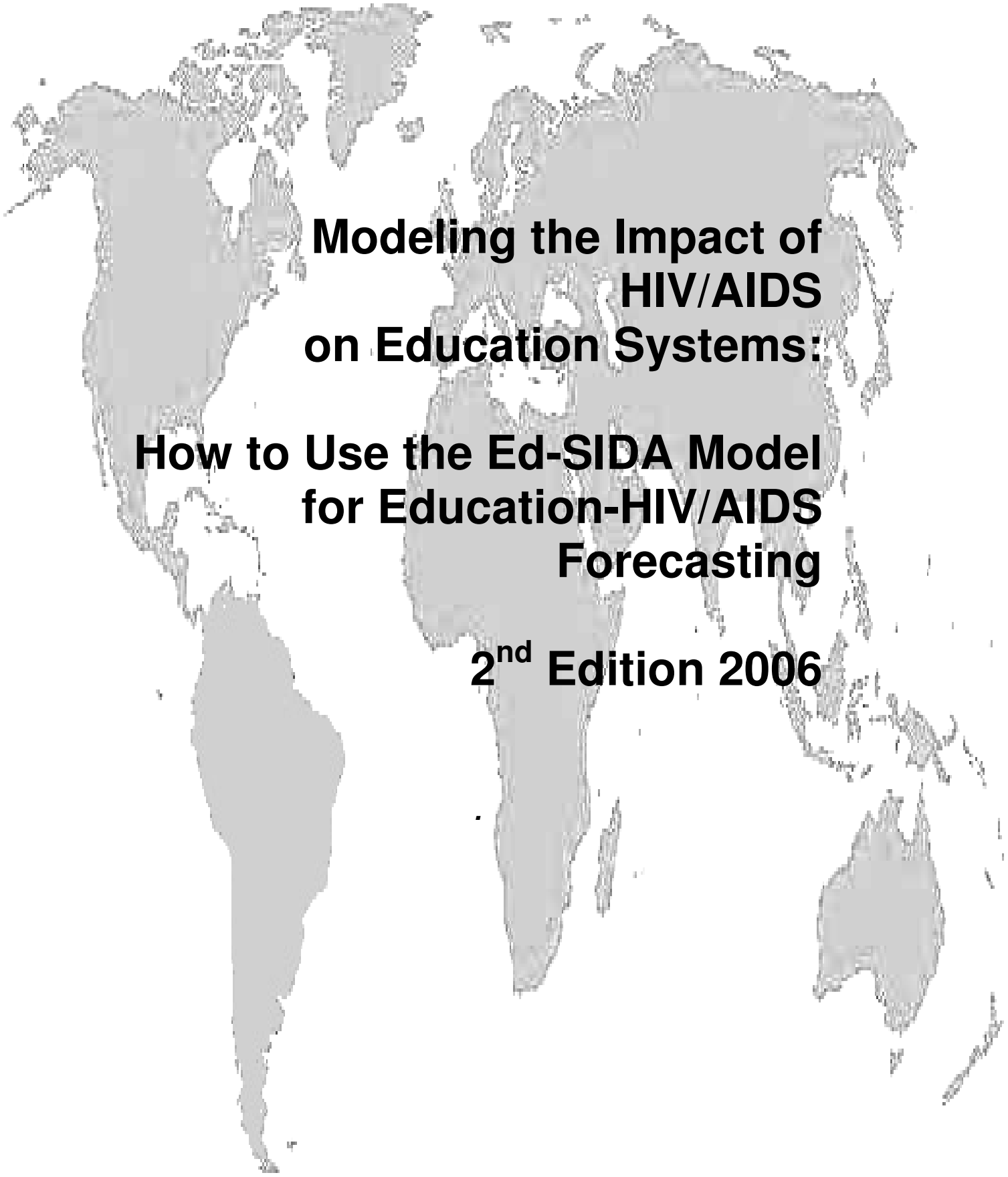

Modeling the Impact of HIV/AIDS on Education Systems:

How to Use the Ed-SIDA Model for Education-HIV/AIDS Forecasting

2nd Edition 2006

The Ed-SIDA Initiative

The Ed-SIDA initiative aims to assist countries in responding to the impact of HIV/AIDS on their education systems. This was developed as part of a package of toolkits by the Working Group to Accelerate the Education sector response to HIV/AIDS

This manual should be distributed with the Microsoft Excel© spreadsheet 'edsida.xls' which is the impact projection model described by this manual.

Notes and acknowledgments on the First Edition:

The Ed-SIDA Initiative was developed by Ministry of Education staff from 9 West African countries (Benin, Burkina Faso, the Gambia, Ghana, Guinea, Niger, Nigeria, Senegal, and Togo), the World Bank, the Department for International Development UK and the Partnership for Child Development and the UNAIDS Reference Epidemiology Group, Imperial College, London.

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Notes and acknowledgments on the Second Edition:

Over the past 6 years, more partners have joined the Accelerate initiative, which now includes 33 countries from sub-Saharan Africa and a similar number of development partners. The experiences and lessons learned during this period have contributed to the continuing evolution of the Ed-SIDA model and this progress is now reflected in the updated model presented in this second edition.

The Key team in developing this second edition is

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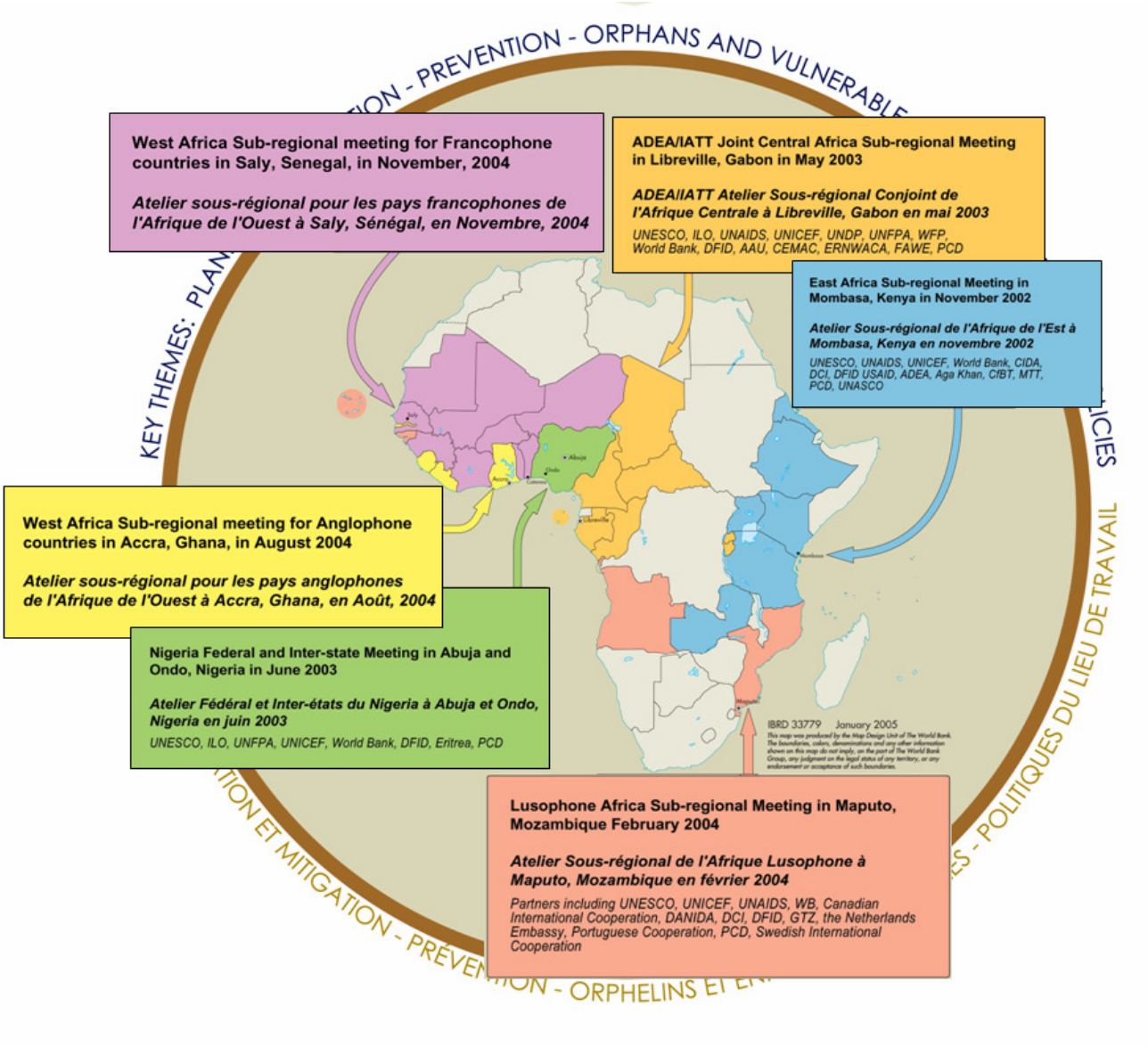
HIV/AIDS and EDUCATION
Accelerating the Education Sector Response to HIV/AIDS workshops



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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 implement 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.

