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# EDUCATION AND HIV/AIDS



## Modeling the Impact of HIV/AIDS on Education Systems A Training Manual

The 2nd in a series of publications for the  
Assessment, Prevention and Mitigation of the Impact of HIV/AIDS  
on the Education Sector



THE WORLD BANK





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*This manual was produced by the Ed-SIDA initiative. The Ed-SIDA initiative was developed by Ministry of Education staff from 9 West African countries, the World Bank, the Department for International Development UK, the International Institute for Educational Planning at UNESCO and the Partnership for Child Development, London. It was launched in November 2000 and aims at assisting countries respond to the impact of HIV/AIDS on their education systems.*

*This manual should be distributed together with the Microsoft Excel© spreadsheet 'edsida.xls' to allow full interactive use with the Ed-SIDA model.*

**The Partnership for Child  
Development Team:**

Kamal Desai  
Lesley Drake  
Nicholas Grassly  
Celia Maier  
Anthi Patrikios  
Elisabetta Pegurri

**The World Bank Team:**

Don Bundy (HDNED)  
Birger Fredriksen (AFRHD)  
Seung-Hee Lee (AFRHD)  
Khama Rogo (AFRHD)  
Shobhana Sosale (HDNED)  
Debrework Zewdie (HDNVP)

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## SUMMARY

The purpose of this document is two-fold. It serves as a practical training manual for World Bank staff, Ministry of Education planners and other stakeholders who wish to use the Ed-SIDA model in a particular country to assist with educational planning in the face of HIV/AIDS. It also serves as an introduction to the epidemiology of HIV/AIDS, the impact it can have on the education sector, its scale and how this can be captured empirically by the Ed-SIDA model.

The threat of HIV/AIDS on education is so extensive in certain settings that no planning initiative should be without specific strategies aimed at estimating and mitigating the impact of this disease. The Ed-SIDA model represents a powerful spreadsheet based tool for educational planners to effectively create these strategies and quantify the impact of HIV/AIDS on the educational sector. In this way, anecdotal evidence of teacher mortality, absenteeism and class sizes is substituted with estimates derived in an informed and systematic manner.

Ed-SIDA can be seen to consist of two components. The first focuses on the impact that HIV/AIDS has on the **supply** of education. For each country, supply refers to estimates of the number of teachers, their HIV prevalence and deaths due to AIDS to be projected into the future (next 10 yrs) under different recruitment policies. These projections are made both in the presence and absence of an AIDS epidemic, allowing the impact of HIV/AIDS to be clearly described. Using this model World Bank staff and Ministry of Education planners can look at the implications of HIV/AIDS for recruitment policies and how they may be changed in response.

The second component of the model focuses on the impact of HIV/AIDS on the size and characteristics of the school-age population in a given country – the **demand** for education. Most important with respect to demand is the number of school-aged children who have been orphaned by AIDS. The challenge to enroll them and other vulnerable children will have to be met.

The relationship between supply and demand are explained in terms of pupil to teacher ratios, which are key to estimating required teacher numbers for national Education For All (EFA) goals in presence of HIV/AIDS. Additionally, the financial costs of HIV/AIDS related to teacher training, absenteeism and enrolment of orphans is illustrated in examples for countries currently in the high prevalence setting of an established epidemic, such as in eastern and southern Africa, and in a low prevalence (but rising) setting of an emerging epidemic, such as in west Africa.

The Ed-SIDA model is implemented in an Excel©-based spreadsheet format called **edsida.xls**. This spreadsheet is fully annotated and may be modified by the user to produce impact analyses relevant to their country of interest.





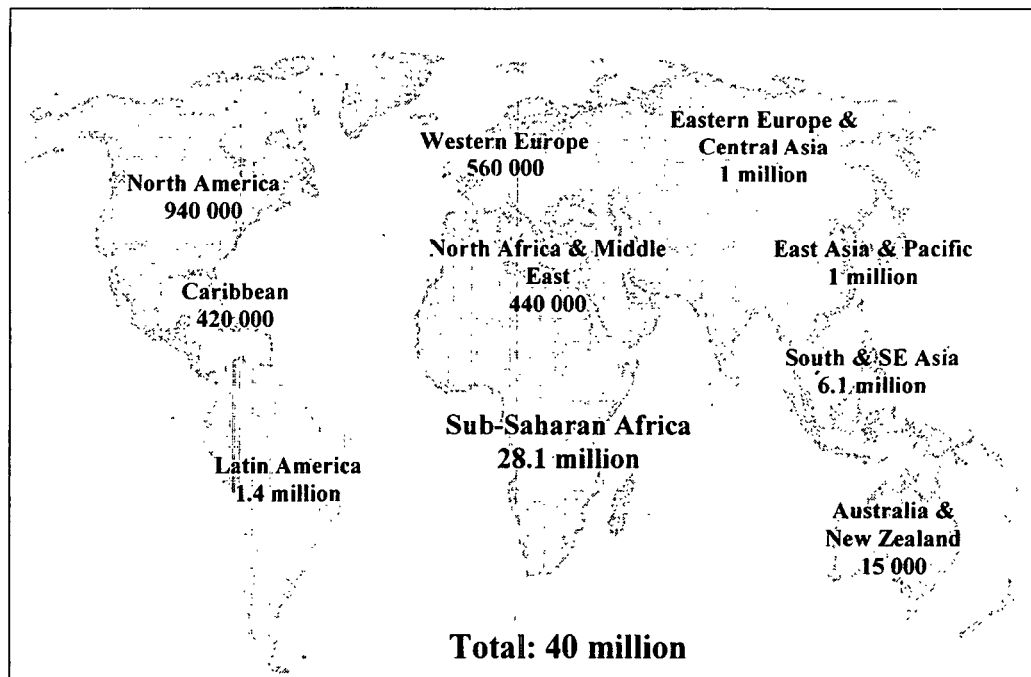
# 1. THE HIV/AIDS EPIDEMIC

## 1.1 Where we are today

HIV/AIDS statistics are now familiar but still staggering. Globally, 25 million people have died from the disease whilst over 40 million people are estimated to be currently living with HIV or AIDS (Figure 1.1) — a figure that is over 50 percent above that projected by the World Health Organization (WHO) in 1991. AIDS orphans (who have lost either their mother or both parents) and other vulnerable children number some 15.6 million worldwide (US Bureau of Census in Hunter & Williamson, 2000). The infection continues to spread rapidly; in 2001 alone, approximately 5 million people became newly infected (World Bank 2002, UNAIDS 2001).

There are about 45 countries in the world where HIV prevalence rates are above 2 percent; of this total, 36 are in Africa, with 7 having prevalence rates around 20 percent or higher. India deserves special mention: it is estimated to have a relatively low prevalence rate but the highest number of AIDS deaths and the second highest number of people living with the infection (end-2000). In many developing countries, especially in Sub-Saharan Africa, HIV/AIDS has spread from high-risk groups to the general population. And in many countries, 60 percent of all new HIV infections occur among people aged 15-24 years.

**Figure 1.1.** Adults and children estimated to be living with HIV/AIDS, end of 2001



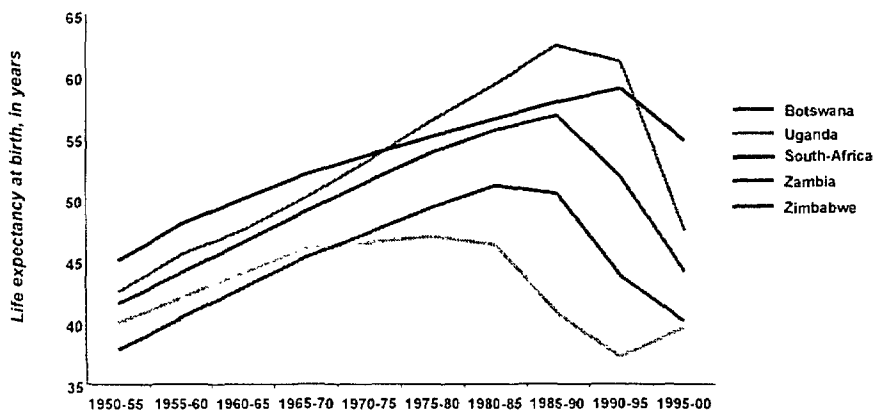
Source: UNAIDS 2002.

The epidemic's grip on sub-Saharan Africa has been by far the deadliest. Average life expectancy at birth has been reduced to 47 years, from 62 years (Figure 1.2), due to health and industrial infrastructure declines caused by HIV/AIDS. UNAIDS estimated that 28.1 million Africans were infected with the virus at the end of the year 2001; a figure which represents around 70% of the total number of people living with HIV/AIDS worldwide. Since the beginning of the epidemic, there have already been 17 million AIDS related deaths in the region, with 2.3 million Africans dying in 2001 alone – just over 75% of the total deaths worldwide.

The overall adult (15 to 49 years old) prevalence in sub-Saharan Africa is around 9% but the figure varies largely between countries. For example, in eastern and southern Africa, at the centre of this epidemic, prevalence rates in some communities of up to 60% have been recorded. In West Africa, prevalence has generally been lower but it is now increasing and already reaching 10% in some areas. For example, at the end of 1999 adult HIV prevalence was 6.4% in Burkina Faso, 3.6% in Ghana and 10.8% in Côte d'Ivoire (UNAIDS 2000b).

Globally, the epidemic is on the upswing, spreading fastest in Eastern Europe: new infections in the Russian Federation appear to be almost doubling annually since 1998. Data from Asia too warn against complacency: national prevalence rates are low but mask localized epidemics. Infection rates in Myanmar, Cambodia and Thailand are in the range 2-4% and similar to many West African countries, while India is second only to South Africa in the number of persons currently infected (UNAIDS 2001).

**Figure 1.2.** Changes in life expectancy in selected African countries with high HIV prevalence, 1950 to 2000 (Source: UNAIDS 2001)



## **1.2 Natural history of HIV/AIDS infection<sup>1</sup>**

There are four major sources of HIV infection:

- (i) sexual transmission
- (ii) transfusions of blood or blood products, or transplanted tissue or organs obtained from HIV-infected donors
- (iii) using skin piercing instruments or injecting equipment that is contaminated with HIV
- (iv) transmission from mother to child during pregnancy, labor, or following birth through breast feeding.

Most people infected with HIV do not know that they have become infected. HIV infected persons develop antibodies to HIV antigens usually 6 weeks to 3 months after being infected. In some individuals, the test for the presence of these antigens may not be positive until 6 months or longer (although this would be considered unusual). This time period, during which people can be highly infectious and yet unaware of their condition, is known as the window period.

Seroconversion is when a person recently infected with HIV first tests positive for HIV antibodies. Some people suffer a 'glandular fever like' illness (fever, rash, joint pains and enlarged lymph nodes) at the time of seroconversion. Occasionally acute infections of the nervous system (e.g. aseptic meningitis, peripheral neuropathies, encephalitis and myelitis) may occur.

In adults, there is often a long, silent period of HIV infection before the disease progresses to full blown AIDS. A person infected with HIV may have no symptoms for up to 10 years or more. The vast majority of HIV-infected children are infected in the peri-natal period, that is, during pregnancy and childbirth. The period without symptoms is shorter in children; while only a few infants become ill in the first few weeks of life, most children start to become ill before 2 years of age, and few remain well for several years.

Almost all, if not all, HIV-infected people will ultimately develop HIV-related disease and AIDS. This progression depends on the type and strain of the virus and certain host characteristics. Factors that may cause faster progression include age (less than 5 years or over 40 years), other infections, and possibly genetic (hereditary) factors. HIV infects both the central and the peripheral nervous system early in the course of infection. This causes a variety of neurological and neuropsychiatric conditions. As HIV infection progresses and immunity declines, people become more susceptible to opportunistic infections.

Opportunistic infections are those that can invade the body when the immune system is weakened, in this case by HIV. These include tuberculosis, other sexually transmitted diseases, septicemia, pneumonia (usually pneumocystis

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<sup>1</sup> Taken from WHO Fact Sheets on HIV/AIDS for nurses and midwives (WHO 2000)

carinii), recurrent fungal infections of the skin, mouth and throat, other skin diseases, unexplained fever and meningitis. Other HIV/AIDS-related conditions include cancers such as Kaposi sarcoma and chronic diarrhea with weight loss (often known as slim disease).

Tuberculosis (TB) deserves special mention: tuberculosis can spread through the air to HIV negative people and is the only major AIDS-related opportunistic infection to pose this kind of risk. Because HIV affects the immune system, it is estimated that TB carriers who are infected with HIV are 30-50 times more likely to develop active TB than those without HIV. Worldwide, over the next four years, the spread of HIV will result in more than 3 million new TB cases. Anti-tuberculosis drugs are just as effective in HIV-infected individuals as in those not infected with HIV, and are considered cost effective, even in the poorest countries.

