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THE FUTURE OF ADULT MORTALITY UNDER THE AIDS THREAT: ESTIMATING AND PROJECTING INCIDENCE; PROJECTING MORTALITY WITH HIV/AIDS *

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The AIDS Pandemic in the 21st Century

International Programs Center, U.S. Census Bureau

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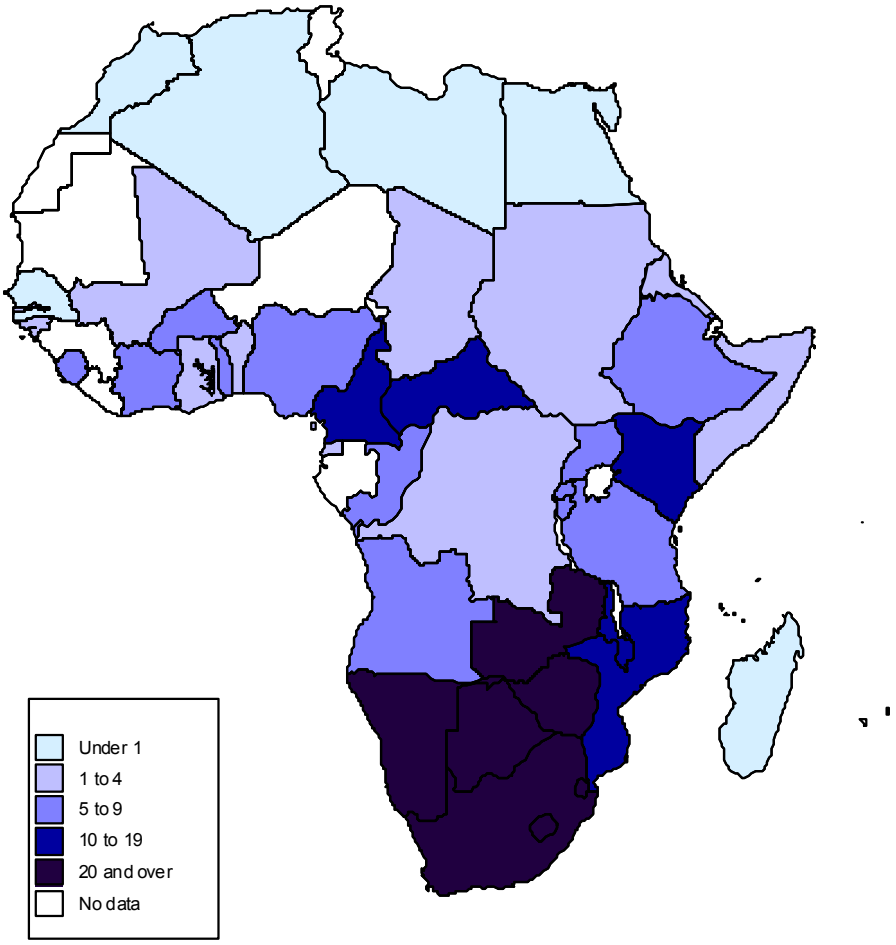
The AIDS Pandemic in the Twenty-First Century Continues to Have Its Greatest Impact in the Developing World

The overwhelming majority of people infected with the Human Immunodeficiency Virus (HIV), which causes AIDS, over 90 percent of the global total, live in the developing world. The Joint United Nations Programme on HIV/AIDS (UNAIDS) expects that this "proportion will continue to rise in countries where poverty, poor health systems, and limited resources for prevention and care fuel the spread of the virus."[1]

Over 70 percent of the global total of HIV-positive people, 28.5 million out of 40 million, live in Sub-Saharan Africa. Sub-Saharan Africa contains only 11 percent of the global population. Nine percent of all adults in Sub-Saharan Africa are HIV positive compared to 0.6 percent of adults in the United States. Since the beginning of the epidemic, over 15 million Africans have died from AIDS; 2.2 million AIDS deaths occurred there in 2001.

Southern and eastern Africa have been the most severely affected regions. Seven countries have an estimated adult (15-49) HIV prevalence of 20 percent or greater: Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe.[2] In these countries, all in southern Africa, at least one adult in five is living with HIV. An additional 5 countries, Cameroon, Central African Republic, Kenya, Malawi, and Mozambique, have adult HIV prevalence levels higher than 10 percent.

Figure 1.
Adult HIV Prevalence in Africa: December 2001
There are now 13 countries in which more than one-tenth of the adult population ages 15-49 is infected with HIV



Source: UNAIDS, 2002.

[1] "AIDS epidemic update: December 1999," UNAIDS, December 1999.
[2] "Report on the global HIV/AIDS epidemic, June 2002," UNAIDS.

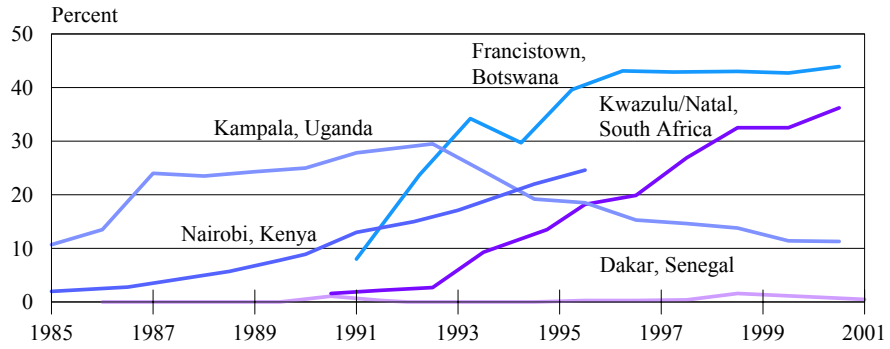
The HIV/AIDS epidemics in southern Africa started later but they have been explosive, such as in Botswana, where HIV prevalence among pregnant women[3] in Francistown increased from 7 percent in 1991 to 44 percent in 2000.

The two notable success stories in Sub-Saharan Africa continue to be Uganda and Senegal. HIV prevalence among pregnant women in Uganda continues to decline in most sentinel surveillance sites. In Kampala, HIV prevalence declined from its peak of 30 percent in 1993 to 11 percent in 2000. In Senegal, AIDS control programs have managed to keep HIV prevalence at very low
levels.

In comparison, adult HIV prevalence levels in Asia are relatively low. HIV prevalence exceeds 1 percent in only three countries: Burma, Cambodia, and Thailand. However, there are differences even in these epidemics. In Thailand and Cambodia, HIV prevalence is declining in some areas and stabilizing at low levels in other areas.

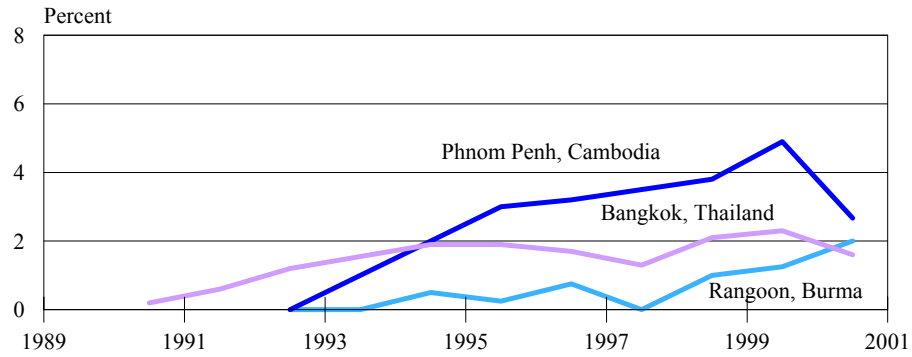
In Latin America and the Caribbean, the HIV/AIDS epidemics vary from those that are concentrated among injecting drug users (Argentina and Uruguay), and men who have sex with men (Peru and Mexico), to epidemics that seem to be mostly driven by heterosexual transmission. The last include the Bahamas, Haiti, Honduras, and Guyana, the countries with the highest adult HIV prevalence levels in the region.

Figure 2.
HIV Seroprevalence in Selected Urban Areas of Africa: 1985-2001
Uganda and Senegal have been the two notable success stories in Africa: Uganda for bringing down HIV prevalence and Senegal for keeping HIV prevalence low



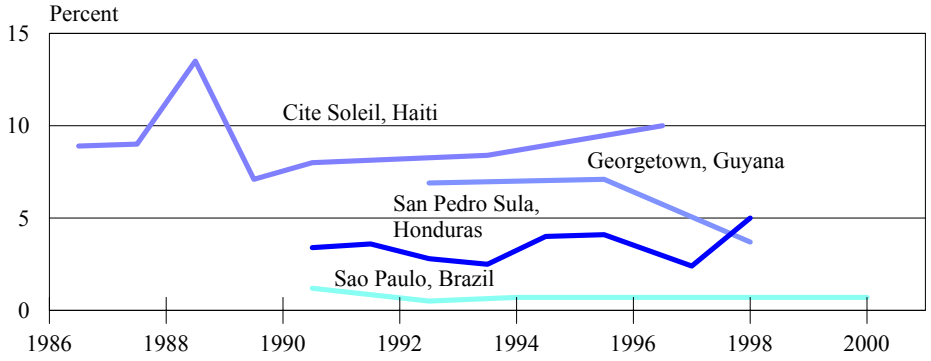
Source: U.S. Census Bureau, HIV/AIDS Surveillance Data Base, 2002.

Figure 3.
HIV Seroprevalence in Selected Urban Areas of Asia: 1989-2000
In Thailand and Cambodia, HIV Seroprevalence for pregnant women has declined



Source: U.S. Census Bureau, HIV/AIDS Surveillance Data Base, 2002.

Figure 4.
HIV Seroprevalence in Selected Urban Areas of Latin America 1986-2000
HIV Seroprevalence for pregnant women in Latin America is low except in a handful of countries



Source: U.S. Census Bureau, HIV/AIDS Surveillance Data Base, 2002.

[3] In this report, "pregnant women" refers to those pregnant women attending antenatal clinics.

In Sub-Saharan Africa, More Women Than Men Are HIV Positive

At the end of 1999, UNAIDS estimated that 55 percent of all HIV infections in Sub-Saharan Africa were among women. Peak HIV prevalence among women occurs at a younger age than among men. Among women, HIV prevalence tends to peak around 25 years of age. Peak HIV prevalence among men occurs 10-15 years later and generally at lower levels. As Figures 5 and 6 show, younger women have higher levels of HIV infection than men of their same age cohort.

Several studies comparing HIV prevalence among pregnant women attending antenatal clinics with HIV prevalence among adult men and women from community based studies have shown that HIV prevalence among pregnant women gives a reasonable overall estimate of HIV prevalence in the general adult population. HIV prevalence among pregnant women tends to underestimate the prevalence among all women but overestimate HIV prevalence among men (Figure 6).

