers with less experience, resulting in a decrease in the quality of education.

Another possible impact of HIV/AIDS on the quality of education is its effect on students, as they witness the absenteeism and the deaths of their teachers. In rural remote areas, where teachers provide a role model, school children may view the disappearance of their teachers as their own destiny if they pursue schooling. Even teachers who are not infected with the HIV virus may be deeply affected personally by the prevalence of HIV/AIDS among their relatives and colleagues.

B. AVAILABLE EVIDENCE ON THE IMPACT OF HIV/AIDS ON EDUCATION

Many studies have been conducted to estimate and predict the impact of AIDS on education. Studies undertaken under the auspices of UNICEF reached the conclusion that because of AIDS, many countries will be facing a shortage of teachers in the near future. For instance, a study conducted in Zambia showed that of around 1.7 million primary school students, 56,000 would have lost a teacher to AIDS in 1999. The study also found that the number of teachers' deaths in 1998 was equivalent to the loss of about two thirds of the annual output of newly trained teachers (UNICEF, 2000).

The same UNICEF study found that 860,000 children lost a teacher to AIDS in sub-Saharan Africa in 1999. The largest numbers of children are affected in South Africa, Kenya, Zimbabwe and Nigeria (table VI.1). In Malawi, 10 per cent of education personnel in urban areas are estimated to have died of AIDS by 1997, and by 2005, it is projected that this figure will increase to 40 per cent (World Bank, 1998).

TABLE VI.1. NUMBER OF PRIMARY SCHOOLCHILDREN WHO LOST A TEACHER TO AIDS, 1999

<i>Country</i>	<i>Number of children who lost their teachers to AIDS</i>
South Africa	100 000
Kenya	95 000
Zimbabwe.....	86 000
Nigeria.....	85 000
Uganda	81 000
Zambia	56 000
Malawi	52 000
Ethiopia	51 000
United Republic of Tanzania.....	49 000
Democratic Rep. of Congo.....	27 000

Source: UNAIDS and UNICEF (2000).

In the South African province of KwaZulu Natal, where HIV/AIDS prevalence is the highest in the country, a random sample of 100 schools found that mortality of teachers rose significantly, from 406 in 1997 to 609 in 2001 (Badcock-Walters and others, 2003).

The HIV/AIDS epidemic will have a negative impact on the learning process in school through increased absenteeism. An empirical research study found that each infected teacher will lose on average six months of professional time before developing full-blown AIDS and an additional 12 months after developing full blown-AIDS (Tarfica, 2000).

Evidence is available on the impact of HIV/AIDS on school enrolment. For example, focus group discussions with AIDS-affected households found that these households were unable to meet the costs of children's education as a result of AIDS. Furthermore, an analysis of 49 case studies of families affected by AIDS throughout Zambia found that 56 of 215 children had been forced to leave school (Haworth and others, 1991).

In the Rakai district of Uganda, a study found that total enrolments in three primary schools went from 1,534 in 1989 to 950 in 1993; that is a 60 per cent drop in a four-year period. The primary school drop-out rate for the district was 27 per cent in 1993 compared to 15 per cent at the national level (Katahoire, 1993). Another study conducted in Uganda found that, of around 5 million school students, 81,000 would have lost a teacher to AIDS in 1999 (UNICEF, 2000). In the same country, a household survey in the capital city of Kampala found that 47 per cent of households with orphans did not have enough money to send children to school, compared with 10 per cent in non-orphans households (Muller and Abba, 1990).

The impact of the HIV/AIDS epidemic on the number of school-aged children is dramatic. In Zambia, projections yield a population aged 15 and below at 5.8 million by 2010, 1.4 million less than it would have been in the absence of AIDS (Hunter and Fall, 1998). Ironically, according to the author, "with between 750,000 and one million fewer than expected children of primary school age, Zambia's goal of achieving universal primary education will become easier to reach". Unfortunately, the goal will be achieved at very high human and other costs (Kelly, 2000). It is important to point out that in most countries affected by the HIV/AIDS epidemic, the school-age population is projected to continue to grow in spite of HIV/AIDS. But in a few countries, some projections show that the population aged 15 years old and under in 2010 will be smaller than it was in 2000.

A number of studies have documented the income effect of AIDS on school attendance. For example, a World Bank study reported that school attendance by students 15-20 years old was cut in half in households that lost an adult female in the United Republic of Tanzania (World Bank, 1995). Another study from Zimbabwe found that 31 per cent of the households interviewed had a child who was not attending school following the death of the mother (Mutangadura, 2000). This result was confirmed by another study in Zambia, which found that 55 per cent of AIDS-affected households in the Mansa district were unable to meet the costs of their children's education because of AIDS (Kasawa, 1993).

Several studies have examined the difference in school enrolments between children who lost one or both parents and children whose parents were alive (see also chapter III). Using DHS data from Ghana, Kenya, Niger, United Republic of Tanzania and Zimbabwe, Bicego and others (2003) found that double orphans aged 6-10 were only half as likely as non-orphans to be in the appropriate grade, and double orphans 11-14 were two thirds as likely. Case and others (2003) used DHS data from 10 countries; their results showed that double orphans in most countries were 10 to 30 percentage points less likely to be in school. A study of orphans in the United Republic of Tanzania found that orphanhood lowered the odds of attending school by 45 to 64 per cent (Sulliman, 2002). Moreover, orphans were more likely to drop out of school and more likely to work while attending school than non-orphans. Orphans were found to have lower school attendance in 44 countries for which information was available by mid-2003. Not only were orphans less likely to be attending school than children with both parents alive, but in countries with trend data, the gap was widening.

In Zambia, some evidence from micro-studies shows that 44 per cent of children of school age were not attending school in the Copperbelt region, with proportionately more orphans (53.6 per cent) than non-orphans (42.4 per cent) not attending (Rossi and Reijer, 1995).

A study conducted on the impact of AIDS on the education sector in Botswana, Malawi and Uganda found country-specific results. For example, in Botswana, a country with one of the highest HIV prevalence rates, absenteeism of school children was very low and orphans had better attendance records than non-orphans, whereas in Uganda and Malawi, absenteeism was somewhat higher among orphans than non-orphans (Bennel and others, 2002). The authors note that Botswana has a strong schooling culture and most children attend primary and junior secondary school. Moreover, household demand for child labour is low, and schools provide meals, a major incentive for disadvantaged children. In addition, the Botswana Government has introduced a national programme of targeted support for orphans. In Malawi and Uganda, which are more typical low-income countries, absenteeism is generally high among all schoolchildren, partly because of widespread poverty. School fees and the cost of uniforms were given as reasons for absenteeism of secondary students in Malawi and Uganda.

Children who had lost a parent to AIDS were 50 per cent less likely to receive an education, and children who had lost both parents were 90 per cent less likely to be educated in Burkina Faso in 1998-1999 whereas children in eastern Zimbabwe who had lost their mother were less likely to have completed primary school than children who had lost their father or children whose parents were living (Nyamukapa and others, 2003).

C. CONCLUSIONS

AIDS is degrading the supply and quality of education and may disrupt schooling for a whole generation of children. In the long run, the diminished investment in human capital may delay social and economic development. The major findings of this chapter are as follows:

- **The HIV/AIDS epidemic is eroding and even reversing progress made in achieving universal primary education.**
- **HIV/AIDS reduces the supply of educational services because of teacher attrition and absenteeism.** Studies predict teacher shortages in many countries, including Kenya, Malawi, Nigeria, South Africa, Zambia and Zimbabwe.
- **The AIDS epidemic imposes higher costs on the educational system** for medical care and death benefits for afflicted teachers and for recruiting and training replacements for teachers lost to AIDS.
- **HIV/AIDS reduces the number of school-aged children.** When children are born with the virus, they rarely live long enough to attend school.
- **Children orphaned by AIDS are less likely to be enrolled or attend schools than non-orphans.** Children whose parents are ill or die of AIDS drop out of school to provide care or help with economic activities, and households with an AIDS victim may no longer be able to afford school fees for their children. Studies in sub-Saharan African countries found significantly lower enrolment rates among children who had lost both parents than among children whose parents were both alive and who were living with at least one biological parent.