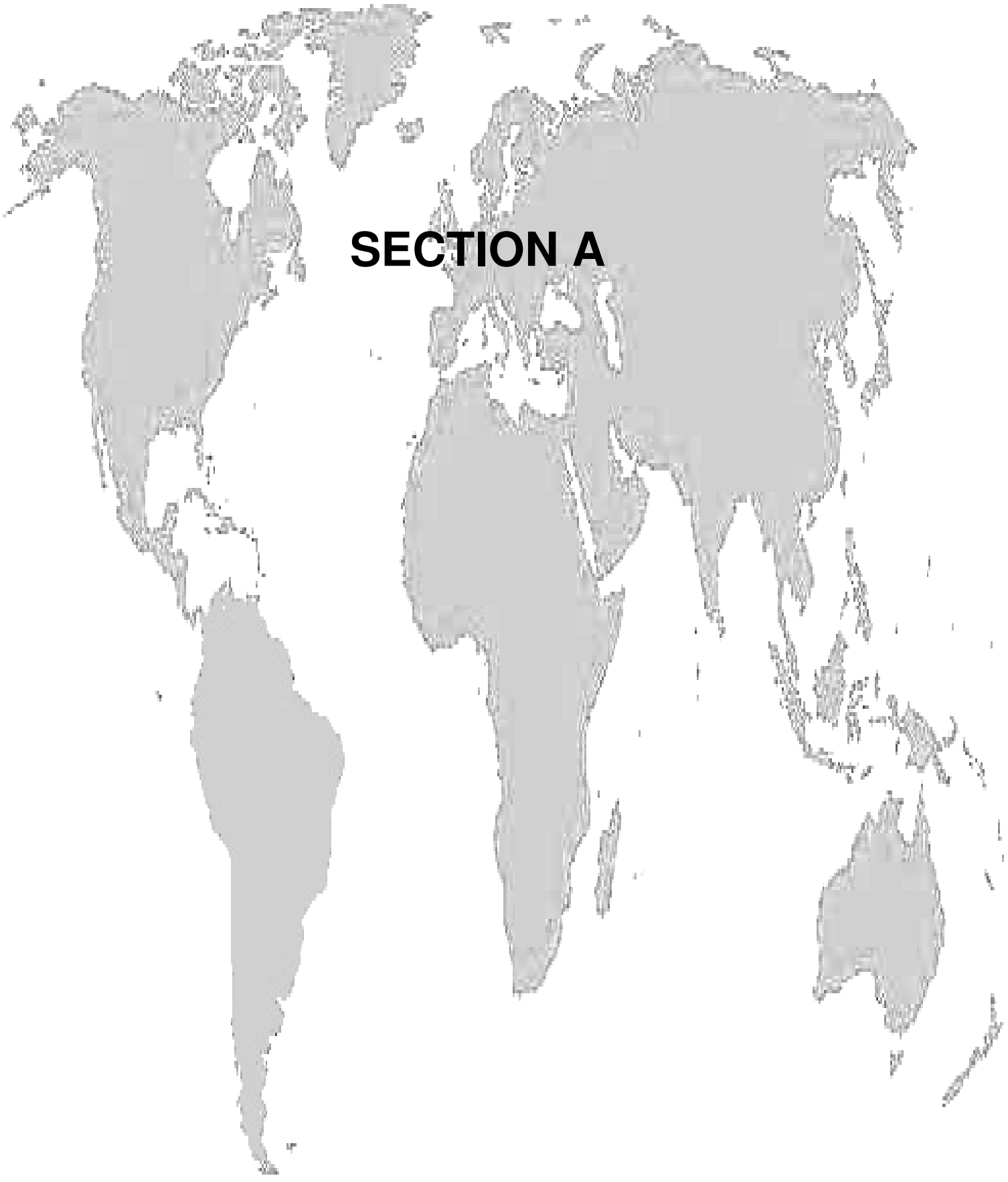
The threat of HIV/AIDS on education is so extensive in certain settings that no planning initiative should be without specific strategies aimed at estimating and mitigating the impact of this disease. The Ed-SIDA model represents a powerful spreadsheet based tool for educational planners to effectively 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 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.



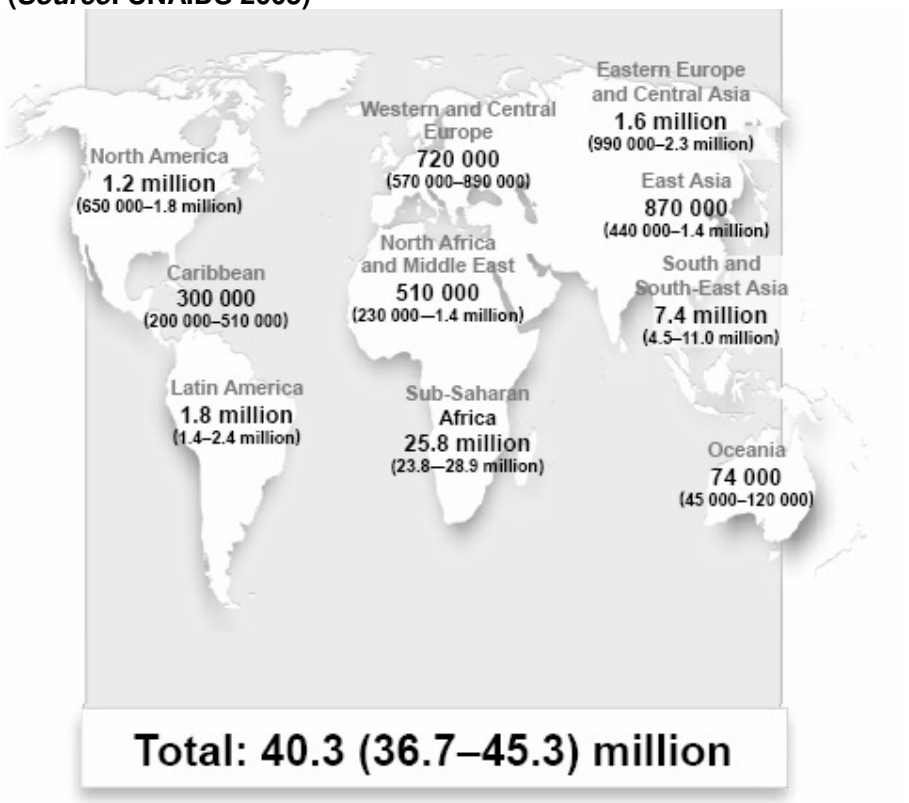
SECTION A

1.1 The HIV/AIDS epidemic today

HIV/AIDS statistics are familiar yet staggering. Globally, 40.3 million people are estimated to be living with HIV or AIDS in 2005 (Figure 1.1). Children orphaned by AIDS (who have lost either their mother or both parents) and other vulnerable children number some 15 million worldwide (WHO/UNAIDS 2004). The infection continues to spread rapidly; approximately 5 million people were newly infected in 2005 (UNAIDS 2005).

HIV prevalence exceeds 2 percent in 39 countries; of this total, 31 are in Africa, and in 6 African countries, prevalence exceeds 20 percent. A characteristic of the epidemic in developing countries, especially in Sub-Saharan Africa, is its ubiquity: HIV infects the general population and not just those at high-risk (e.g. men who have sex with men; intravenous drug users). With prevalence in some countries approaching 40%, unprotected sex with even the safest-seeming person may often carry a death sentence. Within the general population, it disproportionately affects young adults; 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 2005 (*Source*: UNAIDS 2005)

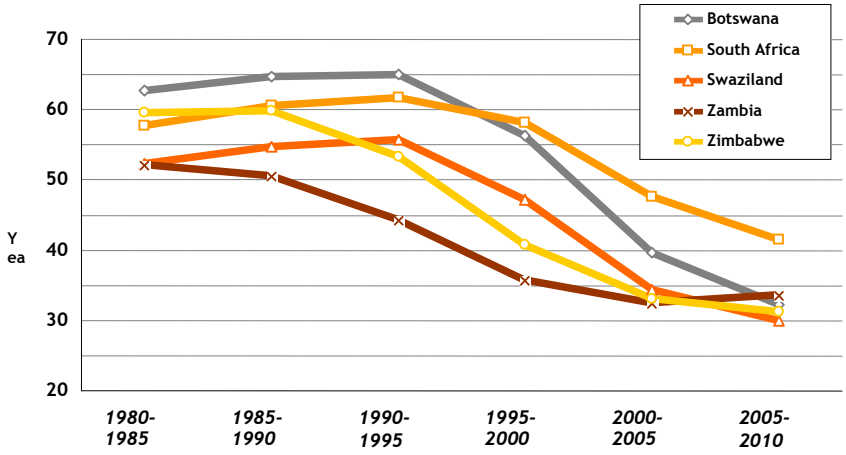


The epidemic's grip on sub-Saharan Africa has been by far the deadliest. In some countries life expectancy at birth has been reduced by as much as 20 years (Figure 1.2), due to health and industrial infrastructure declines caused by HIV/AIDS. UNAIDS estimated that 25.8 million Africans were infected with the virus at the end of the year 2005; 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 been over 20 million AIDS deaths in the region, with 2.4 million Africans dying in 2005 alone – over 75% of the total deaths worldwide.

The overall adult (15 to 49 years old) prevalence in Sub-Saharan Africa is around 7.5%, with large between-country variance. For example, in eastern and southern Africa, the focus of this epidemic, prevalences in some communities of up to 60% have been recorded. Botswana and Swaziland are the countries currently worst affected; prevalences are estimated to be 37.3 and 38.8% respectively. The epidemic appears to be stabilizing, often at high levels, in most countries. Those countries in which numbers have increased by more than 10% between 2001 and 2003 are mostly in West Africa, although prevalence rates are currently relatively low compared to southern African countries (e.g. Côte d'Ivoire's number infected increased by 11% to give a prevalence of 7% in 2003).

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 localised epidemics, infection rates in Myanmar, Cambodia and Thailand are in the range 1-3% and similar to many West African countries. India deserves special mention: it is estimated to have a relatively low prevalence rate but is second only to South Africa in terms of number of people living with the infection (end-2005).

Figure 1.2 Changes in life expectancy in selected African countries with high HIV prevalence, 1980 to 2000 (*Source*: UNAIDS Report on the Global AIDS Epidemic 2004)



1.2 Natural history of HIV/AIDS infection[1]

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

[1] Taken from WHO Fact Sheets on HIV/AIDS for nurses and midwives (WHO 2000)

(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 occurs 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 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 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

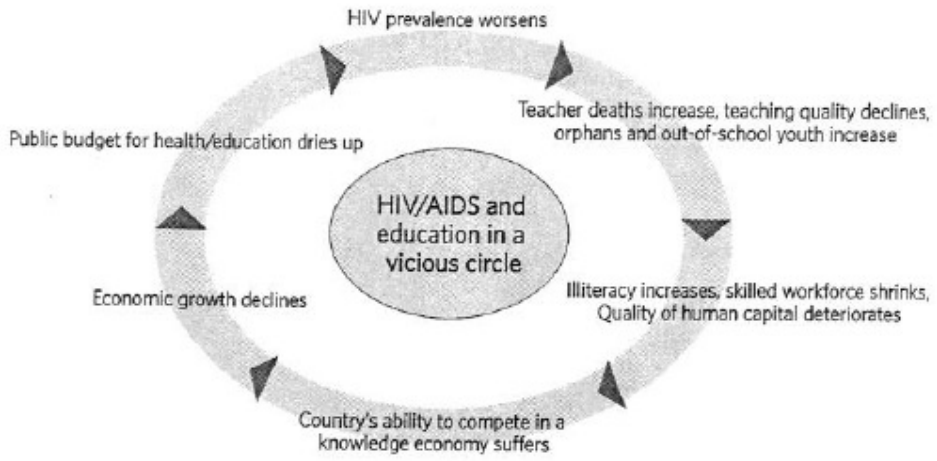
The Ed-SIDA initiative was motivated by the realization that few countries factored the HIV epidemic into their educational plans, particularly with respect to recruitment schedules for new teachers. Such important omissions potentially have detrimental effects on efforts to reach *International Development 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.

The impact of 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, inter-personal relationships, and coping with the emotions and stress of negative circumstances such as personal or family HIV infection.