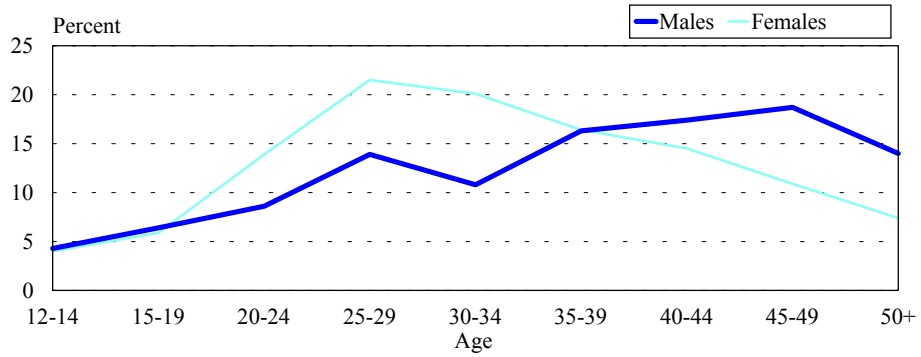
Mortality Patterns are Driven by HIV Prevalence Patterns

Median survival with HIV/AIDS is estimated to be around 10 years. In South Africa, by 2020, mortality for adults ages 20-45 will be much higher than it would have been without AIDS. Mortality for women will peak during the ages of 30-34, earlier than the peak seen for men during the ages of 40-44.

Figure 5.

HIV Prevalence by Age and Sex in Rwanda: 1997

In Sub-Saharan Africa, HIV prevalence is much higher among young females than among males of their same age cohort

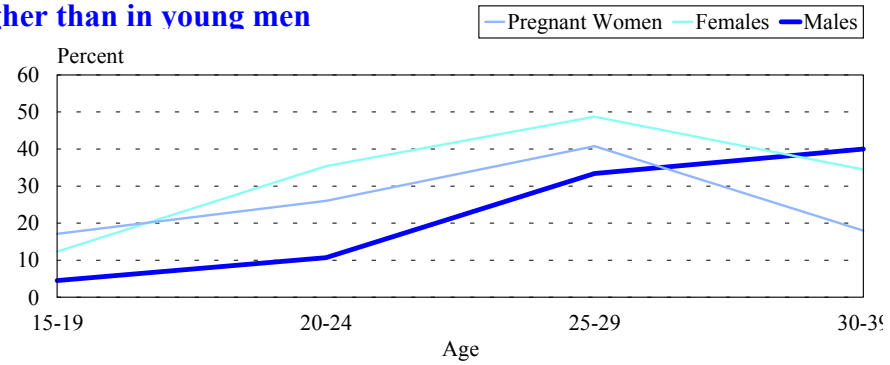


Source: Republic of Rwanda, Ministry of Health, 1998.

Figure 6.

HIV Prevalence for Pregnant Women and the General Population in Zambia: 1995-96

All over Sub-Saharan Africa, HIV prevalence for young women is higher than in young men

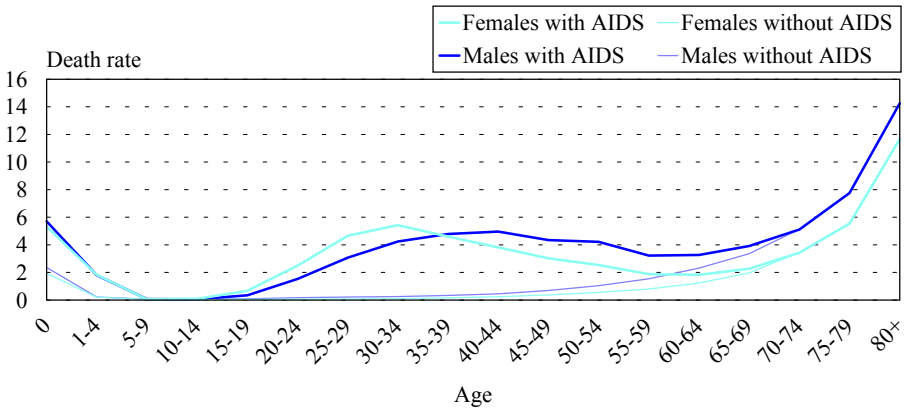


Source: Fylkenes, Musonda, Sichone, et al., 1999.

Figure 7.

Death Rates With and Without AIDS by Age and Sex: 2020

AIDS mortality increases death rates in those ages where mortality due to all other causes is very low



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

Table 1.

Demographic Characteristics With and Without AIDS: 2002

Country	Growth Rate			Life Expectancy			Crude Death Rate			Infant Mortality Rate			Child Mortality (Under age 5)		
	With AIDS	Without AIDS	Net decrease	With AIDS	Without AIDS	Net decrease	With AIDS	Without AIDS	Net increase	With AIDS	Without AIDS	Net increase	With AIDS	Without AIDS	Net increase
Angola	2.0	2.2	0.1	37.1	38.9	1.8	25.8	24.3	1.5	195.2	191.6	3.6	287.4	281.8	5.6
Benin	3.0	3.1	0.1	51.3	53.8	2.5	13.6	12.4	1.2	87.7	84.4	3.3	149.6	143.8	5.8
Botswana	-0.2	2.3	2.5	33.9	72.4	38.5	28.6	4.8	23.8	64.8	20.0	44.8	107.1	30.6	76.5
Burkina Faso	2.6	3.1	0.5	44.7	52.3	7.6	18.8	14.7	4.1	100.9	93.5	7.5	199.8	187.9	11.8
Burundi	2.2	3.0	0.8	43.0	57.6	14.6	18.0	10.4	7.6	72.7	59.1	13.6	133.8	111.5	22.3
Cameroon	2.1	2.6	0.5	48.1	58.8	10.6	15.3	10.0	5.3	71.1	61.7	9.4	124.1	108.4	15.7
CAR	1.7	2.6	0.9	42.1	57.5	15.4	19.5	10.8	8.7	94.5	78.6	15.9	144.7	118.2	26.5
Chad	3.1	3.3	0.1	48.7	51.4	2.7	16.4	15.0	1.4	96.7	93.5	3.3	171.1	165.4	5.8
Congo (Brazzaville)	1.6	2.0	0.4	50.5	58.1	7.6	14.0	10.1	3.9	96.8	88.8	8.0	148.2	134.1	14.1
Congo (Kinshasa)	2.8	3.1	0.3	48.7	55.2	6.5	15.1	11.9	3.2	98.5	92.4	6.0	142.5	132.4	10.1
Côte d'Ivoire	2.2	2.9	0.8	42.8	55.6	12.7	18.4	11.2	7.1	99.6	86.9	12.6	152.6	131.6	20.9
Djibouti	2.2	2.7	0.5	43.1	51.6	8.5	19.5	14.4	5.1	108.4	99.6	8.8	175.3	161.0	14.3
Eritrea	1.3	1.5	0.2	53.6	56.6	3.0	13.1	11.7	1.4	77.1	73.5	3.5	130.2	123.7	6.5
Ethiopia	2.0	2.7	0.7	41.6	53.1	11.5	20.0	13.1	6.9	104.3	92.1	12.2	169.9	150.0	20.0
Gabon	2.6	2.8	0.3	57.7	63.7	6.0	10.9	8.4	2.5	55.8	50.2	5.6	82.8	72.6	10.2
Ghana	1.6	1.8	0.3	56.8	62.4	5.7	10.4	7.9	2.5	53.8	49.2	4.7	92.9	84.4	8.5
Guinea	2.4	2.6	0.1	49.4	51.4	2.0	15.9	14.8	1.1	94.8	92.8	2.0	168.8	165.3	3.5
Guinea-Bissau	2.0	2.2	0.2	47.0	49.8	2.9	16.7	15.0	1.7	111.9	108.4	3.4	180.3	174.6	5.7
Kenya	1.4	2.3	1.0	45.5	65.6	20.1	15.7	6.2	9.5	64.1	46.9	17.2	95.0	65.7	29.2
Lesotho	0.2	2.0	1.7	37.1	64.4	27.3	24.4	8.2	16.3	87.2	59.1	28.2	127.7	80.6	47.1
Liberia	1.7	1.9	0.2	48.3	51.8	3.5	17.9	16.0	1.8	133.9	130.1	3.8	203.2	196.8	6.4
Malawi	2.3	3.3	1.0	38.5	56.3	17.8	22.3	12.0	10.3	106.1	87.2	18.9	184.7	155.0	29.7
Mali	2.9	3.0	0.1	45.6	47.4	1.9	19.3	18.3	1.0	120.4	119.5	0.9	218.1	215.4	2.7
Mozambique	1.0	1.8	0.8	32.1	40.0	7.9	29.3	21.9	7.4	199.7	186.1	13.6	304.1	280.9	23.1
Namibia	1.7	2.9	1.1	45.0	65.8	20.9	17.6	7.0	10.6	67.3	42.0	25.3	104.1	59.2	44.9
Nigeria	2.6	2.9	0.3	51.5	57.8	6.3	13.6	10.5	3.1	72.2	65.8	6.5	136.2	124.9	11.4
Niger	2.8	2.8	0.1	42.2	43.5	1.3	21.9	21.1	0.8	124.6	122.7	1.9	269.8	267.1	0.0
Rwanda	1.8	2.7	0.8	39.5	51.5	12.1	21.6	14.0	7.6	103.6	90.4	13.2	185.9	164.9	21.0
Senegal	2.6	2.7	0.1	56.2	59.0	2.9	11.0	9.8	1.2	58.6	56.2	2.4	110.7	106.4	4.4
Sierra Leone	3.0	3.2	0.2	43.0	46.0	3.0	20.7	18.8	1.9	148.5	144.3	4.2	225.6	218.9	6.8
South Africa	0.2	1.2	1.0	48.8	66.3	17.5	16.6	7.3	9.3	59.5	38.9	20.6	97.3	61.4	35.9
Swaziland	1.1	2.7	1.6	41.4	72.6	31.1	19.3	4.1	15.2	66.5	34.2	32.3	103.5	48.1	55.4
Tanzania	1.8	2.3	0.6	44.7	54.3	9.6	17.3	12.1	5.3	105.3	96.0	9.3	156.5	140.9	15.6
Togo	2.5	2.9	0.4	53.8	62.6	8.9	11.4	7.7	3.7	69.8	62.6	7.2	119.1	106.6	12.5
Uganda	2.9	3.5	0.6	44.5	56.0	11.5	17.3	11.6	5.7	89.7	79.2	10.5	145.2	127.9	17.3
Zambia	1.6	2.9	1.3	35.3	55.4	20.1	24.3	11.5	12.8	100.2	76.5	23.7	170.8	132.7	38.1
Zimbabwe	1.0	2.6	1.6	40.2	69.0	28.8	20.8	5.4	15.4	65.9	34.7	31.2	100.7	47.2	53.4
Bahamas, The	0.8	1.2	0.3	65.8	74.0	8.2	8.6	5.2	3.4	26.7	21.4	5.4	35.8	26.3	9.5
Barbados	0.4	0.5	0.1	72.0	74.5	2.5	9.0	7.9	1.1	12.8	10.9	1.9	15.6	12.2	3.4
Belize	2.5	2.6	0.1	67.3	71.3	4.1	6.1	4.7	1.4	27.8	25.0	2.8	36.0	30.8	5.2
Dominican Republic	1.4	1.6	0.2	68.3	74.2	5.9	6.7	4.5	2.2	35.1	31.3	3.8	45.3	38.2	7.2
Guatemala	2.7	2.8	0.1	65.3	67.8	2.5	6.8	5.9	0.9	39.0	36.9	2.0	51.2	47.5	3.7
Guyana	0.3	0.5	0.2	63.7	69.0	5.3	8.9	6.6	2.3	37.9	33.3	4.6	52.3	43.8	8.5
Haiti	1.6	2.0	0.4	51.4	58.7	7.2	13.5	10.3	3.3	77.7	71.5	6.2	117.1	106.6	10.5
Honduras	2.4	2.6	0.2	67.1	71.5	4.4	6.3	4.8	1.5	30.3	26.8	3.5	41.4	34.9	6.5
Panama	1.4	1.5	0.1	72.5	76.1	3.6	6.1	4.9	1.3	21.9	19.6	2.3	27.9	23.7	4.1
Trinidad & Tobago	-0.6	-0.6	0.1	69.9	71.7	1.8	8.4	7.7	0.7	25.3	23.6	1.7	30.0	27.1	2.9
Suriname	0.4	0.5	0.1	69.3	71.9	2.6	6.7	5.7	1.0	25.4	23.4	2.0	32.3	28.8	3.5
Burma	0.6	0.7	0.2	55.6	58.5	3.0	12.2	10.6	1.6	72.0	69.5	2.4	101.0	96.4	4.6
Cambodia	1.8	2.0	0.2	57.4	61.9	4.5	9.4	7.5	1.9	78.3	74.5	3.8	103.0	96.0	7.0
Thailand	1.0	1.1	0.1	71.1	72.7	1.6	6.8	6.1	0.7	22.5	22.2	0.3	30.0	28.8	1.2