- **HIV/AIDS erodes the quality of education.** Infected teachers may be absent or too ill to provide a good education for their students, and substitute teachers may have neither the qualifications nor the experience to replace them. Quality of education may also suffer if investment in the education sector declines as funds are diverted to fight the HIV/AIDS epidemic.

VII. IMPACT ON THE HEALTH SECTOR

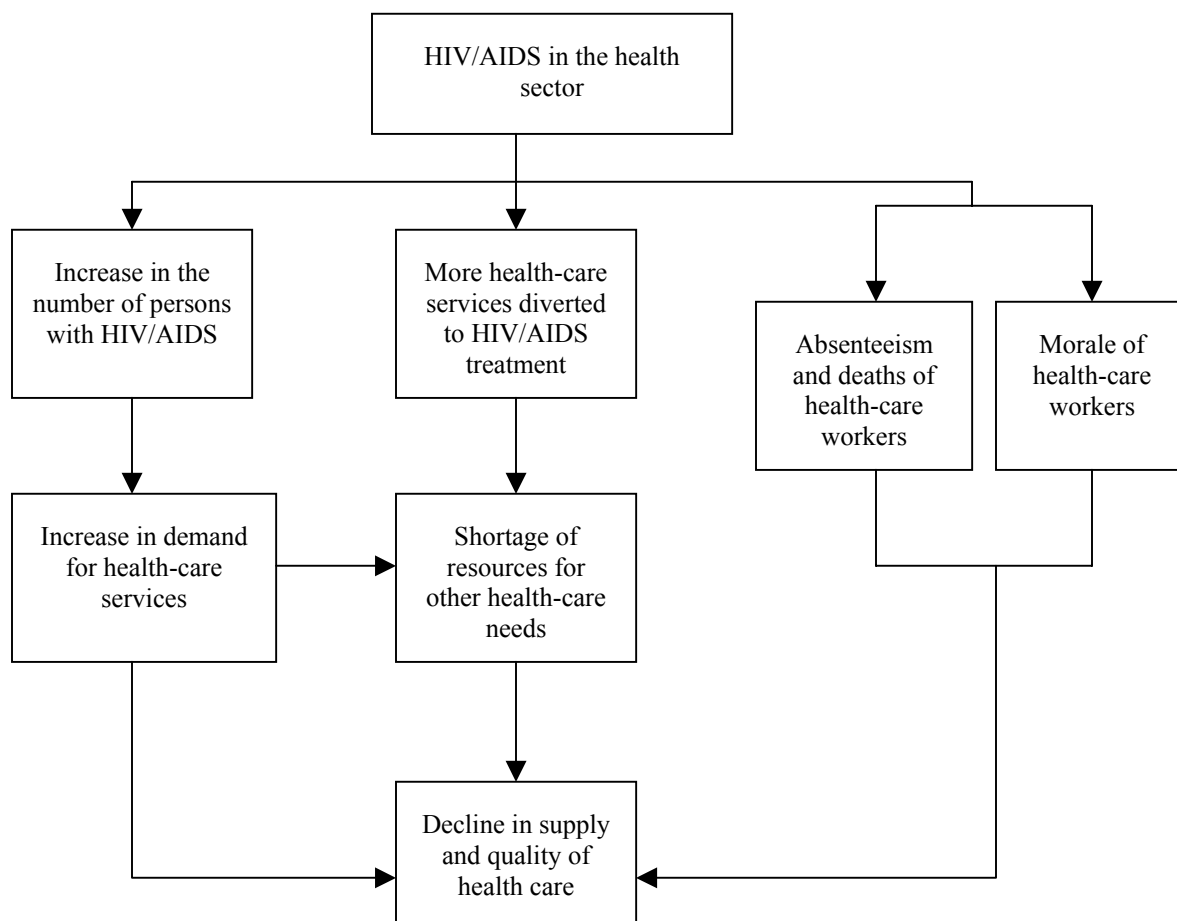
The HIV/AIDS epidemic has been posing and is continuing to pose tremendous challenges to the health systems of the developing countries, especially in the most severely affected countries. HIV/AIDS increases the overall health expenditures for both medical care and social support at the same time that it is claiming the lives of doctors and nurses in the developing countries. The present chapter presents a conceptual framework on the impact of HIV/AIDS on the health sector. It then discusses some of the empirical findings on the effects of HIV/AIDS on the health sector.

A. CONCEPTUAL FRAMEWORK

The impact of the HIV/AIDS on the health sector may operate in many ways, as shown in figure VII.1.

- First, health workers themselves will be infected with the HIV virus, and this will affect the supply of public health services. Health workers are vulnerable to the same routes of infection as the general public, but, in addition, they may contract the HIV virus or other infections associated with AIDS, such as tuberculosis, through contact with AIDS patients.
- The morale of the health professionals may also be affected. Caring for AIDS patients is demanding and stressful for the health staff involved. High levels of stress may lead to greater staff absenteeism, and staff may refuse to be transferred to high-prevalence regions within the countries.
- In some cases the quality of services may also be affected by the attitude of the health staff towards HIV/AIDS patients. Fears of contracting the disease and the psychological stress involved in treating AIDS patients may lead to a drop in the quality of services provided.
- HIV/AIDS contributes to increases in health expenditures in both the public and private sectors, and may divert resources towards higher levels of care needed for AIDS patients.
- The added strains on public health finances, staff and other resources may force more people to seek private health care. Many households may have to choose between health care and other essentials such as food.

Figure VII.1. Conceptual framework of the impact of the HIV/AIDS epidemic on the health sector



B. AVAILABLE EVIDENCE ON THE IMPACT OF HIV/AIDS ON THE HEALTH SECTOR

Increases in the number of people seeking health care are straining the health sector in the developing countries most affected by HIV/AIDS. The health systems of these countries were struggling to cope with pressing health-care needs even before the HIV/AIDS epidemic.

Shortage of health professionals

The World Bank has estimated that a country with a stable 5 per cent adult HIV-prevalence rate can expect that each year between 0.5 and 1 per cent of its health care providers will die from AIDS. In contrast, a country with 30 per cent prevalence would lose 3-7 per cent of its health workers to the HIV/AIDS epidemic (World Bank, 1999).

Absenteeism and illness among the health staff is a major issue. In Lusaka, Zambia, for example, HIV prevalence was 39 per cent among midwives and 44 per cent among nurses in 1991-1992 (Whiteside, 2002). Health workers are also susceptible to opportunistic infections that often accompany HIV/AIDS. Studies conducted in South Africa between 1991 and 1998 documented a five-fold increase in the tuberculosis rate among staff. In Zambia, pilot surveys found that mortality among nurses had increase 13-fold between 1980 and 1991, to 2.7 per cent (Buvé and others, 1994).

Quality of care of AIDS patients may also suffer because care-givers fear contracting the disease. In Burkina Faso, a study found that health-care workers were afraid of contracting the HIV virus, and this fear had led to a decline in the quality of care (Burkina Faso National Committee to Combat AIDS, 2003).