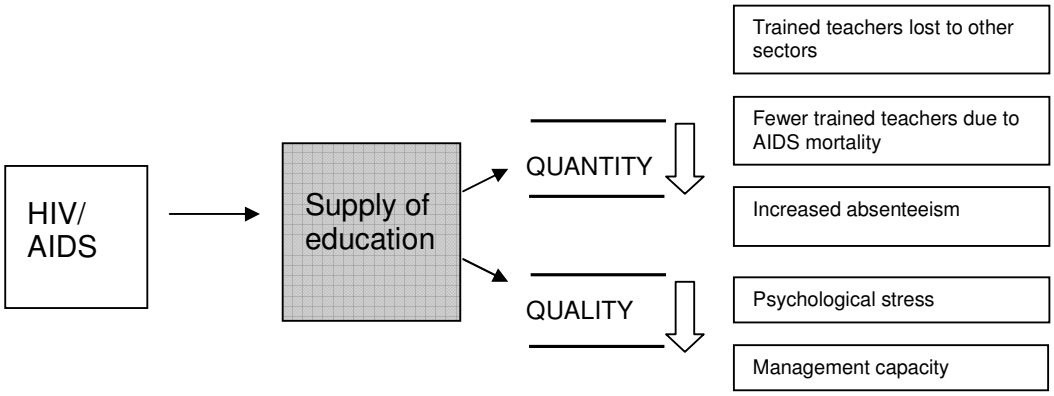
Some of the countries of eastern and southern Africa have already introduced life-skills programs in their schools. The results are mixed but a major problem has been identified in the lack of teacher competency in the newly required skills and handling of sensitive topics (Kelly, 2000). In cases where 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. HIV might be more prevalent among teachers than in the general population, resulting in many teachers dying of AIDS (box 1).

Box 1. Are teachers especially vulnerable to HIV?
There is an ongoing discussion regarding the risk of HIV infection in teachers. Some studies have found they experience an increased risk; the International Labour Organisation defines teachers as workers at special risk 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. Others (Bennell, 2005) argue that teacher mortality, and consequently teacher HIV infection rate, is less than that of the general population, due to protective behaviour change by teachers.

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 these teachers requires a doubling of expenditure. Second, teachers with sick families take time off to attend

funerals or to care for sick or dying relatives. In several countries, head teachers have reported problems with female teachers, in particular, coming late or leaving early. A recent survey in Botswana found that absenteeism among female teachers averaged 6.6 percent compared with 3.3 percent for male teachers, and funeral attendance was the second biggest factor (after illness) in AIDS-related absenteeism in schools, accounting for 7-12 percent of episodes of absenteeism. Funerals also result in several days of absence at a time, as noted by a primary-school head teacher in Botswana: "teachers who come from other parts of the country leave on Thursday and sometimes don't get back until mid-Monday." (Government of Botswana, DfID 2000).

The **quality** of the education provided may suffer due to the psychological stress, trauma and discrimination experienced by teachers infected with HIV, or with HIV-affected households. For example, in Zambia the majority of teachers in such circumstances were unable even to talk about the problem with their relatives or friends (World Bank 2002). Such isolation and fear will undoubtedly influence their teaching performance.

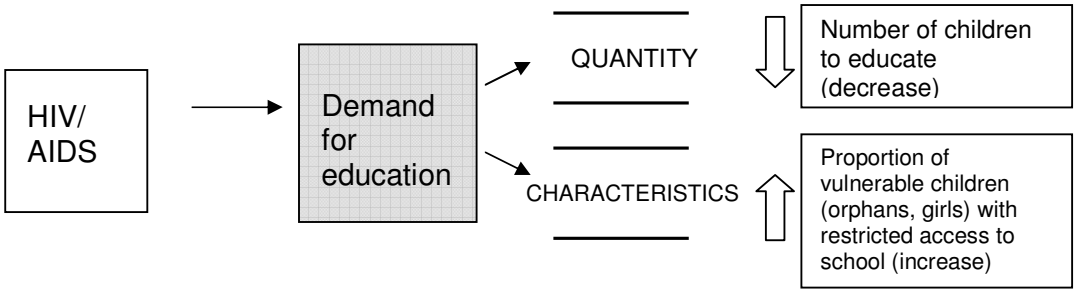
Furthermore, the quality of education is negatively affected by losses in the administrative and coordination capacity due to HIV-illness and AIDS deaths among management personnel and educational planning and financial officers. Although the scale of the loss has not been estimated, it is likely to parallel that seen amongst teachers themselves.

The decline in quality and consequently in the worth attributed to education by parents and children may reinforce the tendencies of a decreasing enrolment rate.

2.4 Impact of HIV/AIDS on the demand for education

The impact of HIV/AIDS on the **demand** for education can be assessed both in terms of quantity and change in characteristics (Figure 2.3).

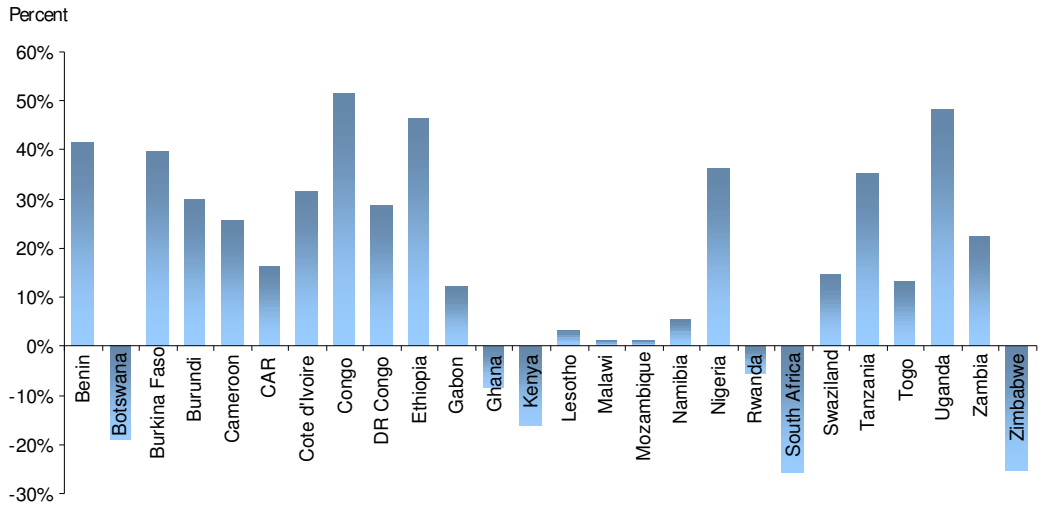
Figure 2.3. The impact of HIV/AIDS on the demand for education



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.

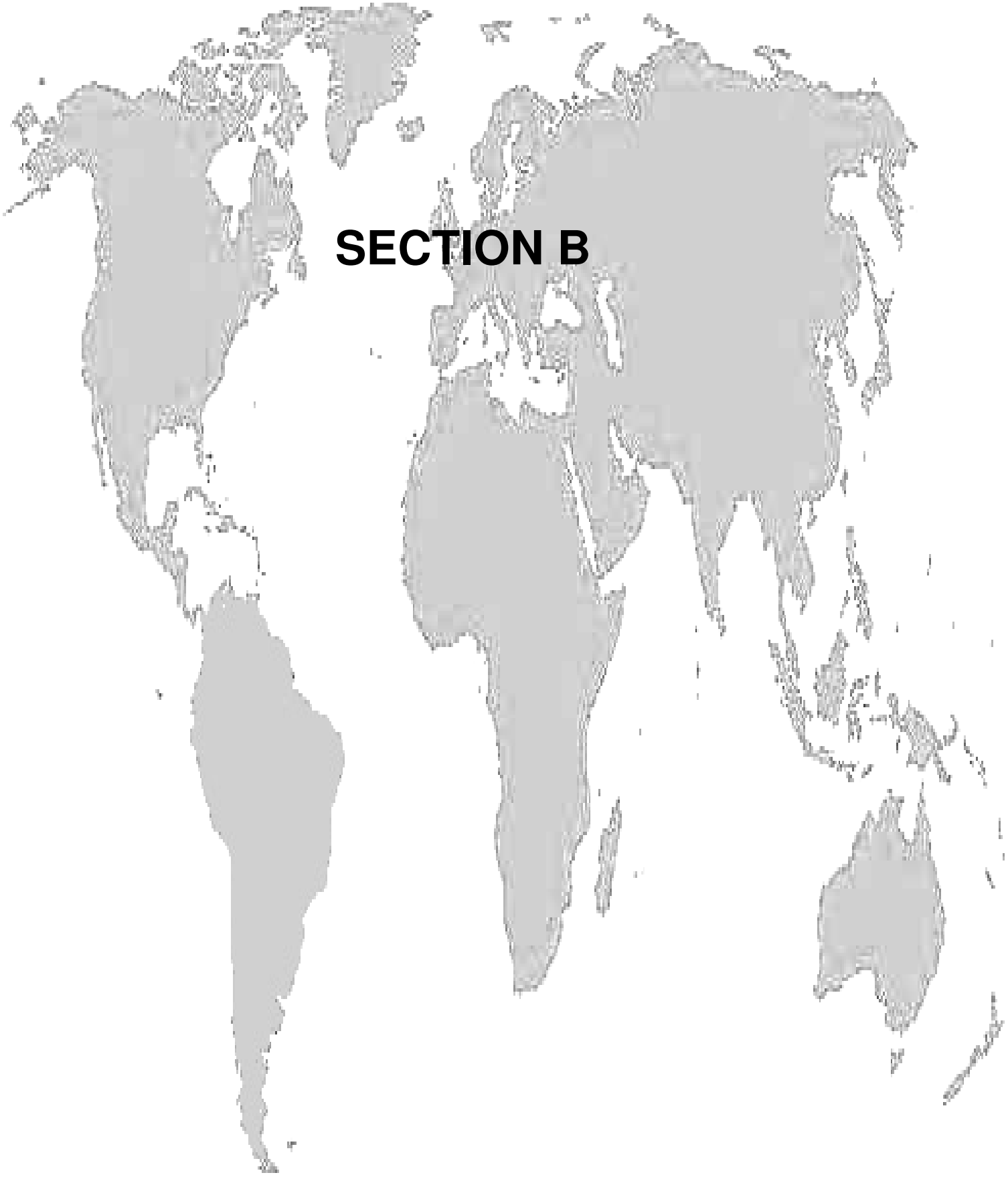
AIDS is responsible for impoverishment of families. Since it affects people during their working years, it deprives households of basic sources of income. As a sizeable part of the remaining earnings must go on medical care for the sick person, education expenditure is most likely to be diverted, particularly 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.