Note: Life expectancy (e_0), infant mortality, and child mortality ($_5q_0$) are for both sexes combined.
Growth rate is given as a percent. Crude death rate is deaths per 1,000 population.
Source: U.S. Census Bureau, International Data Base, and unpublished tables.

Table 2.
Demographic Characteristics With and Without AIDS: 2010

Country	Growth Rate			Life Expectancy			Crude Death Rate			Infant Mortality Rate			Child Mortality (Under age 5)			Total Fertility
	With AIDS	Without AIDS	Net decrease	With AIDS	Without AIDS	Net decrease	With AIDS	Without AIDS	Net increase	With AIDS	Without AIDS	Net increase	With AIDS	Without AIDS	Net increase	
Angola	1.7	2.3	0.6	35.0	41.3	6.2	26.8	21.6	5.2	183.6	174.7	8.9	268.9	255.2	13.7	5.9
Benin	2.4	2.9	0.5	47.9	57.0	9.0	14.8	10.2	4.6	80.1	71.3	8.7	132.2	117.5	14.7	5.4
Botswana	-2.1	1.9	4.0	26.7	74.4	47.7	42.8	4.2	38.6	74.6	15.8	58.8	122.9	22.8	100.1	2.7
Burkina Faso	2.4	3.0	0.7	43.6	55.4	11.9	18.6	12.2	6.4	92.1	80.7	11.4	173.9	156.0	18.0	5.9
Burundi	2.7	3.4	0.7	44.6	60.7	16.2	16.7	8.5	8.1	63.3	49.4	13.9	111.4	88.3	23.1	5.3
Cameroon	1.7	2.4	0.7	47.9	61.9	14.0	15.5	8.5	7.0	62.7	51.4	11.3	105.5	86.5	19.0	4.1
CAR	1.3	2.3	1.0	41.0	60.6	19.6	20.2	9.2	11.0	83.9	65.2	18.7	127.1	95.6	31.5	4.1
Chad	2.7	3.1	0.5	46.2	54.6	8.4	16.8	12.5	4.3	88.6	80.8	7.8	151.6	138.6	13.0	6.0
Congo (Brazzaville)	0.9	1.7	0.8	47.0	61.2	14.3	16.5	8.5	8.0	85.7	72.8	12.9	128.8	107.1	21.7	3.0
Congo (Kinshasa)	2.9	3.2	0.3	50.5	58.4	7.9	13.4	9.8	3.6	83.2	76.7	6.6	118.9	107.8	11.2	6.1
Côte d'Ivoire	1.8	2.7	0.9	41.7	58.7	17.0	19.0	9.4	9.6	88.4	72.5	16.0	133.7	107.1	26.6	4.8
Djibouti	1.9	2.5	0.6	43.4	54.8	11.4	19.1	12.6	6.5	95.9	85.3	10.6	152.0	134.6	17.4	5.0
Eritrea	2.2	2.8	0.6	48.9	59.8	10.8	15.0	9.8	5.2	70.9	61.7	9.1	115.9	100.3	15.6	5.2
Ethiopia	1.5	2.5	1.0	40.1	56.3	16.3	20.7	10.9	9.8	94.9	77.9	16.9	150.8	123.3	27.5	4.8
Gabon	2.2	2.9	0.6	52.9	66.5	13.6	12.9	7.0	5.9	50.5	39.7	10.8	74.4	55.5	18.9	4.6
Ghana	1.0	1.4	0.5	55.6	65.4	9.8	11.5	7.0	4.5	47.6	40.2	7.4	78.6	65.7	12.9	2.5
Guinea	2.7	2.8	0.2	51.3	54.6	3.2	14.3	12.7	1.6	83.1	80.1	2.9	143.6	138.5	5.2	5.6
Guinea-Bissau	1.9	2.3	0.3	47.3	52.9	5.6	16.2	13.0	3.2	99.4	93.8	5.6	157.0	147.6	9.3	4.6
Kenya	0.5	1.8	1.3	43.7	68.3	24.7	18.3	5.4	12.9	58.0	37.2	20.9	86.3	50.6	35.7	2.6
Lesotho	-0.2	1.7	1.9	36.5	67.2	30.6	26.0	7.1	18.8	78.1	46.7	31.5	115.9	62.3	53.7	3.0
Liberia	2.3	2.7	0.5	46.3	55.0	8.7	17.9	13.5	4.4	120.5	112.7	7.8	180.7	167.8	12.9	5.7
Malawi	1.9	3.2	1.3	36.9	59.4	22.6	23.1	9.9	13.2	97.9	73.2	24.7	165.1	125.2	39.9	5.7
Mali	2.5	2.9	0.4	44.3	50.5	6.2	18.8	15.3	3.4	110.1	105.1	5.0	193.6	184.8	8.8	6.1
Mozambique	-0.2	1.6	1.8	27.1	42.5	15.4	36.2	19.4	16.9	194.1	169.2	25.0	292.8	253.5	39.3	4.3
Namibia	0.2	2.7	2.4	33.8	68.5	34.8	28.1	5.7	22.4	73.4	32.8	40.6	113.9	44.8	69.1	4.3
Nigeria	2.0	2.7	0.7	47.3	60.9	13.6	15.7	8.7	7.0	65.8	54.6	11.2	117.3	98.3	19.0	4.8
Niger	2.4	2.7	0.3	41.4	46.3	4.9	21.0	17.9	3.1	117.1	110.9	6.2	244.8	235.0	9.9	6.3
Rwanda	1.6	2.7	1.0	38.7	54.7	16.0	22.3	12.0	10.3	94.5	78.1	16.4	164.4	138.0	26.4	5.2
Senegal	2.3	2.5	0.2	58.2	62.1	3.9	9.8	8.2	1.6	50.4	47.1	3.3	90.3	84.5	5.8	4.3
Sierra Leone	2.0	2.5	0.5	41.9	48.9	7.1	20.5	16.1	4.4	135.2	127.2	8.0	203.3	190.5	12.9	5.3
South Africa	-1.4	1.0	2.4	36.5	68.4	31.9	30.1	7.2	22.9	65.1	31.5	33.7	104.3	47.3	57.0	2.0
Swaziland	-0.4	2.3	2.6	33.0	74.6	41.6	28.8	3.8	25.1	70.8	25.6	45.3	111.7	34.6	77.1	3.2
Tanzania	1.9	2.6	0.7	44.6	57.5	12.9	17.1	10.0	7.1	92.3	80.1	12.2	135.5	115.3	20.3	4.6
Togo	1.7	2.3	0.7	50.7	65.5	14.8	12.9	6.3	6.6	61.8	50.6	11.2	101.2	82.0	19.2	3.8
Uganda	3.0	3.5	0.5	46.8	59.2	12.3	15.2	9.5	5.7	76.6	66.5	10.1	121.1	104.1	17.0	6.1
Zambia	1.0	2.6	1.5	34.4	58.6	24.3	25.4	9.5	15.9	92.3	64.7	27.6	153.4	108.3	45.2	4.5
Zimbabwe	0.0	2.3	2.3	34.6	71.4	36.9	27.4	4.8	22.6	69.0	27.0	42.0	107.6	35.8	71.9	3.3
Bahamas, The	0.5	0.9	0.4	65.8	75.8	10.0	9.4	5.4	4.0	22.7	16.3	6.4	30.8	19.7	11.1	2.1
Barbados	0.2	0.4	0.2	71.2	76.3	5.1	9.5	7.4	2.1	11.9	8.7	3.2	15.6	9.7	5.9	1.7
Belize	2.1	2.3	0.2	68.3	73.5	5.2	5.9	4.1	1.8	22.7	19.0	3.7	29.4	23.0	6.4	3.3
Dominican Republic	1.2	1.5	0.3	66.7	76.0	9.3	8.1	4.6	3.5	28.6	22.9	5.8	37.7	27.5	10.2	2.7
Guatemala	2.4	2.6	0.2	65.9	70.3	4.5	6.6	5.0	1.6	31.4	28.2	3.2	41.4	35.6	5.8	4.2
Guyana	0.4	1.1	0.7	57.1	71.4	14.3	13.6	6.4	7.1	35.8	25.7	10.1	50.7	32.9	17.7	2.0
Haiti	2.0	2.3	0.4	53.3	61.7	8.5	12.3	8.6	3.8	64.8	58.2	6.6	95.7	84.4	11.3	4.1
Honduras	1.7	2.1	0.4	62.2	73.6	11.4	8.4	4.3	4.1	28.0	20.7	7.4	39.3	26.2	13.1	3.4
Panama	1.1	1.3	0.2	72.1	77.6	5.5	6.9	5.0	2.0	18.5	15.2	3.4	24.2	18.1	6.1	2.3
Trinidad & Tobago	-1.0	-0.6	0.4	64.5	73.8	9.3	12.5	8.5	4.0	25.2	17.9	7.3	34.6	20.5	14.1	1.7
Suriname	0.0	0.3	0.2	69.1	74.0	4.9	7.8	5.8	2.0	20.9	17.8	3.2	27.3	21.5	5.8	2.2
Burma	0.3	0.5	0.2	57.7	61.6	3.9	12.0	9.8	2.2	59.7	56.4	3.3	82.5	76.6	5.8	1.9
Cambodia	1.8	2.0	0.2	60.6	64.9	4.2	8.5	6.7	1.8	61.9	58.5	3.4	80.2	74.3	6.0	3.1
Thailand	0.7	0.8	0.1	73.0	74.7	1.6	7.3	6.5	0.7	17.4	17.2	0.2	22.5	21.7	0.8	1.8

Note: Life expectancy (e_0), infant mortality, and child mortality ($_5q_0$) are for both sexes combined.
Growth rate is given as a percent. Crude death rate is deaths per 1,000 population.
Source: U.S. Census Bureau, International Data Base, and unpublished tables.