Currently the only option of therapy (antiretroviral drugs) for HIV/AIDS is very expensive and unavailable to many people living with the disease. Their use requires close consultation with medical experts and facilities permitting:

- HIV diagnosis
- access to voluntary and confidential counseling and testing
- reliable long-term and regular supply of quality drugs
- sufficient resources to pay for drugs on a long-term basis (a life-long commitment)
- support from a social network to help patients stay with the treatment regimen
- appropriate training for health care workers in the correct use of antiretroviral drugs
- laboratory facilities to monitor adverse reactions
- capacity to diagnose and treat opportunistic infections with the availability of affordable drugs.

## 2. THE RELATIONSHIP BETWEEN HIV/AIDS AND EDUCATION

### 2.1 *The Pivotal Role of Education*

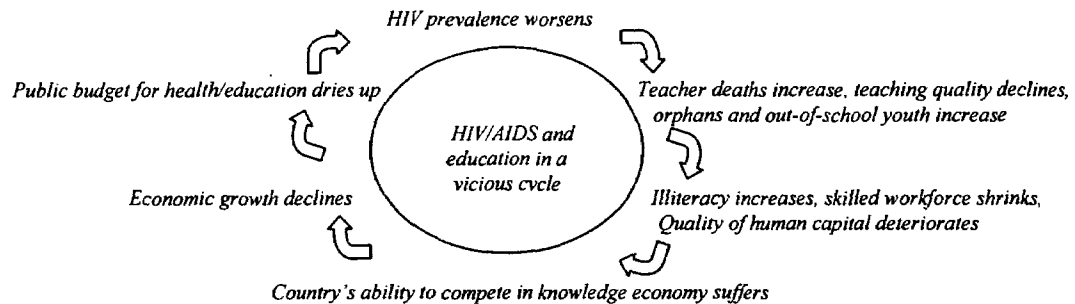
The Ed-SIDA initiative was motivated by the realization that few countries factored the HIV epidemic into their educational plans, particularly with respect to recruitment schedules for new teachers. Such important omissions potentially have detrimental effects on efforts to reach *International Development Goals of Eliminating Gender Disparities in Education* and *Education for All (EFA)* targets. The name Ed-SIDA was coined as the initiative was launched in Francophone Africa (SIDA meaning AIDS in French) and for reasons of simplicity, will be referred to under this name throughout the manual; although, in Anglophone countries, Ed-AIDS is accepted as the title for the initiative.

An educated population and work force are prerequisite to achieving national health and self-sustainable development. Combined with sound macroeconomic policies, education promotes well-being and poverty reduction by directly raising national productivity. This, in turn, has a massive influence on a country's competitiveness in all global markets, the success of which is knowledge-dependent. It follows that global poverty may only be reduced through the existence of educated human capital; achievable only where a primary education of adequate quality is available to all children in all countries.

At the *Education for All* Forum held in Dakar, Senegal, in the year 2000, the targets of the International Development Goal (IDG) (now known as the Millennium Development Goals – MDG) of “Eliminating Gender Disparities in Education” and “Education for All (EFA)” were agreed to be met by the years 2005 and 2015 respectively. However, the challenges facing the education sector in sub-Saharan Africa mean at least half of these countries already seem unlikely to reach these targets. At present, the enrolment rate at primary level is over 90% in only five of these countries, whilst for the vast majority it is lower, often reaching levels of less than 50%. Well over 60% of the non-enrolled children are represented by girls (UNESCO 2000).

The spread of HIV/AIDS is compromising the potential to attain EFA and furthermore, is in danger of reversing the gains that have already been made in the capacity to deliver high quality education. The disease not only causes illness and death of teachers and teacher-trainees, but also impacts on the demand for education in terms of the numbers and composition of the school-age population. This impact on both the supply and demand for education is currently being felt in eastern and southern Africa, and is likely to threaten education systems in western Africa in the near future.

**Figure 2.1.** HIV/AIDS and education: The consequences of inaction (Source: World Bank 2002)



Much of the macro- and microeconomic literature emphasizes the role of education in economic growth (Krueger and Mikael, 2000). Further research provides robust evidence of a substantial social and private payoff to investment in education. Evidence points to a positive association between economic growth and change in education: growth increases with more education, and declines with less (Figure 2.1). No country has achieved economic growth without first assuring the education of its population. A prediction may be made, with reasonable confidence, that for countries where HIV/AIDS has significantly reduced average years of schooling or enrolment rates, the impact on education alone will dramatically constrain economic growth. (World Bank 2002)

HIV/AIDS is draining the supply of education, eroding its quality, weakening demand and access, drying up countries' pools of skilled workers, and increasing sector costs. The full scope of the epidemic's impact on education comes into view when seen in the context of the formidable challenges already confronting the sector. More than 113 million school age children are out of school in developing countries, two-thirds of them girls. Of those who enter school, one out of four drops out before attaining literacy. (World Bank 2002). The extent of the problem no longer allows HIV/AIDS to be conceived purely as a health issue.

## **2.2 Impact of education on HIV/AIDS**

Although jeopardized by HIV/AIDS, education itself offers one of the main hopes against the epidemic and its negative consequences.

In the long-term, good quality "Education for All" contributes to economic well-being and socio-cultural changes such as female empowerment and decision making. These are widely recognized as crucial determinants for health improvements, and can be key elements in reducing the vulnerability of women to HIV/AIDS. In addition, literacy and numeracy, and the training required to

acquire these skills, facilitate the adoption of a long-term perspective, which can be critical in determining an individual's risk behavior.

Substantial evidence shows that education profoundly affects young people's reproductive lives. Better (formally) educated women are more likely, in comparison with their peers, to delay marriage and childbearing; have fewer children and healthier babies; enjoy better earning potential; have stronger decision making and negotiation skills as well as self-esteem; and avoid commercial sex. Studies documenting the benefits of female education include reduced infant and maternal mortality, enhanced family health and welfare, and increased economic productivity (cited in Odaga and Heneveld 1995). Analysis of data from 100 countries also found that an additional year of female education reduces total fertility rate by 0.23 births (World Bank 2002).

Recent evidence shows a negative correlation between education level and HIV infection, particularly when knowledge about HIV becomes widespread among younger people. Reduced vulnerability has been observed in people with secondary or higher education (Kelly, 2000). The World Bank (2002) reports that nearly half of the illiterate women in various countries in sub-Saharan Africa are not aware of the basic facts about HIV/AIDS, and consequently, do not know how to protect themselves and their children. In South Africa, a third of survey respondents believed that HIV-positive people would always show symptoms; in Kenya, AIDS orphans—often in denial—believed that their parents had died from witchcraft or a curse. Surveys of 15-19 year olds (1994-98) showed varying levels of knowledge across 17 countries, with greater knowledge in countries with a longer history of AIDS (all UNAIDS, 2000a); girls were consistently more poorly informed than boys. A survey of school children in Botswana showed some knowledge gaps; a common perception of teachers is that many are in denial and unable to accept that staff and students are being infected (Ministry of Health, Botswana; Kelly 2000a). Other gaps include African university students' belief that oral contraceptives prevent HIV infection and that the virus can pass through pores in an undamaged condom.

Education on behavior is strongest on the young, which may reflect the relative effectiveness of ensuring that a child grows up to practice health behaviors, versus efforts to achieve behavior change in adults with established risky behaviors. This may explain why some teachers, who are often the best educated persons in a community, still practice behaviors which contribute to the epidemic. However, the view that teachers are particularly at risk of infection, or that prevalence of HIV is higher in teachers than adults in general, does not appear to be supported (or denied) by any available evidence. In addition to its intrinsic outcomes, education is in the unique position of being able to directly address HIV/AIDS through specifically designed programs, targeting people at key times.

The traditional role of formal education must thus widen to embrace additional areas of child development, to include HIV/AIDS preventive knowledge, together with emotional and psychosocial support. Particular emphasis could be

usefully placed on reducing the stigma, shame and discrimination linked to the disease. Since providing information is necessary but not sufficient to cause protective behavioral changes, programs must further extend to health and social attitudes, to values and to the development of *life-skills* (UNICEF, 1999). Specific *life-skills* may be self-awareness and empathy, creative and critical thinking, decision making and problem solving, private communication, interpersonal relationships, and coping with the emotions and stress of negative circumstances such as personal or family HIV infection.

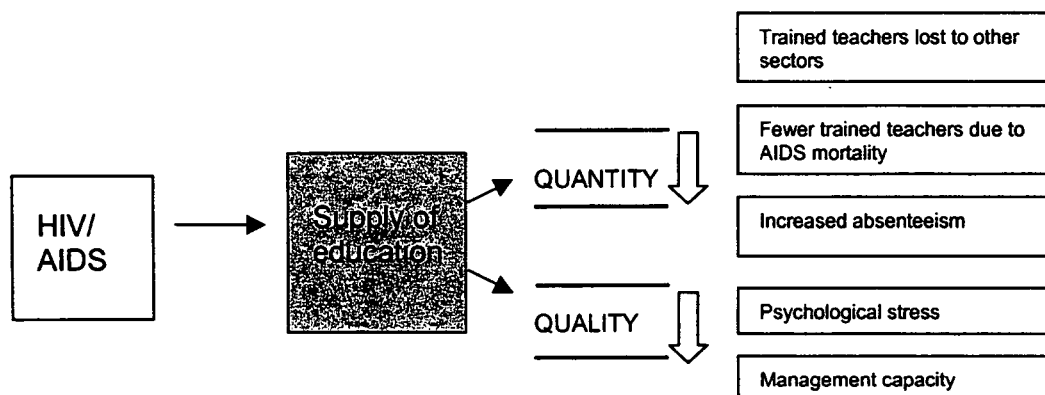
Some of the countries of eastern and southern Africa have already introduced life-skills programs in their schools. The results are mixed but a major problem has been identified in the lack of teacher competency in the newly required skills and handling of sensitive topics (Kelly, 2000). In cases where teachers are asked to undertake new demanding roles, such as counseling and support, as well as making use of new ways of teaching (participatory and student centered), it appears that they too must receive sufficient training and support.

The driving force behind the use of the Ed-SIDA model is that the education of children and youth is that which merits highest priority in a world afflicted by HIV/AIDS. It merits this priority because the very education system that supplies a nation's future is being gravely threatened by the epidemic, particularly in areas of high or rising HIV prevalence. Countries thus need urgently to strengthen their education systems, which offer a window of hope unlike any other for escaping the grip of HIV/AIDS. (World Bank 2002)

### 2.3 Impact of HIV/AIDS on the supply of education

The impact of HIV/AIDS on the **supply** of education can be separated into quantity and quality effects (Figure 2.2).

**Figure 2.2.** The impact of HIV/AIDS on the supply of education





The most crucial effect of AIDS on **quantity** is the decreased availability of experienced teachers. This drop is directly due to a dramatically increased infection rate of teachers. In fact, in eastern and southern Africa the incidence and prevalence of HIV among teachers is greater than in the general adult population. The International Labour Organisation defines teachers as workers at special risk. This is because the relatively higher socio-economic status and mobility of teachers, who are often posted away from their families, may increase their sexual contacts and related risk of HIV infection. As these teachers develop full blown AIDS, the effect of mortality on teacher supply will be felt.

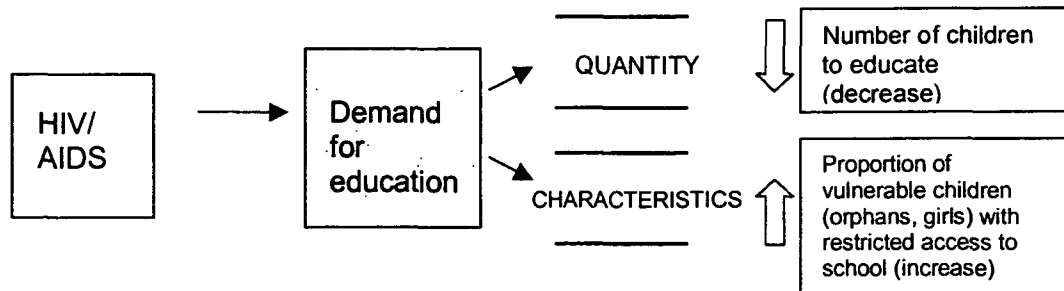
Most countries lack reliable data concerning the number of teachers who are dying from AIDS. However, the World Bank estimates that in the worst affected countries of Africa, about 10 percent of teachers will die over the next five years (World Bank 2002). Annual death rates range from 0.5% in Uganda to 1.4% in Kenya up to 2.1% in Zimbabwe. UNICEF additionally estimates that about 860,000 primary school children in sub-Saharan Africa had teachers who died from AIDS during 1999 (UNICEF 2000) with the national figures varying from 27,000 children in the Democratic Republic of Congo up to 100,000 children in South Africa.

AIDS can indirectly affect teacher supply through other sectors: in some countries, the reduction in teacher numbers is reinforced by the additional loss of teachers who take up non-teaching jobs vacated because of AIDS mortality in other sectors of the economy or to take up administrative roles in the Ministry of Education itself. The desirability for teachers to change profession differs with teaching conditions and overall incentives such as status or payment scales. In West Africa government employed teachers have little incentive to leave the teaching profession, even in the event of an increased demand in the private sector, since salaries are good and employment is stable. In contrast, in South Africa, the loss of trained teachers to the private sector has been a serious problem that is likely to have been exacerbated by HIV/AIDS.