SECTION B

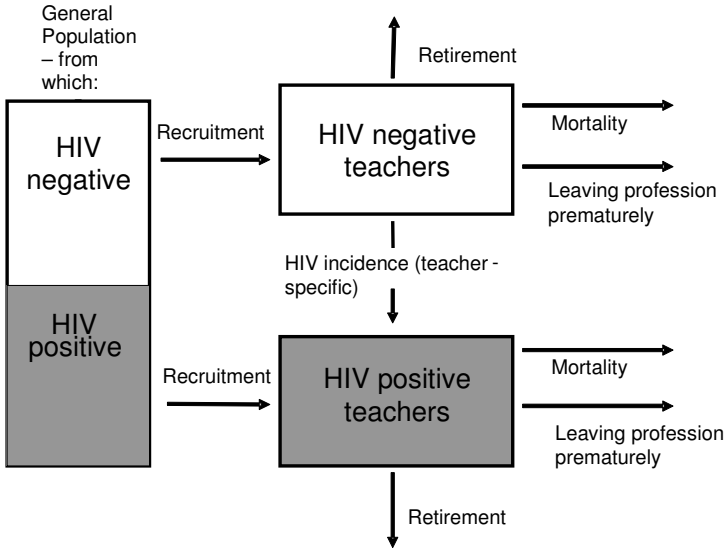
3. THE Ed-SIDA MODEL

3.1 Modeling the supply of education

For a defined country or setting, Ed-SIDA projects the total number of teachers to 2015, the proportion 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 gender 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 Modeling the Demand for Education

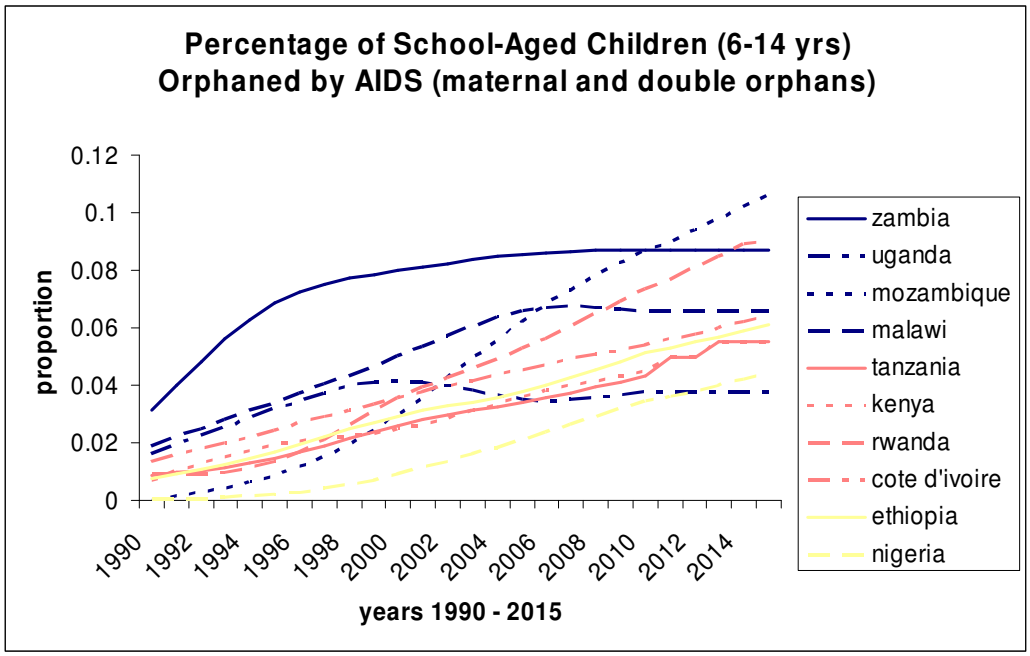
The demand input into Ed-SIDA includes country-specific projections for the absolute number of school-aged children produced by UN Population Division (UN Population Division 1998). It also requires estimates of the current and future school-age children losing their mother or both parents to AIDS (maternal or double orphans under age 15 years). Orphanhood projections are quite complex have been systematized by the UNAIDS

Epidemiology Reference Group and are now available for most countries. It is especially important that the education sector has good orphanhood estimates because orphans may require resources to ensure equality of access to education i.e. governments may wish to pay for orphans to attend school.

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.

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. Due to this lag, 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.



3.3 Data entry

Ed-SIDA is implemented with the Excel© based file **edsida.xls** consisting of 13 sheets:

1. <Parameters (data entry)> - data entry on baseline, recruitment, attrition, enrolment, orphans, and sensitivity to prevalence, relative risk of teachers and future conditions.

2. <Teacher plot> - graphical display by year of total number of teachers, number infected/non-infected, and number of teachers in absence of an epidemic.

3. <Pupils> - graphical display by year of numbers of school-aged children, number enrolled and number of maternal and double orphans

4. <Recruitment> -Shows number recruited per year and the recruitment necessary to replace those dying of AIDS.

5. <Pupil teacher ratio> - graphical display of pupil teacher ratio in presence and absence of HIV/AIDS epidemic

6. <Absenteeism> -Shows person-years of absence due to the impact of HIV/AIDS

7. <Attrition> - graphical display of cumulative number of teachers lost due to AIDS since 1990

8. <Cost Per Year> - Cost each year of HIV/AIDS to education systems, broken down by cause

9. <Cumulative Cost> - Shows cost of the whole epidemic by year, by cause

10. <PRINT> - contains button connected to macro which creates an output report and prints it

11. <Projections> - based on the data entered, calculates number of teachers by age, sex and year who are infected/uninfected. Also calculates pupil-teacher ratios

12. <Prevalence data> - 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.

13. <Demographic data> - data source on AIDS and non-AIDS related mortality by age. No data input is required here.

Data entry is divided into 5 'Stages'. The data for each stage is entered in one of 5 areas of the <Parameters (data entry)> worksheet enclosed with a double red box. Scrolling down the worksheet allows viewing of all areas of data entry, and for added convenience the numbered buttons allows the user to navigate ("jump") between stages.

3.3.1 Baseline

The total number of teachers by age category and gender in the year 1990, and recruitment in 1990, are used as a start point for projections (Screenshot 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 2005, where available. Ed-SIDA calculates the numbers of those expected to be HIV positive by age and gender 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 the indirect determination of the prevalence in the general population.

3.3.2 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 gender-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 Screenshots 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 gender. While some countries lack standardized collection of this information, the approximate age ranges and proportion of males/females of newly hired teachers can usually be entered. Such approximation will not greatly affect the conclusions of the model, unless HIV infection rates greatly differ by age or gender.

Screenshots 1. <Parameters (data entry)> sheet of **edsida.xls** file where baseline and recruitment are entered.

For the following five stages, please enter the necessary data the yellow cells. When the data are not available, please provide estimates that you jud

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1st Stage

1990 BASELINE & RECRUITMENT

Enter the absolute number of teachers for the years 1990-2005 or the most up-to-date data available

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Absolute number of teachers	3,661	4,430	5,808	6,250	6,531	6,820	6,493	6,961	6,784	7,541	8,045	9,027	9,306	10,275	10,391	

Percentage of women in 1990: 35%

Enter the number or % of teachers stratified by age and gender for 1990 (or as near a year as date are available)

Age	% M	% W	Men	Wome	W and M
15-19 years	6%	4%	151	49	200
20-24 years	30%	21%	705	276	981
25-29 years	19%	24%	455	307	762

Annual number of teachers, for validation, and baseline data (1990 distribution of teacher age and gender) to be entered. Note that in Ed-SIDA where spaces for both numbers and percentages are given, either numbers, or percentages and total number, may be entered. The buttons labeled 1-5 allow the user to jump between stages.

Indicate the percentage of newly recruited teachers by age and gender

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Recruitment by age (%)																
15-19 years	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
20-24 years	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	
25-29 years	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	
30-34 years	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	
35-39 years	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
40-44 years	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
45-49 years	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
50-54 years	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
55-59 years	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Recruitment by gender (%)																
% women	45%	38%	37%	35%	35%	35%	35%	35%	35%	36%	37%	38%	39%	40%	41%	42%
% men	55%	62%	63%	65%	65%	65%	65%	65%	65%	64%	63%	62%	61%	60%	59%	

Distribution of newly recruited teachers by age and gender each year. Approximate distribution may be entered if exact data are not available.

3.3.3 Attrition due to causes other than AIDS

Following recruitment, the teachers leaving by age and gender are entered:

Screenshot 2. <Parameters (data entry)> sheet of **edsida.xls** where attrition percentage and profile of teachers leaving are entered.

1 2 3 4 5

2nd Stage

NON-AIDS ATTRITION

Indicate the percentage of teachers who leave the profession not due to AIDS. Indicate the percentage of women.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	20
Numbers of teachers leaving											
Percentage attrition	0.5%	0.4%	1.8%	7.1%	12.4%	10.8%	0.6%	2.2%	2.3%	1.7%	
Percentage of whom women	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	5

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	20
Women											
15-19	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
20-24	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
25-29	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	
30-34	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	
35-39	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
40-44	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
45-49	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
50-54	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
55-59	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	10
Men											
15-19	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
20-24	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
25-29	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	
30-34	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	
35-39	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	

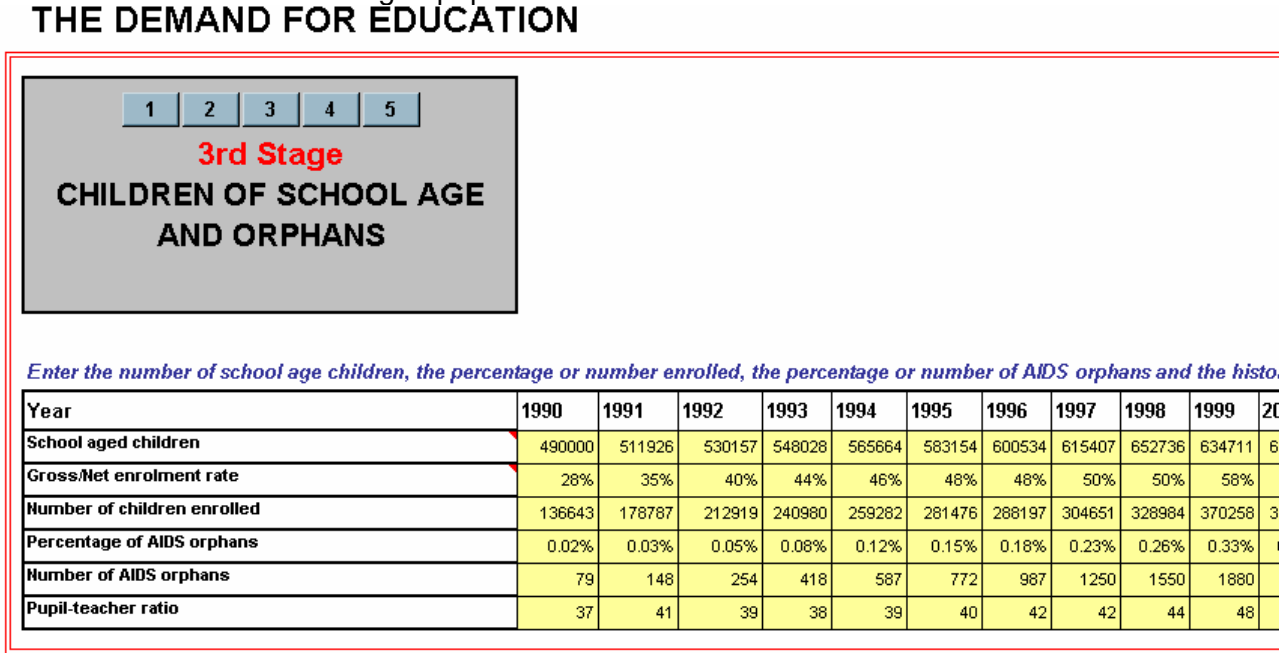
3.3.4 Retirement of teachers

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

3.3.5 Entering data on educational demand (children and orphans)

The percentage of children 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 by sex and year in order to estimate the size of the enrolled school-aged population and number of AIDS orphans (Screenshot 3).

