Putting it together

AIDS and the Millennium Development Goals

September 2005

International AIDS Vaccine Initiative

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Policy Discussion Paper

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
DHS	Demographic and Health Survey
DOTS	Directly Observed Treatment Short-course
GDP	Gross Domestic Product
HDI	Human Development Index
HIPC	Heavily Indebted Poor Country
HIV	Human Immunodeficiency Virus
LDC	Least Developed Country
MDG	Millennium Development Goal
ODA	Official Development Assistance
TB	Tuberculosis
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Contents

Progress toward selected MDGs by region [1,2]

			MDG progress					
Region	**Adult HIV prevalence rate, 2004**	**Population, 2002 (millions)**	**Goal: Eradicate extreme poverty and hunger**		**Goal: Achieve universal primary education**	**Goal: Reduce child mortality**	**Goal: Improve maternal health**	**Goal: Combat infectious diseases**
			Reduce extreme poverty by half	Reduce hunger by half	Universal primary schooling	Reduce child mortality rate by two-thirds	Reduce maternal mortality ratio by three-quarters	Halt and reduce the spread of tuberculosis
Sub-Saharan Africa	7.2%	638	Very high	Very high	Low	Very high	Very high	High
Independent states, Europe	1.2%	206	Low	Very low	Moderate	Low	Low	Moderate
Southern Asia	0.7%	1,382	High	High	Moderate	High	Very high	High
Latin America and the Caribbean	0.7%	535	Moderate	Moderate	High	Moderate	Moderate	Low
Oceania	0.6%	8	--	Moderate	Moderate	High	High	High
Southeastern Asia	0.5%	536	Moderate	Moderate	High	Moderate	High	High
Commonwealth of Independent States, Asia	0.2%	73	Low	High	High	High	Low	Moderate
Northern Africa	0.1%	148	Low	Very low	High	Moderate	Moderate	Low
Eastern Asia	0.1%	1,375	Moderate	Moderate	High	Moderate	Low	Moderate
Western Asia	<0.1%	190	Low	Moderate	Moderate	Moderate	Moderate	Low

Note: Words in each box refer to the absolute level of the indicator (e.g. “high” when applied to poverty indicates a high level of poverty, which is unfavorable; “high” when applied to school enrollment indicates a high level of enrollment, which is favorable).

The colors of each box show the trend toward meeting the target by 2015.

- Target already met or very close to being met
- Target expected to be met by 2015
- Target not expected to be met by 2015
- No progress or a deterioration or reversal
- Insufficient data

1 Introduction

One of the most important and visionary global actions of recent years was the commitment in September 2000 by 189 governments from around the world to "making the right to development a reality for everyone and to freeing the entire human race from want."[3] As a global priority, the movement to achieve sustainable reductions in all dimensions of extreme poverty has reached an unprecedented level, with efforts focused on and measured against the agreed Millennium Development Goals (MDGs) set for 2015.[4]

To date, progress towards achieving many of these goals has been mixed: in some regions of the developing world, such as East Asia, most countries have made important gains across the board and are thus "on track" or better for reaching many MDG targets. But in other regions, most notably in sub-Saharan Africa, a large number of countries are far behind and appear unlikely to reach or even come close to reaching their goals for 2015.[4] The reasons for this are complex and often interlinked, but one stands out as a major overarching threat to development: HIV/AIDS, the leading cause of mortality among adults worldwide.[5] The severe health impacts of AIDS - illness, incapacity and death - are increasingly well documented and understood. But AIDS also affects countries' fundamental development performance and exerts detrimental effects on many of the other MDGs. AIDS will make it difficult if not impossible for many countries to achieve their MDG targets.

There has been considerable progress on the global response to AIDS, with a concomitant increase in the resources for the currently available range of interventions for prevention, treatment and care. Yet AIDS ravages large parts of the world today and will continue to do so in the absence of new preventive technologies, including a vaccine, which represents the best hope for eventually controlling the epidemic.

To further explore the links between fighting AIDS and improving other development outcomes, the International AIDS Vaccine Initiative (IAVI) commissioned this paper to review the literature on the impact of AIDS on selected MDGs.

With the introduction of a safe, effective and accessible AIDS vaccine still some years away, it is unclear whether a vaccine will be available in time to contribute much to progress towards the MDG targets between now and 2015. But to sustain progress in fighting poverty and achieving basic social goals over the longer run, developing countries urgently require new HIV prevention technologies - especially an AIDS vaccine - and major investments are needed now if such a vaccine is to emerge in the future.

Increasing the global commitment to AIDS vaccine research and development must therefore be part of the world's long-term global poverty reduction efforts. Commitment should include provision of increased funding; stronger political support, especially deeper involvement of developing countries; and a more coordinated and active scientific effort. That commitment is needed today and must be sustained over the years to come, to 2015 and beyond.

II Rationale for this paper

The UN's recent progress report, *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*, assesses progress so far, identifies development gaps by country and region, and advocates strategies for reaching the targets.[4] The report does not, however, systematically describe how the MDG indicators interact with and reinforce each other.

This paper examines in depth one such interaction, specifically how HIV/AIDS impedes numerous MDGs, beyond the direct target dedicated to reducing the HIV epidemic itself. The MDGs affected by AIDS that are examined here include:

- **Eradicating extreme poverty and hunger,**
- **Achieving universal primary education,**
- **Reducing child mortality, and**
- **Combating tuberculosis.**

The paper describes the effects of HIV and AIDS on each of the MDGs in turn. This approach does not attempt to capture all the interactions among these development outcome measures. In addition, the paper is uni-directional in its analysis of the impact of AIDS on other development goals: it does not try to explain how poverty, malnutrition or poor educational status increase transmission of and susceptibility to HIV. This connection has been explored in many other studies.

This analysis draws on primary sources published over the past five years (2000-2005), though some references are also made to secondary sources. During the search, which was carried out during January-February 2005, the authors selected key representative material only. They relied on consultations with experts in the five fields, in addition to general database searches, to obtain sources for the review.

Key findings

HIV/AIDS increases poverty

Goal: Eradicate extreme poverty and hunger

Target: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day

Indicator: Proportion of population below $1 per day

Nations suffer at the macroeconomic level

At the national level, economists have used a variety of modeling techniques to estimate the impact of AIDS on GDP growth in high prevalence countries. A range of studies have argued that AIDS lowers GDP growth by up to 1.5% per annum (cited in [6]). An analysis across 80 developing countries predicts that in a "typical" African country with 20% HIV prevalence, the rate of GDP growth would be 2.6% lower each year than in the absence of AIDS, due to a reduction in growth per capita (1.2%) and a shortfall in population growth (1.4%). At the end of a 20-year period, GDP would be 67% lower than it would have been without AIDS.[7]

Households face revenue losses and heavy costs

Because of the high medical and other costs of HIV-related illness and death and because AIDS often kills working-age adults, the epidemic can have a very large impact at the household level. Studies from Thailand and South Africa demonstrate that poverty is higher among AIDS-afflicted households than among families without HIV-infected members.[8,9] As families lose earnings and spend savings due to illness and death from HIV and AIDS, the goal of reducing extreme poverty becomes increasingly remote.