Increased demand for health care

Many countries in the developing world are faced with a high demand for treatment of AIDS-related diseases, making it difficult to satisfy demand for treatment of other diseases. Information on bed usage by AIDS patients is available for major hospitals in a number of countries. For many of the most affected countries, the loss of hospital capacity could be on the order of 50 per cent.

A study conducted in Rwanda found that 350 HIV-positive outpatients visited the hospital 10.9 times on average as opposed to 0.3 times for the general population. The study also revealed that the increased demand for out-patient services was characterized by considerable inequities. Expenditures on health services differed according to gender, income, place of residence and the ability to mobilize non-household resources to pay for care (Nandakumar and others, 2000).

Increases in health expenditures

In sub-Saharan Africa, the annual direct medical costs of AIDS (excluding antiretroviral therapy) are estimated at US\$30 per person infected, whereas the overall health expenditures in the public health sector are less than US\$10 per capita in most African countries (UNAIDS, 2002a). In many low income countries public health budgets are too low to provide basic health-care services, even without the added burden imposed by AIDS (Musgrove and Zeramini, 2001).

In studies conducted in Côte d'Ivoire, Mexico and United Republic of Tanzania, health expenditures have increased drastically during the last two decades. In many affected countries,

the health budget allocated to the HIV/AIDS epidemic has increased, leading to the compression of the non-AIDS health budget (Shepard, 1998).

One of the reasons for the higher allocation of the health budget to AIDS is that it is far more costly to treat. A study in Zimbabwe shows, for instance, that hospital care for HIV/AIDS patients was twice as expensive as that for the non-HIV/AIDS patients. In Côte d'Ivoire, 906 AIDS patients who went to private clinics spent a total of 2,516,709 CFA francs in 1996, whereas 8,699 patients who went to public health facilities spent 4,735,000 CFA francs (Koné and others, 1998). The Government has allocated a budget of 470 million CFA for the fight against HIV/AIDS. But only 60 per cent of the budget was made available. Of the total of 1.5 billion CFA spent in 1994-1995 by the public health sector, only 18 per cent came from Government funds. Total Government expenditures for 1995 were 50 billion CFA (US\$100 million), of which three-quarters was spent on curative care and one quarter on prevention. AIDS expenditures represented 8.5 per cent of total health spending.

In Mexico, the Government spent US\$79 million on AIDS-related health care and prevention in 1995, or about 1 per cent of its total (private and public) health expenditures. HIV prevalence is low in Mexico, which explains the relatively low proportion of HIV/AIDS-related expenditures in the total health expenditures (Izazola and others, 1998).

In the United Republic of Tanzania, where adult HIV prevalence is higher than in either Mexico or Côte d'Ivoire, HIV/AIDS health expenditures are higher. Because of the large share of prevention interventions financed by donors and the large amount spent, donors funded a third of all health spending in the United Republic of Tanzania and 84 per cent of all spending on HIV/AIDS/STDs in 1996—a larger share in both cases than that of the Government. The contribution of Government to health and HIV/AIDS/STD spending is therefore very small—19 per cent of total health spending and 5 per cent of spending on HIV/AIDS/STDs (Tibandebage and others, 1998).

A few studies have documented how the costs of treatment are shared between service providers in the public sector, private clinics and households. In developing countries, there seems to be a shift of the burden of treatment towards households. Households' out-of-pocket share of total health-care spending tends to be higher in low-income than in middle- or high-income countries (Musgrove and Zeramardini, 2001). The epidemic has triggered an increase in private health spending which, for many affected households, has affected the consumption of basic items (see chapter III). The "care gap" is now being partially filled by local, non-governmental service organizations as well as the traditional network of extended family.

Highly active antiretroviral treatment for AIDS has hardly been available in low-income countries, but this is beginning to change with the establishment of differential pricing schemes for the drugs. In early 2000, the annual cost of the drugs for treating one person was US\$10,000-12,000 nearly everywhere, but by the end of 2001 prices as low as US\$350 were being offered in some cases (UNAIDS, 2002a). Such prices will mean that many more people can be treated. However, low-income countries with high HIV prevalence cannot be expected to meet, out of their own resources, the cost of extending treatment to all who need it.

The international community has recognized that low-income countries need donor assistance to cope with the costs of prevention and treatment of HIV and AIDS. Experts associated with UNAIDS estimated that, as of 2001, annual spending on HIV/AIDS in low- and middle-income countries from all sources was US\$1.8 billion, but that annual resource needs amounted to \$3.2 billion in 2002 and would rise to \$9.2 billion by 2005. Of the total for 2005,

\$4.8 billion is estimated to be needed for prevention interventions and \$4.4 billion for care and support, of which \$2.2 billion would be needed for antiretroviral treatment (Schwartländer and others, 2001). While these estimates include an allowance for non-medical support to orphaned children, they do not include the costs of improvements to the health infrastructure that will be required to expand delivery of services. It was estimated that one-third to one-half of the needed resources could come from the public and private sectors of the countries themselves, but the remainder would need to be provided by international donors.

Health as a human capital investment

Investment in human capital is one of the most important aspects of development and economic growth. Along with education, good health is an element of human capital and is an essential ingredient for a productive population. The education sector adds value to human capital, whereas the health sector maintains it (Whiteside, 2002). The HIV/AIDS epidemic has changed the equation for investment in human capital: if mortality rates are high, especially among young adults, then there is a substantial decrease in lifetime returns to human capital investments (United Nations, 2003b). Moreover, as costs of care for AIDS patients increasingly strain public spending on health care, the health needs of other individuals may receive less attention. This could compromise the health status of the whole population and retard economic growth. A study in Burkina Faso found that the increase in resources allocated to HIV/AIDS treatment has resulted in fewer resources available to combat other health concerns, such as malnutrition, malaria and tuberculosis (Burkina Faso National Committee to Combat AIDS, 2003).

The HIV/AIDS epidemic is also affecting the human capital investment in children whose parents have died of AIDS. Several studies have found that orphans are more likely to be living in poor households than non-orphans and less likely to be enrolled in school (Bicego and others, 2003; Case and others, 2003; Sulliman, 2003; see also chapter III on households and chapter VI on education). In addition, the health and nutritional status of orphans are also likely to suffer. Children in rural Uganda who had lost a parent to AIDS had higher HIV-1 seropositivity rates than those whose parents were not infected (Busingye and others, 2003). Floyd and others (2003) found that children of AIDS victims in the Karonga district of Malawi had higher mortality rates than other children. In a study in 312 communities in 13 Indonesian provinces, Gertler and others (2003) found that children whose mothers had died were more likely to die than children who had not lost a parent. Bereaved children were generally less healthy than children whose parents had lived.

In a study of children's health in northwestern Tanzania, Ainsworth and Semali (2000) found that adult deaths led to increased morbidity and reduced height for age of children under five in the household. The effects were most severe for children from the poorest households, those whose parents were uneducated and those with the least access to health care.

C. CONCLUSIONS

Developed countries generally, albeit with difficulty, have been able to cope with burdens on the public health sector due to HIV/AIDS. However, in the less developed countries, especially in the most affected ones, the total effects on the health sector are already serious and are projected to increase sharply as the number of AIDS cases grows. Increased need for health-care services, together with an eroding supply of health-care workers, risks degrading the quality and quantity of health care for whole populations.