Screenshot 3. <Parameters (data entry)> sheet of **edsida.xls** where net enrollment rate and school aged population are entered.



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3rd Stage

CHILDREN OF SCHOOL AGE AND ORPHANS

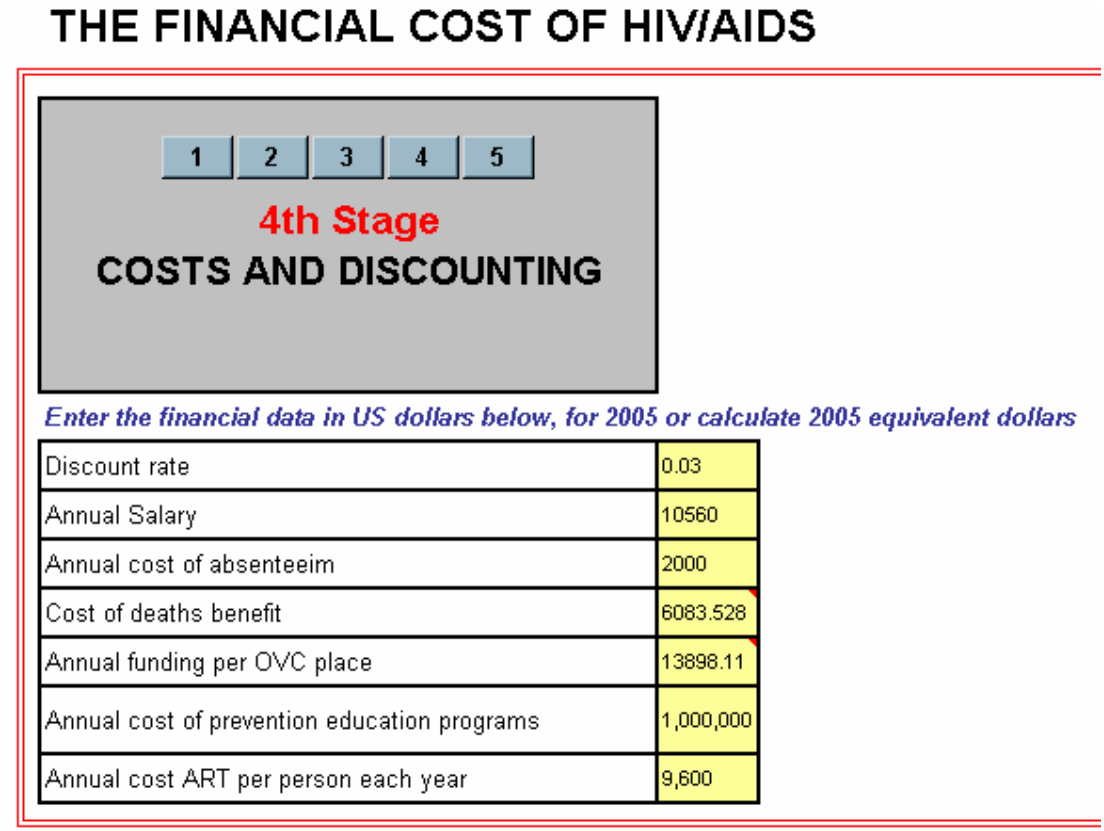
Enter the number of school age children, the percentage or number enrolled, the percentage or number of AIDS orphans and the histo

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	20
School aged children	490000	511926	530157	548028	565664	583154	600534	615407	652736	634711	6
Gross/Net enrolment rate	28%	35%	40%	44%	46%	48%	48%	50%	50%	58%	
Number of children enrolled	136643	178787	212919	240980	259282	281476	288197	304651	328984	370258	3
Percentage of AIDS orphans	0.02%	0.03%	0.05%	0.08%	0.12%	0.15%	0.18%	0.23%	0.26%	0.33%	
Number of AIDS orphans	79	148	254	418	587	772	987	1250	1550	1880	
Pupil-teacher ratio	37	41	39	38	39	40	42	42	44	48	

3.2.6 The cost of HIV/AIDS

The facility for prediction of the economic impact of HIV is included in Ed-SIDA. Costs are those incurred by the ministry of education. Actual costs incurred could include those of covering the classes of a teacher absent due to HIV/AIDS, any deaths benefit paid to the family of a deceased teacher, including funeral costs, the cost of training a new teacher to replace one who has died, and the human capital loss (i.e. the loss of experience and years of training) resulting from teacher death. Large costs are incurred where orphans are supported by the MoE. Of particular interest is the cost-effectiveness of antiretroviral therapy (ART), which is expensive but saves expenditure on teacher substation, replacement and death benefits.

Screenshot 4. <Parameters (data entry)> sheet of **edsida.xls** where data are entered to allow assessment of the economic impact of HIV on education.



3.3 Entry of variables, sensitivity analysis, and assumptions about the future

This stage allows exploration of possible scenarios. All the data may be modified by the user of course, but as the data in this section are the least dependable, exploration of alternatives is strongly advised. To aid appreciation of the effects of such variation of input, graphical representations are displayed to the right of the data entry cells for each variable.

3.3.1 HIV prevalence

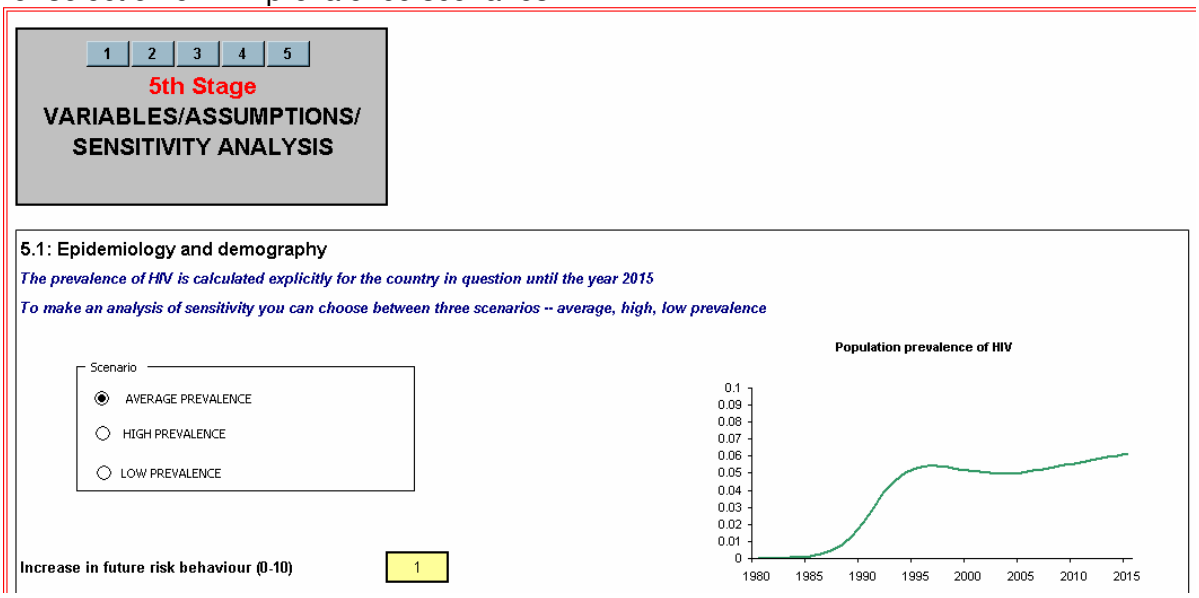
In the implementation of the model accompanying this manual, high, low and medium prevalence scenarios can be explored. The high and low scenarios are created from the medium by raising or lowering the prevalence curve based on the relative magnitude of the most recent UNAIDS prevalence estimates of the country of implementation.

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. HIV prevalence curves are generated using UNAIDS models and entered into the model prior to each country-specific implementation.

In addition to the prevalence scenario, a facility is included to allow the possibility of a future increase in incautious behavior leading to an increase in prevalence. Increase in risk is entered in a box where 0 = prevalence continues according to the UNAIDS model curve and 10 = large new epidemic occurs.

Screenshot 5. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for selection of HIV prevalence scenarios.

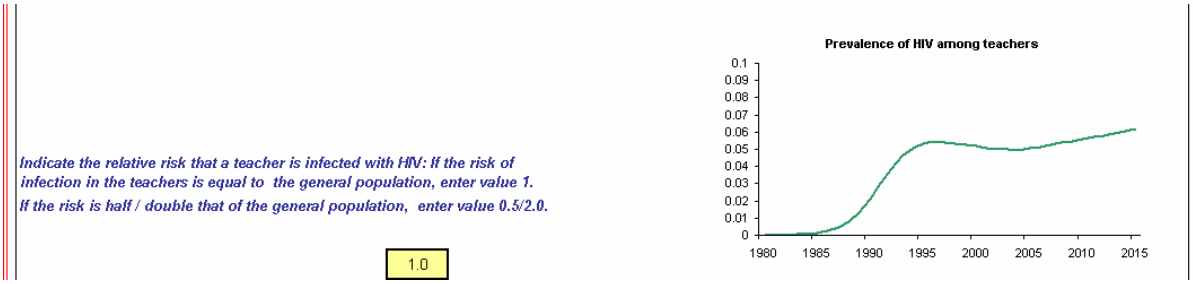


3.3.2 Relative risk of HIV infection in teachers

The prevalence and incidence 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 Screenshot 6. 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.

Screenshot 6. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for relative risk of a teacher being infected compared to the general population.