A recent analysis of household data from Botswana drawing on income and expenditure surveys, shows that HIV/AIDS can be expected to lower average income per capita by 10% (base case) over the next ten years. It also predicts that the share of households below the poverty line will increase by 6%, and it shows that the income loss is twice as large among the poorest households as it is for the population as a whole, meaning that extreme poverty will become entrenched due to HIV/AIDS. Looking at the bottom of the income distribution, the analysis points to a dramatic increase in the number of destitute households, i.e. households with no income earners.[10]

A cross-country analysis of household responses to AIDS in rural areas of five high-prevalence countries (Kenya, Malawi, Mozambique, Rwanda and Zambia) shows a correlation between AIDS and declines in household wealth. Adult AIDS deaths in Kenya, for instance, had a significant impact on both crop income and value of household assets. The results from some countries, however, were not statistically significant, possibly because many of those who died of AIDS were young women and men who were economic dependents or did not contribute substantially to family income.[11]

A case study from the Phayao province of northern Thailand used a cross-sectional design to investigate the behavior of households with and without chronically ill adults. The study found that the main caregiver stopped working outside the household in 25% of households with a sick adult. Consumption also fell by 25-52%, depending on whether households were located in districts with or without support services. Families coped with having a chronically ill member in a variety of ways that tend to increase poverty, including selling assets and borrowing money.[12]

These effects will escalate over time

The long-term negative impact of AIDS, both at a macroeconomic level and for individual households, can be expected to accelerate. Classic GDP growth models have been criticized as too optimistic because they fail to capture the negative long term inter-generational effects of HIV/AIDS. The impact of HIV/AIDS on economies will be magnified, these critics argue, when current AIDS orphans reach working age, earn reduced incomes and possess less capital to invest in the future of their own children. The steadily increasing number of orphans indicates how severe this problem could become (Box 1).

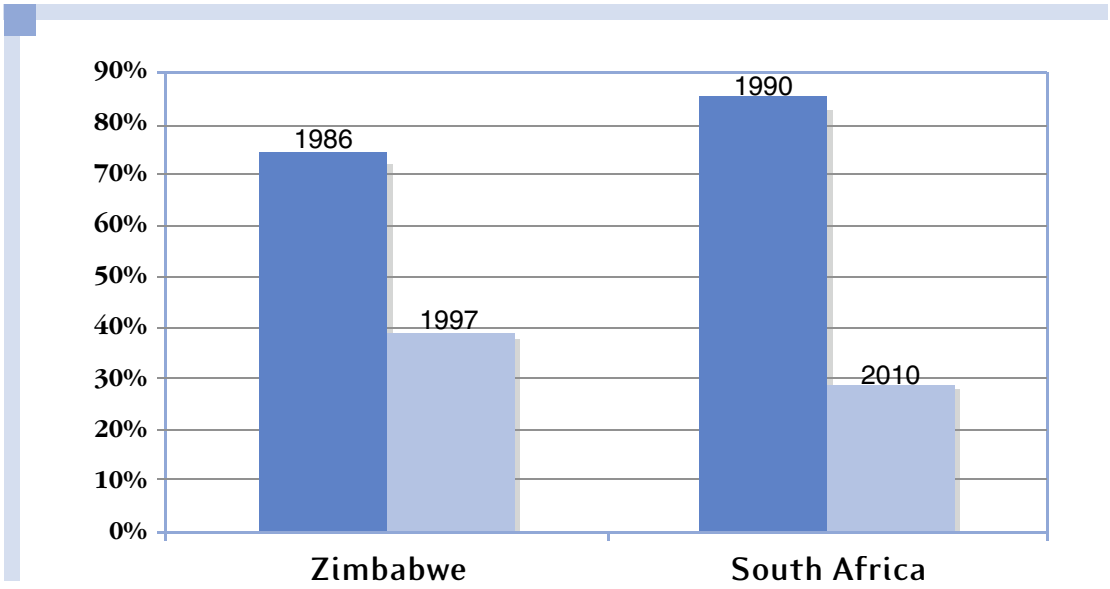
In a recent publication, Bell, Devarajan, and Gersbach modeled the impact of HIV/AIDS over three generations to demonstrate that AIDS may produce a progressive collapse of the economy. Family income decreases during severe illness and following deaths, and scarce household resources force parents to choose in favor of immediate consumption (e.g. food and medical expenditures) over long-term investments in the next generation's human capital (e.g. school fees). As a result, children of parents who die of AIDS possess less human capital, which is transmitted over generations.[13] A similar analysis also shows that, even though traditional models indicate that AIDS will significantly affect macroeconomic growth in some countries, the future effects may be even more severe than current estimates suggest.[14]

The increasing number of children who become orphans due to AIDS can also be expected to raise poverty levels over time since orphans add to the economic burden of their adoptive families and communities. A model based on data from Zimbabwe showed that as a result of AIDS, by 1997 only 39% of children lived in households in which both parents were still alive. In South Africa, only 29% of children are expected to be living with both parents at the end of the current decade. More than half will be in single-parent households, and nearly a fifth of children will have lost both parents (Figure 2).[13]

Box 1. Orphans - statistics and predictions [5,15]

- 15 million children have been orphaned by AIDS worldwide
- 8 in 10 live in sub-Saharan Africa
- The proportion of orphans under 15 years of age is as high as 17% of all children in some countries
- By 2010, there may be as many as 18 million children orphaned by AIDS in sub-Saharan Africa alone

Figure 2. Probabilities of two parents surviving over time [13]



HIV/AIDS worsens the nutritional status of children

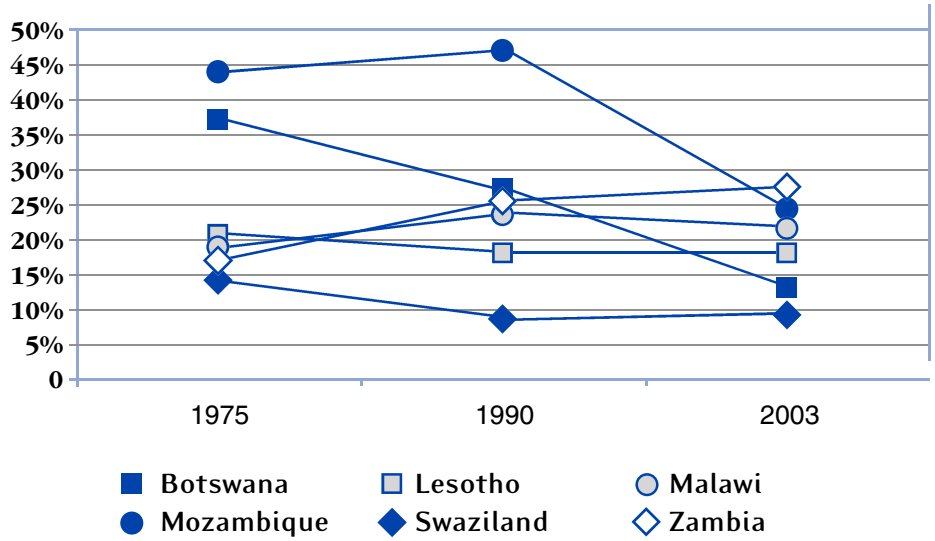
Goal: Eradicate extreme poverty and hunger

Target: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Indicator: Prevalence of underweight children under five years of age

Worldwide, 53% of annual deaths among children under five years of age are associated with malnutrition.[5] Figure 3 shows rates of underweight children in six high HIV prevalence countries. Four of the six countries are not making much progress in lowering child malnutrition, and two (Malawi and Zambia) have seen malnutrition rates grow over the last few decades and are currently far "off track" in reaching the malnutrition target for 2015. Two of the countries - Mozambique and Botswana - seem to be making better progress. But it is difficult to see a clear link between HIV and malnutrition at the macro level because a number of other factors, including income growth, income distribution, and cyclical droughts also have an important impact on child nutritional status.