At the Beginning of the Twenty-First Century, the Population Growth Rate in Botswana is Less Than Zero Due to AIDS Mortality[4]

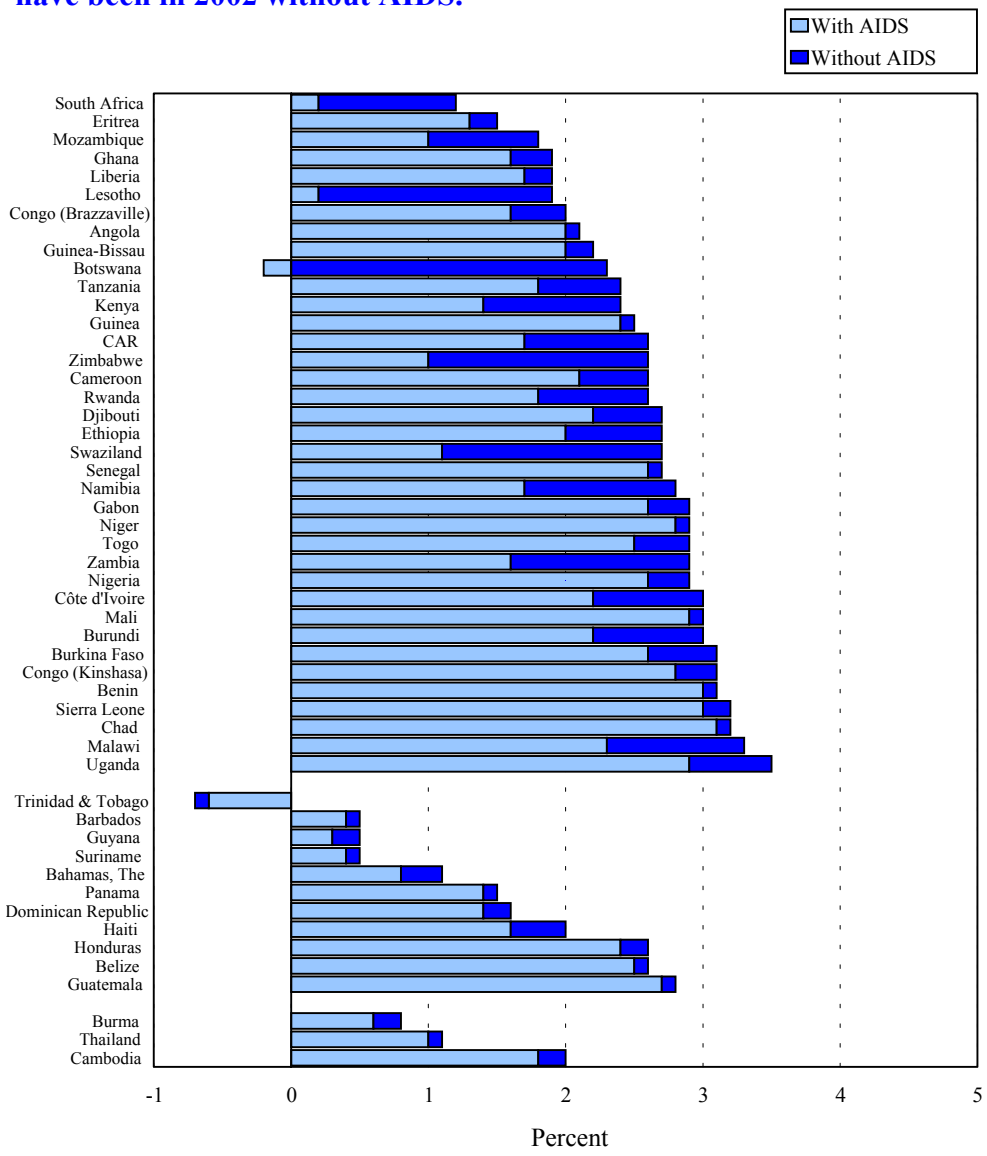
Other countries with sharply reduced growth rates include several other southern African countries: Lesotho, Malawi, Namibia, South Africa, Swaziland, and Zimbabwe.

The negative population growth seen in Trinidad and Tobago in 2002 is the impact of AIDS mortality compounded by out-migration. The underlying growth rate for Trinidad & Tobago is nearly –0.6.

In Asia, AIDS mortality results in slightly lower population growth rates in Burma, Cambodia, and Thailand.

Figure 8.
Population Growth Rates With and Without AIDS in Selected Countries: 2002

Botswana is now experiencing negative population growth. In South Africa, the growth rate is now less than half what it might have been in 2002 without AIDS.



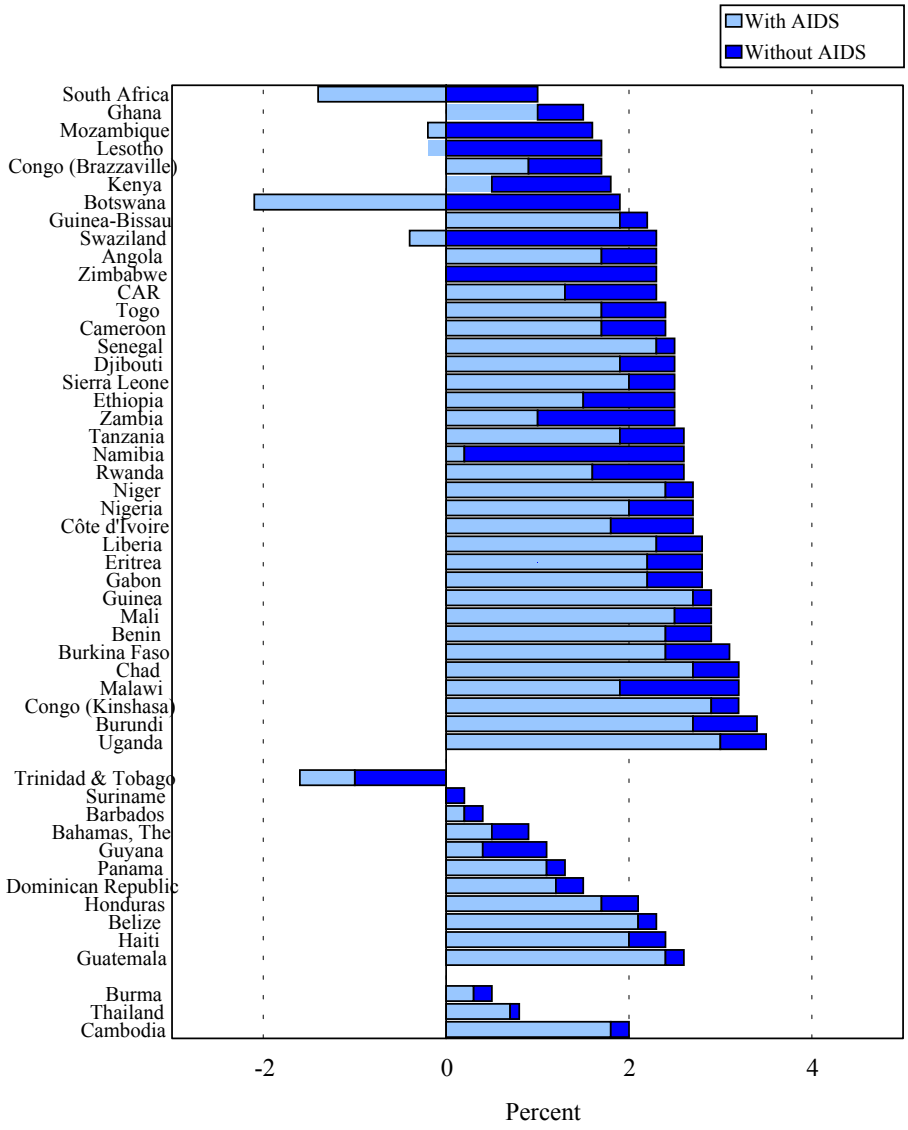
Source: U.S. Census Bureau, International Data Base, and unpublished tables.

[4] Refer to Tables 9 and 10 for country specific indicators.

Figure 9.

Population Growth Rates With and Without AIDS for Selected Countries: 2010

By 2010, Botswana, Mozambique, Lesotho, Swaziland, and South Africa, will all be experiencing negative population growth due to AIDS



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

By the Year 2010, Five Countries Will Be Experiencing Negative Population Growth Because of AIDS Mortality

The growth rate for Botswana will continue to be suppressed and by 2010 it will be -2 percent. In South Africa it will be –1.4 percent and in Swaziland a –0.4 percent. This negative population growth is due to the high levels of HIV prevalence in these countries and relatively low fertility. Previously, HIV/AIDS experts never expected HIV prevalence rates to reach such high levels for any country. By the end of 2001, adult HIV prevalence had reached an estimated 39 percent in Botswana, 20 percent in South Africa, and 33 percent in Swaziland.[5] Zimbabwe and Namibia will be experiencing a growth rate of close to zero. Without AIDS, these countries would have been experiencing a growth rate of 2 percent or greater.

In Latin America and the Caribbean, the Bahamas and Guyana will be experiencing the greatest impact on their growth rates[6]. Growth rates will be reduced from 1 percent to 0.5 percent. Trinidad and Tobago will see their already negative population growth due to out migration increased due to AIDS mortality.

In Asia, growth rates will be slightly reduced for Burma, Thailand, and Cambodia.