3.3.3 AIDS 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.

3.3.4 Projections

Teacher attrition

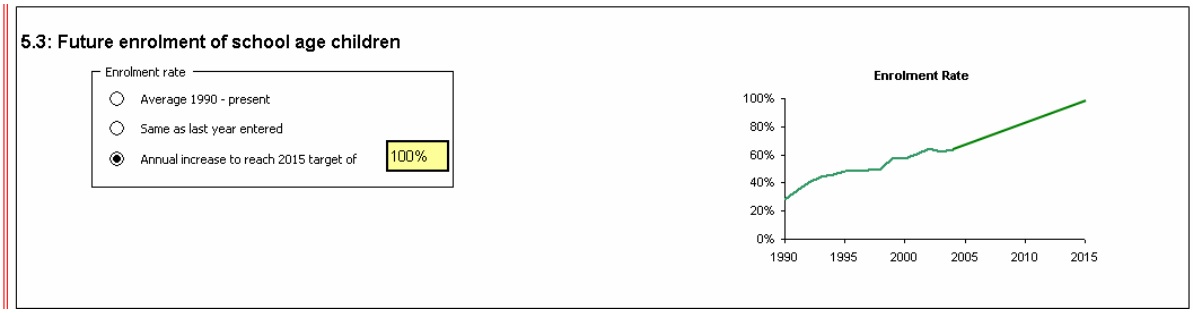
Two options are possible here, and in both, the projection is constant : attrition rate of the magnitude of the last year entered, or of the average attrition over the years entered.

Screenshot 7. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for projected attrition rate

Future enrolment

The enrolment rate can be held constant at an average or a last-entered level, or can be increased in a linear fashion to achieve a user-entered 2015 target:

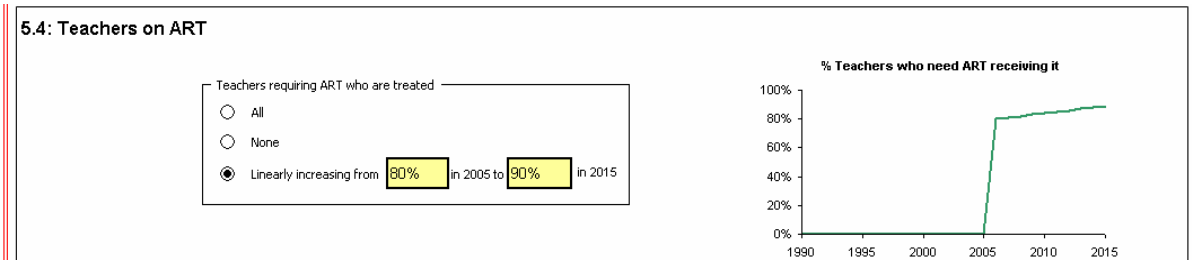
Screenshot 8. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for future child enrolment



Treated Teachers

Many countries have policies to treat teachers requiring ART. This input allows the user to specify that in the future, all teachers requiring treatment will receive it, none, or a fixed or an increasing proportion of them will.

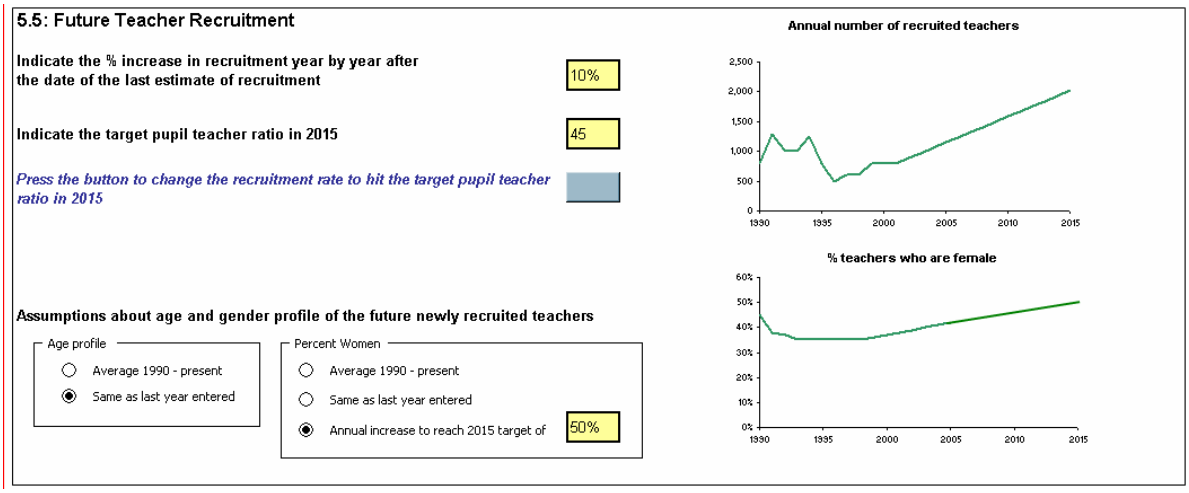
Screenshot 9. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for teachers on ART



Teacher recruitment

The user may wish to vary teacher recruitment as it pertains to two targets: a low pupil teacher ratio and an equitable teacher gender profile. Once target 2015 PTR is entered, the required recruitment may be calculated by Ed-SIDA when a button is clicked:

Screenshot 10. Screenshot of <Parameters (data entry)> sheet of **edsida.xls** for teacher recruitment



3.4 Model outputs

3.4.1 Within-spreadsheet view

Ed-SIDA automatically outputs the following projections (in the <Projections> sheet of **edsida.xls**) from 1990 to 2015 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 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
- The total recruitment of teachers and the recruitment required to replace those teachers dying of AIDS
- pupil-teacher ratio in presence and absence of HIV/AIDS.
- Absenteeism of teachers due to HIV
- Attrition due to HIV
- cost of HIV/AIDS epidemic in terms of teacher deaths and absenteeism; OVC funding; AIDS prevention education; and the human capital costs over the years of teacher loss. These are given both by year and cumulative since the start of the epidemic.

As indicated in the examples, these results are represented graphically in the <Teacher plot>, <Pupils>, <Recruitment>, <Pupil teacher ratio>, <Absenteeism>, <Attrition>, <Cost Per Year> and <Cumulative Cost> sheets of the **edsida.xls** program.

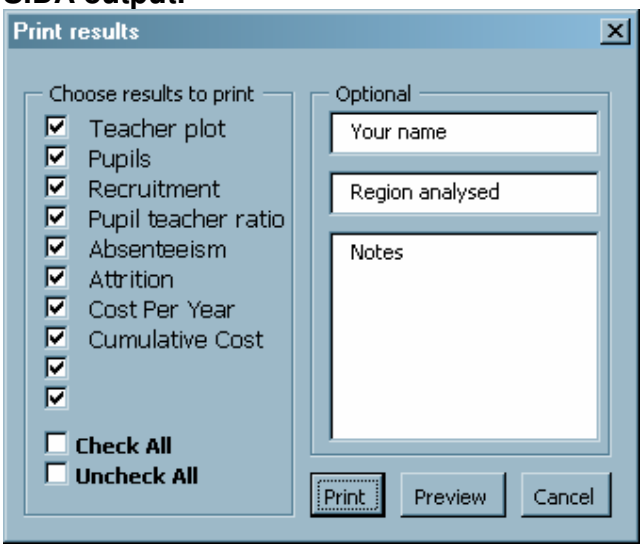
3.4.2 Print View

Ed-SIDA has a function to generate a printed report which neatly presents the results listed above.

This may be achieved as follows:

1. Go to the "PRINT" worksheet
2. Press the button
3. A dialog box will appear (figure 3.3). Select which results you would like in your output via the checkboxes, and add your name, region and notes if you would like these to appear in the printed report.
4. Press "Preview". Look through the pages to be printed (by pressing "Next" if there is more than one page). If this is how you would like the report to appear, press "Print". If some figures are split across pages, you will need to adjust the margins. Press "Margins"; drag the margins until you are happy with the result.
5. Press "Print" and "OK" to sent the report to the printer.

Figure 3.3: Dialog box allowing user to create personalized report of Ed-SIDA output.



4. IMPLICATIONS OF THE Ed-SIDA MODEL

4.1 Examining impact of HIV/AIDS

In addition to helping 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 2015 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

Ed-SIDA currently output the economic parameters: teacher deaths and absenteeism; OVC funding; AIDS prevention education; and the human capital costs over the years of teacher loss. Other specific financial or economic analyses of interest can be performed once 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 by the educational system due to HIV/AIDS occur primarily in the following ways:

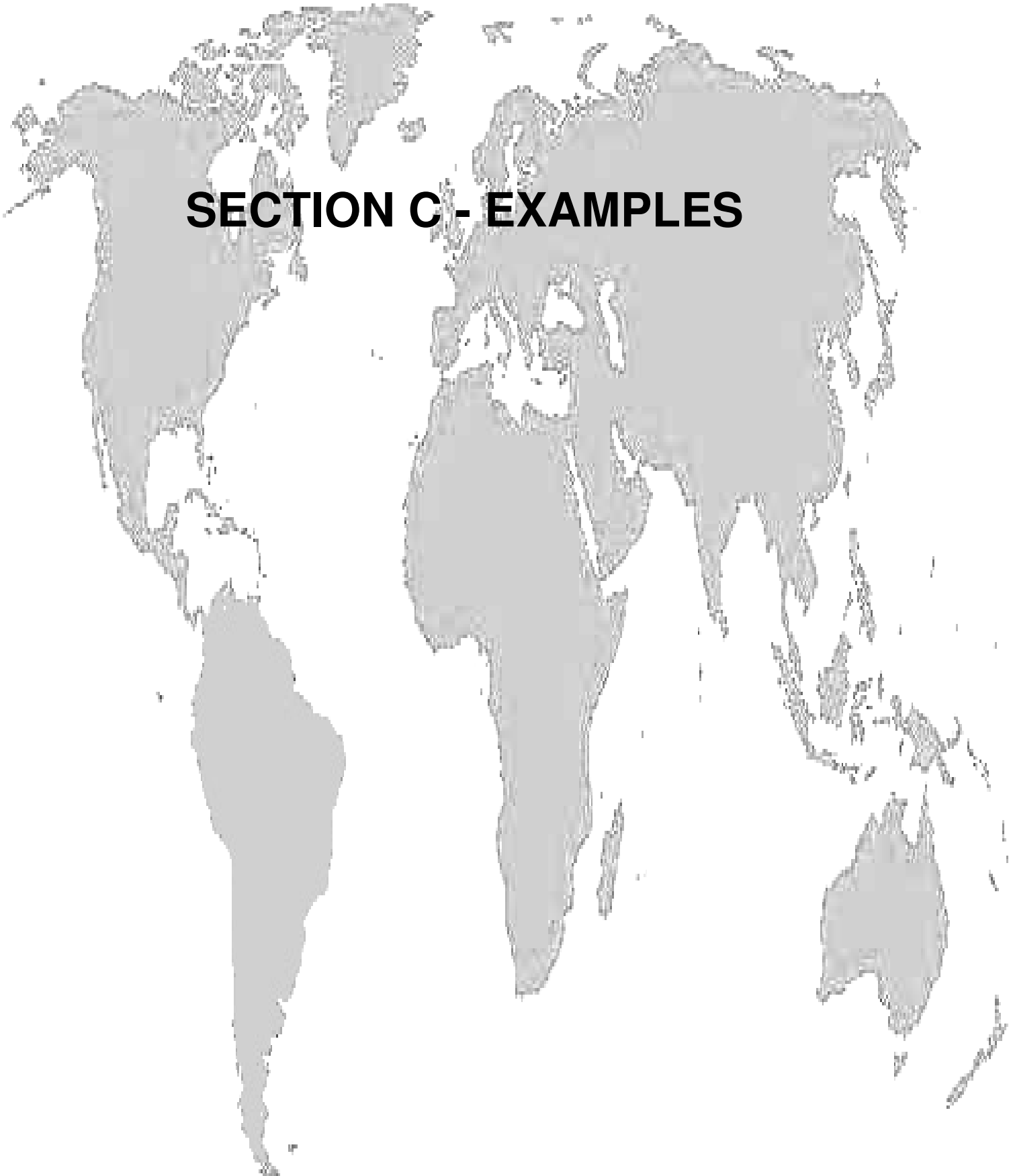
- Training (initial and in-service) of additional qualified teachers to replace those dying of AIDS.
- Training (initial and in-service) of additional qualified teachers to replace those who depart from active teaching to serve in non-teaching posts within the Ministry of Education which are vacated 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.