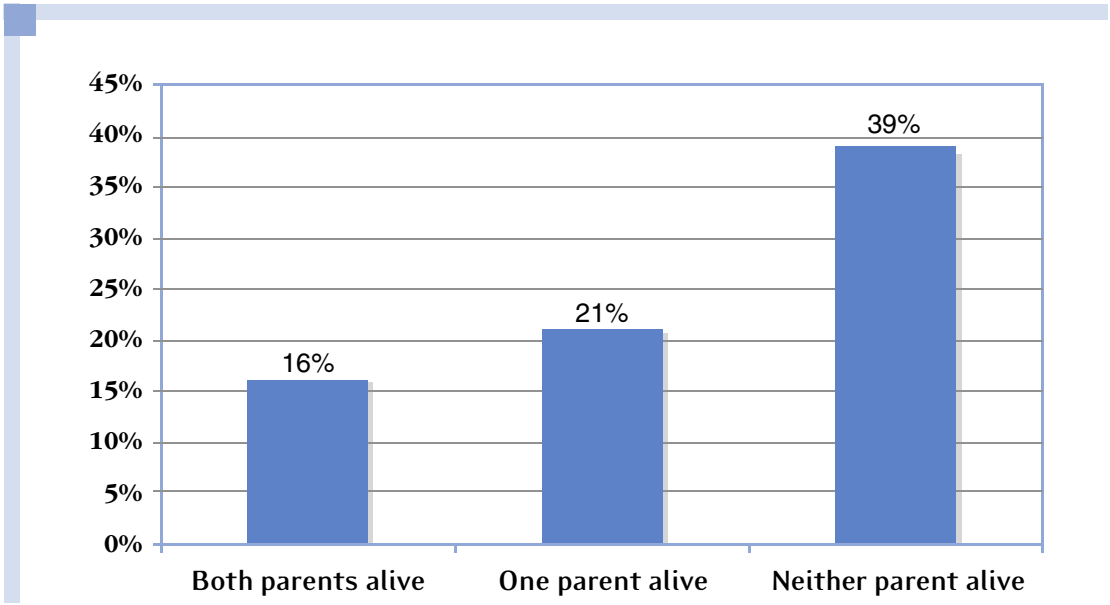
Figure 3. Nutritional status of children under five who are underweight in selected high-HIV-prevalence countries, 1975-2003 (adapted from [15])



When these other confounding factors are removed, however, there is growing evidence of an important link between child nutrition, food security and HIV/AIDS. Falling calorie and protein consumption and increasing income inequality are strongly inversely correlated with HIV prevalence in 44 sub-Saharan countries.[16] Some data suggest that HIV/AIDS contributes to food crises in areas where HIV prevalence is high, possibly because of the way that AIDS affects poverty, illness and lost agricultural productivity.[17] For example, a recent study that examined the impact of the 2002 drought in southern Africa found that in six countries affected by the drought, child nutrition rapidly deteriorated in the presence of high HIV prevalence. The share of underweight children rose from 5% to 20% in Maputo (Mozambique, 1997-2002), from 17% to 32% in Copperbelt (Zambia, 1999-2001/2), and from 11% to 26% in Midlands Province (Zimbabwe, 1999-2002). Changes were much smaller during non-drought periods and in areas with lower HIV prevalence.[18]

AIDS also affects child nutrition through parental mortality: orphaned children are more likely to live in poverty conditions and are less likely to receive adequate nutrition than children in non-orphan households. For example, in the Kagera region of Tanzania, maternal orphans lost on average one standard deviation in height, while paternal orphans' height declined one-third of a standard deviation.[19] A study from Kenya found that the weight-for-height scores were almost 0.3 standard deviations lower for orphans than for non-orphans, an association that was most pronounced among paternal orphans.[20] Based on data from regional and national demographic surveys, Mason et al report that in Zimbabwe, orphans were significantly more likely to be underweight than children whose parents were both alive. And in Lesotho, almost 40% of children under four who had lost both parents were underweight, compared to approximately 16% of non-orphans (Figure 4).[18]

Figure 4. Underweight prevalence among children under four, Lesotho [18]



AIDS compromises efforts to reach universal primary education

Goal: Achieve universal primary education

Target: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Indicator: Net enrollment ratio in primary education

Indicator: Proportion of pupils starting grade 1 who reach grade 5 (completion rate)

The AIDS epidemic can affect both the "demand side" and the "supply side" of education. On the one hand, it has been argued that AIDS prevents children from enrolling in school or causes them to be taken out of school before they have completed primary education. On the other, AIDS may cause absenteeism and mortality of teachers and other staff, thus lowering the quality of learning and preventing children from obtaining a basic education.[21]

The data suggest that many developing countries, especially in Africa, are falling badly "off track" in their efforts to reach universal primary school completion by 2015. It is less clear, however, how much of their disappointing performance can be connected to HIV and AIDS or with other factors. AIDS appears to be one of the causative factors.

AIDS reduces the demand for schooling

Children in AIDS-affected areas may drop out of school because they can no longer afford fees or supplies or because their families increasingly rely on them to contribute economically to the household or to provide care for ill family members. In a study conducted in the Kagera region of Tanzania, young children (7-10 years) who lost their mothers had their schooling delayed, while enrollment of older children (11-14 years) was maintained.[22] Another study in Zimbabwe found that adult deaths negatively affected school enrollment for the children of those who died. Overall, 65% of children aged 13-15 years had completed primary school, but the completion rate for maternal orphans was only 53%.[23] A survey of panel data from Indonesia found that 14% of children who had recently lost a parent dropped out of school between ages 6 and 10, whereas only 7% of non-bereaved children did. In Mexico, maternal death caused a statistically significant 2.3% increase in dropout rates in the first six months following a mother's death; higher levels of household consumption did not reduce this negative effect.[24]

Another study, however, suggests that orphan status may not have a significant bearing on school enrollment.[25] The survey, using enrollment data from 28 countries in Sub-Saharan Africa, Latin America and the Caribbean and one country in Southeast Asia, found larger differentials in enrollment among different countries than between orphans and non-orphans. It also found that the enrollment gap between orphaned boys and girls was not different from the gap between boys and girls living with parents. At the same time, the authors point out that schooling may be most affected before a sick parent dies (when time and household resources are devoted to caring for the ill adult), so the impact of parental death on enrollment may have been greater than the study found.

