

# The Demographic Impact of AIDS Mortality Among the Adult Population in 48 Countries

by

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This report is released to inform interested parties of ongoing research and to encourage discussion of the estimated impacts of AIDS mortality.

The use of data not generated by the U.S. Census Bureau precludes performing the same statistical reviews on those data that the U.S. Census Bureau does on its own data.

U S C E N S U S B U R E A U

**Background:** The U.S. Census Bureau prepares cohort-component population estimates and projections for all countries of the world. For those countries with significant HIV/AIDS epidemics, the impact of AIDS mortality is included. This poster shows estimated demographic effects specific to the HIV/AIDS pandemic in 48 countries. Located in Sub-Saharan Africa, Asia, Latin America, and the Caribbean, AIDS mortality in these countries is increasing death rates in those ages where mortality due to all other causes tends to be very low – among 15- to 49-year-old adults.

In countries with high HIV prevalence, the socioeconomic consequences of high mortality among adults, in their prime economically-active and child-rearing years, could be widespread – devastating families and households and increasing demand for social services as adults fall ill and die, and the number of children and elderly affected by HIV/AIDS rise.

**Methods:** The U.S. Census Bureau compiles HIV prevalence information for developing countries in its HIV/AIDS Surveillance Data Base. This database contains over 75,000 records from various publications and surveillance reports. HIV prevalence points taken from this database are the basis for projecting HIV prevalence and estimating AIDS mortality.

To produce estimates of AIDS-related mortality, a new application developed at the Census Bureau incorporates estimates of HIV prevalence from the *Estimation and Projection Package (EPP)*, an epidemiologically realistic model developed and used by the World Health Organization (WHO) and the Joint United Nations Programme on AIDS (UNAIDS). EPP produces a national “best fit” curve of adult HIV prevalence using sentinel surveillance data pertaining to pregnant women. Country-specific adult HIV prevalence estimates from EPP are used for years from the beginning of the epidemic to 2010.

The Census Bureau application applies assumptions from the WHO/UNAIDS Epidemiological Reference Group about the age and sex distribution of HIV incidence, sex ratios of new infections, the mother-to-child transmission rate, and disease progression. This reference group provides the relevant technical basis for the UNAIDS/WHO global estimates and projections of HIV prevalence. They represent the consensus reached at meetings held with representatives from the United Nations Population Division, U.S. Census Bureau, United Nations Children’s Fund (UNICEF), World Health Organization (WHO), and the Joint United Nations Programme on HIV/AIDS (UNAIDS) among others. Further, the model allows for competing risk of death and projects HIV incidence implied by the EPP estimates of HIV prevalence through 2010, assuming a decline in HIV incidence of 50 percent by 2050. The model can include the impact of antiretroviral therapy, but the current projections assume no direct treatment impact.

This methodology works in conjunction with the Census Bureau’s cohort component *Rural-Urban Projection (RUP)* program, which is used to prepare population estimates

and projections. RUP is used to produce a “With AIDS Series” and “Without AIDS Scenarios.”

A “With AIDS Series” is generated showing what has happened and what is projected to happen in a country as a result of AIDS mortality and its demographic consequences. Next, a hypothetical “Without AIDS Scenario” shows what the Census Bureau's modeling work indicates would have happened if a country had not been affected by the HIV/AIDS epidemic. This modeling takes into account not only lower death rates but also associated changes to a country's age and sex profile and, indirectly, the combined effects of lower mortality and changing population composition on demographic indicators. The “Without AIDS Scenario” currently assumes the same fertility rates (based on observed data) as the “With AIDS Series” and thus likely underestimates what fertility might have been in the absence of AIDS. In the “With AIDS Series” the number of births decreases as a result of mortality-induced reductions in the number of women of reproductive age.

In the 2004 round of population estimates and projections generated by the Census Bureau, AIDS mortality is estimated for countries located in Asia, Latin America and the Caribbean, and Sub-Saharan Africa. And, for the first time, AIDS mortality is estimated for the Russian Federation.

**Results:** This poster displays the effects of increased AIDS mortality on population indicators in various countries of the developing world most impacted by HIV/AIDS. It focuses on the adult population, ages 15 to 49 years, and in particular, the devastating impacts that the epidemic continues to have in Sub-Saharan Africa. An overview of the methodology used to obtain the estimates and projections is included. Indicators are compared from the “With AIDS Series” and “Without AIDS Scenario” in order to specifically examine the impact of adult AIDS mortality for 2005 and projected to 2015. These indicators include age-specific mortality rates, adult crude death rates by sex, under-5 mortality rates, number of births, life expectancy at age 15 by sex, population growth rates, and population structure.