SECTION C - EXAMPLES

5. APPLICATION OF THE Ed-SIDA MODEL – THE SOUTHERN AFRICAN, HIGH-PREVALENCE EXAMPLE

Southern Africa 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%. Figures in urban areas tend to be double the rural ones; however, in no area 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 a Southern African country's Ministry of Education Headquarters staff and were presented at a Workshop on *Modeling the Impact of HIV/AIDS on Education*. These data are preliminary and may be revised. Financial data were not collected - an economic analysis was not performed. The example spreadsheets are the previous version of Ed-SIDA and are therefore in a slightly different format; but the model is identical.

5.1 The Supply of Education

5.1.1 Data entry

The data presented in *Table1* 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

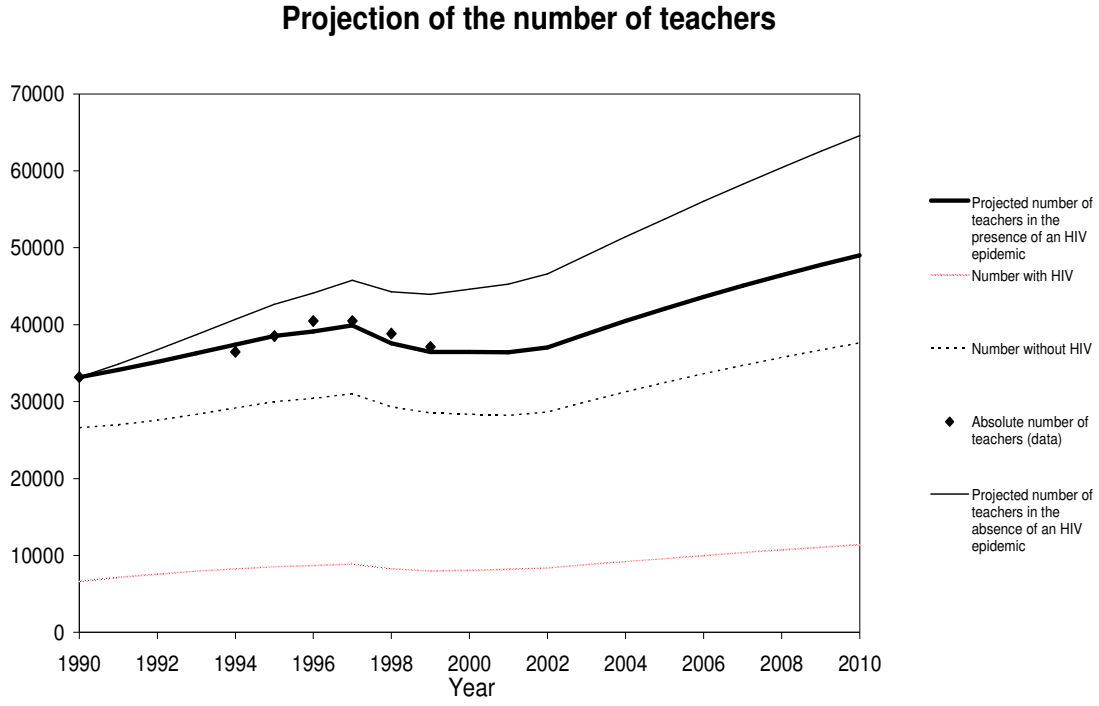
VARIABLES	VALUES
RECRUITMENT	
Total number of registered teachers	33,200 in 1990; 36,484 in 1994 rising to 37,117 in 1999. Data are missing for years 1991-3 and 2000-2
Age and gender of registered teachers (1990-91)	Age 20-24 4551 males 3576 females " " 25-29 3522 " " 2768 " " " " 30-34 2793 " " 2195 " " " " 35-39 2257 " " 1774 " " " " 40-44 1809 " " 1421 " " " " 45-49 1463 " " 1150 " " " " 50-54 1211 " " 951 " " " " 55-59 985 " " 774 " "
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
EPIDEMIOLOGY	
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
LEAVING THE TEACHING PROFESSION PREMATURELY	
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.



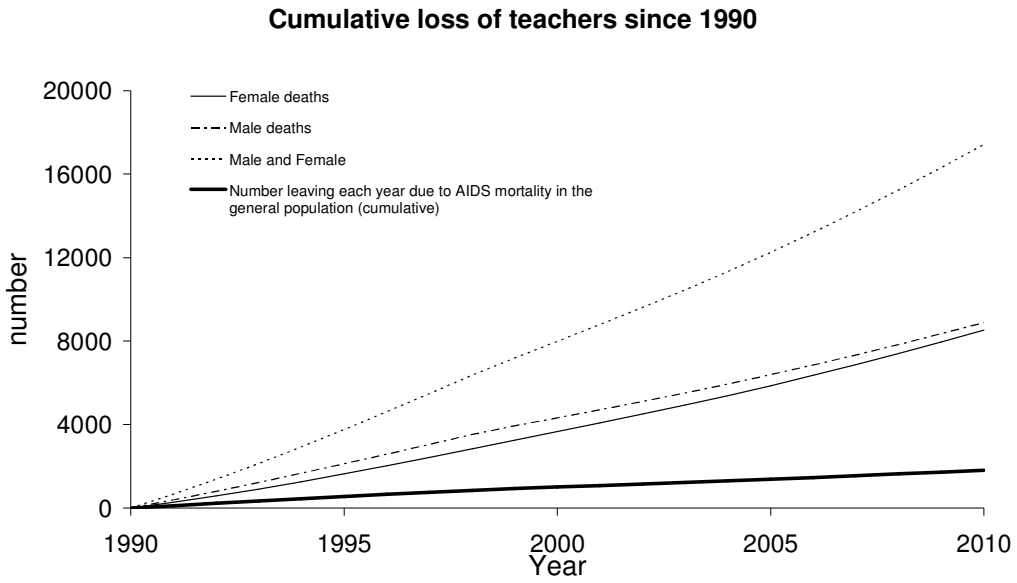
The annual number of teachers' deaths from AIDS is expected to rise from 796 in 2000 to approximately 1,105 a year by 2010. The cumulative number of AIDS deaths between 1990 and 2010 will be 17,416. The number of teachers dying from AIDS each year corresponds to one third of the planned annual recruitment 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 This

country, 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
Total number of teachers under various circumstances		
According to recruitments plans, with HIV	36,443	49,106
According to recruitment plans, without HIV	44 621	64 598
Teachers dying from AIDS		
Per year	796	1105
Cumulative number since 1990	7986	17 416
Loss of teachers to other professions		
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 this country – taken from <Pupils> sheet of **edsida.xls**.

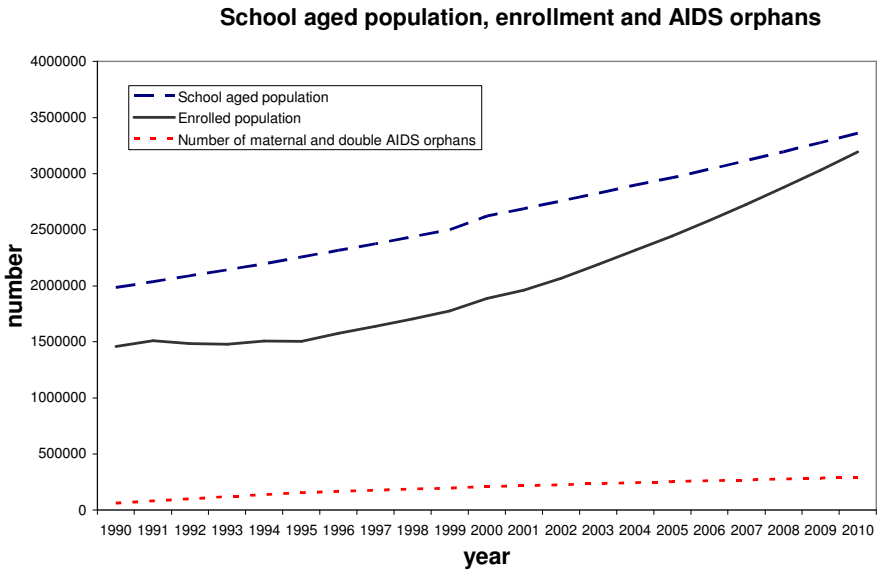


Figure 5.4. Projected pupil:teacher ratio in presence and absence of HIV/AIDS – taken from <Pupil-teacher ratio> sheet.