The theory that orphans face special disadvantage when they are not closely related to the household head may help to explain the discrepancy in these results. A review of 19 DHS studies in 10 African countries found a correlation between enrollment of orphans and the degree to which they were related to their guardians [26]. This finding corroborates the

results of a study in Uganda showing that biological relatedness is an important predictor of the quality of care offered to children.[27]

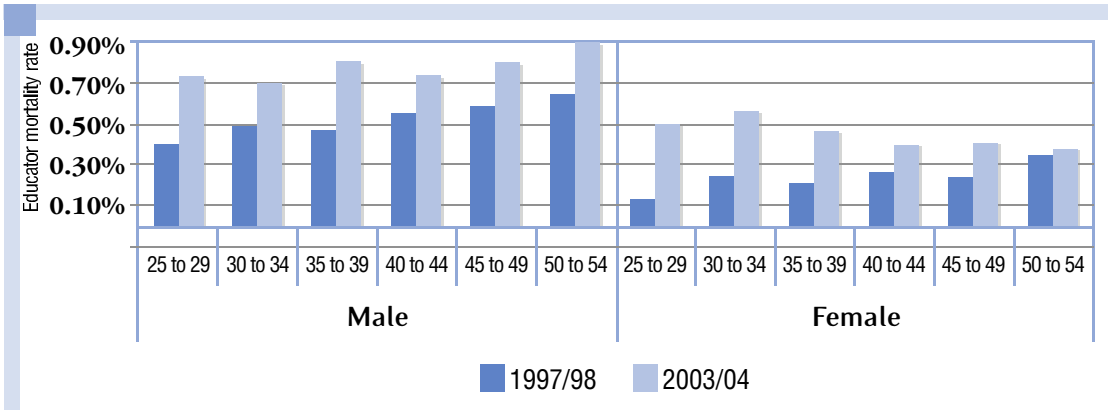
AIDS also hampers countries' ability to supply education

Teacher absenteeism and death may also affect rates of primary school completion as children are left without teachers. In many poor countries, administrators face substantial challenges in finding qualified teachers to replace those who die, and schooling suffers as a result. Even when replacement teachers are readily available, the death of a teacher imposes costs (for temporary and permanent replacement, as well as for training) on education systems that are already fiscally burdened.[28]

A comprehensive case study of the public school system in South Africa provides an overview of educator attrition and mortality trends, stratified by age and gender (Figure 5).[29] Data from about 90% of South Africa's teaching force tracked over seven years (1997/8 - 2003/4) showed that:

- Even though educators in South Africa appeared somewhat less at risk for HIV/AIDS than the general population at the same ages, there were still large numbers of HIV-infected teachers.
- The total number of in-service deaths (from all causes) grew by about 30% during this period.
- The proportion of educator attrition from deaths increased from 7.0% in 1997/98 to 17.7% in 2003/04. The proportion of contract terminations attributed to medical reasons grew from 4.5% to 8.7% over the same period. In other words, a quarter of all teacher attrition is due to death and illness, much of it related to AIDS.

Figure 5. Educator mortality rates by age and gender, South Africa, 1997/98 and 2003/04 [29]



Source: PERSAL and National Death Register

AIDS has a negative impact on child mortality

Goal: Reduce child mortality

Target: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

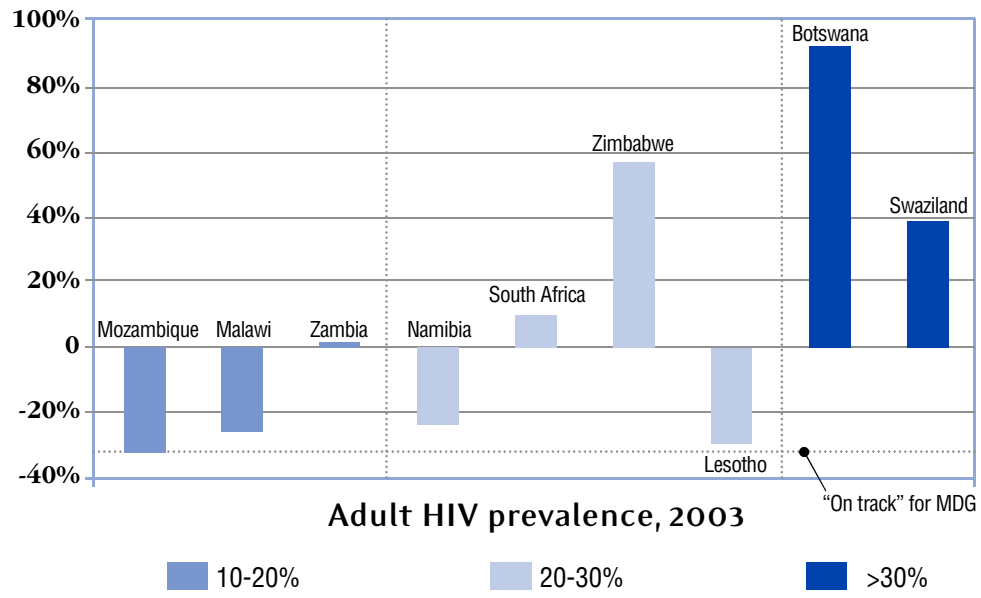
Indicator: Under-five mortality rate

Worldwide, approximately 10.5 million children below the age of five died in 2002; nearly half of these deaths occurred in sub-Saharan Africa. The major killers in the developing world remain infectious and parasitic diseases, with HIV/AIDS accounting for about 400,000 deaths in 2002, about 3.6% of all child deaths globally.[30]

Though AIDS contributes only modestly to the global burden of child mortality [31,32], in high-prevalence countries, the incremental effect of HIV/AIDS on child mortality is substantial. Where the prevalence of HIV continues to increase in young women - as in many countries in sub-Saharan Africa - this effect will grow. One study estimated that by 2015, up to 90% of under-five deaths in Botswana will be directly or indirectly caused by HIV/AIDS.[4]

The challenge of achieving the child mortality MDG in the presence of HIV is illustrated by the recent experience of high-HIV-prevalence countries in Africa (Figure 6). All of these countries are "off track" (i.e. the actual rate of improvement in child mortality is far below what is needed to reach the MDG). In the five countries (Botswana, South Africa, Swaziland, Zambia and Zimbabwe) that currently have HIV prevalence rates above 10%, under-five mortality actually increased between 1990 and 2003.

Figure 6. Change in under-five mortality rate in select countries with high HIV prevalence, 1990-2003 [33]



Note: To be "on track," a country would have to have experienced at least a 33.3% decline in child mortality during the period 1990-2002. Only Lesotho and Mozambique approach this result.