A second quantitative effect on the supply of education relates to increased absenteeism, reducing available teacher-years of service. Opportunistic infections, particularly towards the later stages of HIV infection, mean that many HIV positive teachers may be formally in post but consistently absent. Absenteeism may further characterize healthy teachers caring for other affected members of their families. An infected teacher is likely to lose 6 months of professional time before developing the full disease and a further 12 months after that. In Zambia, between 12 and 14 sickness episodes have been observed in teachers with AIDS before the terminal illness (World Bank 2002).

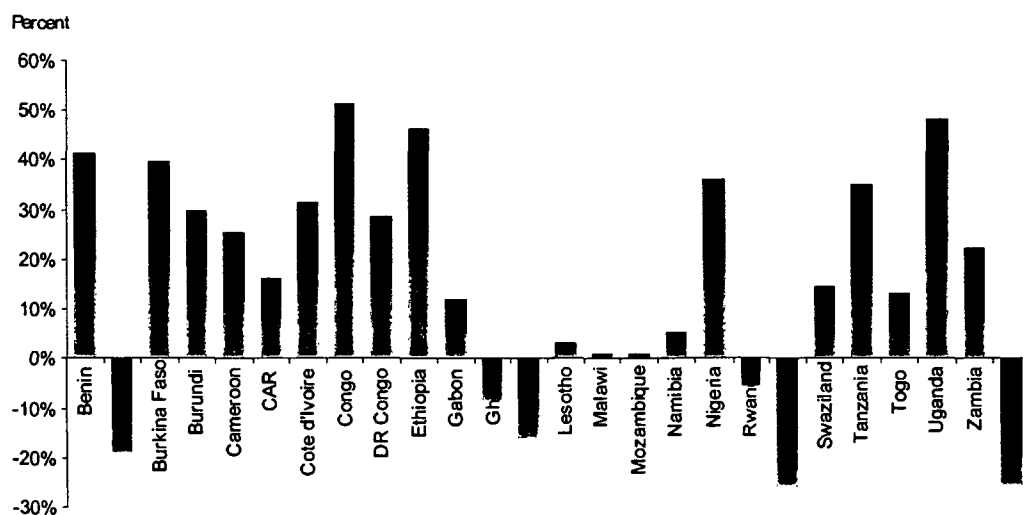
Infected teachers, who do not take formal sick leave, will tend to do so in order to avoid or postpone the decline in remuneration that results from prolonged absence. Teachers are thus absent but not replaced with substitutes, as they remain formally in post earning a full salary. Consequently, substitution for

**Figure 2.3.** The impact of HIV/AIDS on the demand for education



HIV/AIDS will affect the number of school-aged children by decreasing the rate of growth of the school-age population, since HIV positive women will have reduced fertility, and mother-to-child transmission of the virus means that child mortality rates are expected to increase. However, in most countries of sub-Saharan Africa the number of children will continue to increase. In western and central Africa the growth rate for the school-age population could still be as high as 30%. Estimates by the US Bureau of Census suggest that only 6 of the 26 countries worst affected by AIDS will show an actual reduction in the school-age population by 2015 (Figure 2.4). In countries hardest hit by the epidemic, however, such as Zambia and Zimbabwe, the number of children of primary school age will be 20 percent lower, by 2010, than pre-AIDS projections (UNAIDS, 2000c).

**Figure 2.4.** Percentage change in school age (5-14) population between 2000 and 2015 (Source: World Bank 2002)



The critical effect of HIV/AIDS is on the **characteristics** of the school-age population (proportion of orphans, vulnerable children, orphans), which will invariably also affect the actual enrolment rate.

AIDS is responsible for impoverishment of families. Since it affects people during their working years, it deprives households of basic sources of income. As a sizeable part of the remaining earnings must go on medical care for the sick person, education expenditure is most likely to be diverted, particularly for girls. The effect is even stronger when child labor becomes essential to family subsistence, implying a higher opportunity cost for schooling. Research carried out in Uganda (Menon *et al.* 1998) found that AIDS-related deaths cause a higher reduction in savings and assets' ownership than other types of death. A study in Tanzania (Ainsworth *et al.* 2000) shows that households cope with adult deaths by delaying enrolment of the young children.

In addition, AIDS mortality of adults is responsible for dramatic increases in the numbers of children who are **orphans**. A USAID (1997) study involving 19 sub-Saharan Africa countries projects that AIDS-orphans (maternal and double) will steadily grow and that by 2010, they will represent nearly 9% of all children under 15. In some countries, such as Botswana, Namibia, Zimbabwe and South Africa (east and south African regions where the epidemic is already established or else very high), orphans will represent more than 15% of all children.

Poverty and new family responsibilities as money-earners and caregivers are the major restrictions on orphans accessing schools. Psychosocial distress may also play a role - AIDS orphans must further face the stigma and discrimination associated with HIV. Demographic and Health Surveys of various African countries reported by the World Bank (2001) show that orphans frequently have a significantly lower rate of attendance at school than non-orphans do; typically between 20 and 65% lower (Benin, the Central African Republic and Mozambique have the lowest rates of orphan enrolment).

Moreover, in areas where the number of orphans is escalating, extended families and traditional support networks are no longer able to cope, forcing children on to the street. It is estimated that in Zambia the number of street-children doubled from 35,000 in 1991 to 75,000 in 1996 and has been growing since then (Hunter, 1998).

The Millennium Development Goal (MDG) of no gender discrimination in schools is especially threatened by HIV/AIDS offset by the fact that for social and cultural reasons, girls already have lower access to education than boys. Additionally, they now bear the major burden of AIDS in terms of domestic duties and care-giving and they are often the first to withdraw from school when money is lacking. This tendency is reinforced in areas where schools are far from home and/or perceived as unsafe places because of the risk of sexual harassment. At the same time, girls are at higher risk of contracting the HIV virus due to physiological reasons, sexual contacts with older men and because

of their overall social and economical vulnerability. A drop in education of girls and consequent disempowerment therefore, may further boost their risk of HIV infection in a vicious cycle.

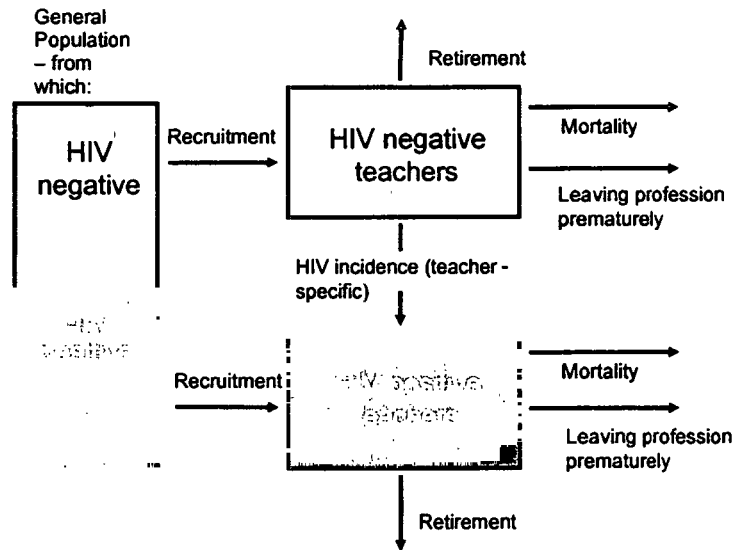
### 3. THE Ed-SIDA MODEL

#### 3.1 Modeling the supply of education

For a defined country or setting, Ed-SIDA projects the total number of teachers to 2010, the proportion of infected, and the annual number dying of AIDS. It can also be used to compare numbers in the presence and absence of an HIV epidemic at different stages within the epidemic. The impact of AIDS on teacher mortality by age and sex is explicitly accounted for using epidemiologic and demographic inputs specific to the country. The impact of HIV associated illness is not explicitly modeled, although the prevalence of HIV among teachers is projected and may be used to obtain an expected level of morbidity caused by the HIV epidemic. In this way, teacher-years of absenteeism caused by HIV related illness can be obtained under certain assumptions on frequency and duration of illnesses from opportunistic infection.

The number of teachers by year is determined by flows corresponding to annual recruitment, retirement, mortality and quitting the profession as shown in Figure 3.1. The model is driven by the difference equations described in Grassly et al (2002).

Figure 3.1. Flows determining the number of teachers in a population



## **3.2 Data entry**

Ed-SIDA is implemented with the Excel© based file **edsida.xls** consisting of 9 sheets:

1. <Parameters> -- data entry on baseline, recruitment, prevalence setting, quitting the profession, relative risk of teacher infection, school-aged population and net enrolment rate.
2. <Data source -- prevalence> -- data source on sex and age specific prevalence and incidence for the country under study. This is for advanced users only and no data input is required.
3. <Data source -- demography> -- data source on AIDS and non-AIDS related mortality by age. No data input is required here.
4. <Projections> -- based on the data entered, calculates number of teachers by age, sex and year who are infected/uninfected. Also calculates pupil-teacher ratios
5. <Pupils> -- graphical display by year of numbers of school-aged children, number enrolled and number of maternal and double orphans
6. <Teacher plot> -- graphical display by year of total number of teachers, number infected/non-infected, and number of teachers in absence of an epidemic.
7. <cumulative loss> -- graphical display of cumulative number of teachers lost due to AIDS since 1990
8. <annual loss> -- graphical display of annual loss of teachers due to AIDS
9. <pupil-teacher ratio> -- graphical display of pupil teacher ratio in presence and absence of HIV/AIDS epidemic

### **3.2.1 Baseline**

The total number of teachers by age category and sex in the year 1990, and the yearly recruitment rate for that year, are used as a start point for projections (Box 1). To validate the baseline entry and recruitment figures, the model also requires input of the actual number of teachers on record from 1990 to 2000, where available. Ed-SIDA will calculate the numbers of those expected to be HIV positive by age and sex based on country-specific HIV/AIDS prevalence and incidence, and demography, obtained from UNAIDS and UN Population Division respectively. The HIV/AIDS prevalence is estimated from sentinel surveillance site for HIV/AIDS in each country. These sites are typically antenatal or family planning clinics where HIV testing is performed anonymously

in women, allowing to indirectly determine the prevalence in the general population.

### **3.2.2 Recruitment**

Teacher numbers can be increased by annual recruitment of newly qualified primary teachers. Some of the new teachers will be HIV positive according to the age and sex specific prevalence of HIV in the population from which they are recruited. Some of the uninfected teachers will become infected during their employment according to the incidence rate of HIV over time, within the region/country they work. These rates of infection are calculated automatically by Ed-SIDA.

As indicated in Box 1, the user is required to enter the annual number of new teachers recruited from 1990 to the present year and the percentage of them by age and sex. While some countries lack standardized data collection providing this information, it is generally known what is the age ranges and proportion of males/females which are newly hired. These figures can be used. This will not greatly affect the conclusions of the model, unless HIV infection rates greatly differ by age or sex.

Box 1. Snapshot of <Parameter> sheet of **edsida.xls** file where baseline and recruitment is entered.

### Baseline

Insert the number of teachers by age and sex for 1990-91 only

Age	Males	Fem.
15-19 yrs	0	0
20-24 yrs	3,413	2,682
25-29 yrs	2,642	2,076
30-34 yrs	2,095	1,646
35-39 yrs	1,693	1,330
40-44 yrs	1,356	1,066
45-49 yrs	1,098	862
50-54 yrs	908	713
55-59 yrs	739	580.6
<b>Total number of teachers</b>	<b>13,944</b>	<b>10,956</b>

**Total number of teachers in the starting academic year 1990-91 by age and sex.**

### Recruitment

Insert the number of teachers entering the profession each year since 1990-91 to 2000-01 and the plans for recruitment until 20

Year	Data											Plan		
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Number of newly recruited teachers	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,730	2,740	3,980	3,980

Insert the percentage distribution by age and sex of newly recruited teachers since 1990-91 to 2010-11

Year	Data											Proj		
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Recruitment by age (%)</b>														
15-19 yrs	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
20-24 yrs	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%
25-29 yrs	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%

...