[5] "Report on the global HIV/AIDS epidemic, June 2002," UNAIDS.

[6] Outmigration in Guyana is assumed to be 0 by 2005 from over 10,000/year during the 1980s and 1990s.

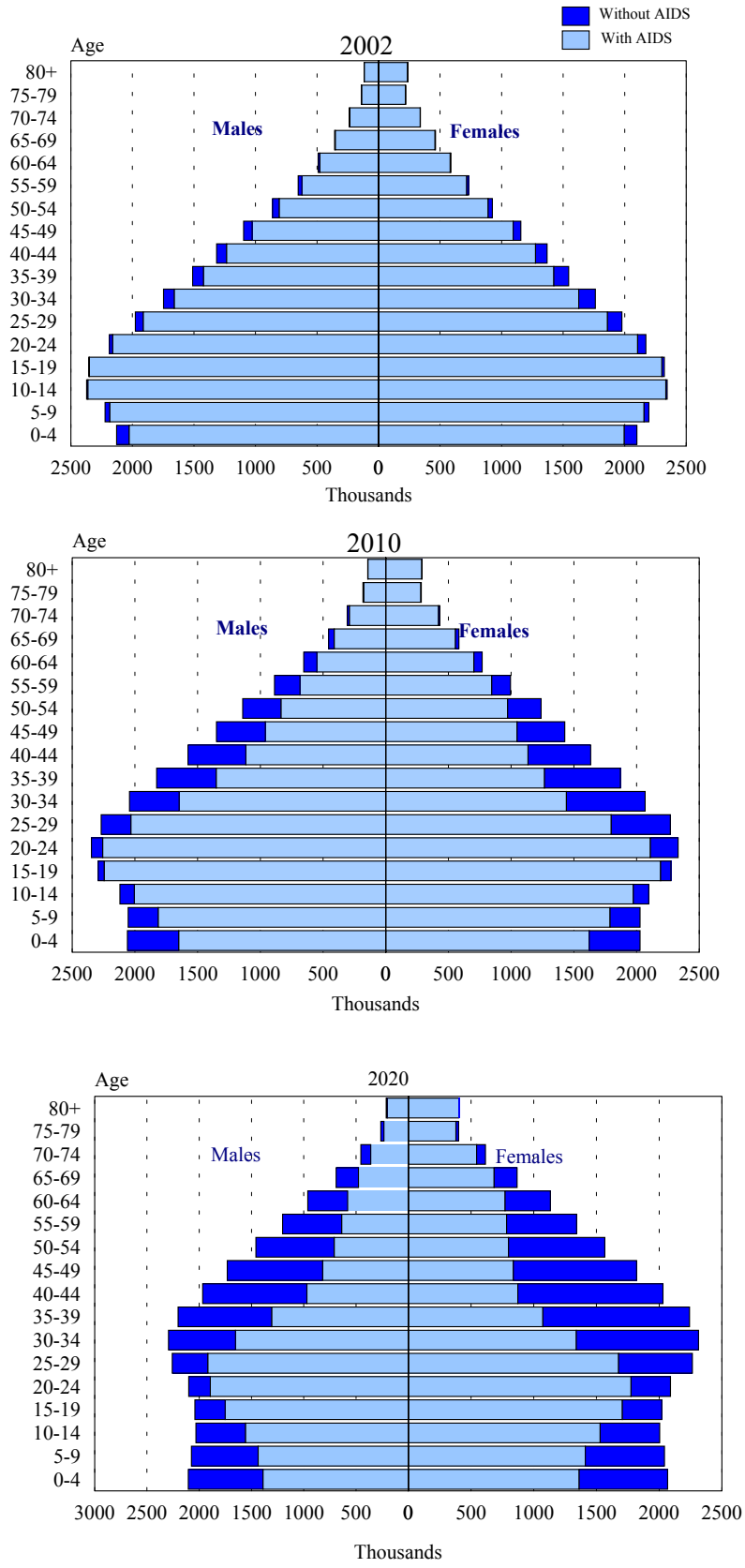
AIDS Mortality Will Produce Population Pyramids That Have Never Been Seen Before

Particularly in those countries with projected negative population growth, Botswana, Lesotho, Mozambique, South Africa, and Swaziland, population pyramids will have a new shape–"the population chimney." The implications of this new population structure are not clear. By 2020, between the ages of 15 and 44, there will be more men than women in each of the five-year-age cohorts, which may push men to seek partners in younger and younger age cohorts. This factor in turn may increase HIV infection rates among younger women. Current evidence[7] indicates that older men are infecting younger women, who then go on to infect their partners, particularly through marriage. This vicious cycle could result in even higher HIV infection levels.

Figure 10.

Population by Age and Sex With and Without AIDS for South Africa: 2002, 2010, and 2020

Population structures of badly affected countries will be radically altered by HIV

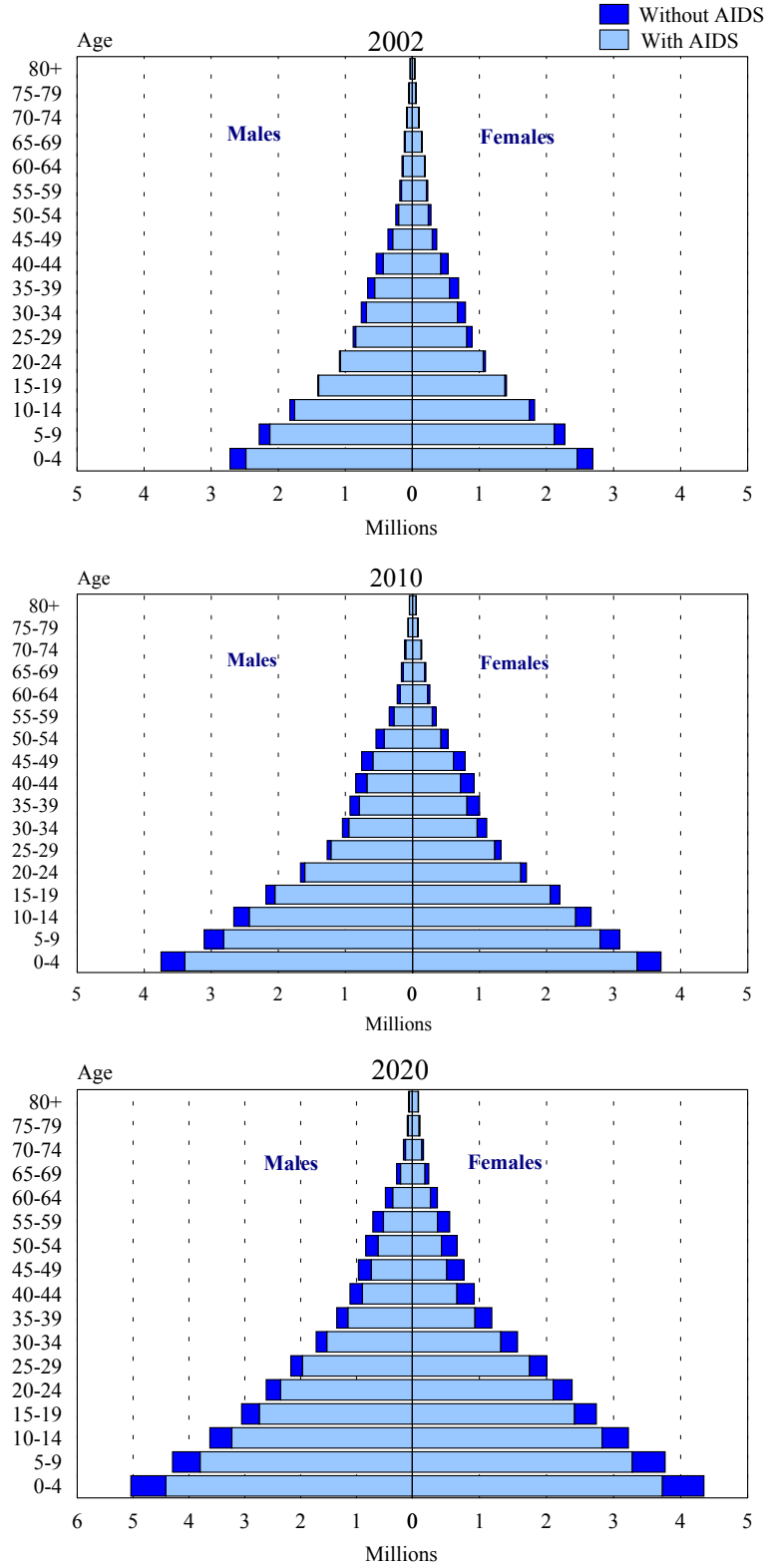


[7] "Multicenter Study on Factors Determining the Differential Spread of HIV in sub-Saharan Africa," Edited by Michel Carael and King Holmes, AIDS Vol. 15 Supp 4 August 2001

Figure 11.

Population by Age and Sex With and Without AIDS for Uganda: 2000, 2010, and 2020

The population structure of Uganda is only slightly altered by HIV



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

In Countries With Moderate Epidemics, AIDS Mortality Will Have Less of an Effect on the Population Structure

For example, in Uganda, the greatest relative differences in future population size by cohort are evident in the youngest age groups and in those 30-50 years of age. However, the population pyramid still continues to maintain its traditional shape.