Some of the major conclusions of this chapter may be summarized as follows:

- **Absenteeism and deaths of health workers pose a serious threat to the health system of the most affected countries.** A shortage of nurses and doctors has been observed in the high-HIV-prevalence countries. This shortage is particularly pronounced in rural areas since many health professionals are unwilling to work in remote areas.
- **The increasing mortality of health professionals in some countries poses a serious threat to the quality of health care.** Training of new professionals is certainly going to cost more money, while the accumulated experience of those who are die is lost forever.
- **The budget devoted to health in most developing countries is insufficient to cover AIDS-related expenditures.** With more people falling ill and with the demand for antiretroviral therapy growing, the budgetary situation can only get worse. Because the treatment of AIDS is expensive, few public health sectors in the developing world can afford it. Thus, there is a shift of the costs to the private sector and to households.
- **The high demand for an effective treatment of AIDS-related diseases makes it difficult for the most affected countries to satisfy demand for treatment of non-HIV/AIDS-related diseases.** Funds for treatment of malaria and tuberculosis, for example, have been diverted to care for AIDS patients.
- **Developing countries need help from international donors if they are to meet the health-care needs imposed by HIV and AIDS.** UNAIDS has estimated that, as of 2001, annual spending on HIV/AIDS in low- and middle-income countries from all sources was US\$1.8 billion, but that annual resource needs amounted to \$3.2 billion in 2002 and would rise to \$9.2 billion by 2005. While the countries involved might be able to provide one-third to one-half of the needed resources, the remainder will need to be provided by the international community.

VIII. IMPACT ON ECONOMIC GROWTH

The impact of the HIV/AIDS epidemic on the economy has been a concern since the beginning of the pandemic. Some believe that the HIV/AIDS epidemic is responsible for slowing the rate of growth of the gross national product of many heavily affected countries and that in some cases, growth of the GNP could decrease by more than 1 percentage point for every 10 per cent HIV prevalence. Others have the view that HIV/AIDS has had little impact on the macro-economy so far. It is difficult to estimate empirically the effect of HIV/AIDS on economic performance because so many factors other than HIV/AIDS affect economic growth. The countries most seriously affected by the epidemic are also faced with drought, war and other problems.

"Development", as set out in the United Nations Declaration on the Right to Development, "is a comprehensive economic, social, cultural and political process, which aims at the constant improvement of the well-being of the entire population and of all individuals on the basis of their active, free and meaningful participation" (A/RES/41/128 of 4 December 1986). While economic growth is an important element of the development process, it is not by itself an adequate yardstick of development. A fuller understanding of effects of HIV/AIDS on prospects for development requires looking beyond and underneath conventional indicators of macro-economic performance.

The present chapter first presents an analytic framework taken from previous studies of the impact of HIV/AIDS on the economy. The second section outlines approaches to estimating the effects of HIV/AIDS, and the third section discusses the currently available evidence on the impact of HIV/AIDS on economic growth rates—and the uncertainties associated with those estimates—and also briefly discusses attempts to address impacts on broader indicators of welfare and development. The final section summarizes the current state of knowledge regarding effects of HIV/AIDS on the macro-economy.

A. CONCEPTUAL FRAMEWORK

The HIV/AIDS epidemic can affect the economy in a number of ways:

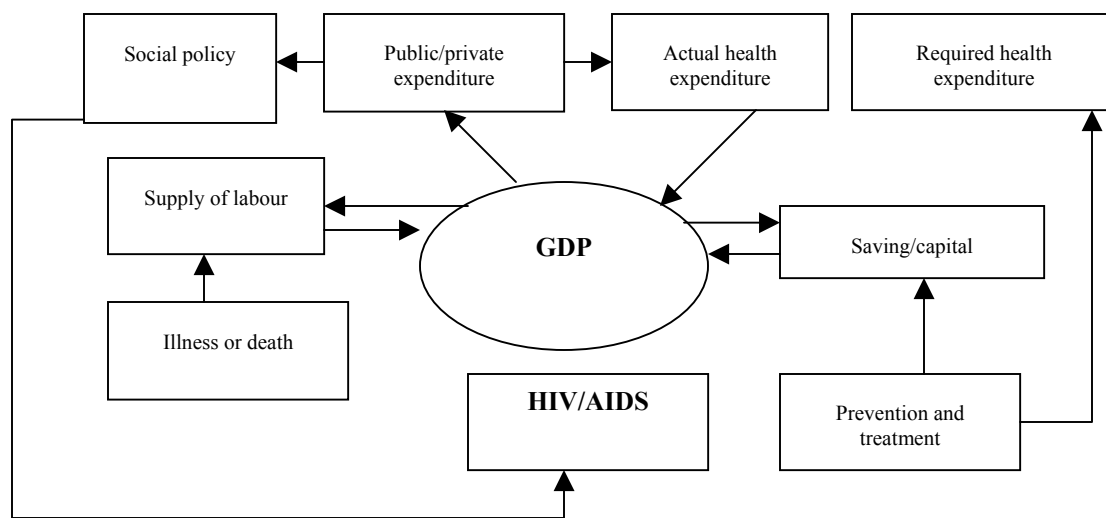
- The AIDS epidemic will slow or reverse growth in the labour supply. The economic impact can vary according to the sector of the economy, the degree to which HIV/AIDS affects hard-to-replace skilled labour, and whether or not there is a substantial pool of "surplus labour".
- Savings and investments of families will be reduced due to the increase of HIV/AIDS-related health expenditures. If children's education, health and nutrition suffer as a result, prospects for longer-run economic growth and development will decline.
- The AIDS epidemic may also divert public spending from investments in physical and human capital to health expenditures, leading over time to a slower growth of the gross domestic product (GDP). Foreign and domestic private investment might also decline, if potential investors become convinced that the epidemic is seriously undermining the rate of return to investment.

- The HIV/AIDS epidemic may also deepen the poverty of the most affected countries by decreasing the growth rate of per capita income and by selectively impoverishing the individuals and families that are directly affected.

Cohen (1997), among others, stresses the effect of HIV on the size of the working population, which tends to reduce total output and to worsen the dependency ratio. More children and elderly people would have to be supported by a smaller active labour force. In addition, the composition of the labour force would change with respect to skills, education and experience, which would decrease the productivity of labour.

Theodore (2001), in a model applied to several Caribbean countries, identified four channels through which HIV/AIDS may affect the economy: the production channel; the allocation channel; the distribution channel and the regeneration channel (figure VIII.1). The production channel refers to the mechanisms through which HIV/AIDS affects the main factors of production—labour and capital—causing the production process to be less fruitful than it would have been in the absence of HIV/AIDS. The second channel through which HIV/AIDS may affect the economy is the allocation channel. One of the most important functions of the economic system is to ensure an efficient allocation of resources. HIV/AIDS reroutes some of these resources to medical expenses, away from other productive uses. The third assumed channel through which HIV/AIDS affects the economy is the distribution channel, that is, the distribution of income. In the face of an epidemic that increases health expenditures and weakens the income base, the lowest income groups may fare the worst. While the rich may have other assets—savings, land or capital—often the only productive asset of the poor is their own labour, which HIV/AIDS attacks. The upper income groups, though they are also affected, may be better placed to protect themselves and better able to afford treatment. Thus, the HIV/AIDS epidemic has the potential not only to affect all groups but also widen the gap between different social strata. The fourth channel, the regeneration channel, refers to the investments in human capital, physical capital and new technology that are needed to keep the economy growing. If the HIV/AIDS epidemic compromises the saving capacity and the human capital of the economy, this will undercut the process of economic development.

Figure VIII.1. Conceptual framework of the impact of HIV/AIDS on the economy



Source: Theodore (2001).