<b>Recruitment by sex (%)</b>														
% recruitment women	44%	44%	45%	46%	47%	48%	49%	50%	50%	51%	51%	52%	52%	52%
% recruitment men	56%	56%	55%	54%	53%	52%	51%	50%	50%	49%	49%	48%	48%	48%

**Number of teachers newly recruited each year from 1990-91 to 2000-01, and the numbers of teachers planned to be recruited for 2001-02 to 2010-11.**



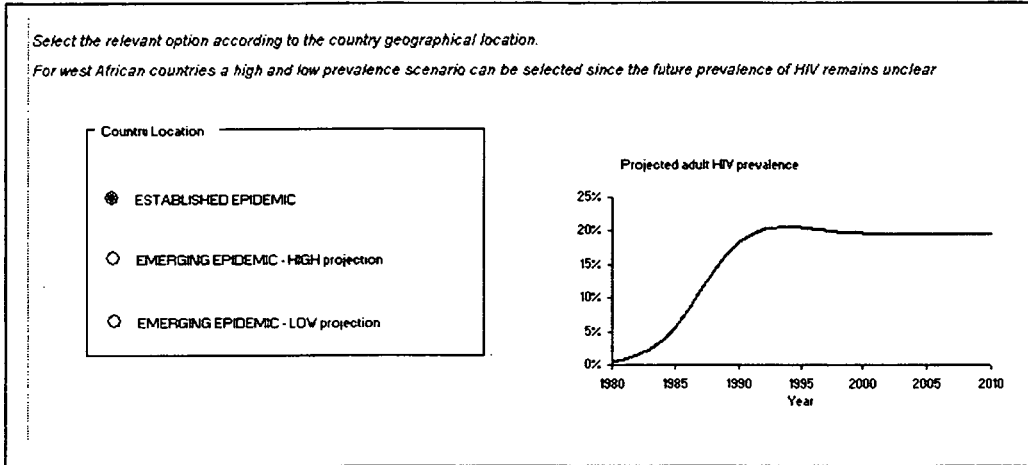
### 3.2.3 HIV prevalence

In the implementation of the model accompanying this manual, data regarding the overall HIV prevalence among adults, over time, are selected according to two distinctly different patterns – established epidemic, as observed in eastern and southern Africa, and emerging epidemic, as in West Africa. UNAIDS estimates for Zambia and Benin are used as a reference for these two regional patterns respectively (Box 2). For the emerging epidemic, (Benin) two scenarios involving a high or low rate of increase in HIV prevalence are available. This is due to the fact that the future pattern of the HIV epidemic in this region remains unclear at present.

In general, the transmission dynamics underlying the spread of HIV in a population are quite complex and involve parameters which are not always easy to estimate. HIV prevalence curves are often found to begin with a sharply rising 'exponential' phase, a peak and are followed either by a gradual decline or a constant endemic level of prevalence. The endemic level can be expected to be lower than the peak achieved during the exponential phase. The 'shape' of the epidemic can be thought to depend on four parameters. First is the time at which HIV successfully establishes in a population. This is often assumed to be during the early 1980's. The second parameter is the force of infection, which is related to the basic reproduction number. The basic reproduction number is the number of infections resulting from one initial incident case of HIV. The higher the force of infection, the more rapid is the rise in the initial exponential phase. Third, the peak of the prevalence curve depends on the proportion of the population that is exposed and susceptible to HIV (risk groups). Fourth, the eventual endemic level or rate of decline will depend on the rate at which infected persons are replenished by new susceptibles. The HIV prevalence curve does not immediately reflect the number of deaths to AIDS, since an infected person will, on average, be HIV positive for 10 years before developing full blown AIDS. Thus, AIDS deaths lag behind the prevalence levels by 10 years. For this reason, methods of HIV prevention may take a decade before a decline in AIDS deaths can be observed.

For detailed analyses of the impact of the HIV epidemic in specific countries, particularly where that country is thought not to reflect the regional pattern, country-specific models may be derived by contacting Nicholas Grassly ([n.grassly@ic.ac.uk](mailto:n.grassly@ic.ac.uk)) or Kamal Desai ([kamal.desai@ic.ac.uk](mailto:kamal.desai@ic.ac.uk)).

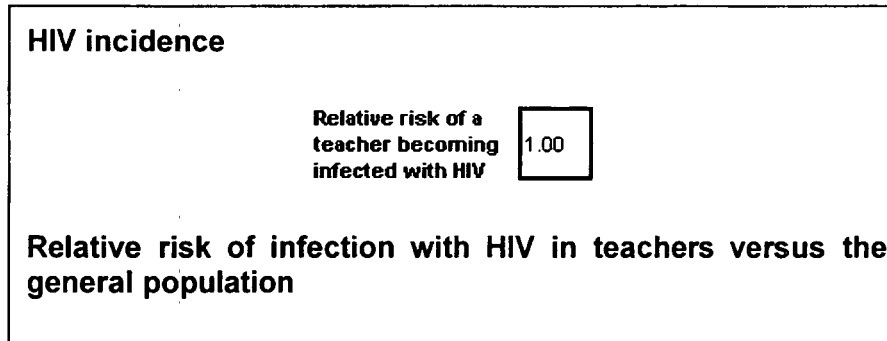
**Box 2. Snapshot of <Parameter> sheet of edsida.xls for selection of HIV prevalence scenarios – established or emerging epidemic**



**3.2.4 Relative risk of HIV infection in teachers**

The prevalence and incidence rate of infection in primary school teachers assumed by Ed-SIDA is that observed from sentinel surveillance sites throughout the country. Since HIV testing in teachers is not generally performed in most countries, it is not possible to estimate infection rates specifically in a teaching population. As mentioned previously, some argue that teachers are at greater risk of HIV infection because of their greater mobility and socioeconomic standard, whereas others argue that teachers are at less risk because of their high level of education which permits them to adopt behaviors that minimize risk. Ed-SIDA allows the user to consider ranges of relative risk of HIV infection in teachers. To calculate the incidence of new HIV infections among teachers, users of the model must know or estimate the relative risk of infection in teachers versus the general population. Users must therefore contribute the information in Box 3. A relative risk of 1.00 implies teachers are exposed to exactly the same risk as the general population, a relative risk of 2.0 implies double the risk of infection, while a relative risk of 0.5 implies half the risk of infection. In absence of any prior knowledge of relative risk, a sensible range to consider would be 0.5 to 2.0, to explore different possible scenarios.

**Box 3.** Snapshot of <Parameter> sheet of **edsida.xls** for relative risk of a teacher being infected compared to the general population.



### 3.2.5 Mortality

A first evident impact of the epidemic is through mortality due to AIDS related illnesses. Mortality among HIV positive teachers due to AIDS is assumed by Ed-SIDA to occur with a mean duration of ten years between time of infection and time of death. This is consistent with estimates from African cohort studies. This mortality effect is a competing risk for other causes of mortality among teachers. The demographic parameters concerning the age-specific rates of mortality not due to AIDS are given by the UN Population Division. This information is embedded in the model and used for AIDS and non-AIDS mortality calculations. The user is not required input this information.

### 3.2.6 Leaving the teaching profession

- *Retirement*

Each year a proportion of teachers will naturally exit the profession due to retirement. The model currently assumes mandatory retirement for men and women occurs at age 60. Country-specific implementation of the model can allow for different ages at retirement.

- *Voluntary early departure from teaching profession*

Teachers may leave the profession prematurely for causes other than AIDS, such as early retirement or maternity. Data on early departure from the teaching profession for non-HIV/AIDS causes may not be systematically available in many countries. However, in many cases, it is likely that voluntary departure from the teaching profession is negligible since stable employment is highly valued. Ministry officials can make sensible estimates on numbers who depart each year and on the proportion who are male/female and their age group. Unless such voluntary departures from the teaching profession are substantial,

this parameter will not greatly affect the outcome of the model results. Box 4 illustrates where this information is to be entered in the Ed-SIDA model.

**Box 4.** Snapshot of <Parameter> sheet from **edsida.xls** model for data entry on voluntary early departure from teaching profession.

<b>Prematurely leaving the profession</b>															
<i>Insert the number of teachers leaving the profession prematurely from 1990-91 to 2010-11 for causes different than AIDS related illnesses taking up AIDS vacated jobs. Indicate the percentage of those leaving who are women</i>															
	← Data →										← Planned →				
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Leaving teaching profession (numbers)	100	100	100	210	210	210	50	40	30	20	20	20	20	20	20
Percentage of women	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Percentage of men	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%

<i>Considering separately women and men, insert the percentage distribution by age of those who retire early</i>															
	← Data →										← Projected →				
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Women</b>															
15-19	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20-24	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%

**Rates of leaving the teaching profession by year from 1990 to 2010, stratified by age and sex (excluding normal retirement). Those leaving because of AIDS related illnesses or to take up AIDS vacated jobs must be excluded in this section.**

- Voluntary departure from teaching to fill non-teaching posts

Losses in teacher numbers may also be indirectly related to the disease; for example, to take up skilled positions newly available due to AIDS mortality in the general population. This can result in a demand for skilled workers in the private sector, or for administrative roles in the Ministry of Education, and consequently, in a loss of teachers to these newly vacated posts. The model estimates this effect by considering the country-specific formal employment rate, the adult overall AIDS mortality rate and the relative risk of teachers taking up a vacated post versus other professionals. In this respect, inputs required by the users of the model are shown in Box 5. The effect of this parameter is likely to be quite small in countries where the employment rate of the formal economy is low.

The relative risk for teachers to change job depends on the overall desirability of teaching versus other professions. This is directly influenced by monetary and non-monetary incentives. If we assume that 5% of all private sector jobs are newly available because of AIDS mortality and teachers present the same risk as other professionals to take up these jobs (i.e. enter 1.0), the model would project that 5% of teachers will change profession. If the risk for teachers to leave were lower than that for other professionals (i.e. enter less than 1.0), less than 5% would change profession. The age distribution of the teachers leaving is assumed to reflect the age distribution among all the teachers.

**Box 5.** Snapshot of <Parameter> sheet of **edsida.xls** for leaving the teaching profession to work in non-teaching positions.

**Leaving profession to take up jobs in other sectors vacated due to AIDS mortality**

*insert the total employment rate in professions that, if vacant, could be taken up by teachers*

	← Data									
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Employment rate	18%	17%	16%	15%	14%	13%	12%	12%	12%	10%

**Employment rate in jobs competitive to the teaching profession (sometimes approximated by the employment rate in the formal sector)**

Relative risk for teachers to change profession

**Estimate of the relative risk for a teacher taking up a non teaching job compared to other professionals**

### 3.3 Modeling the Demand for Education

The Ed-SIDA model for demand uses country-specific projections for the absolute number of school-aged children produced by UN Population Division (UN Population Division 1998). It also uses complex methodology developed by

UNAIDS to estimate and project the number of school-age children who have lost their mother or both parents to AIDS (maternal or double orphans under age 15 years). In this way the expected percentage of school-age children who are orphans due to AIDS can be calculated. This can give an indication of the resources that should be spent to ensure these children are able to enroll in schooling.

The methodology for estimating the number of school-age AIDS orphans requires country-specific information on age-specific female fertility levels and trends, the probability of mother-to-child transmission of HIV, and the survival of HIV positive and negative children. Age-specific fertility levels are taken from Demographic and Health Surveys (Macro International) where available, while trends in fertility correspond to the 'medium' scenario for population projections (UN Population Division, 2002). Mother-to-child transmission of HIV in breastfeeding population is assumed to occur in 30% of cases according to the best estimate of UNAIDS. Survival curves for HIV positive children are derived from cohort studies in sub-Saharan Africa, and it is currently assumed that half the HIV positive children die by 2 years of age. HIV negative child survival is taken from country-specific life tables; obtained by fitting an African, standard relational Brass model to UN Population Division data on crude adult death rates and life expectancy.

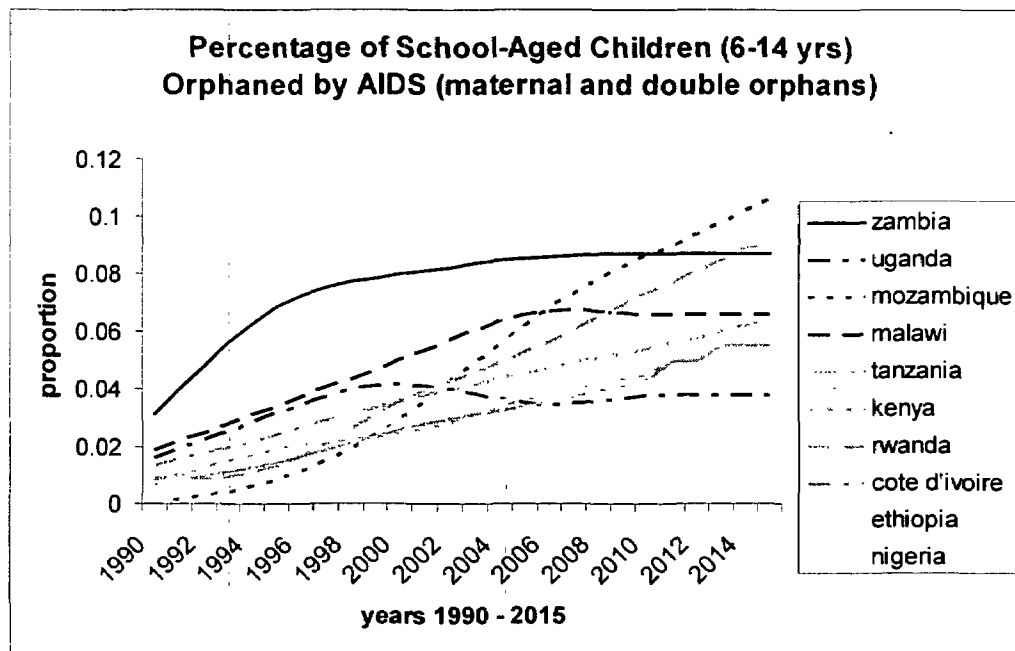
The percentage that are orphaned due to AIDS is currently provided in the generic Ed-SIDA model. The user must provide only school-aged population and net enrolment rates classed by sex and year in order to estimate the size of the enrolled school-aged population and number of AIDS orphans (Box 6).