AIDS Mortality Is Resulting in Falling Life Expectancies

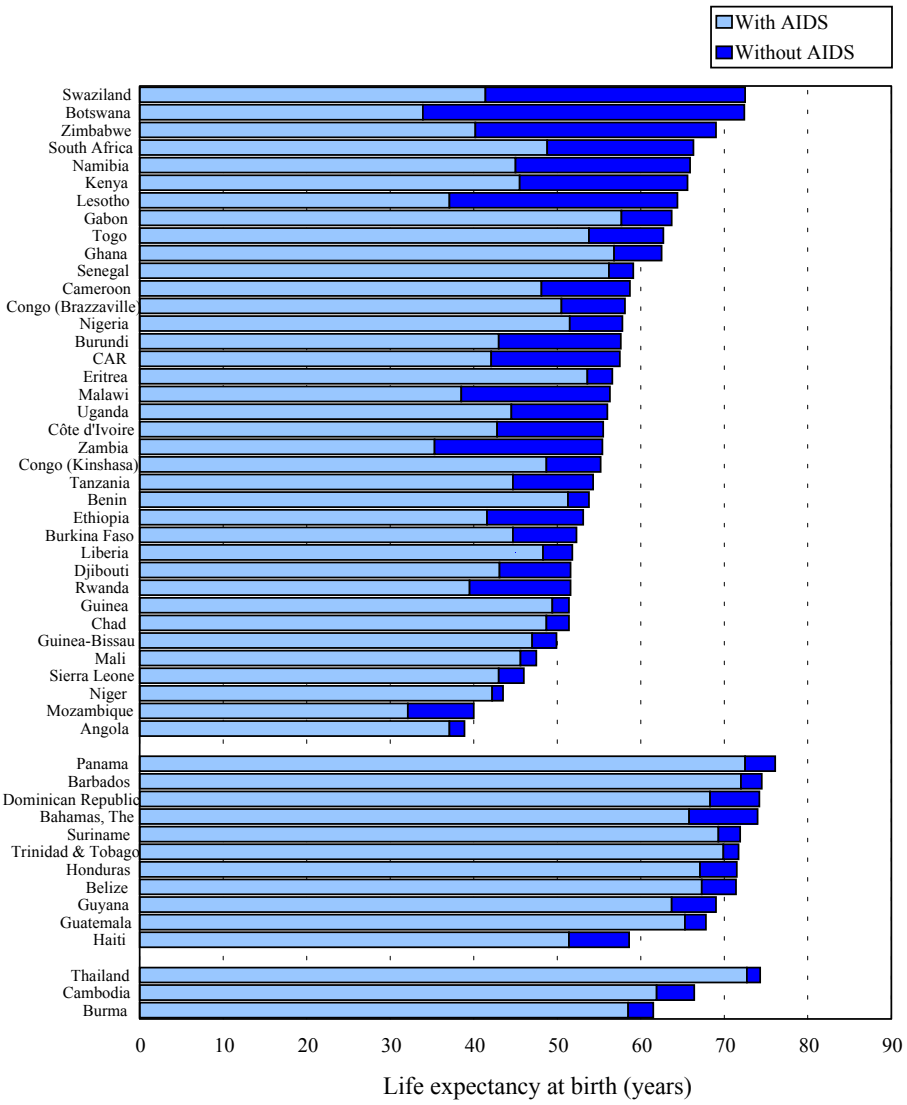
Already, life expectancies have fallen in many countries in Sub-Saharan Africa from levels that would have been seen without AIDS. In Botswana, life expectancy is now 39 instead of 72. In Zimbabwe, life expectancy is 40 instead of 69. In fact, seven countries in Sub-Saharan Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Rwanda, and Zambia have life expectancies below 40 years of age. Each of the countries, except for Angola, would have had an estimated life expectancy of 50 years or greater without AIDS.

In Latin America and the Caribbean, the impact on life expectancy is not as great as in Sub-Saharan Africa because of lower HIV prevalence levels. However, life expectancy is still lower than it would have been without AIDS. In the Bahamas, life expectancy is now 66 instead of 74. And in Haiti, life expectancy is now 51 instead of 59.

In Asia, Thailand, Cambodia, and Burma have lost two to five years of life expectancy.

Figure 12.
Life Expectancy at Birth With and Without AIDS for Selected Countries: 2002

In Botswana, nearly 40 years of life expectancy have been lost due to AIDS

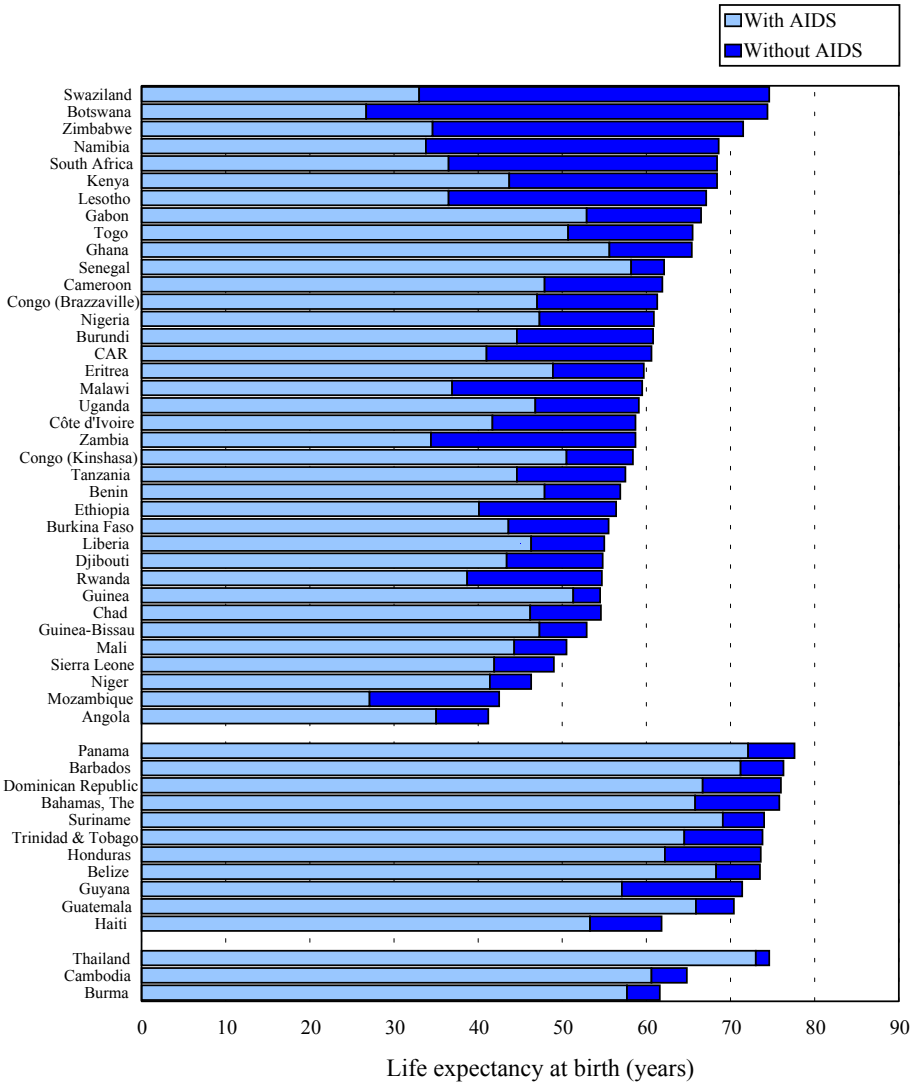


Source: U.S. Census Bureau, International Data Base, and unpublished tables.

Figure 13.

Life Expectancy at Birth With and Without AIDS for Selected Countries: 2010

By 2010, Botswana and Swaziland will see life expectancy reduced by over 40 years



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

In Less Than Ten Years Time, Many Countries in Southern Africa Will See Life Expectancies Fall to Near 30 Years of Age, Levels Not Seen Since the End of the 19th Century

In Southern Africa, life expectancies will be falling to levels that have not been seen in over 100 years. In a region that would have expected life expectancies to reach 70 years of age by 2010, many will see life expectancies falling to around 30:

- Botswana–27 years
- Namibia–34 years
- Swaziland–33 years
- Zambia–34 years

Many other countries will see life expectancies falling to 30-40 years of age instead of 50-60 years.

AIDS mortality will continue to result in lower life expectancies in Latin America, the Caribbean, and Asia. In Latin America and the Caribbean, life expectancies will be 10-14 years lower in the Bahamas and Guyana than they would have been without AIDS. In Asia, life expectancies will be 2 years lower in Thailand and 4 years lower in Cambodia and Burma.

The Most Direct Impact of AIDS Is to Increase the Number of Deaths in Affected Populations

Crude death rates, the number of people dying per 1,000 population, have already been affected by AIDS.

In Africa, HIV epidemics have had their greatest impact in the eastern and the southern regions. Adult HIV prevalence is 20 percent or higher in seven countries and an additional six countries have HIV prevalence rates between 10 percent and 20 percent. In many of these countries, reports indicate the presence of the HIV virus since the early 1980s.

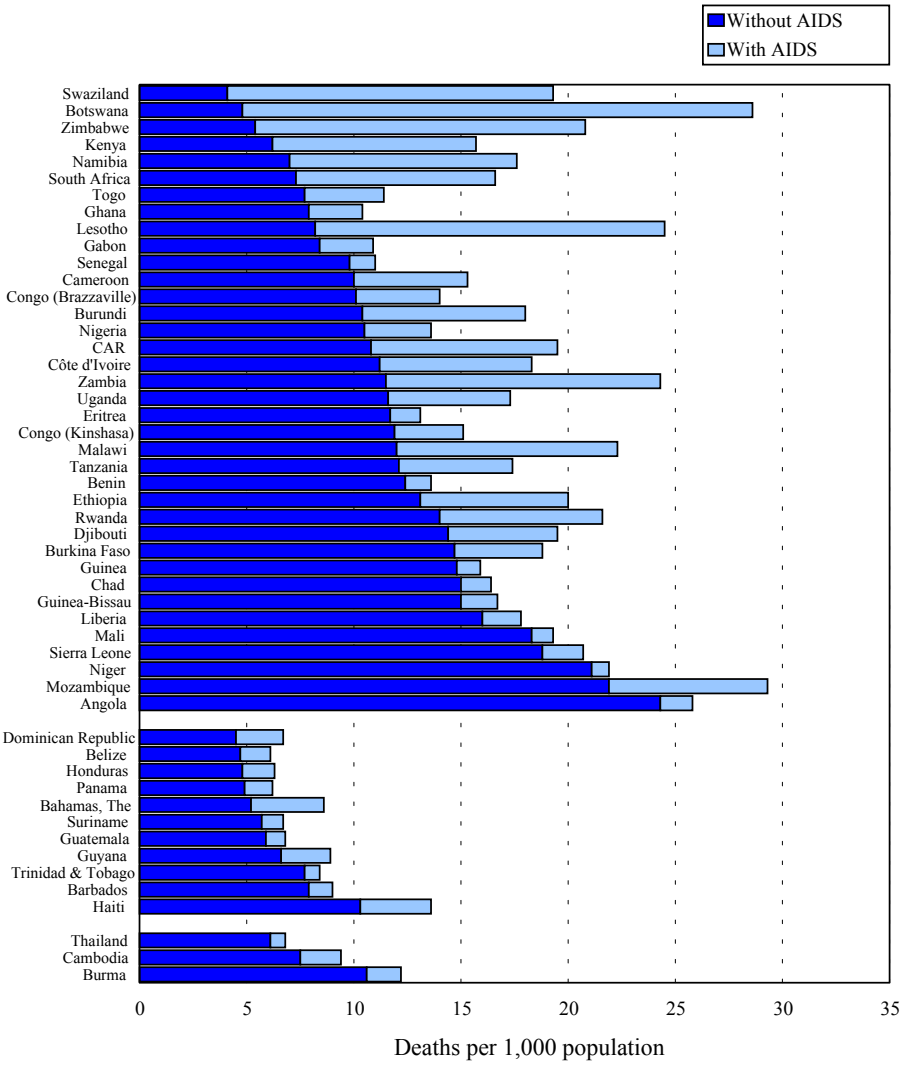
As a result of these high levels of HIV infection over several years, estimated crude death rates including AIDS mortality are greater by 50-500 percent in eastern and southern Africa over what they would have been without AIDS. For example, in Kenya with an adult HIV prevalence of 15 percent at the end of 2001, the crude death rate is estimated to be more than twice as high, 15.7, as it would have been without AIDS, 6.2. In South Africa, with an estimated 20 percent adult HIV prevalence level, the crude death rate is also twice as high, 16.6, as it would have been without AIDS, 7.3.