B. APPROACHES TO ESTIMATING THE EFFECTS OF HIV/AIDS

A variety of economic modelling approaches have been employed to estimate the macro-economic effects of the HIV/AIDS epidemic. In general, the task is to estimate how the economy would have performed in the absence of AIDS and contrast this with an estimate of economic performance given the estimated or projected number of HIV/AIDS cases. The economic outcome studied is typically growth in total gross domestic product (GDP) per capita and/or growth in total GDP. Sometimes intermediate outcomes, such as effects on savings rates, have also been estimated. Sometimes the analyst's interest centres as much on trying to gain insight into the epidemic's differential effects on particular sectors of the economy as on estimation of effects on GDP as a whole.

Some studies have employed cross-national data, which may pertain to a single time period or to a time series. In those analyses, regression analysis was used to estimate the effects of one or more indicators of the volume of HIV/AIDS infections or deaths on economic outcomes, controlling for other variables that previous work had identified as having an important effect on economic growth.

Other analyses have employed an economic model fitted to the data of a particular country and, usually, projected for 10 or 15 years into the future. In a typical neoclassical growth model, AIDS affects total output directly, by decreasing the number and efficiency of workers, and also indirectly, by decreasing savings and investment. Since HIV/AIDS also results in a lower population than would otherwise have existed, the effect on GDP/capita is smaller than the effect on total output; at least in principal, there could be situations in which the net effect on GDP/capita would be nil or even positive. Since it is commonly the case that the values of some of the model's key parameters are not precisely known, analyses often include various scenarios, assuming different plausible values for the unknown parameters.

Some analyses have further elaborated this type of model by positing a dual-sector economy, in which there is a relatively well-paying and productive formal sector, which tends to employ the more highly skilled workers, and a relatively low-wage, low-productivity informal sector that employs labour that is in surplus to the needs of the formal sector. With such a dual-sector model, the predicted economic effects of the HIV/AIDS pandemic can vary significantly depending on the degree to which infections are assumed to be concentrated in the more-skilled workers that are key to the functioning of the formal sector. If a country has a substantial pool of surplus labour with very low marginal productivity, and if HIV/AIDS is highly concentrated in the pool of unskilled labour, then even a substantial prevalence of HIV/AIDS might have only a small effect on performance of the macro-economy, while if the same number of infections were to occur in the skilled labour force, the macroeconomic effect could be large.

The latter type of model has, however, been criticized by some analysts (for example, Cohen, 2002) for downplaying the importance of the informal sector as an engine of economic advancement, and also for downplaying the degree of expertise embodied in informal-sector employees and entrepreneurs, whose knowledge may be as difficult to replace as that of the skilled workers of the formal sector. It should also be noted that, even if it should be the case that a substantial loss of unskilled labour would have only a minor impact on a particular economy's growth of GDP, the impact on the families that depend on such labour will be dire. Many families depend on low-wage workers to maintain a basic level of subsistence, and the loss of these workers will deepen their poverty (see chapter III).

Other, more elaborated, models have also been used to analyse how impacts of HIV/AIDS on different sectors of an economy relate to overall economic performance. For instance, Kambou, Devarajan and Over (1992) applied an eleven-sector computable general equilibrium (CGE) model to estimate the economic effects of HIV/AIDS in Cameroon. The model is based on a snapshot picture of an economy contained in a social accounting matrix. The CGE models are rich in sectoral and distributional data as compared with the time-series-based and aggregated macro-econometric models, and are widely used to evaluate trade and expenditure, since they commonly have differential impacts within society. Again, lack of knowledge about many of the variables and their relationships often makes it necessary to make assumptions or to borrow estimates from other situations in order to apply such models to the situations of particular countries affected by HIV/AIDS.

Another approach is to focus only on those directly affected by the epidemic, excluding from consideration the rest of the society. For example, Broomberg (1993) estimated the cost of HIV/AIDS in South Africa. The costs are divided into direct costs and indirect costs, where direct costs include the costs of health services provided by both public and private sectors to the persons living with AIDS at all stages of the disease, including testing costs, prevention research and education. The indirect costs include the economic value of disability and premature mortality as a result of HIV/AIDS, estimated as the present value of lost future earnings. This approach leaves out such macro-economic effects as reduced investment, as resources are diverted from other economic areas in order to cope with HIV/AIDS. Good-quality estimates of direct and indirect costs of dealing with the epidemic are, however, much needed in order to derive sound estimates of the full macro-economic effects.

C. EVIDENCE OF THE IMPACT OF HIV/AIDS

Many of the available studies on the impact of AIDS on the economy covered the southern part of Africa, which currently has the highest levels of HIV prevalence. There have also been some studies of countries in Eastern Africa, the region with the second-highest HIV prevalence, and some have covered other regions.

Macro-economic effects of HIV/AIDS are discussed below in terms of differences in projected annual growth rates between "with-AIDS" and "no-AIDS" scenarios. It should be borne in mind that the effects of lower growth rates will cumulate over time, since unlike epidemics of contagious diseases such as influenza, HIV/AIDS will continue to exert its effects for many years into the future. For example, if the growth rate of GDP is lowered by HIV/AIDS by 1, 2 or 3 percentage points per year, in 15 years this would produce an economy that is smaller by about 15, 25 or 35 per cent, respectively, than it would have been in the absence of AIDS.

Dixon, McDonald and Roberts (2002) and Cornia and Zagonaria (2002) reviewed studies that attempted to quantify the effect of HIV/AIDS on growth of GDP and GDP per capita in Africa. "The consensus from these studies is that the net effect on the growth of GDP per capita will be negative and substantial. The more recent studies show greater effects; and the most recent estimates indicate that the pandemic has reduced average national growth rates by 2-4 [percentage points] a year across Africa." (Dixon, McDonald and Roberts, 2002; p. 233). Impacts on GDP per capita are smaller, and range from substantially negative to negligible or even positive impacts over the medium term of 10 or 15 years. The results of selected studies are summarized below and in table VIII.1:

TABLE VIII.1. SUMMARY OF STUDIES OF THE MACROECONOMIC IMPACT OF HIV/AIDS IN AFRICA

Study	Countries and period of economic data	Period of most recently used HIV/AIDS data	Results (comparison with non-HIV/AIDS scenario)	
			Growth of GDP	Growth of GDP/capita
Dixon and others (2001)	41 countries (1960-1998)	Late 1990s	GDP growth rates reduced by 2-4% per year; large variation across countries, in line with prevalence of HIV	
World Bank (2001b)	Swaziland	Early 1990s	Average annual growth rate of GDP during 1991-2015 will be 1.3% lower	Average annual growth rate of GDP/capita during 1991-2015 will be 0.2% higher
World Bank (2001a)	Namibia	Early 1990s	Average annual growth rate of GDP in 1991-2015 will be 0.8% lower	Average annual growth rate of GDP/capita during 1999-2015 will be 0.1% higher
World Bank (2000a)	Lesotho	Early 1990s	Average annual growth rate of GDP during 1999-2015 will be 1.4% lower	Average annual growth rate of GDP/capita during 1999-2015 will be 0.3% lower
Bonnel (2000)	About 50 countries (1990-1997)	Mid 1990s		Rate of growth of GDP per capita in Africa reduced by 0.7% per year in the 1990s (1.2% for a country with HIV prevalence of 20%)
Quatteck and Fourie (2000)	South Africa	Mid 1990s	Average rate of GDP growth over next 15 years will be 0.3-0.4% lower per year	
Arndt and Lewis (2000)	South Africa	n.a.	Annual growth rate of GDP is lowered by about 0.5% in the late 1990s, rising to 2.5-2.6% during 2008-2010	GDP per capita will be 8 % lower in 2010 than in the absence of AIDS; implies that AIDS lowers average annual growth rate of GDP per capita by 0.7% during 1997-2010
Greener, Jefferis and Sifambe (2001)	Botswana	Late 1990s	During 1996-2021, annual growth rate of GDP reduced by 1.1-2.1%, 1.5% in the scenario considered most likely	Little effect: annual per capita GDP growth rate between 0.6% lower and 0.4% higher due to AIDS; 0.1% lower in the scenario considered most likely
BIDPA (2000a)	Botswana	Late 1990s	Average rate of growth of GDP in 2000-2010 reduced by 1.5% per year	
Bloom and Mahal (1995)	51 countries (1980-1992)	Early 1990s	Statistically insignificant effect on income growth	
Cuddington and Hancock (1994)	Malawi	Early 1990s	Average rate of growth of GDP in 1985-2010 reduced by up to 1.5% per year	Average growth of per capita GDP reduced by up to 0.3% per year ^a
Cuddington (1993a, 1993b)	United Republic of Tanzania	Early 1990s	Average annual rate of growth of GDP in 1985-2010 reduced by up to 1.1%.	Average annual growth reduced by up to 0.5%.
Kambou, Devarajan and Over (1992)	Cameroon	n.a.	GDP growth rate over 1986-1991 reduced by 1.9 % per year	
Over (1992)	30 sub-Saharan countries	Early 1990s	Average annual growth rate of GDP during 1990-2025 reduced by 0.9 % on average (up to 1.5 % in 10 worst affected countries)	Average annual growth rate of GDP per capita reduced by 0.15% per year (up to 0.6% in 10 worst affected countries).