**Box 6.** Snapshot of <Parameter> sheet of **edsida.xls** for entering net enrollment rate and school aged population.

<b>Enrolment rate and school-aged population</b>											
<i>Please enter the net enrolment rate and school aged population below.</i>											
<b>Year</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>School-age population</b>	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	3E+06
<b>Net enrolment rate</b>	0.735	0.741	0.710	0.690	0.686	0.667	0.680	0.690	0.700	0.710	0.710
<b>Enrolled population</b>	1E+06	2E+06	1E+06	1E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06	2E+06
<b>Percentage orphans</b>	0.031	0.04	0.048	0.056	0.053	0.069	0.073	0.075	0.077	0.079	0.08
<b>Number of orphans</b>	61987	81365	1E+05	1E+05	1E+05	2E+05	2E+05	2E+05	2E+05	2E+05	2E+05

At present, orphanhood projections are quite complex but are being systematized by the UNAIDS Epidemiology Reference Group and will be available for most countries by the middle of 2002. Figure 3.2 illustrates approximate proportions of maternal and double orphans of school age in 10 sub-Saharan countries. In general, it can be said that the increase in orphan rates lags behind HIV infection rates by about ten years, the life-expectancy of a newly infected parent. However, as national HIV prevalence declines, orphanhood levels continues to remain high for several years until orphans reach age 15, when they are no longer considered orphans. Demographers prefer to estimate maternal and double orphans for methodological reasons and because it is easier to relate children to their biological mothers than to fathers. However, the importance of paternal orphans should not be forgotten. It is thought that inclusion of paternal orphans would roughly double orphanhood numbers.

**Figure 3.2.** Percentage of school aged children (6-14 yrs) orphaned (maternal and double) by AIDS.



### 3.4 Model outputs

Ed-SIDA automatically outputs the following projections (in the <Projections> sheet of **edsida.xls**) from 1990 to 2010 based on the data entered:

- the annual projected number of HIV positive and HIV negative primary school teachers (total and by age category and sex)
- the annual and cumulative number of AIDS deaths in teachers (total and by age category and sex)

- the number of teachers leaving the profession to take up non-teaching jobs resulting from AIDS deaths in other sectors
- the total projected number of primary school teachers which would theoretically be observed in absence of HIV/AIDS, allowing the user to see the impact of HIV/AIDS on teacher numbers.
- the total school-aged population size and number of school-aged maternal and double orphans
- pupil-teacher ratio in presence and absence of HIV/AIDS.

As indicated in the examples, these results are represented graphically in the <Teacher plot>, <cumulative loss>, <annual loss>, <pupils>, and <pupil-teacher> sheet of the **edsida.xls** program.



## **4. IMPLICATIONS OF THE Ed-SIDA MODEL**

### ***4.1 Examining impact of HIV/AIDS***

In addition to help formalize educational plans in the face of HIV/AIDS, the Ed-SIDA output can help to consider several important questions. These include the estimation of the impact of HIV/AIDS on teacher numbers, balancing supply with demand and estimating economic impacts of HIV/AIDS on the education sector.

Ed-SIDA outputs projections on the future number of teachers available in the presence and absence of an AIDS epidemic to 2010 and represents them graphically. The difference between these two curves over time indicates the decline in teacher numbers due to AIDS that would have been avoided in absence of AIDS induced losses. The area between these curves represents the total loss in teacher-years of service due to HIV/AIDS. Thus Ed-SIDA quantifies the loss in terms of teacher numbers over time and teacher-years. This information allows economic impact studies of AIDS on the education sector and suggests additional teacher training requirements to regain pre-AIDS levels of teacher numbers. Such analyses prove to be very useful to highlight the impact of AIDS in financial terms and in terms of teacher numbers for advocacy purposes and policy-formulation.

### ***4.2 Balancing supply with demand***

The second question, and perhaps most important, concerns balancing supply and demand based on projected enrolment rate and the desired pupil-teacher ratios which will define the total teacher numbers that will be required under country-specific educational targets. Once the projected numbers of enrolled schoolchildren are entered to 2010, based on the country-specific enrolment targets, the future recruitment of teachers can be explored to meet the desired pupil-teacher ratio. This can be explored using the goal-seek feature of Excel©, by indicating the desired pupil-teacher ratio in 2010 to be achieved by adjusting the annual recruitment rates.

Further analyses can consider prevention campaigns specifically targeted at teachers to prevent HIV/AIDS. However, at present, it must be acknowledged that current HIV infections will lead to AIDS death before normal duration of teaching service. Interventions aimed at treating HIV (provision of antiretroviral therapy) can extend the time teachers remain productive after becoming infected with HIV. Although this can partly reduce the need for new recruitment, it may be an impractical option as expensive antiretroviral drugs still remain out of reach for many people in developing countries. Country-specific

implementations of the supply side of the model may be used to further explore the impact of such interventions.

The projections and implications from the model are long-term. However, the short-term problem of addressing the current loss of trained teachers in individual schools or areas of a country, and finding adequate replacements is also an issue and must be duly addressed.

Moreover, any plans to balance the future supply of teachers with their demand must be accompanied by interventions dealing with the changes in the characteristics of the school-age population. The projections for the demand side give clear indications of the proportion of orphans among children. Addressing this problem requires specific efforts and innovative solutions. Particular attention must be given to girls, more likely to take the role of caregivers in the households affected by HIV/AIDS.

### ***4.3 Estimating the economic impact of AIDS on education***

The specific financial or economic analysis of interest can be performed once its purpose and perspective are defined. For example, the purpose may be to assess the past and future economic impact of HIV/AIDS on the education sector or the future cost requirements for achieving EFA goals. The perspective may be that of the education provider (normally the Ministry of Education) or societal where costs of community schools, enrolling orphans and user fees must be counted.

Financial or economic costs incurred to the educational system due to HIV/AIDS occur primarily in the following ways:

- Training (initial and in-service) of additional qualified teachers to replace those dying of AIDS.
- Training (initial and in-service) of additional qualified teachers to replace those who depart from active teaching to serve in non-teaching posts within the Ministry of Education which are vacated due to AIDS deaths. This may also include teachers who quit the teaching profession to work in private industry.
- Teacher absenteeism due to episodes of HIV-related illnesses.
- Funeral grants or death benefits for teachers and immediate family members dying of AIDS.
- Teachers performing double teaching duties to cover for absentees, but not receiving additional emoluments.
- Volunteers serving as teachers, for example, in community schools and educational broadcasting. Payment in kind is sometimes given in such cases.
- Activities directed to orphans and vulnerable children to enrol them in school. Such children are often forced to leave formal schooling due to

AIDS in a family member. This may be due to orphanhood, to provide care to an ill family member or to find work to compensate for loss of household income resulting from death to AIDS. Many activities here, in their various forms, are conducted by NGOs, religious organizations, foreign agencies and community-based efforts. The Ministry of Education may offer bursary programmes for such children. Estimation of the financial costs of HIV / AIDS on educational demand would benefit from a mapping of the activities of the various NGOs, religious organizations and Ministry of Education.

Such analyses would require unit costs of teacher training, in-service training, annual teacher salaries, cost of funeral or death benefits, and estimates of unit cost of enrolling orphans and vulnerable children in primary school.

Costs of absenteeism due to HIV/AIDS require additional explanation. These costs are incurred when HIV-related illness in infected teachers keeps them from their teaching duties or when teachers are required to attend the funeral of a colleague, friend or relative who died of AIDS. It is customary that when a school officer dies much of the school staff takes automatic leave to attend the funeral (anecdotal information). In cases of teacher absence, their duties are not always covered by a formal system of substitute teachers. However, another teacher or staff from the same school may informally assume teaching duties without additional remuneration, or the classroom may remain without a teacher, having the obvious impact on quality of education. Therefore, it may be that no financial costs are actually attributed to absenteeism apart from the salary paid to absent teachers without receiving any service in return; however, there is an opportunity cost.

Absenteeism costs due to HIV-related illness in the teachers can be estimated based on epidemiological data specific to sub-Saharan Africa on number and severity of expected episodes of AIDS related opportunistic infection and AIDS sickness. Assuming an HIV infected teacher collects full salary during 11 episodes of HIV related illness each lasting, on average, 10 work days and is additionally absent from work during his last 6 months of life (when he has full blown AIDS), he will receive pay for 260 days of absenteeism. We assume these days of absenteeism are uniformly distributed over the 10 years and that there are 267 work days per year. In other words, the assumption is that 1 day in 10 the teacher is absent due to HIV/AIDS illness. This assumption combined with the teacher's salary and number of HIV positive teachers obtained from Ed-SIDA gives the cost of absenteeism.

## **5. APPLICATION OF THE Ed-SIDA MODEL – THE ZAMBIA EXAMPLE**

Zambia is experiencing one of the worst HIV/AIDS epidemics in Africa. The prevalence of HIV in adults at the end of 1999 was estimated by UNAIDS (2000a) at 20%. In 1999 alone, the deaths attributable to AIDS were close to 100,000. Figures in urban areas tend to be double the rural ones; however, in no part of the country are rates low. This is having a serious effect on the population and there is an already visible impact on both the death of teachers and the number of orphans.

The following data and results were provided by Zambia Ministry of Education Headquarters staff and were presented at a Workshop on *Modeling the Impact of HIV/AIDS on Education* held during June 18, 2001 in Lusaka. These data are preliminary and may be revised.

### ***5.1 The Supply of Education***

#### **5.1.1 Data entry**

The data presented in *Table 1*, are from the Zambian Ministry of Education. They can be entered in the sheet called <Parameters> in the Excel© file by users of this model as a practical exercise.

Reference can be made to the earlier section of this document describing the flows of the model, and the corresponding data requirements.

**Table 1. Data required from users of the model**

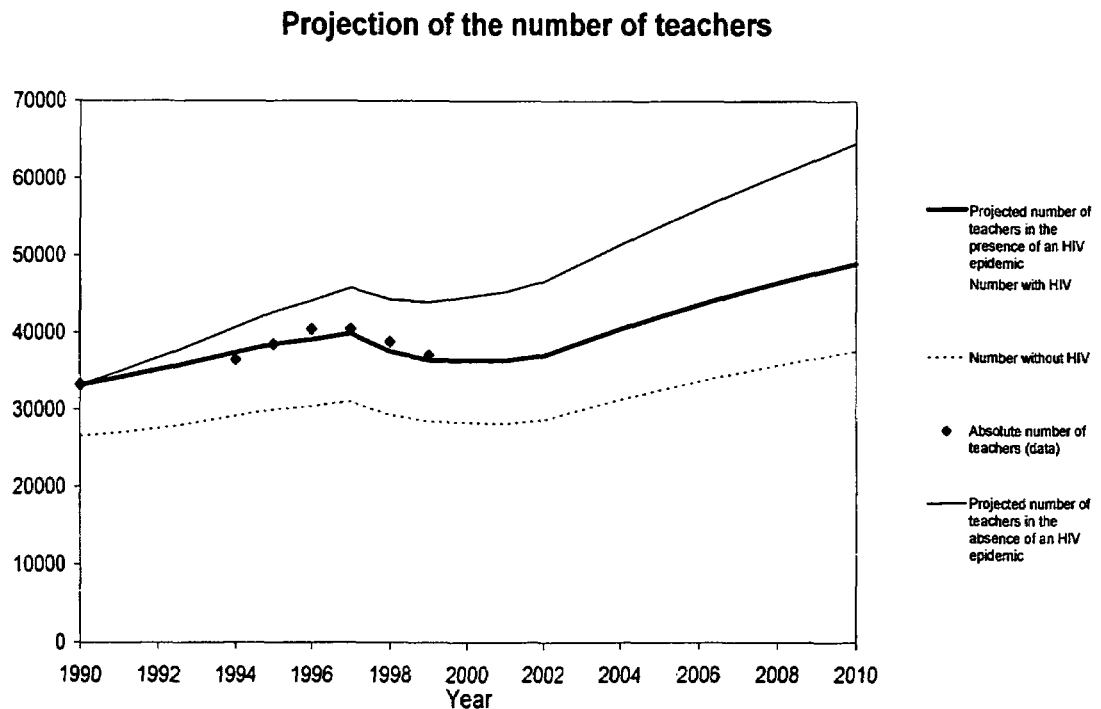
VARIABLES	VALUES																								
<b>RECRUITMENT</b>																									
Total number of registered teachers	33,200 in 1990; 36,484 in 1994 rising to 37,117 in 1999. Data are missing for years 1991-3 and 2000-2																								
Age and sex of registered teachers (1990-91)	<table border="1"> <tr> <td>Age 20-24</td> <td>4551 males</td> <td>3576 females</td> </tr> <tr> <td>" " 25-29</td> <td>3522 "</td> <td>2768 "</td> </tr> <tr> <td>" " 30-34</td> <td>2793 "</td> <td>2195 "</td> </tr> <tr> <td>" " 35-39</td> <td>2257 "</td> <td>1774 "</td> </tr> <tr> <td>" " 40-44</td> <td>1809 "</td> <td>1421 "</td> </tr> <tr> <td>" " 45-49</td> <td>1463 "</td> <td>1150 "</td> </tr> <tr> <td>" " 50-54</td> <td>1211 "</td> <td>951 "</td> </tr> <tr> <td>" " 55-59</td> <td>985 "</td> <td>774 "</td> </tr> </table>	Age 20-24	4551 males	3576 females	" " 25-29	3522 "	2768 "	" " 30-34	2793 "	2195 "	" " 35-39	2257 "	1774 "	" " 40-44	1809 "	1421 "	" " 45-49	1463 "	1150 "	" " 50-54	1211 "	951 "	" " 55-59	985 "	774 "
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" " 35-39	2257 "	1774 "																							
" " 40-44	1809 "	1421 "																							
" " 45-49	1463 "	1150 "																							
" " 50-54	1211 "	951 "																							
" " 55-59	985 "	774 "																							
Teachers newly recruited	2,800 new teachers in 1990, increasing to 3257 in 1998, declining to 1800 in 1999 and 2000; rising to 2521 in 2001; 3663 in years 2002-2010																								
Age of newly recruited teachers	67% between ages 20-24 28% " " ages 25-29 4% " " ages 30-34																								
Gender of newly recruited teachers	44% female in 1990, rising to 51% female in 2001																								
<b>EPIDEMIOLOGY</b>																									
HIV prevalence rates in the general population (as captured through sentinel surveillance at antenatal clinics)	Rising from 5.6% in 1985 to 20% in 1992 and remaining approximately stable at this level until 2000 (UNAIDS)																								
Risk of HIV in teachers versus general population	It seems plausible that teachers have the same risk to be infected with HIV than the general population																								
<b>LEAVING THE TEACHING PROFESSION PREMATURELY</b>																									
Teachers leaving the profession for causes different than AIDS	350 from 1990 to 1994; 943 in 1995; 750 in 1996; 3800 in 1997; 2700 in 1998; 350 rising to 450 in 1999 to 2010																								
Age of departing teachers	65% of departing males are between ages 30-39, 60% of departing females between ages 30-34																								
Gender of departing teachers	70% male, 30% female																								
Employment rate in the formal sector	18% in 1990, declining to 10% in 2000																								
Desirability to stay in the teaching profession	Teachers present the same RISK as other professionals to take up jobs vacated because of HIV/AIDS																								