In Asia and Latin America the estimated crude death rates are also higher than they would have been without AIDS.

Figure 14.

Crude Death Rates With and Without AIDS for Selected Countries: 2002

Crude death rates with AIDS are four times as high in Zimbabwe as they would have been without AIDS

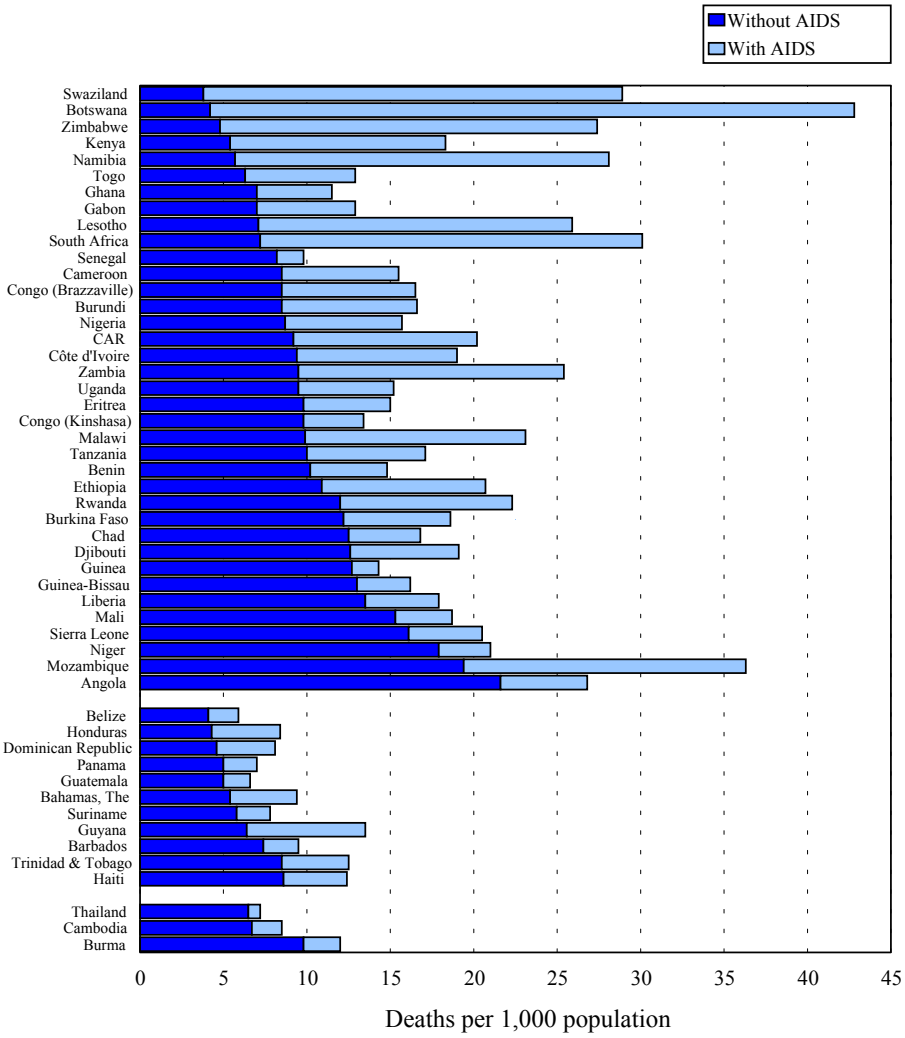


Source: U.S. Census Bureau, International Data Base, and unpublished tables.

Figure 15.

Crude Death Rates With and Without AIDS for Selected Countries: 2010

By 2010 years, crude death rates will be ten times as high in Botswana and seven times as high in Swaziland as they would have been without AIDS



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

In Many Sub-Saharan African Countries, Crude Death Rates Will Be Higher in 2010 Than in 2000, Even Though Mortality Due to Non-AIDS Causes Will Continue to Decline

In Botswana, crude death rates will increase from 28.6 in 2002 to 42.8 in 2010. In South Africa, crude death rates will increase from 16.6 to 30.1 and in Zimbabwe from 20.8 to 27.4. In all three of these countries, crude death rates would have ranged from 4 to 7 without AIDS.

In Latin America and the Caribbean, the Bahamas and Guyana will see a doubling of crude death rates with AIDS over what they would have been without AIDS.

In Asia, crude death rates will be slightly higher with AIDS than they would have been without AIDS. In Thailand crude death rates with AIDS will be 7.3 compared to 6.5 without AIDS. In Cambodia, crude death rates will be 8.5 with AIDS versus 6.7 without AIDS.

In Some Sub-Saharan African Countries, Infant Mortality Rates Are Now Higher Than They Were in 1990[8]

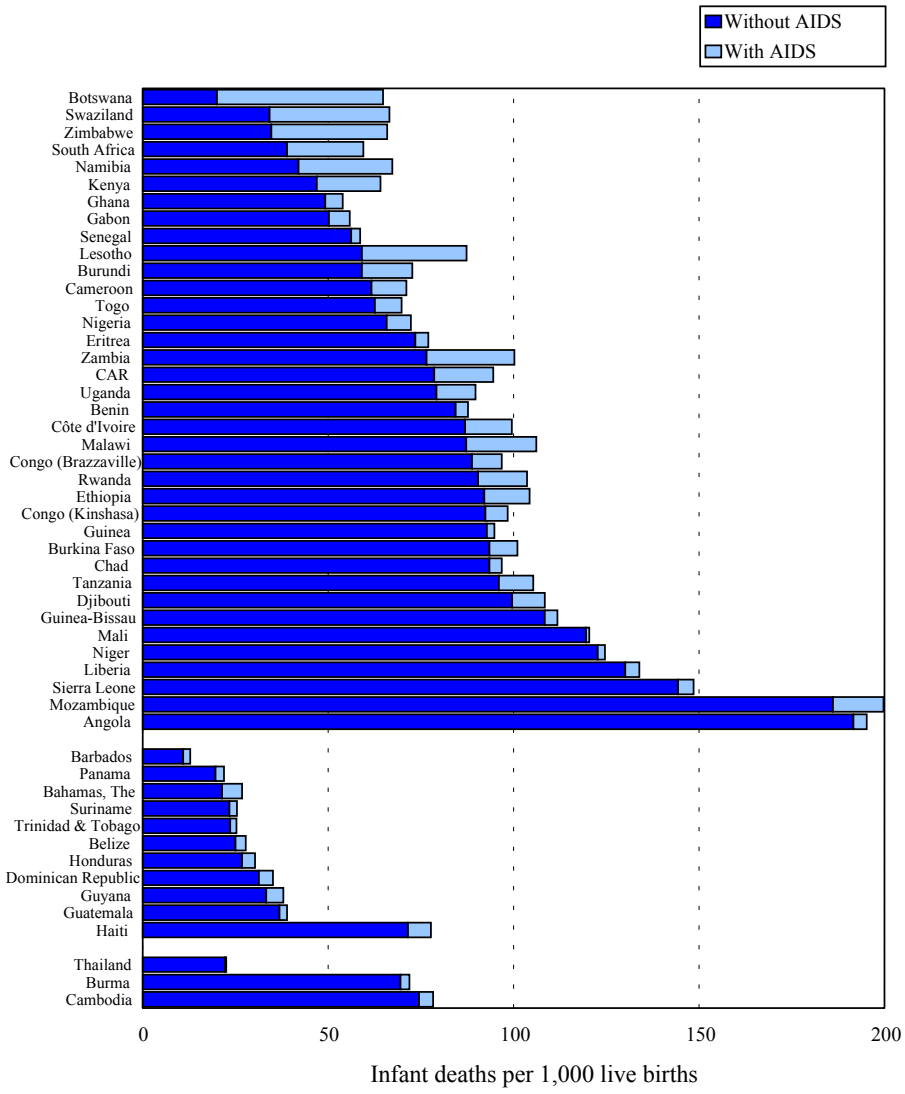
AIDS mortality has reversed the declines in infant mortality rates that had been occurring during the 1980s and early 1990s. Over 30 percent of all children born to HIV infected mothers in Sub-Saharan Africa will be HIV positive either through the birth process or due to breast feeding. The relative impact of AIDS on infant mortality rates, the number of infants who will die before their first birthday out of 1000 live births, will depend on both the levels of HIV prevalence in the population and the infant mortality rate from other causes. In 1990[9] the infant mortality rate in Zimbabwe was 52; in 2002 it is 66. In South Africa, the infant mortality rate in 1990 was 51, in 2002 it is 60. Without AIDS, infant mortality in Zimbabwe and South Africa would likely have been 35 and 39, respectively.

In countries with less severe epidemics, such as in western and central Africa, infant mortality rates are still higher than they would have been without AIDS. The increase ranges from 3 percent in Benin to 13 percent in Côte d'Ivoire and in Rwanda.

In those countries most affected by AIDS in Latin America, the Caribbean, and Asia, infant mortality rates are also higher than they would have been without AIDS. In Latin America and the Caribbean, infant mortality rates are 2-6 percent higher. In Asia, infant mortality is less than 1 percent higher in Thailand and 4 percent higher in Cambodia.