Sources: Adapted from Dixon, McDonald and Roberts (2002), table 2; Cornia and Zagonari (2002), table 2; and the studies cited in the table.

NOTES: References to effect on GDP growth or per capita GDP growth rates refer to average annual growth rates for the period mentioned, expressed as percentage-point differences from a "No AIDS" scenario.

^a For "extreme" assumption about future AIDS prevalence.

- Among the earlier papers, Cuddington's (1993) and Cuddington and Hancock's (1994) studies using a neoclassical one-sector, two-factor growth model to predict economic growth in the United Republic of Tanzania and Malawi, found that over the period 1985-2010, GDP growth would be reduced by up to 1.1 percentage points in Tanzania and 1.5 percentage points in Malawi. Assuming that AIDS treatment costs would be entirely financed from savings, the AIDS epidemic would reduce per capita GDP growth by 0.1 percentage points per year in Tanzania and by 0.3 percentage points in Malawi.
- Applying an eleven-sector computable general equilibrium (CGE) model to the analysis of the impact of AIDS in Cameroon, Kambou, Devarajan and Over (1992) found that over five years the loss of an urban worker had seven times the negative impact on production as would the loss of a rural worker. In the capital goods, construction and services sectors, the negative impact would be 100 times larger when the lost workers were skilled and urban.
- Over (1992), using a model that distinguished between three classes of workers and between rural and urban production, projected the macro-economic impact of AIDS on the growth trajectories of 30 countries in sub-Saharan Africa over the period 1990-2025. The macro-economic impact varied depending on assumptions about relative levels of HIV infection in educated and uneducated workers, and on how much of the treatment costs are taken from savings. For the assumptions the author regarded as most plausible (that 50 per cent of the treatment costs are financed out of savings and that each education class of workers has double the risk of the one beneath it), the net effect of the AIDS epidemic on the annual growth rate of per capita GDP was a reduction of about 0.15 percentage point on average and one third percentage point in the ten countries with the most advanced epidemics. The effect in the 10 most affected countries would be 0.6 percentage point if all the treatment cost were financed from savings).
- More recently, Theodore (2001) estimated the economic losses associated with HIV in three Caribbean countries (Jamaica, Saint Lucia and Trinidad and Tobago). He found that, by 2005, HIV/AIDS would lead to a reduction of GDP, by comparison with a "No AIDS" scenario, of 4.9 per cent in Jamaica, 5.6 per cent in Trinidad and Tobago and 2.1 per cent in Saint Lucia in the first scenario. Those estimates assume that all infected persons would be medically covered, with an estimated per capita treatment cost of US\$4,000.
- Bonnel (2000) used cross-national regressions to estimate relationships among economic growth, policy, institutional variables and HIV/AIDS. He estimated that, for a sub-Saharan country with HIV prevalence of 20 per cent, the annual growth rate of GDP per capita during 1990-1997 would have been 1.2 per cent higher without HIV/AIDS.
- Robalino, Jenkins and Al-Maroufi (2002) developed a growth model to assess the risks of an HIV/AIDS epidemic and its potential economic consequences in nine countries in Western Asia and Northern Africa: Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Morocco, Tunisia and Yemen. Adult HIV prevalence is still low in these countries, and prospects for future transmission are highly uncertain. However, given the mean values from the authors' simulations, HIV prevalence may reach 3-4 per cent of the adult population by 2015 (higher in Djibouti), and over the period 2000-2025, and the annual

growth rate of GDP would be 0.3-0.4 percentage points lower than in the absence of AIDS (1.6 points in Djibouti).

- A 2002 World Bank study of the economic impact of HIV/AIDS in the Russian Federation showed that GDP in 2010 could be up to 4 percent lower and, without intervention, the loss could rise to 10 per cent by 2020 (Ruhl and others, 2002). The study projected that the most significant impact for long-term development was the uninhibited spread of HIV, which would diminish the economy's long-term growth rate, taking off half a percentage point annually by 2010 and a full percentage point annually by 2020. Another result of the study was that investment would decline more than production. In the pessimistic scenario, its level would decline by 5.5 per cent in 2010 and 14.5 per cent in 2020.

How large are these effects in comparison to other factors affecting economic growth? Some analysts note that other factors can produce effects on economic growth that are at least as large as those estimated to result from the spread of HIV/AIDS. For instance, Greener (2002) notes that a reduction in the rate of growth of GDP by between 0.5 and 2.6 percentage points, which encompasses the size of the effect indicated by most studies, "is within the range of variation that could be caused by poor economic management or fiscal policy. This implies that the macroeconomic impacts of HIV/AIDS, in themselves, can be substantially reduced by appropriate policy interventions" (Greener, 2002, p. 49). Yet such observations cannot bring much comfort, since factors such as poor economic management, war or drought are likely to make it all the more difficult to mount an effective response to the threat of HIV/AIDS.

In interpreting the estimates, it should be borne in mind that economic forecasting is not an exact science. It is not unusual to find economists—even those engaged in such analyses—adding cautionary notes about the reliability of the analytic outcomes. For instance: "It cannot be said that econometric modelling...has a good track record. Also, it should be readily admitted that we know relatively little about those structural relationships which are important for estimating the impact of HIV on development" (Cohen, 1992).

One manifestation of this uncertainty is that analysts may come to substantially different conclusions about the impact of HIV/AIDS on a particular economy because of differing assumptions built into their economic models. For instance, Haacker (2002b) observes that studies of South Africa by ING Barings (2000) and by Arndt and Lewis (2001) drew on the same demographic projections, yet, while the first study predicted that GDP per capita would be 7.5 percentage points *higher* by 2010 than in the absence of AIDS, the second study projected by GDP per capita would be 8 percentage points *lower* by 2010 than in the absence of AIDS.

Haacker (2000 and 2000b) argues that many analyses have ignored the potential negative impact of HIV/AIDS on foreign investment, and that this has probably led to an underestimate of the negative effect of the epidemic on the macro-economy. Specifically, many of the analyses employing one-sector and dual-economy neoclassical growth models imply that the rate of return to capital would decline, but the analyses usually do not take account of the declines in foreign investment and the outflow of domestic capital that may occur in response. Haacker's own estimates indicate that this effect could be large.