### 5.1.2 Projections from the model

Under the planned recruitment practices, the total numbers of teachers will rise from 36,443 in 2000 to 49,106 in 2010. Without HIV/AIDS, the number of teachers in 2010 would be 64,598 according to current recruitment plans. This can be seen from the graph on the sheet called <Teacher Plot>, or by looking at the relevant figures in the <Projections> sheet.

The significant difference between the projected numbers of teachers in the presence and absence of the epidemic captures the impact of HIV/AIDS on teachers supply (Figure 5.1). This quantitative impact is even greater when the additional decline in productivity due to absenteeism in teachers with AIDS is considered.

**Figure 5.1.** Projected number of teachers in the presence and absence of HIV based on values of Table1 – taken from <Teacher plot> sheet.

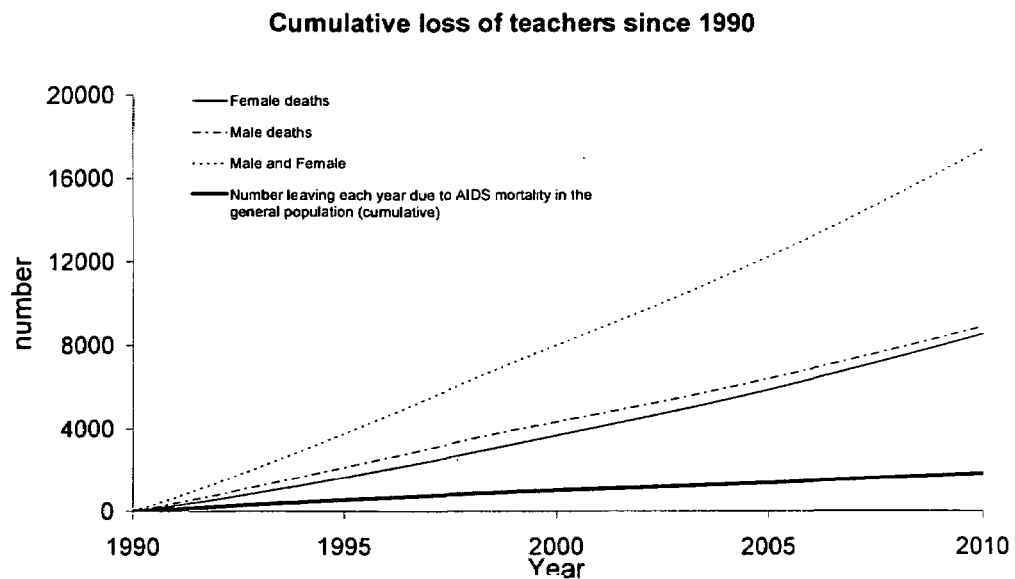


The annual number of teachers' deaths from AIDS is expected to rise from 796 in 2000 to approximately 1,105 a year by 2010. The cumulative number of AIDS deaths between 1990 and 2010 will be 17,416. The number of teachers dying from AIDS each year corresponds to one third of the planned annual recruitment of new teachers. However, if recruitment were to remain at pre-2000 levels, in 2010 the losses would represent almost half of the newly recruited teachers.

Due to the fact that most teachers dying from AIDS are in their 30s and 40s there is a dramatic loss in the skills base of the teaching profession. Mortality in these younger ages means that few teachers will survive to their 50s and be able to contribute their experience to the training of new teachers. In Zambia, although the mean age of teachers is projected to decline by only 1.5 years, this masks a loss of about 40% of teachers in the older age-ranges (e.g. 50-54).

Although there will be losses of teachers to other professions due to AIDS mortality in other sectors, these are relatively few because the employment rate in the formal sector is only about 10% (Figure 5.2). This figure is given in sheet <Cumulative loss>.

**Figure 5.2.** Cumulative number of teachers dying and changing profession in the presence of HIV since 1990 based on the data and assumptions in Table 1- taken from <Cumulative loss> sheet.



In the above application of the model, the risk of infection with HIV for teachers was considered equal to that of the general population. If the risk in teachers were double that in the general population their total number would drop by an additional 4,880 in 2010. If incidence were halved, the projected number of teachers would rise by 2,730.

Table 2 summarizes the results from the supply side.

**Table 2.** Results from the supply side when HIV incidence in teachers is equal to that in the general population.

	2000	2010
<b>Total number of teachers under various circumstances</b>		
According to recruitments plans, with HIV	36,443	49,106
According to recruitment plans, without HIV	44 621	64 598
<b>Teachers dying from AIDS</b>		
Per year	796	1105
Cumulative number since 1990	7986	17 416
<b>Loss of teachers to other professions</b>		
Per year	74	109
Cumulative number since 1990	1008	1813

## **5.2 The Demand for Education**

The number of school-age (ages 6-14 years) children is estimated at 1,986,000 in 1990 and this is expected to rise roughly linearly to 3,360,000 by 2010 (Figure 5.3). This corresponds to approximately 2.4% annual growth. Therefore, despite the HIV epidemic and its fertility and mortality consequences, the absolute number of school-age children is expected to increase over the next ten years. If the EFA goal is achieved, the number of children actually enrolled in schools will also increase from the current 1,886,400 to 3,192,500 by 2010. The net enrollment rate has declined from 73.5% in 1990 to 66% in 1996. Under EFA Goals this will rise to almost 95% by 2010. These figures on school aged population and net enrollment rate are entered in the <Parameters> sheet.

As illustrated in Figure 5.3, the model further projects the impact of AIDS on the number of orphans. Such an estimate is central for understanding the changed characteristics of the school-age population and planning interventions accordingly. The number of school-age children who lost their mother or both parents to AIDS is about 209,000 in 2000 and will be around 291,000 in 2010. Inclusion of those children who lost their father to AIDS is likely to double this figure.

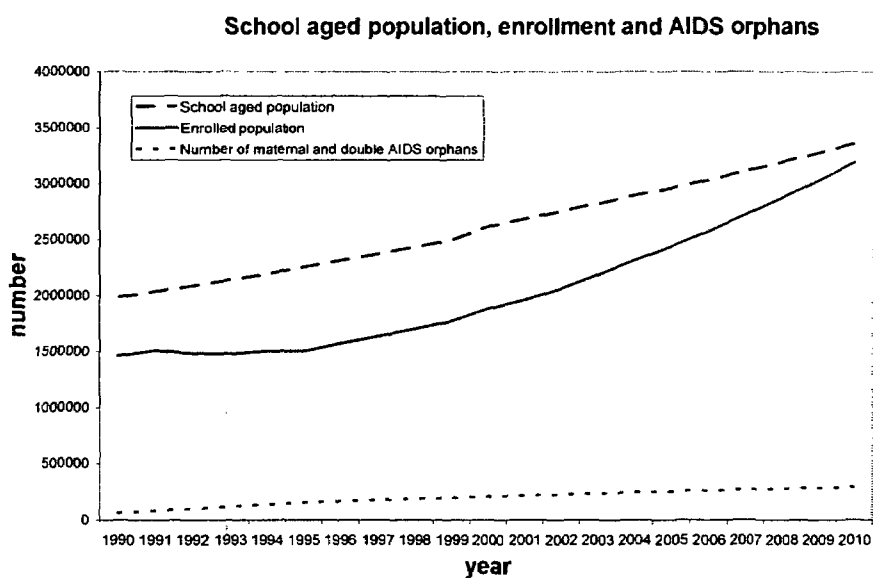
From the above, it is possible to project the percentage of school-age children who lost their mother or both parents to AIDS. In 2000, they represented 7.9% while in 2010 they will be 8.6%.

The enrolled school-age population to year 2010 can be combined with the projected number of teachers from the supply side, to produce pupil-teacher ratios (Figure 5.4). The pupil teacher ratio is 52:1 in presence of the epidemic in



2000. This would have been 42:1 in absence of effects of HIV/AIDS. In 2010, the ratio is expected to be 65:1 under projected recruitment practice of 3660 new teachers annually. In absence of HIV/AIDS this ratio would be 49:1. The goal-seek feature of Excel© allows to explore required recruitment rates to achieve 95% enrolment by 2010 with 45:1 pupil teacher ratio. We find this can be achieved by recruiting 6780 new teachers annually from 2002 to 2010.

**Figure 5.3.** Projected number of school-age children, numbers enrolled and number who lost their mother or both parents to AIDS in Zambia – taken from <Pupils> sheet of **edsida.xls**.



**Figure 5.4.** Projected pupil:teacher ratio in presence and absence of HIV/AIDS – taken from <Pupil-teacher ratio> sheet.

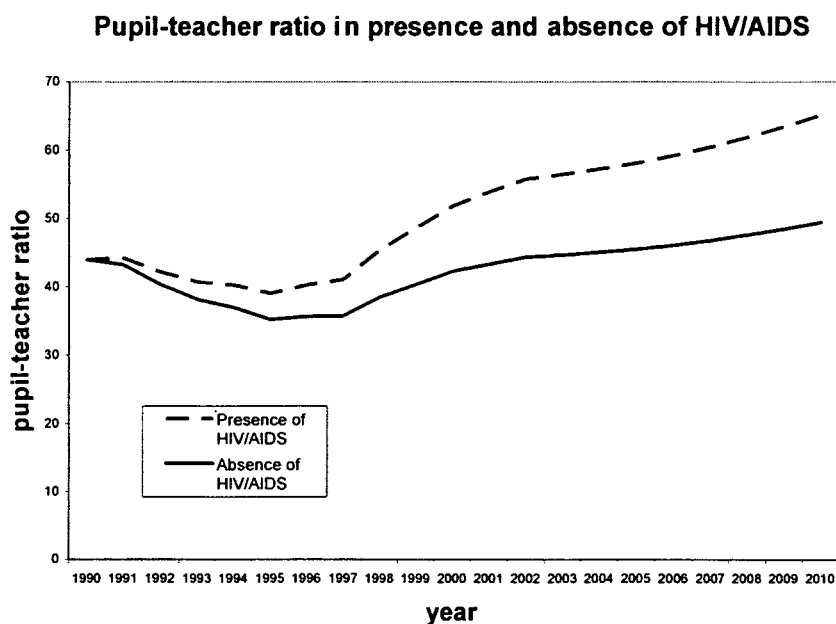


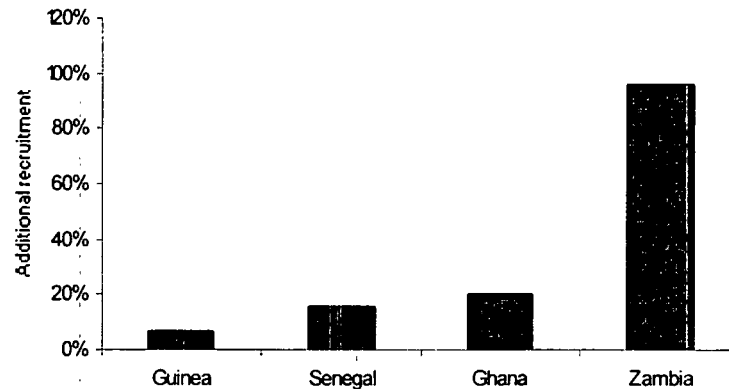
Table 3 summarizes the results from the demand side of the model.