AIDS increases child mortality directly and indirectly

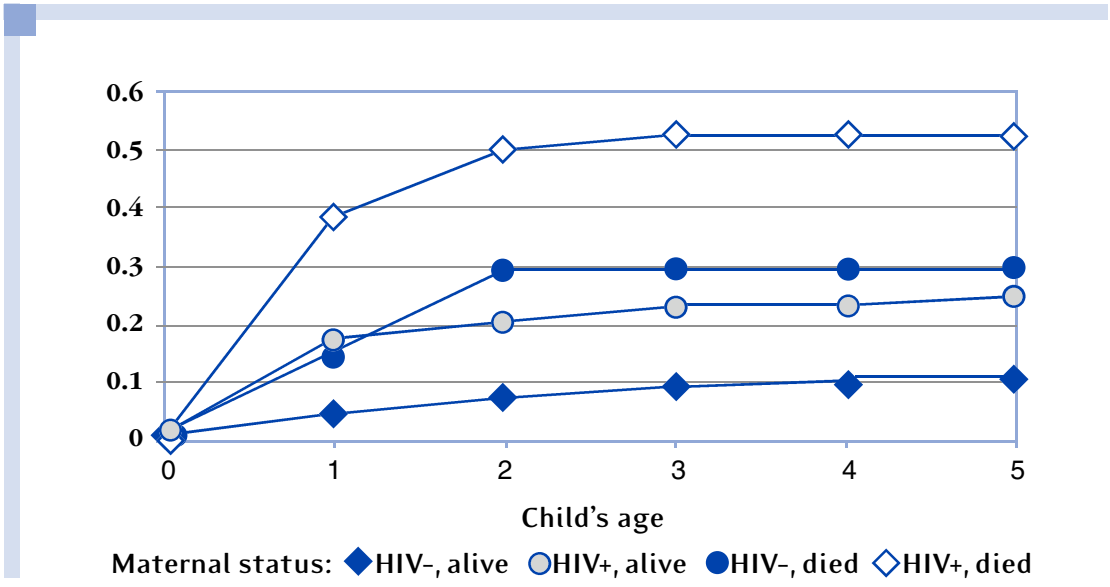
HIV/AIDS impacts child mortality in two ways: infected children themselves die of AIDS, and families and communities weakened by AIDS render children more susceptible to illness and death from other causes.

Approximately one-sixth of the 2.5-3.5 million annual AIDS deaths worldwide occur in children under 15, the majority of whom have been infected through perinatal transmission. Sixty percent will die before their fifth birthday; the mean survival time for HIV-positive children is about three years.[34,35]

But child mortality can be attributed to AIDS even in cases where HIV is not the direct cause of death, since uninfected children are made vulnerable to a range of economic and social consequences from parents' illness and death. Because studies on child survival in relation to maternal HIV status do not gather data on the HIV status of the child, it is difficult separate the direct and indirect effects of maternal HIV seropositivity [34]. But since maternal deaths in general are strongly correlated with child mortality, maternal HIV status is a strong predictor of child survival regardless of a child's HIV status.[36]

Several studies have shown that children born to HIV-infected mothers are approximately three times more likely to die than children born to uninfected mothers. This effect lasts throughout the childhood years, but the risk of dying is highest during the years immediately before and after a mother's death, suggesting that the mother's illness and eventual demise has a strong effect on the child's well-being.[34,37] Furthermore, pooled data from studies in Uganda, Tanzania, and Malawi show not only an increased risk of dying for children of HIV-positive mothers, but also a more marked effect among the children of HIV-positive mothers who died than among those who lived (Figure 7).[36]

Figure 7. Cumulative proportion of children dying by mother's HIV status and survival in Uganda, 1989-2000 [36]

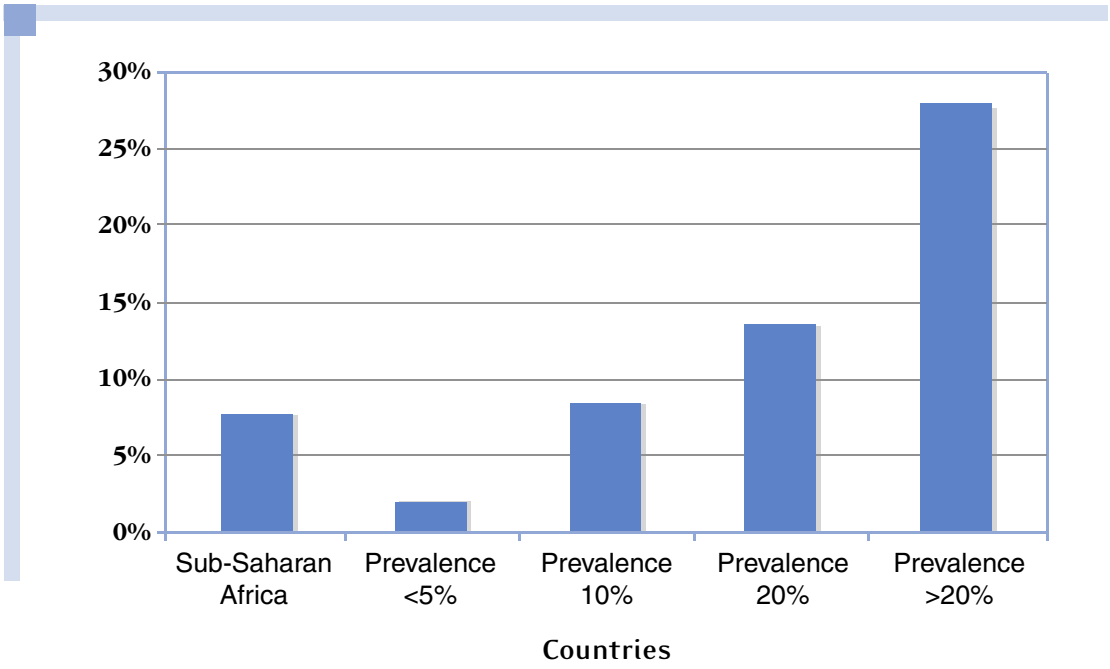


The effect of AIDS on child mortality is increasing

In an analysis of the HIV-related risk of dying before age five in 42 countries in sub-Saharan Africa, the authors estimated that in 1999 HIV accounted for 7.7% of under-five mortality [38], up from 2% in 1990. A more recent analysis estimated that in 2002 nearly 10% of all under-five deaths in sub-Saharan Africa could be attributed to HIV/AIDS.[34]

These figures, furthermore, average the rates across many countries. When the analysis broke down HIV-related proportional attributable child mortality for individual countries for 1999, countries with high prevalence showed the effect of HIV even more strongly (Figure 8). For instance, in Botswana and Zimbabwe, both of which have seen increases in all-cause child mortality since 1990, the percentage of under-five deaths attributable to HIV/AIDS was estimated at 42.4% and 35.1% respectively. In Namibia, where all-cause child mortality has decreased, HIV/AIDS contributes substantially to the under-five mortality rate, accounting for approximately 26.8% of under-five deaths.[38]

Figure 8. HIV-related population proportional attributable risk of dying before age five, sub-Saharan Africa, 1999 [38]



A study on the long-term impact of HIV and orphanhood on child mortality in rural Malawi, where approximately 10% of pregnant women were HIV-positive at the time of the study, estimated that 18% of under-five deaths in this population were attributable to HIV.[39] On the basis of pooled data from community-based studies in Uganda, Tanzania and Malawi on child survival in relation to maternal HIV status, another study estimated that, in a population with adult HIV prevalence of 11%, the population-attributable fraction of child mortality due to maternal HIV infection was 15.7%.[40]

HIV/AIDS worsens maternal health

Goal: Improve maternal health

Target: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Indicator: Maternal mortality ratio

Every year, more than 500,000 women die from complications during pregnancy and childbirth, and at least 20 million suffer serious injuries or disabilities. More than 80 percent of maternal deaths occur in sub-Saharan Africa and Southern Asia, regions vulnerable to rising HIV prevalence rates, exacerbating already high maternal mortality ratios. Both HIV-positive and uninfected women are susceptible to this effect.[41]

Though trend data are limited, recent estimates indicate that while countries and regions with moderate to low levels of maternal mortality have made progress in the past decade, rates have remained static and even worsened in the regions where historical maternal mortality rates were highest.[41] Fractured health systems, shortages of skilled personnel and inadequate education about basic health interventions contribute to high levels of maternal mortality in these regions.