Some of the macro-economic estimates discussed above are themselves part of more comprehensive assessments that examine sector-specific impacts of HIV/AIDS, and that consider the effects on different strata of society. Such reports sometimes give a graver assessment of

impacts on particular areas of the economy than might be supposed from the relatively modest size of the projected macro-economic effects. For instance:

- The World Bank study of Swaziland cited in table VIII.1 estimated that HIV/AIDS would have the greatest impact on the agricultural, manufacturing and distribution sectors, which together accounted for over 60 per cent of value added in the national economy, with a "likely devastating impact of AIDS on the productive sectors of the economy" (World Bank, 2001b, p. 17). At the same time, the macro-economic model employed projected essentially no effect on growth of GDP per capita over the period 1991-2015.
- In Botswana, related analyses by BIDPA (2000) and Greener, Jefferis and Siphambe (2001) conclude that even though per capita GDP will be little affected by the epidemic over the period 1996-2021, HIV/AIDS will come to dominate health systems, and AIDS patients may crowd out those with other illnesses. There will be an increase in poverty, and the degree of poverty will deepen. Up to half of households are likely to have at least one infected member, and one quarter of households are likely to lose an income earner within 10 years. In this case, the divergence between the serious effects projected for households and the health sector and the relatively modest projected macro-economic results is due to the circumstance that Botswana's macro-economic performance, and its Government income, is heavily dependent on its diamond industry, which is capital intensive and whose revenue probably will not be greatly affected by AIDS. Most of the impact is likely to fall on households, whose per capita income may fall by 8-12 per cent over the period 1996-2021 (Greener, Jefferis and Siphambe, 2001).

A number of researchers have argued that analyses of the epidemic's macro-economic effects tend to give an overly sanguine assessment of the eventual economic impact of the epidemic, because they fail to take account of effects on human capital and social capital that will become increasingly prominent as time goes on. "Not only does AIDS destroy existing human capital, but by killing mostly young adults, it also weakens the mechanism through which knowledge and abilities are transmitted from one generation to the next; for the children of AIDS victims will be left without one or both parents to love, raise and educate them" (Bell, Devarajan and Gersbach, 2003, p. 2). "None of the models has adequately allowed for the erosion of networks and information channels that are fundamental to labour specialization and the maintenance of social capital" (MacPherson, 2003, p. 4).

As Greener (2002) notes, that the available estimates are open to question does not detract from the importance of trying to assess overall economic effects of the epidemic. Policy makers need to have some understanding of how the epidemic will affect the economy and Government income if they are to make sound choices in combating the epidemic and its effects.

D. BEYOND GDP: INCOME DISTRIBUTION AND WELFARE

GDP is not itself a measure of welfare. For one thing, the costs of responding to manmade or natural disasters add to GDP, even though well-being would have been greater had that spending not been needed. "[A]ctivities such as increased household and government expenditure on health care related to HIV...will be counted as a part of GDP, even though they are not part of what would normally be thought of as a productive activity. Impact should perhaps be measured in terms of a more satisfactory indicator of socially productive economic activity" (Greener, 2002, p. 50). Another limitation is that conventional macro-economic indicators are not by themselves informative about trends in the distribution of income, and in particular about the

extent of and trends in poverty. And beyond this, as noted above, "development" is a broader concept than is captured by measures of material welfare alone.

Most economists who have commented on the issue think that HIV/AIDS in developing countries will tend to make income distribution more unequal and will increase poverty, notably by impoverishing many of the households directly affected by the disease (see chapter III). Such effects can be dire for the well-being of the population and yet might have relatively little impact on the GDP as conventionally measured: the poor account for a much smaller fraction of national income than of the total population, and it follows that the deepening impoverishment of those who were already poor may have little effect on the macro-economic statistics.

With respect to broader indicators of welfare than GDP, a few studies used the human development index developed in the early 1990s by UNDP as an indicator to assess the impact of HIV/AIDS (Cohen, 1998; Gaigbe-Togbe, 2001). AIDS affects this index through its effects on life expectancy, which is a component of the index.

Another approach is to try to include the economic value of health as an aspect of "economic welfare", which by definition is not a matter of income alone. Jamison, Sachs and Wang (2001) attempted to assess the contribution of mortality changes in sub-Saharan Africa to such a broader measure of economic welfare. The idea is first to estimate in monetary terms the value that societies place on improved longevity, and then to use such valuations to derive a more inclusive measure of trends in economic welfare that incorporates trends in both mortality and GDP/capita. Empirical assessments of societies' willingness to pay to avert an adult death have found values ranging from about 75 to over 180 times per capita GDP (Jamison, Sachs and Wang, 2001). Given this, the value attached to actual mortality changes can be large in relation to the size of conventionally measured trends in GDP. For five countries that have been heavily impacted by HIV/AIDS (Botswana, Kenya, Malawi, Zambia and Zimbabwe), they estimated that, between 1960 and 1985, when mortality was falling, the impact of lower mortality was to add a welfare value that was between 1.7 and 2.7 percentage points per annum above the growth rate of per capita GDP alone. However, between 1985 and 2000 the impact of AIDS-induced mortality increase was to subtract between 5 and 8 per cent annually, producing substantial reductions in the combined GDP-mortality measure of change in economic welfare. Crafts and Haacker (2003) adopt a similar approach to estimate the economic value of the loss in life expectancy due to HIV/AIDS, expressed as a percentage of GDP. They estimate that the value of welfare losses in 2003 due to lower life expectancy is substantial even in countries where HIV prevalence is 1-3 per cent and "horrific" in the countries with the highest prevalence. For instance, in the countries with adult HIV prevalence above 10 per cent, the estimated welfare loss due to higher mortality has already resulted in a loss of welfare of over 40 per cent of GDP, and around 80 per cent in Botswana. "The direct welfare effects of HIV/AIDS through increased mortality substantially outweigh even the worst projections of the impact on GDP per capita" (Crafts and Haacker, 2003, p. 17).

E. CONCLUSIONS

At present there is little agreement among economists about the size of the effects on national economies that are directly attributable to the HIV/AIDS epidemic. The most enduring impact of AIDS on a country's economic development may be the loss of human capital, which represents a long-term investment and is rarely captured in economic models. The major findings of this chapter are as follows:

- **Estimated effects of the epidemic on the rate of growth of GDP in affected countries range from "small" to annual GDP growth rates of 2-4 percentage points lower than in the absence of AIDS.** Estimates of the macro-economic effects of HIV/AIDS should be regarded as being subject to a wide range of uncertainty. Differences in models and in assumptions sometimes lead to substantially different economic projections for the same country.
- **More recent analyses have tended to produce larger predicted impacts,** which may mainly reflect rising HIV prevalence over time, and that earlier projections of HIV prevalence have in many cases proven to be too low.
- **The longer-term effects on the economy may be more serious than most macro-economic estimates suggest.** Estimates of AIDS' effects on macro-economic performance usually take no account of the loss of "social capital" or of the long-term damage that is accruing to human capital, as children's education, nutrition and health suffer directly and indirectly as a consequence of HIV/AIDS. The effects of lowered investment in the human capital of the younger generation will affect economic performance over future decades, well beyond the timeframe of most economic analyses.
- **Beyond its effects on growth of GDP, the HIV/AIDS epidemic is likely to exacerbate income inequality and to increase poverty.**
- **The effects of HIV/AIDS on a population's welfare are not reducible to effects on GDP per capita.** Based on empirical evidence of societies' economic valuation of a death, the epidemic's effect on mortality itself represents a loss of welfare that dwarfs the estimated effects of HIV/AIDS on GDP.