**Table 3.** Results from the demand side.

	2000	2010
<b>School-age children</b>		
Total number	2,620,000	3,360,500
<b>Total enrolled in school</b>		
Current enrolment rate (72%)	1,886,400	—
Planned enrolment rate (95%)	—	3,192,500
<b>Orphans</b>		
Maternal and double	209,000	291,800

Figure 5.5 shows the percentage of additional recruitment necessary, as a result of HIV/AIDS, from 2000 to 2010 if the 95% enrolment rate must be reached by year 2010. The result is compared with the equivalent figure for three countries in West Africa planning to reach the EFA target (at 100% enrolment) by 2010 with pupil to teacher ratios between 40 and 50 (Ed-SIDA 2001). The adult HIV prevalence at the end of 1999 in these countries, Guinea, Senegal and Ghana is estimated at 1.5%, 1.8% and 3.6% respectively (UNAIDS, 2000b). As expected, the stage of the epidemic is a good predictor of the extra efforts in teacher recruitment required in the face of HIV/AIDS.

**Figure 5.5.** Additional annual recruitment necessary by 2010 to reach EFA (results for West Africa represent 'high prevalence' scenarios into the future; ED-SIDA 2001).



Indeed, in these last years, while the number of school-age children has been on the increase, Zambia has experienced a decline in primary school attendance.

As already argued in the introductory paragraphs, the real challenge for EFA will be to reach those children who, obliged to adopt the roles of money-earners or caregivers, will be likely to spend more and more time away from school. This is particularly the case for girls, whose exclusion will further undermine the goal for eliminating gender disparities in education.

### ***5.3 Estimating financial impact of HIV/AIDS in Zambia***

Currently the Ministry of Education will qualify around 3663 new teachers annually through the newly restructured Zambia Teacher Education Course. Given the total teacher population numbers around 36,443 in year 2000 and the

projected recruitment rates from the Ed-SIDA model, this number will grow to 49,106 by year 2010, even in presence of AIDS related mortality. The enrolled student population will be 3,192,500 in 2010, assuming 95% enrolments of school aged children. This corresponds to a pupil-teacher ratio of 65:1.

To estimate the impact on HIV/AIDS teacher training, we question what would the recruitment rate have to be in absence of HIV to meet the goal of 49,106 teachers by 2010. The Ed-SIDA model predicts that 1622 new teachers would have to be qualified annually from 2002 to 2010. This is a difference of 2041 newly qualified teachers per year. Given the cost of teacher training is \$790 USD per teacher (A Cost Study of the Impact of HIV/AIDS on Education in Zambia, 2001); this corresponds to a financial impact of \$1,612,000 in year 2002. If we factor in a cost of in-service training of 86\$ per year, this rises to **\$1,787,916** in 2002. Note that we assume here that the cost of one in-service training program is \$345 per teacher and that a teacher undergoes in-service training every four years. Applying this cost until 2010 and discounting by 3%, yields a cumulative impact of **\$14,355,000** (in present value terms) for the next nine years. In other words, the presence of HIV/AIDS is responsible for an additional cost of \$14 million to the Ministry of Education, donor organizations and students (who pay user fees) in training which would not have been incurred in absence of HIV.

The average future cost of absenteeism for teachers who are currently infected with HIV in 2001 is \$884 (A Cost Study of the Impact of HIV/AIDS on Education in Zambia, 2001). This figure assumes that over the next ten years, one in ten days will be lost to AIDS related illness (see section 4.3). The Ed-SIDA model puts the number of HIV infected teachers in 2001 at 8071. Thus the future (until 2010) cost of absenteeism due to HIV related illness for these teachers in present value terms is \$7,134,000. This does not include those will be infected in the coming years.

The Ed-SIDA models predicts that 100 new infections will occur in 2001, and this will rise to 400 new infections in 2005 before declining to 320 new infections in 2009. The absenteeism costs to be incurred by 2010 for new infections during years 2001 to 2004 amount \$180,000. Note that infections occurring after 2004 will probably not translate into substantial absenteeism cost until after 2010. Thus, total cost of absenteeism for HIV-related illness until 2010 is **\$7,314,000**, in present value terms.

## **6. APPLICATION OF THE Ed-SIDA MODEL – THE BURKINA-FASO EXAMPLE**

### ***6.1 The Supply of Education***

The Burkina-Faso example follows in a similar manner to that of the Zambia example, but is different in one important facet – the stage of the epidemic. Unlike Zambia, Burkina-Faso is experiencing an emerging epidemic with prevalence rates of HIV rising from around 3% in 1990 to 6.4% at end of 1999. Projecting prevalence for an early-stage epidemic requires consideration of a high and low projection scenario. This is discussed below.

The present results are only preliminary.

#### **6.1.1 Data entry**

The data presented in Table 4, are from the Ministry of Education of Burkina-Faso obtained during an Ed-SIDA workshop that took place in Accra, Ghana in April 2001. They can be entered in the sheet called <Parameters> in the Excel© file by users of this model as a practical exercise. Reference can be made to the earlier section of this document describing the flows of the model, and the corresponding data requirements.

**Table 4. Data required from users of the model – Burkina-Faso example**

VARIABLES	VALUES																								
<b>RECRUITMENT</b>																									
Total number of registered teachers	Teachers number from 1990 to 1999 as follows: 8900, 8658, 9392, 10300, 12754, 14071, 13950, 16724, 16660, 18119																								
Age and sex of registered teachers (1990-91)	<table border="1"> <tr> <td>Age 20-24</td> <td>3622 males</td> <td>1730 females</td> </tr> <tr> <td>" " 25-29</td> <td>1204 "</td> <td>577 "</td> </tr> <tr> <td>" " 30-34</td> <td>301 "</td> <td>144 "</td> </tr> <tr> <td>" " 35-39</td> <td>301 "</td> <td>144 "</td> </tr> <tr> <td>" " 40-44</td> <td>150 "</td> <td>72 "</td> </tr> <tr> <td>" " 45-49</td> <td>150 "</td> <td>72 "</td> </tr> <tr> <td>" " 50-54</td> <td>150 "</td> <td>72 "</td> </tr> <tr> <td>" " 55-59</td> <td>150 "</td> <td>72 "</td> </tr> </table>	Age 20-24	3622 males	1730 females	" " 25-29	1204 "	577 "	" " 30-34	301 "	144 "	" " 35-39	301 "	144 "	" " 40-44	150 "	72 "	" " 45-49	150 "	72 "	" " 50-54	150 "	72 "	" " 55-59	150 "	72 "
Age 20-24	3622 males	1730 females																							
" " 25-29	1204 "	577 "																							
" " 30-34	301 "	144 "																							
" " 35-39	301 "	144 "																							
" " 40-44	150 "	72 "																							
" " 45-49	150 "	72 "																							
" " 50-54	150 "	72 "																							
" " 55-59	150 "	72 "																							
Teachers newly recruited	Teacher recruits from 1990 to 2001: 800, 910, 950, 1300, 2720, 1650, 1500, 1700, 1700, 1700, 1700. Future years' recruitment is 1750 annually.																								
Age of newly recruited teachers	60% between ages 20-24 20% " " ages 25-29 20% " " ages 30-59																								
Gender of newly recruited teachers	50% female, 50% male																								
<b>EPIDEMIOLOGY</b>																									
HIV prevalence rates in the general population (as captured through sentinel surveillance at antenatal clinics)	EMERGING EPIDEMIC – low and high scenarios																								
Risk of HIV in teachers versus general population	It seems plausible that teachers have the same risk to be infected with HIV than the general population																								
<b>LEAVING THE TEACHING PROFESSION PREMATURELY</b>																									
Teachers leaving the profession for causes different than AIDS	Number leaving each year rise from 55 in 1990 to 150 in 2000. Future years' losses number 150 annually																								
Age of departing teachers	Assumed uniformly distributed across age categories.																								
Gender of departing teachers	Assumed 50% male, 50% female																								
Employment rate in the formal sector	Constant at 10%																								
Desirability to stay in the teaching profession	Teachers present the same RISK as other professionals to take up jobs vacated because of HIV/AIDS																								

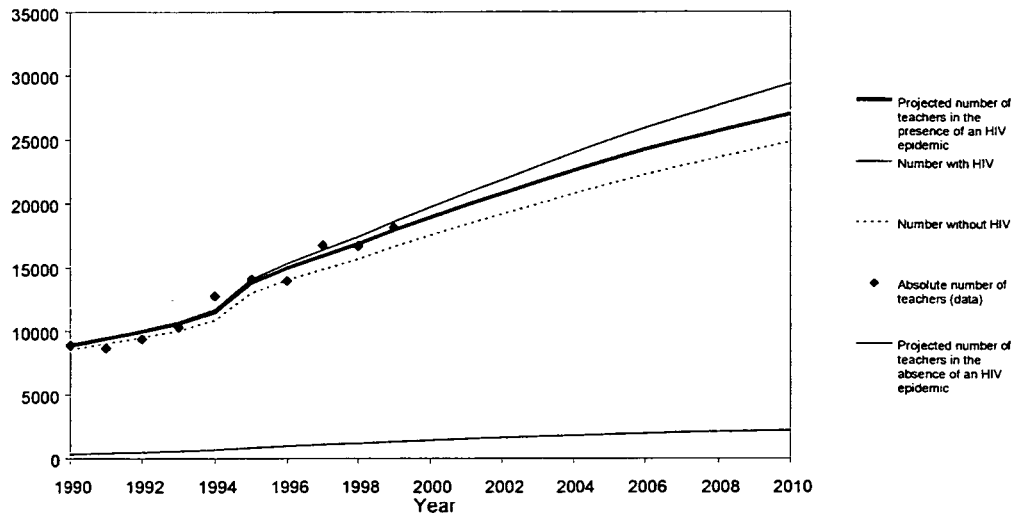
### 6.1.2 Projections from the model

Under the planned recruitment practices, the total numbers of teachers will rise from 18,900 in 2000 to between 24,600 and 27,000 by 2010 (Figure 6.1), depending on the magnitude of the projected epidemic (low and high scenarios). This is a difference of fewer than 3000 teachers in total numbers. However the number of HIV positive teachers in 2010 is 2200 under the 'low projections' scenario compared to 7800 under the 'high projections' scenario. What is striking here is that while the number of total teachers may vary by less than 3000 under the low and high scenarios, the number of HIV positive teachers will range between 2200 and 7800, a difference of 5600 teachers. The apparent discrepancy is actually due to the fact that Burkina-Faso is experiencing an emerging epidemic and infected teachers may take some 10 years to die of AIDS once infected. The impact of these deaths on total teacher numbers is to be felt largely after 2010. This also illustrates a key point that if preventive measures can be implemented now, the magnitude of the HIV epidemic may be minimized to resemble the 'low projection' scenario averting the worse consequences of the 'high' scenario. Unlike in established epidemics (such as in the Zambia example), there is a substantial benefit which will be achieved in the coming years if action is taken now to prevent infections in teachers in Burkina-Faso. This is in stark contrast to the Zambia example where the number of annual teachers dying equal one-third of those being recruited.

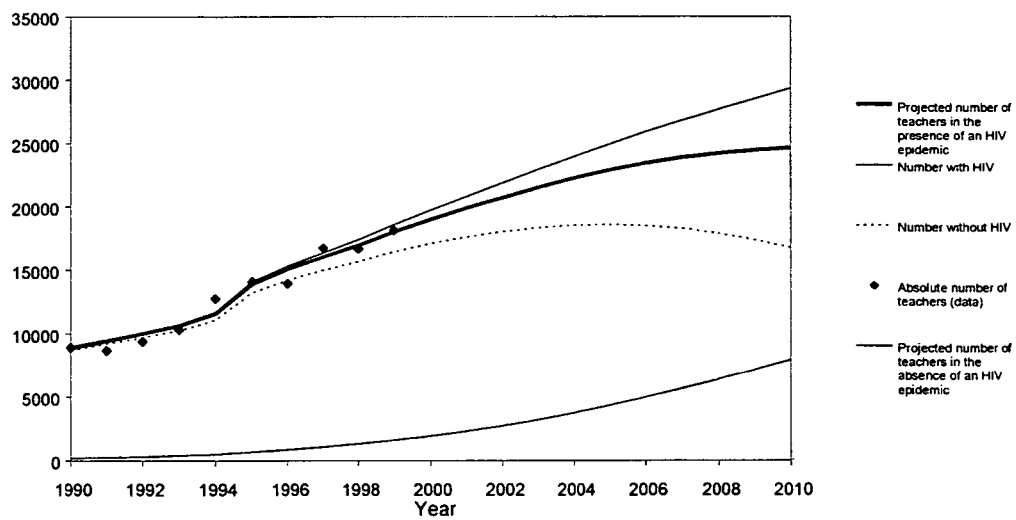
Further information can be derived from exploring the range of outputs of the Ed-SIDA model.