HIV/AIDS creates additional risks to mothers so progress toward achieving the MDG target will be hampered by the growing epidemic. Suppressed immunity causes higher risks of prenatal and childbirth complications including miscarriage, anemia, postpartum hemorrhage, and puerperal sepsis, in addition to indirect causes of death during and after pregnancy, such as malaria or pneumonia.[42,43]

Thus, maternal mortality ratios for women infected with HIV can be substantially higher than for uninfected women. For example, in Durban, South Africa, between 1996 and 1998, one study found that the maternal mortality rate for HIV-positive mothers was 323.3 per 100,000 live births, in contrast to 148.6 for uninfected mothers.[44] In Rakai, Uganda, the rate of maternal deaths of HIV-positive women was more than three times the rate among uninfected women.[45] In South Africa, the proportion of maternal deaths due to indirect infections (including AIDS) increased from 23% to 31% over the period 1998-2001, making these infections the leading cause of maternal mortality.[46]

In areas with high HIV prevalence, women who are not infected with HIV also may be at higher risk for maternal mortality. HIV/AIDS places additional burdens on weak health systems because of the needs of individuals with AIDS and shortages of health professionals. This decrease in the availability of medical care, combined with lack of safe blood for transfusions and lower quality of care due to healthcare worker discrimination, can adversely affect pregnant women.[47]

HIV/AIDS undermines global efforts to control tuberculosis

Goal: Combat infectious diseases

Target: Have halted by 2015 and begun to reverse the incidence of major diseases

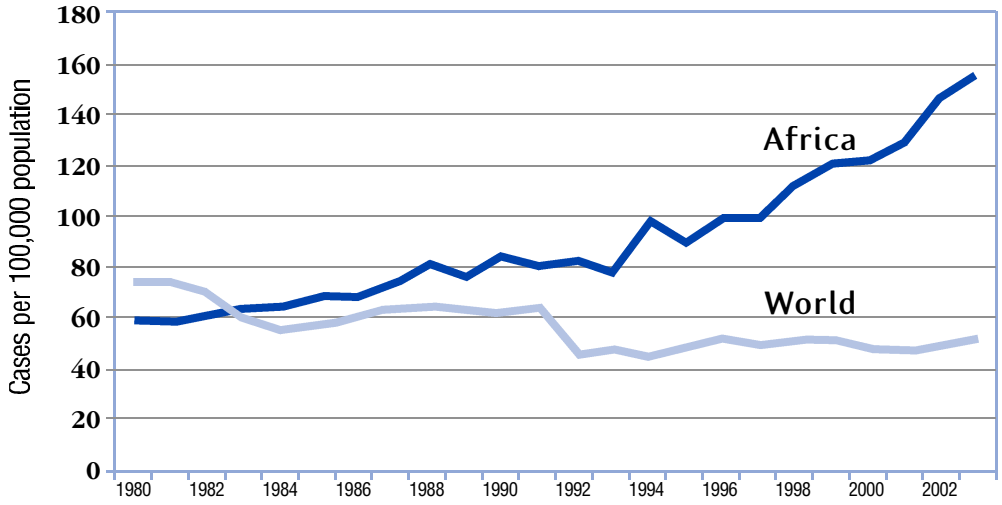
Indicator: Prevalence and death rates associated with tuberculosis

Indicator: Proportion of tuberculosis cases detected and cured under DOTS

The epidemics of HIV and tuberculosis (TB) are closely intertwined. Of the 40 million people currently living with HIV/AIDS worldwide, it is estimated that one-third are also infected with TB.[48] Because their immune systems are compromised, HIV-positive individuals who carry the TB bacillus are more susceptible to active TB than uninfected carriers. And individuals with active TB who are HIV-infected are also harder to treat successfully.[49]

The risk of acquiring TB doubles soon after infection with HIV and continues to increase during subsequent years.[49,50] One study estimated that 9% of the estimated 8.3 million new adult TB cases worldwide in 2000 were directly attributable to HIV.[51] Not only is progress in successfully diagnosing and treating TB (with the Directly Observed Treatment - Short Course (DOTS) approach) slowing, but TB rates are actually increasing in high-HIV-prevalence areas of sub-Saharan Africa (Figure 9). As a result, AIDS is seriously compromising progress in attaining the MDG for TB control.

Figure 9. Tuberculosis case notification rates, 1980-2003 [52]



A recent review on progress toward the MDGs argues that the AIDS epidemic represents the greatest emerging threat to TB control.[53] The spread of HIV in sub-Saharan Africa is primarily responsible for driving the number of TB cases upwards by 6% per year. One analysis finds that if sub-Saharan Africa and Eastern Europe were excluded from global statistics, under current trends the TB prevalence rate could be cut in half between 1990 and 2015.[54]

IV Putting it together:

Sustainable strategies to stop the AIDS epidemic

Failure to halt and reverse the AIDS epidemic is and will continue to jeopardize progress on achieving a wide range of the MDGs. It will not only thwart the direct objective of stopping HIV infection and AIDS-related illness itself; AIDS will also undermine progress in areas as diverse as lowering poverty rates, ensuring that all children attend and complete six years of primary education, reducing child death rates and fighting the global tuberculosis epidemic.

Looking at the time between today and the 2015 target date, it is essential that the delivery of existing interventions for HIV prevention, treatment and mitigation of the social affects of HIV be dramatically scaled up. This will help to reduce the negative effects of the pandemic on the other social and economic goals set by the world community and by individual developing countries.

At the same time and looking beyond 2015, it is equally essential to invest in the development of the new and better technologies needed for more effective prevention, diagnosis and treatment of HIV/AIDS. The best chance of ultimately controlling the epidemic will come from new preventive technologies - vaccines and microbicides - of which vaccines hold the promise of bringing the spread of HIV to an end. Models of the impact of even partially effective vaccines with modest uptake estimate that HIV prevalences can be reduced by up to 47% over 15 years. This could translate to 30-70 million individuals protected from AIDS.[55]

Part of the commitment to long term development and prosperity for the world's poorest countries must therefore include investing in these HIV prevention tools for the future. Governments, donors and civil society need to increase funds for HIV prevention research and product development and build stronger political support, especially for the deeper involvement of developing countries. The international community must also take steps to promote expanded industry participation and a more coordinated and active scientific effort. Such actions are needed today and must be maintained in the years to come.