Despite the uncertainties that surround such estimates, there remains a need for policymakers to understand the impacts that HIV/AIDS will have on overall performance of economies and budgets. In the most affected countries, the HIV/AIDS epidemic comes on top of many obstacles on the road to development. The difficulty of measuring the impact of the AIDS epidemic does not mean that there is less cause for alarm. Indeed, the real likelihood is that the full impact is yet to occur.

IX. CONCLUSIONS

HIVAIDS is the deadliest epidemic of our time. Over 22 million people have already lost their lives and more than 42 million are currently living with HIV/AIDS. Even if a vaccine for HIV were discovered today, over 40 million people would still die prematurely due to AIDS. In many countries, especially in Africa and the hardest-hit countries such as Botswana, Swaziland and Zimbabwe, the AIDS epidemic has spread rapidly, leaving illness, death, poverty and misery in its wake. In other countries the disease is still in its early stages. Notably, HIV/AIDS has now taken hold in the largest countries of the world—the number of people infected with HIV has reached one million in China and six million in India; the destructive effects of the epidemic are already being felt in those countries.

The epidemic affects every aspect of human life with devastating consequences. It has imposed heavy burdens on individuals, families, communities and nations. In many countries, the epidemic is undermining personal aspirations, family well-being and national development. The epidemic is threatening the achievement of the Millennium Development Goals, adopted by the United Nations General Assembly in 2000.

The impact of AIDS is already strikingly apparent in the countries with the highest prevalence rates. In these countries, the impact on mortality and on population size and growth is already substantial. In the most severe case, Botswana, where currently more than one in three adults is HIV positive, life expectancy is expected to drop from 65 years in 1990-1995 to just under 40 years in 2000-2005. As a result of the high death rate, Botswana's population is expected to decline within the next few years.

HIV/AIDS is not just a demographic disaster; the epidemic has consequences for every sector of society. This report reveals the wide-ranging societal impacts of HIV/AIDS: on individuals, families and households; on agricultural sustainability; on business; on the health sector; on education and on national economic growth.

The burdens of the disease on families and households are staggering. Typically, a family where the disease is present loses an adult in the prime of life, leaving behind not only a bereft family, but also an HIV-infected spouse as well as children. During the long period of illness, the loss of income and the cost of caring for family members may bring ruin to the household. The stigma of the disease will be endured not only by those who are ill, but also by family members, and even after death, the stigma will be felt by the survivors. Adult deaths, especially of parents, often cause households to be dissolved and children sent to live with relatives or even abandoned to the streets.

In the agricultural sector, the loss of farm workers to HIV/AIDS has ramifications for food security. A survey in Zimbabwe found that agricultural output declined by nearly 50 per cent among households affected by AIDS. The United Nations Food and Agriculture Organization estimated that the ten most severely affected African countries will lose between 10 and 26 per cent of their agricultural labour force by 2020.

Business enterprises in both the agricultural and non-agricultural sectors are also affected by the disease, as the most productive workers in the labour force become too ill to work and eventually die. Ill workers are less productive, as are those workers who must care for ill family members. The costs of paying health and death benefits and replacing experienced workers has serious financial implications for businesses and may cause them to become less competitive and eventually close down.

In countries with high HIV prevalence, output in the agricultural, industrial and service sectors is expected to suffer as more workers are afflicted, and the labour force weakens and shrinks. Funds for investment and savings are often diverted to pay for health care and social welfare benefits for afflicted families. As a result, economic development will likely stall or lose ground.

AIDS reduces the means and the incentives to invest in human capital. The next generation will be less healthy and less well educated than the previous one. HIV/AIDS seriously threatens especially the education of the next generation. In households affected by HIV/AIDS, children are often taken out of school to help at home with care-giving or income-generating activities. AIDS orphans suffer long-term disadvantages when their education is interrupted. Experienced teachers are also dying of AIDS, eroding the quality of education.

Health-care systems were already inadequate in many of the countries even before HIV/AIDS struck. The additional demand for treatment of AIDS and the opportunistic infections that are common in people with compromised immune systems have strained resources, burdened programmes and threatened the viability of the entire health care system in a growing number of countries.

Development involves more than the pursuit of economic growth. A long and healthy life is one of the most highly coveted components of human existence. Health and longevity are not merely intermediate goals on the path to socio-economic development, but rather are among the fundamental pillars of development. World leaders met at the United Nations in September 2000 for the United Nations Millennium Summit and agreed to a set of time-bound and measurable goals and targets.

One of the eight Millennium Development Goals refers directly to the need to fight against HIV/AIDS:

- *Reverse the spread of diseases, especially HIV/AIDS and malaria.*
The Millennium Declaration notes that “killer diseases have erased a generation of development gains”.

HIV/AIDS is also seriously threatening the achievement of the other seven Millennium Development Goals, namely:

- *Halve extreme poverty and hunger;*
AIDS is contributing to the impoverishment and malnutrition of households and communities that are affected by the epidemic.
- *Achieve universal primary education*
With the increasing number of children leaving school to care for ill relatives or to replace them on the farms and in the workplace, the AIDS epidemic has made the goal of universal primary education much more difficult to achieve, especially in the hardest-hit countries.

- *Empower women and promote equality between women and men*

HIV/AIDS affects both men and women, but at different ages and stages of the lifecycle. Women are particularly vulnerable to HIV/AIDS, and the burden of caring for AIDS victims in households falls heavily on girls and women.

- *Reduce under-five mortality by two-thirds*

One of the direct impacts of the HIV/AIDS epidemic is the increase in the mortality of children under five. Children die young from HIV due to mother-to-child transmission and to the weakened ability of infected mothers to care for their infants and young children.

- *Reduce maternal mortality by three-quarters*

HIV/AIDS impairs the maternal health of infected women. In sub-Saharan African countries where women are more affected by HIV/AIDS than men, the impact on maternal mortality is more severe than in other regions.

- *Ensure environmental sustainability*

HIV/AIDS is reducing the ability of nations and communities to integrate principles of sustainable development into their policies and programmes, in particular the provision of safe drinking water and adequate housing.

- *Create a global partnership for development, with targets for aid, trade and debt relief*

The HIV/AIDS epidemic is undermining national economies and development efforts and places heavy burdens on nations to deal with the consequences of the epidemic.

.....

The United Nations General Assembly, at its twenty-sixth special session in June, 2001, adopted the Declaration of Commitment on HIV/AIDS. The Declaration noted that "...the global HIV/AIDS epidemic, through its devastating scale and impact, constitutes a global emergency and one of the most formidable challenges to human life and dignity, as well as to the effective enjoyment of human rights, which undermines social and economic development throughout the world and affects all levels of society—national, community, family and individual."

Since the adoption of the Declaration of Commitment, the HIV/AIDS epidemic has worsened and become more widespread. The recent report of the Secretary-General to the fifty-eighth session of the General Assembly on progress towards implementation of the Declaration of Commitment, emphasizes that assertive political leadership and effective action are required to prevent a major expansion of HIV/AIDS. The report recommends that all countries develop and implement national strategies to promote the delivery of comprehensive prevention, treatment, care and support to those people living with or affected by HIV/AIDS.

In order to conquer HIV/AIDS, considerably greater efforts and resources will be required. As Secretary-General Kofi Annan concludes in his report to the 58th session of the General Assembly, "to finance the global responses, ...annual funding for HIV/AIDS programmes must increase three-fold over current levels by 2005, and five-fold by 2007".

The course of the HIV/AIDS epidemic is by no means pre-determined. The eventual course of the disease depends on how individuals, communities, nations and the world respond to the HIV/AIDS threat today and tomorrow.