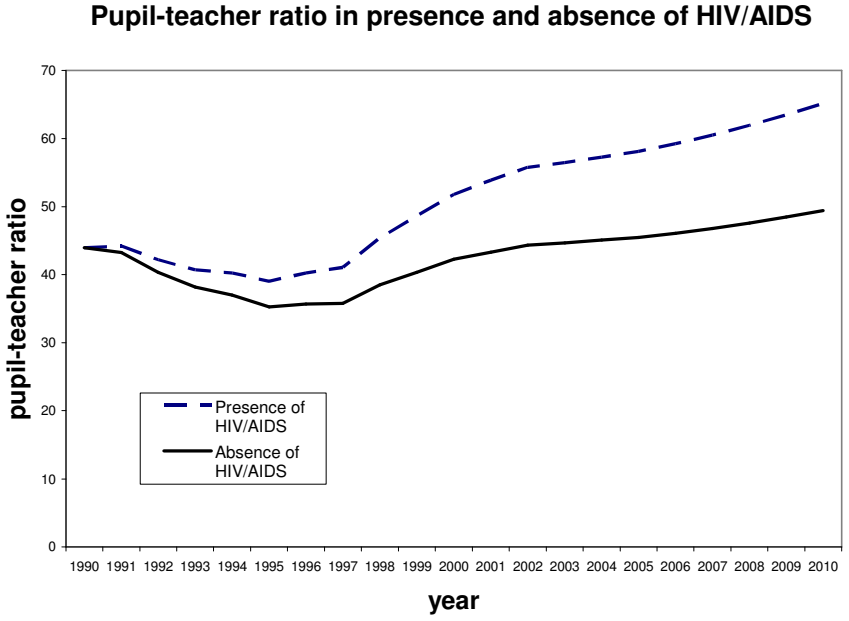


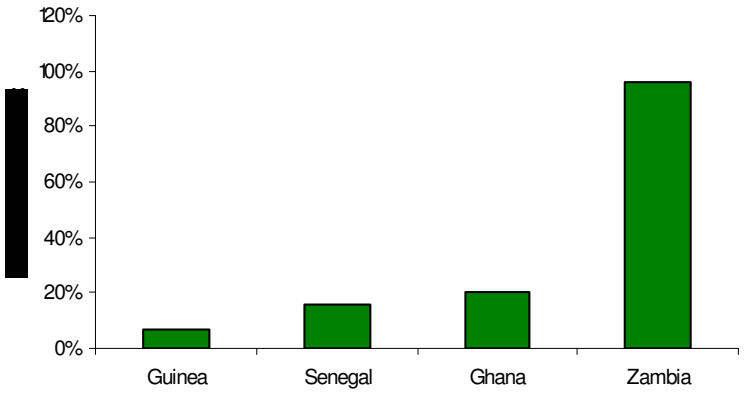
Table 3 summarizes the results from the demand side of the model.

Table 3. Results from the demand side.

	2000	2010
School-age children		
Total number	2,620,000	3,360,500
Total enrolled in school:		
Current enrolment rate (72%)	1,886,400	----
Planned enrolment rate (95%)	----	3,192,500
Orphans		
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, This country 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 a high prevalence country

Currently the Ministry of Education in this country will qualify around 3663 new teachers annually through the newly restructured 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; 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. 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 WESTERN AFRICA LOWER-PREVALENCE EXAMPLE

6.1 The Supply of Education

The low-prevalence example follows in a similar manner to that of the high-prevalence example, but is different in one important facet – the stage of the epidemic. Several western African countries are experiencing an emerging epidemic with prevalence rates of HIV rising from around 3% in 1990 to 6.4% at the 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 a low-prevalence Western African country 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 – low prevalence example

VARIABLES	VALUES
RECRUITMENT	
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 gender of registered teachers (1990-91)	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, 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
EPIDEMIOLOGY	
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
LEAVING THE TEACHING PROFESSION PREMATURELY	
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

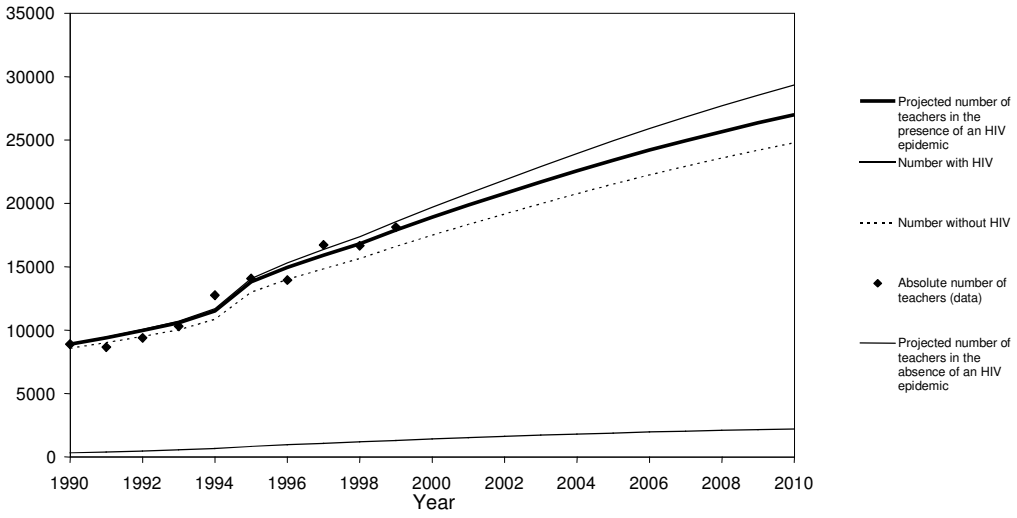
6.1.2 Projections from the model

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 this country 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 High prevalence 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 This country. This is in stark contrast to the high prevalence example where the number of annual teachers dying equal one-third of those being recruited.

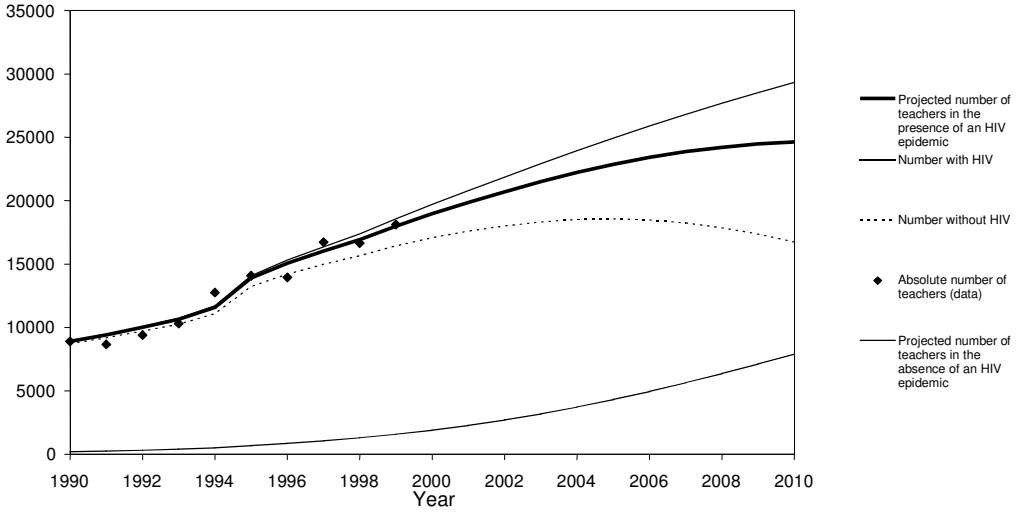
Further information can be derived from exploring the range of outputs of the Ed-SIDA model.

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

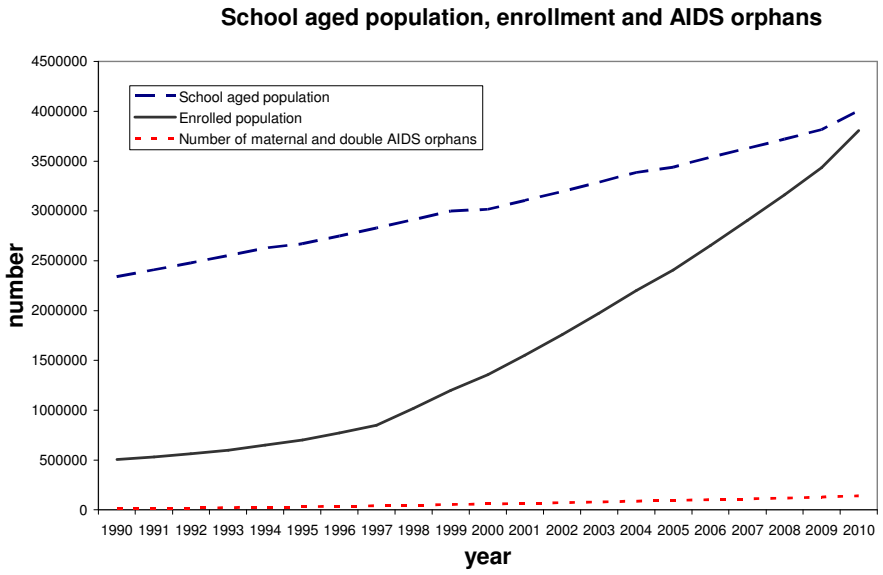


6.2 The Demand for Education

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 to 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.

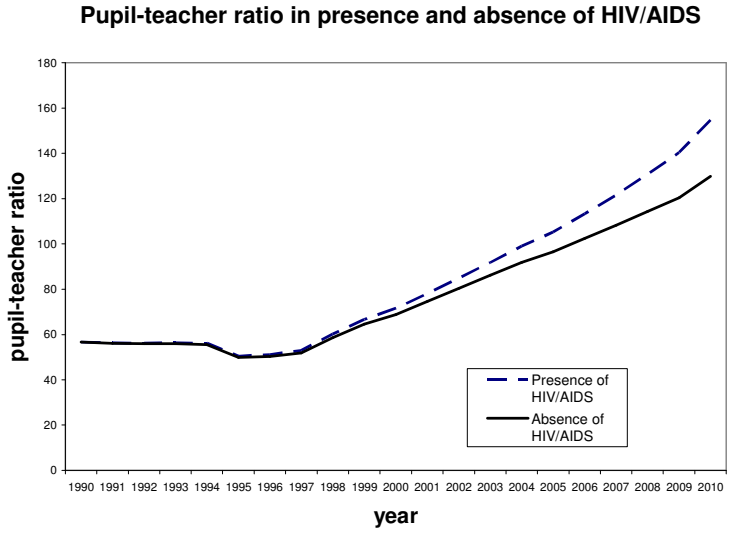
Figure 6.2. Projected number of school-age children, numbers enrolled and number who lost their mother or both parents to AIDS in a low prevalence country – taken from <Pupils> sheet.



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 accurate data are entered, the Ed-SIDA model is a simple and valuable means of 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 has published a "Sourcebook of HIV/AIDS prevention in schools" (World Bank 2004) which provides 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 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.

9) Currently roll-out of ART provision is occurring in many African countries, which will shape the epidemic, by preventing deaths and altering transmission. The provision of ART to teachers is now included in Ed-SIDA to enable an assessment of the costs and consequences of such treatment.

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, esp. 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.

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

IIEP	International Institute for Educational Planning, part of UNESCO
MAP	Multi-Country HIV/AIDS Program for Africa
NGO	Non-governmental organization
PCD	Partnership for Child Development
SES	Social and Economic Surveys
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
UN	The United Nations
UNAIDS	The UN Programme on HIV/AIDS (the agency that coordinates the response to HIV/AIDS)
UNESCO	The UN Educational, Scientific and Cultural Organization
UNFPA	The UN Population Fund
UNGASS	The UN General Assembly Session
UNICEF	The UN Children's Fund
USAID	The USA Agency for International Development
WHO	The World Health Organization

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