"For [the poorest] countries, a vaccine is the best hope for salvation, because the world doesn't stop in 2015."

Stephen Lewis, UN Special Envoy for HIV/AIDS in Africa

References

[1] UN Department of Economic and Social Affairs, Statistics Division. "Millennium Development Goals: 2005 progress report." New York, NY: UN DESA, 2005. Available at http://unstats.un.org/unsd/mi/mi_worldregn.asp.

[2] UN DESA, Statistics Division. *Demographic yearbook* 2002. New York, NY: UN DESA, 2002. Available at http://unstats.un.org/unsd/demographic/products/dyb/dyb2.htm.

[3] UN General Assembly, fifty-fifth session. "Resolution adopted by the General Assembly: United Nations Millennium Declaration" (A/RES/55/2). 18 September 2000.

[4] UNDP. Investing in development: A practical plan to achieve the Millennium Development Goals. Overview. New York, United Nations Development Program, 2005.

[5] World Health Organization. Health and the Millennium Development Goals. Geneva, WHO, 2005.

[6] Bell, C., Devarajan, S., and Gersbach, H. The long-run costs of AIDS: Theory and an application to South Africa. World Bank Policy Research Working Paper 3152. Washington DC, World Bank, 2003.

[7] Bonnel, R. Economic analysis of HIV/AIDS. Background paper for ACTAfrica. Washington DC, World Bank, January 2000.

[8] Janjaroen, W.A. The impact of AIDS on household composition and consumption in Thailand. In: Ainsworth, M., Fransen, L., and Over, M., eds. Confronting AIDS: Evidence from the developing world, 349-54. Washington DC, European Commission, 1998.

[9] Booysen, F.R. Poverty dynamics and HIV/AIDS-related morbidity and mortality in South Africa. Paper presented at an international conference on "Empirical Evidence for the Demographic and Socio-Economic Impact of AIDS," Health Economics an HIV/AIDS Research Division, University of KwaZulu-Natal, South Africa, March 26-28, 2003.

[10] Greener, R. The impact of HIV/AIDS on poverty and inequality. In: Haacker, M., ed. The Macroeconomics of HIV/AIDS, 167-81. Washington DC, International Monetary Fund, 2004.

[11] Mather, D., Donovan, C., Jayne, T.S., Weber, M., Mazhangara, E., Bailey, L., Yoo, K., Yamano, T., and Mghenyo, E. A cross-country analysis of household responses to adult mortality in rural sub-Saharan Africa: Implications for HIV/AIDS mitigation and rural development policies, MSU International Working Paper No. 82. Michigan State University, Department of Africa Agricultural Economics, 2004.

[12] Kongsin, S. The economic impact of HIV/AIDS morbidity on households in Upper-North Thailand: Phayao Case Study (dissertation). University of London, 2003.

[13] Bell, C., Devarajan, S., and Gersbach, H. Thinking about the long-run economic costs of AIDS. In: Haacker, M., ed. The Macroeconomics of HIV/AIDS, 96-133. Washington DC, International Monetary Fund, 2004.

[14] Drouhin, N., Touze, V., and Ventelou, B. AIDS and economic growth in Africa: A critical assessment of the "base-case scenario" approach. In: Moatti, J.P., et al, eds. Economics of AIDS and Access to HIV/AIDS Care in Developing Countries: Issues and Challenges, 383-412. Paris, ANRS, 2003.

[15] Bellamy, C. The state of the world's children 2005: Childhood under threat. New York, UNICEF, 2004.

[16] Stillwaggon, E. HIV/AIDS in Africa: Fertile terrain. *Journal of Development Studies* 2002; 38(6): 1-22.

[17] De Waal, A. and Whiteside, A. New variant famine: AIDS and food crisis in southern Africa. *Lancet* 2003; 362(9391): 1234-7.

[18] Mason, J.B., Bailes, A.T., and Mason, K. Drought, AIDS and child malnutrition in Southern Africa. Paper prepared for UNICEF Regional Office for Eastern and Southern Asia. New Orleans, Tulane University, 2003.

[19] Ainsworth, M. and Semali, I. The impact of adult deaths on children's health in Northwestern Tanzania. World Bank Policy Research Working Paper 2266. Washington DC, World Bank, 2000.

[20] Lindblade, K.A., Odhiambo, F., Rosen, D.H., DeCock, K.M. Health and nutritional status of orphans <6 years old cared for by relatives in western Kenya. *Tropical Medicine and International Health* 2003; 8(1): 67-72.

[21] Guinness, L. and Alban, A. The economic impact of AIDS in Africa: A review of literature. UNAIDS Background paper for ADF, 2000.

[22] Ainsworth, M., Beegle, K., and Koda, G. The impact of adult mortality on primary school enrollment in Northwestern Tanzania. Africa Region, World Bank Working Paper Series, 2000.

[23] Nyamukapa, C. and Gregson, S. Contrasting primary school outcomes of paternal and maternal orphans in Manicaland, Zimbabwe: HIV/AIDS and weaknesses in the extended family system. MEASURE Evaluation. Washington, DC: USAID and University of North Carolina, January 2003.

[24] Gertler, P., Martinez, S., Levine, D., and Bertozzi, S. Lost presence and presents: How parental death affects children. Berkeley CA, University of California, Haas School of Business, 2004.

[25] Ainsworth, M. and Filmer, D. Poverty, AIDS and children's schooling: A targeting dilemma. World Bank Policy Research Working Paper 2885. Washington DC, World Bank, 2002.

[26] Case, A., Paxson, C., Ableidinger, J. Orphans in Africa: Parental death, poverty and school enrollment. *Demography* 2004; 41(3): 483-508.

[27] Bishai, D., Brahmbhatt, H., Gray, R., Kigozi, G., Serwadda, D., Sewankambo, E.D.S., et al. Does biological relatedness affect child survival? *Demographic Research* 2003; 8(9).

[28] Grassly, N.C., Kamal, D., Pegurri, E., Sikazwe, A., Malambo, I., Siamatowe, C., et al. The economic impact of HIV/AIDS on the education sector in Zambia. *AIDS* 2003; 17: 1039-44.

[29] Badcock-Walthers, P., Wilson, D., Gorgens, M., Heard, W., Desmond, C., and Buckle, A. Educator attrition & mortality in South Africa (1997/98-2003/04). Education Labour Relations Council (ELCR) by the MTT (Mobile Task Team on the impact of HIV/AIDS on education), 2005.

[30] World Health Organization. World Health Report 2003: Shaping the future. Geneva, WHO, 2003.

[31] Black, R.E., Morris, S.S., and Bryce. J. Where and why are 10 million children dying every year? *Lancet* 2003; 361: 2226-34.

[32] Claeson, M., Gillespie, D., Mshinda, H., Troedsson, H., Victoria, C.G.; Bellagio Study Group on Child Survival. Knowledge into action for child survival. *Lancet* 2003; 362 (9380): 323-7.