**Figure 6.1.** Projected number of teachers under (a) low and (b) high epidemic projections based on values in Table 4 – taken from <Teacher Plot> sheet.

**(a) Projection of the number of teachers under a low epidemic**



**(b) Projection of the number of teachers under a high epidemic**



## 6.2 The Demand for Education

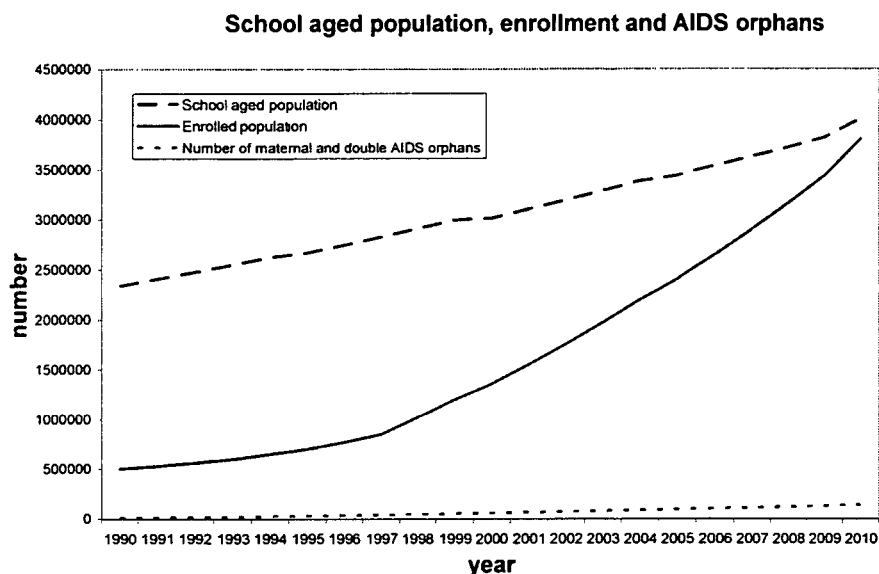
The number of school-age (ages 6-14 years) children is estimated at 3,016,000 in 1990 and this is expected to rise roughly linearly to 4,008,000 by 2010. This corresponds to approximately 2.9% annual growth. If the EFA goal is achieved by 2010, the number of children actually enrolled in schools will also increase



from the current 1,357,400 (assumed 45% enrolment) to 3,800,500 (95% enrolment), highlighting the important level of investment necessary. The net enrollment rate has risen from 21.6% in 1990, to 26.2% in 1995. This is assumed to rise to 95% in 2010. This data on school-aged population and net enrollment rate are entered in the <Parameters> sheet to produce Figure 6.2.

The model further projects the impact of AIDS on the number of orphans. Such an estimate is central for understanding the changed characteristics of the school-age population and planning interventions accordingly. The number of school-age children who lost their mother or both parents to AIDS is about 58,500 in 2000 and will be around 141,330 in 2010. Inclusion of those children who lost their father to AIDS is likely to double this figure.

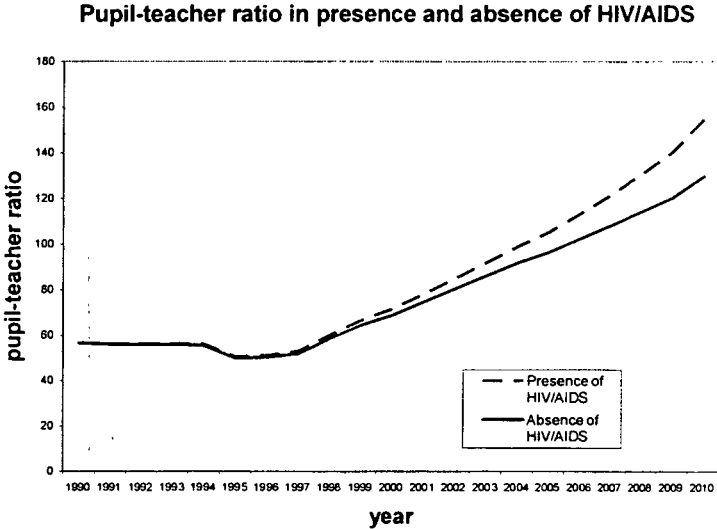
**Figure 6.2.** Projected number of school-age children, numbers enrolled and number who lost their mother or both parents to AIDS in Burkina-Faso – taken from <Pupils> sheet.



From the above, it is possible to project the percentage of school-age children who lost their mother or both parents to AIDS. In 2000, they represented 1.9% while in 2010 they will be 3.5%.

The enrolled school-age population to year 2010 can be combined with the projected number of teachers from the supply side, to produce pupil-teacher ratios (Figure 6.3). The pupil teacher ratio is 70:1 currently in 2000, assuming 45% enrolment. This will rise to 155:1 under current recruitment and population growth levels and the assumption of 95% enrolment in 2010. To maintain a 70:1 ratio (not to suggest that 70:1 is acceptable), in 2010, recruitment from 2002 to 2010 will have to be 6013 annually, as predicted by 'goal-seek' under the 'high projection' scenario. This result also signals the magnitude of the task of achieving EFA in terms of capacity building for the training and maintaining of sufficient numbers of teachers and enrolling the children in school.

**Figure 6.3.** Projected pupil-teacher ratio in presence and absence of HIV/AIDS – taken from <Pupil-teacher ratio> sheet.



## **7. POLICY IMPLICATIONS**

Whilst countries in southern and eastern Africa have already felt the impact of HIV/AIDS on their education system, in central, and particularly in West Africa, the epidemic is still within lower ranges. Consequently, these countries have the opportunity to offer a timely response to the worsening scenario, by planning and management actions.

For this purpose, close monitoring of the effects of the epidemic on education is crucial. When data are accurately collected, the Ed-SIDA model is a simple and valuable means for assessment. By projecting the long-term levels of teachers supply and the size and characteristics of the school-age population, it becomes the base for the design of coping strategies.

Relevant policy recommendations based on studies of the impact of HIV/AIDS on education have been proposed by the World Bank in a recent report (World Bank 2001). These are reproduced below:

- 1)** Education systems must recognize that the epidemic has sectoral relevance for education. HIV/AIDS is not only a health issue, but a major roadblock preventing the achievement of universal basic education of good quality and equitable access to education, EFA and the Millennium Goals.
- 2)** The keystone to the education sector's response to HIV/AIDS is to strengthen education. Achieving EFA and gender equity is the best contribution to HIV/AIDS prevention that the education sector can make. This must include a focus on girls' education because of the higher incidence of infection in girls, and the clearly demonstrated differential benefits that accrue to educated girls.
- 3)** All countries need to quantify the actual and/or potential impact of HIV/AIDS on their education systems. For the worst affected countries this is essential in developing the emergency response, managing resources and planning for the future. For the rest of the world it allows timely planning for future risk management. The World Bank, with partners, has launched the Ed-SIDA initiative to train education planners in estimating and projecting the impact of HIV/AIDS on education supply and demand.
- 4)** For the worst affected countries there is an immediate need to implement mitigating activities to sustain the education system. This implies intensifying and broadening the scope of existing efforts to achieve EFA. On the supply side this may mean increasing the output of teacher training colleges, greater use of distance education methods for teacher training and for education; particularly at the secondary and tertiary levels. On the demand side, it implies education sector responses to increase access to education, social protection responses that help ensure that orphans and other vulnerable children have access to education, and improved access to health services for parents and caregivers.

5) For all countries there is a need to establish preventative programs in schools – through curriculum reform – and more widely, to reach all children and youth. These programs can learn from the experiences of governments, supported by UNFPA, UNICEF and others in Family Life Education. Skills-based approaches to behavior change should start early in a child's career, and should develop specific strategies for primary, secondary and tertiary levels. Activities in schools should be fully integrated with the community and PTAs, and require community champions. The World Bank is currently developing a "Sourcebook of HIV/AIDS prevention in schools" which will provide examples of good practice benchmarked against standards set by the Interagency Working Group on HIV/AIDS, Schools and Education.

6) Prevention is most effective if it is part of a broader attempt at health promotion. The inclusion of HIV/AIDS prevention within the FRESH (Focusing Resources on Effective School Health) framework and health promoting schools provides a programmatic approach to school health. Linking health and schools requires a specifically intersectoral approach, involving at least the education and health sectors. For affected countries, the preventative programs should be closely aligned with peer and other counseling services, as well as linked to access to youth-friendly health services.

7) Youth in secondary and tertiary institutions are simultaneously amongst the most vulnerable members of society, and the most valuable in terms of future development. There is therefore a particular cost-effectiveness to targeting the post-basic levels. This is especially true of teachers at all levels, and teacher training and development institutions should develop a curriculum that can equip teachers and administrators with the knowledge, attitudes, values and skills to help them protect themselves and their families from HIV/AIDS. They should also ensure policies and actions within the education sector that support teachers and administrators affected by HIV/AIDS.

8) There are still major areas of uncertainty surrounding HIV/AIDS and education, and there would be a large payoff for research into the impact on macroeconomics and teacher attrition rates. The consequences of orphanhood for school achievement and macroeconomics are not understood, and orphanhood should always be included in surveys of children today. There is a particular need for prospective studies into the impact of school based interventions.

HIV/AIDS is being mainstreamed in all World Bank work in Africa, recognizing that AIDS and development are inextricably tied together. The World Bank is backing this commitment with increased funding and with long term partnership. This is particularly relevant to education since the World Bank has joined the development community in making a specific commitment to supporting the goals of Education for All; goals which are potentially compromised by the HIV/AIDS epidemic. All World Bank projects in education now specifically address the need for support for HIV/AIDS prevention and mitigation in the education sector.

## DEFINITIONS OF TERMS/ACRONYMS

**Death Rate** An estimate of the proportion of a population that dies during a specified period. The numerator is the number of persons dying during the period, the denominator is the number of person-years at risk of dying during the period. Also **Mortality Rate**.

**Incidence** The number of instances of illness commencing or persons falling ill during a given period in a specified population. Often estimated as number of new cases in a defined group divided by the total exposed person-time of that group during the defined period.

**Morbidity** Any departure, subjective or objective, from a state of physiological or psychological well-being.

**Orphans** A person, especially a child, whose parents have died. With respect to AIDS, the working definition of an orphan is: A child, under the age of fifteen, who has lost his mother (maternal) or both parents (double) to AIDS.

**Prevalence** The proportion of a population that has a disease or condition at a specific point in time.

<b>ACTAfrica</b>	AIDS Campaign Team for Africa (The World Bank)
<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>DfID</b>	UK Department for International Development
<b>DHS</b>	Demographic and Household Surveys
<b>ECOWAS</b>	West Africa Economic Community
<b>Ed-SIDA/AIDS</b>	An initiative for assessing the impact of AIDS (SIDA in French) on education systems
<b>EFA</b>	Education for All
<b>FRESH</b>	Focusing Resources on Effective School Health – an international partnership
<b>HDN</b>	Human Development Network at the World Bank
<b>HDNED</b>	The Education group within HDN, World Bank
<b>HFLE</b>	Health and Family Life Education
<b>HIPC</b>	Heavily Indebted Poor Countries
<b>HIV</b>	Human Immunodeficiency Virus
<b>HNP</b>	The Health, Nutrition, and Population Group within HDN, World Bank
<b>IBRD</b>	International Bank for Reconstruction and Development, part of the World Bank Group

<b>IDA</b>	International Development Association, part of the World Bank Group
<b>IMF</b>	International Monetary Fund
<b>IIEP</b>	International Institute for Educational Planning, part of UNESCO
<b>MAP</b>	Multi-Country HIV/AIDS Program for Africa
<b>NGO</b>	Non-governmental organization
<b>PCD</b>	Partnership for Child Development
<b>SES</b>	Social and Economic Surveys
<b>STD</b>	Sexually Transmitted Disease
<b>STI</b>	Sexually Transmitted Infection
<b>UN</b>	The United Nations
<b>UNAIDS</b>	Joint United Nations Programme on HIV/AIDS
<b>UNESCO</b>	The UN Educational, Scientific and Cultural Organization
<b>UNFPA</b>	The UN Population Fund
<b>UNGASS</b>	The UN General Assembly Special Session
<b>UNICEF</b>	The UN Children's Fund
<b>USAID</b>	The USA Agency for International Development
<b>WHO</b>	The World Health Organization

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The World Bank  
1818 H Street, NW  
Washington, DC 20433 USA  
Telephone: 202.473.1000  
Facsimile: 202.477.6391  
Internet: [www.worldbank.org](http://www.worldbank.org)  
E-mail: [feedback@worldbank.org](mailto:feedback@worldbank.org)