Estimated prevalence curves for the selected countries show the current state of the epidemic and projected future course. The nature of the epidemic does vary from country to country. Some epidemics are stabilizing, while others have declined significantly. Still other countries have managed to keep their epidemics to a low rate. Results from seroprevalence studies give a picture of HIV prevalence among workers among various occupation groups in selected countries. And Demographic and Health Surveys conducted in Zambia and Kenya give an example of population-based HIV prevalence for adults by age and sex. Results from these surveys show that in countries with high prevalence and/or older epidemics, women are increasingly becoming infected with HIV, and at higher rates than men.

An example from Namibia illustrates the lump formed in the middle of what would be a typical “J” curve of mortality rates by age. Mortality is usually high for infants under 1 year old, then drops dramatically after the first year of life with a gradual increase as people age. However, because the predominate method of acquiring HIV/AIDS is via

sexual contact, those in their sexually and reproductively active years are at greatest risk. As a result, AIDS mortality increases the mortality rate among adults, forming the lump evident in the “With AIDS Series” for both females and males.

In fact, in several high-prevalence countries, estimated crude death rates are not only increased due to AIDS mortality among adults, but the increases are greater for females, reflecting the rising HIV prevalence for women. In 2005, the estimated under-5 mortality rate is higher in the “With AIDS Series” due to mother-to-child-transmission; and this effect is still projected to be evident by 2015. And, as illustrated by Botswana, Lesotho, and Swaziland, from 1990 – 2015, births are estimated to be lower in the “With AIDS Series” due to high adult AIDS mortality. HIV also impacts fertility rates, as women who are HIV positive are less likely to become pregnant.

In many developing countries, people enter the workforce at young ages. However, the estimated life expectancy at 15 years of age for 2005 is cut short due to HIV/AIDS. Many are projected to live only another 20-30 years in Botswana, Swaziland, and Lesotho. But this impact is seen even in countries which are experiencing a decline in HIV prevalence, for example, Kenya and Uganda are estimated to have lost around 10 years of life due to AIDS. The effects of AIDS mortality are still projected to be evident by 2015.

The increase in AIDS mortality is affecting population growth rates. In 2005, Lesotho, South Africa, and Russia are already experiencing negative growth rates; it is estimated that Lesotho and South Africa would have increased their population in the “Without AIDS Scenario.” By 2015, an additional three countries are projected to have negative growth due to AIDS. This is illustrated further by the difference in population size from the “With AIDS Series” and “Without AIDS Scenario” for 1990 to 2050 in Botswana and Uganda.

The change in population structure due to AIDS mortality is illustrated through a series of population pyramids for Swaziland – which has the highest level of HIV prevalence found anywhere in the world – for 2005, and projected for 2015 and 2025. Because of AIDS mortality, the population changes from a pyramid shape – which indicates a young and growing population – to one of a chimney as the adult population dies and birth cohorts stabilize and begin to decline. In the case of Swaziland, by 2025, there likely will be more males than females under the age of 45.

**Conclusions:** AIDS is already resulting in higher estimated mortality rates among the adult population in many countries hit hard by the epidemic. In the absence of a cure, vaccine, or significant behavior change, adult crude death rates are projected to be significantly higher than they would have been if there was no HIV/AIDS epidemic. In several countries, estimated adult crude death rates are higher among women than men in the “With AIDS Series.” Higher HIV prevalence and AIDS mortality among women is likely to result in more infants born HIV positive and fewer births.

As the adult population falls ill and dies, more children and older adults will be left vulnerable by HIV/AIDS, directly by the loss of economic and familial support and

indirectly by the increased demand for social services. The labor market is also likely to be impacted in many countries as the life expectancy of an adult just entering the workforce is expected to be cut drastically due to AIDS.

In countries with the highest HIV prevalence, population growth is projected to be negative in the near future, given the already low fertility rate in these countries. The age and sex structure is likely to be impacted as well, with population pyramids taking on a chimney shape indicative of high mortality among the adult population, and in some countries, resulting in more men than women in each of the 5-year age groups.

However, countries that have managed to curtail an epidemic, such as Uganda, Kenya, and Thailand, are likely to see less of an impact of AIDS mortality. Although a residual effect will still be apparent in estimates for 2005, these countries are projected to see a decline in mortality rates and an increase in life expectancy in the near future.