[33] UN DESA, Statistics Division. Millennium indicators database. New York, NY: UN DESA, 2005. Available at http://millenniumindicators.un.org/unsd/mi/mi_goals.asp

[34] Newell, M., Brahmbhatt, H., and Ghys, P. Child mortality and HIV infection in Africa: a review. *AIDS* 2004; 18 (Suppl. 2): 7-34.

[35] Spira, R., Lepage, P., Msellati, P., Van de Perre, P., Leroy, V., Simonon, A., et al. Natural history of human immunodeficiency virus type 1 infection in children: A five-year prospective study in Rwanda. Mother-to-Child HIV-1 Transmission Study Group. *Pediatrics* 1999; 104(5): e56.

[36] Nakiyingi, J.S., Bracher, M., Whitworth, J.A., Ruberantwari, A., Busingye, J., Mbulaiteye, S.M., and Zaba, B. Child survival in relation to mother's HIV infection and survival: Evidence from a Ugandan cohort study. *AIDS* 2003; 17(12): 1827-34.

[37] Zaba, B., Marston, M., and Floyd, S. The effect of HIV on child mortality trends in sub-Saharan Africa. New York, UN DESA, Population Division, August 2003. Available at http://www.un.org/esa/population/publications/adultmort/Zaba.pdf

[38] Walker, N., Schwartländer, B., Bryce, J. Meeting international goals in child survival and HIV/AIDS. *Lancet* 2002; 360: 284-9.

[39] Crampin, A.C., Floyd, S., Glynn, J.R., Madise, N., Nyondo, A., Khondowe, M.M., et al. The long-term impact of HIV and orphanhood on the mortality and physical well-being of children in rural Malawi. *AIDS* 2003; 17(3): 389-97.

[40] Zaba, B., Marston, M., Nakiyingi, J., Whitworth, J., Ruberantwari, A., Urassa, M., Issingo, R., Mwaluko, G., Crampin, A., Floyd, S., Nyondo, A., and Bracher, M. HIV and child mortality: evidence from surveillance studies in Uganda, Tanzania and Malawi. MEASURE Evaluation. Washington, DC: USAID and University of North Carolina, January 2003.

[41] UN DESA, Statistics Division. 2005, *Progress toward the Millennium Development Goals, 1990-2005.* UN, New York. Available at http://unstats.un.org/unsd/mi/mi_dev_report.htm

[42] WHO. 2005, *The World Health Report 2005: Making every mother and child count.* WHO, Geneva.

[43] Graham, W. and Hussein, J. 2003, "Measuring and estimating maternal mortality in the era of HIV/AIDS." UN Population Division, New York.

[44] Khan, M., Pillay, T., Moodley, J.M., Connolly, C.A.: Durban Perinatal TB HIV-1 Study Group. 2001, "Maternal mortality associated with tuberculosis-HIV-1 co-infection in Durban, South Africa." AIDS Vol. 15, No. 14: 1857-63.

[45] Sewankambo NK, Gray RH, Ahmad S, Serwadda D, Wabwire-Mangen F, Nalugoda F et al. Mortality associated with HIV infection in rural Rakai District, Uganda. AIDS, 2000, 14:2391-2400.

[46] Pattinson R. and Moodley J. (2002). Saving Mothers. Second Report on Confidential Enquiries into Maternal Deaths in South Africa. 1999-2001. Department of Health. South Africa.

[47] Graham, W. and Hussein, J. 2003, "Measuring and estimating maternal mortality in the era of HIV/AIDS." UN Population Division, New York.

[48] World Health Organization. Frequently asked questions about TB and HIV. Available at www.who.int/tb/hiv/en, accessed July 2005.

[49] Williams, B.G., Dye, C. Antiretroviral drugs for tuberculosis control in the era of HIV/AIDS. *Science* 2003; 301: 1535-7.

[50] Sonnenberg, P., Glynn, J.R., Fielding, K., Murray, J., Godfrey-Faussett, P., and Shearer, S. How soon after infection with HIV does the risk of tuberculosis start to increase? A retrospective cohort study in South African gold miners. *Journal of Infectious Diseases* 2005; 191(15): 150-8.

[51] Corbett, E., Watt, C., Walker, N., Maher, D., Williams, B.G., Raviglione, M.C., et al. The growing burden of tuberculosis: Global trends and interactions with the HIV epidemic. *Archives of Internal Medicine* 2003; 163(9): 1009-21.

[52] World Health Organization. Global tuberculosis control: Surveillance, planning, financing. WHO Report 2005. Geneva, WHO, 2005.

[53] Broekmans, J., Caines, K., and Paluzzi, J.E. Investing in strategies to reverse the global incidence of TB. Millennium Development Task Force. London, UNDP, January 2005.

[54] Dye, C., Watt, C.J., Bleed, D.M., Hosseini, S.M., and Raviglione, M.C. The evolution of tuberculosis control and prospects for reaching the Millennium Development Goals. Geneva, WHO STOP TB, 2005.

[55] Stover, J. and Willson, K. "Modeling the impact of AIDS vaccines: A review of the literature." New York, IAVI, 2005.

Millennium Development Goals

Goal 1:	**Eradicate extreme poverty and hunger**
Target 1	Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day
Target 2	Halve, between 1990 and 2015, the proportion of people who suffer from hunger
Goal 2:	**Achieve universal primary education**
Target 3	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling
Goal 3:	**Promote gender equality and empower women**
Target 4	Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2015
Goal 4:	**Reduce child mortality**
Target 5	Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate
Goal 5:	**Improve maternal health**
Target 6	Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio
Goal 6:	**Combat HIV/AIDS, malaria and other diseases**
Target 7	Have halted by 2015 and begun to reverse the spread of HIV/AIDS
Target 8	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
Goal 7:	**Ensure environmental sustainability**
Target 9	Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources
Target 10	Halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation
Target 11	By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers
Goal 8:	**Develop a global partnership for development**
Target 12	Develop further an open, rule-based, predictable, non-discriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction - both nationally and internationally)
Target 13	Address the Special Needs of the Least Developed Countries (includes tariff and quota free access for LDC exports; enhanced program of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction)
Target 14	Address the Special Needs of landlocked countries and small island developing States (through the Program of Action for the Sustainable Development of Small Island Developing States and the outcome of the 22nd special session of the General Assembly)
Target 15	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term
Target 16	In co-operation with developing countries, develop and implement strategies for decent and productive work for youth
Target 17	In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries
Target 18	In co-operation with the private sector, make available the benefits of new technologies, especially information and communications

About IAVI: IAVI (www.iavi.org) is a global not-for-profit organization whose mission is to ensure the development of safe, effective, accessible, preventive HIV vaccines for use throughout the world. IAVI's financial and in-kind supporters include the Bill & Melinda Gates, Rockefeller, Alfred P. Sloan and Starr Foundations; the Governments of Canada, Denmark, Ireland, the Netherlands, Norway, Sweden, the United Kingdom and the United States; multilateral organizations including the European Union and the World Bank; corporations such as BD (Becton, Dickinson & Co.), Continental Airlines and DHL; leading AIDS charities such as Crusaid, Deutsche AIDS Stiftung and the Until There's A Cure Foundation; and other private donors such as the Phoebe W. Haas Charitable Trust B.

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