Figure 16.
Infant Mortality With and Without AIDS for Selected Countries: 2002

Infant mortality is nearly twice as high in Swaziland and Zimbabwe with AIDS as it would have been without AIDS



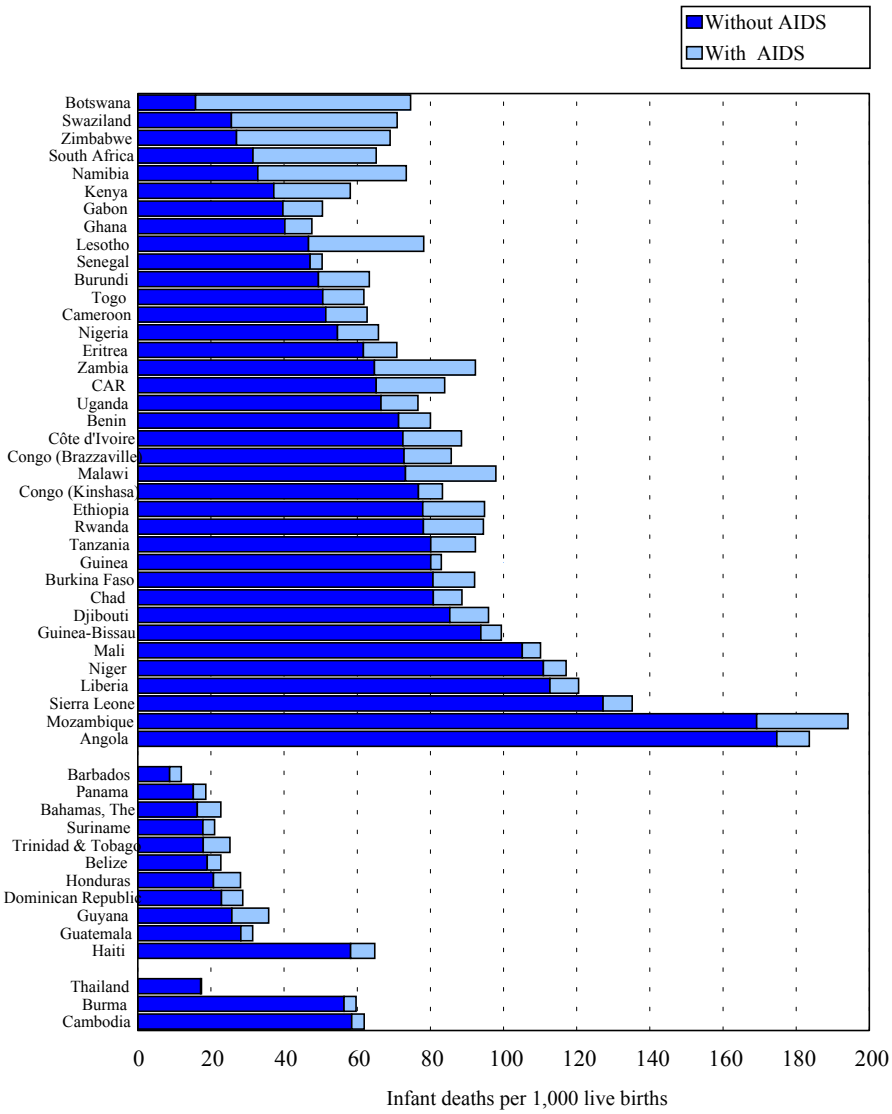
Source: U.S. Census Bureau, International Data Base, and unpublished tables.

[8] U.S. Census Bureau, International Data Base, and unpublished tables.
[9] Figures for 1990 also include AIDS mortality.

Figure 17.

Infant Mortality With and Without AIDS for Selected Countries: 2010

By 2010, 45 infants out of every 1,000 live births will die in Zimbabwe due to AIDS



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

In Four Countries of Sub-Saharan Africa, More Infants Will Die From AIDS in 2010 Than From All Other Causes

In Botswana and Zimbabwe, twice as many infants will die from AIDS as from all other causes. South Africa and Namibia are the other two countries where more infants will die from AIDS than from all other causes. Although overall infant mortality rates are projected to decline between 2000 and 2010, infant mortality due to AIDS is projected to increase.

Of those countries shown, Uganda and Thailand have the only projected declines in AIDS mortality among infants.

In 37 Sub-Saharan African Countries, Child Mortality Rates Have Increased Over What They Would Have Been Without AIDS

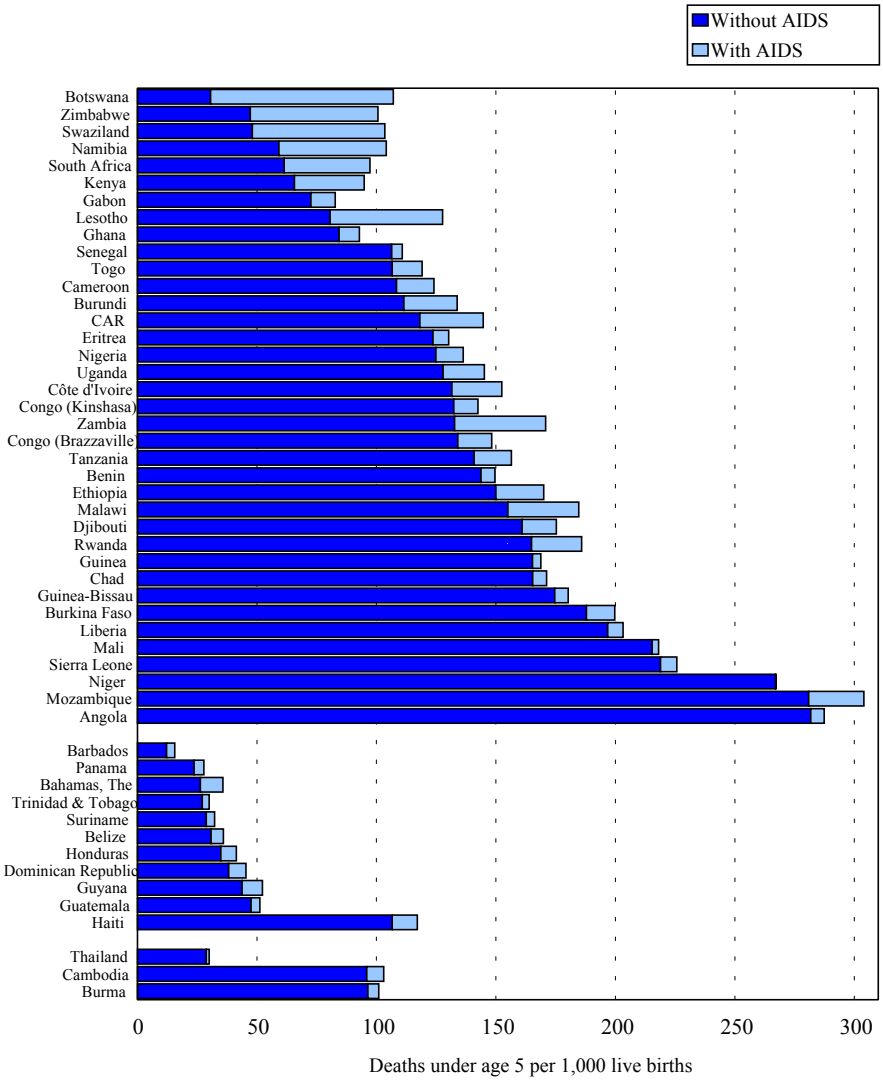
The impact on child mortality is highest among those countries that had significantly reduced child mortality due to other causes and where HIV prevalence is high. Many HIV infected children survive their first birthdays, only to die before the age of five. In Botswana, three-quarters of child mortality is due to AIDS. In Zimbabwe and Swaziland over half of all deaths among children less than five are due to AIDS.

In The Bahamas and Haiti, 10 percent of deaths among children less than five are due to AIDS.

In Thailand, Burma and Cambodia, less than 1 percent of deaths among children are due to AIDS.

Figure 18.
The Under-Five Mortality Rate With and Without AIDS for Selected Countries: 2002

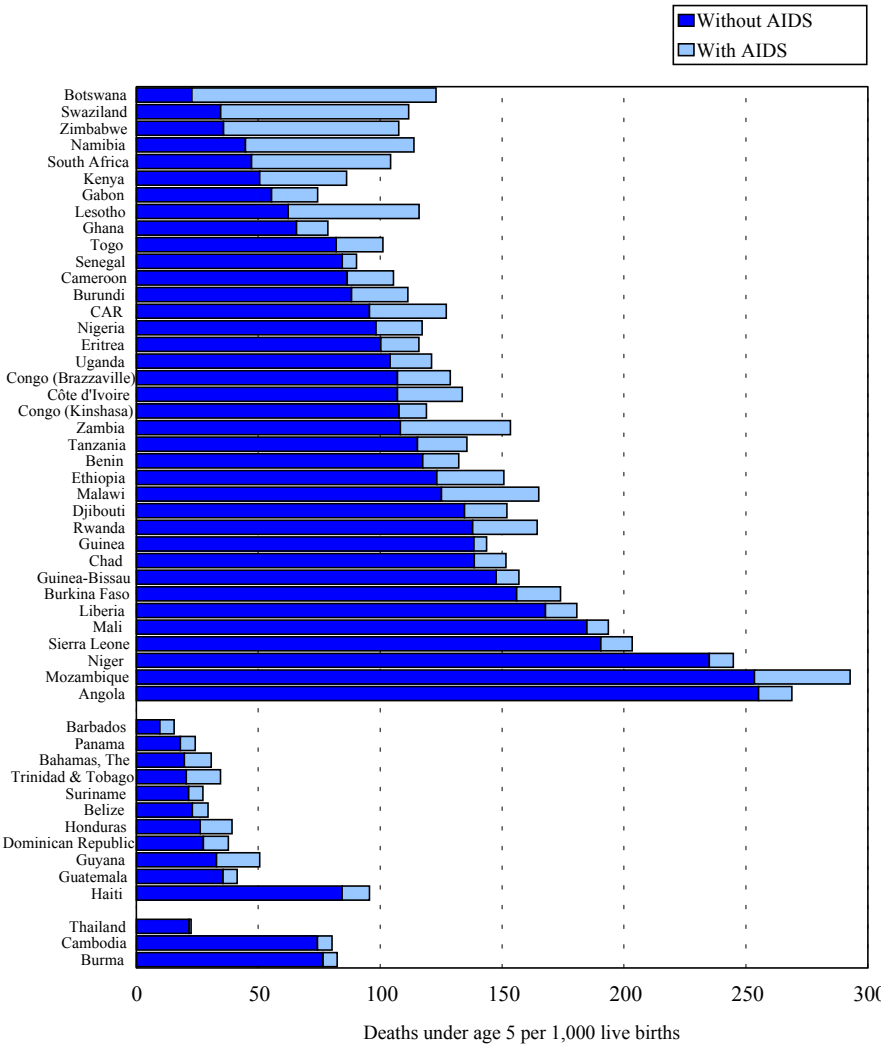
AIDS deaths among children under five years of age are resulting in higher child mortality rates



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

Figure 19.
The Under-Five Mortality Rate With and Without AIDS for Selected Countries: 2010

Over eighty percent of deaths among children under 5 years of age in Botswana in 2010 will be due to AIDS



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

In the Absence of Prevention of Mother to Child Transmission, Child Mortality Rates in 2010 Will Continue to Be Significantly Higher With AIDS Than They Would Have Been Without AIDS

In Botswana, where child mortality rates may have been below 30 without AIDS, over 122 children per 1000 born will die before their fifth birthday. Of that total, over 80 percent will be due to AIDS. In many of the countries in southern Africa, over 50 percent of childhood deaths will be due to AIDS. In Malawi and Mozambique, where child mortality rates due to other causes are already high, AIDS mortality will increase those rates by 30 percent.

In Trinidad and Tobago, 40 percent of childhood deaths will be due to AIDS. In a number of other countries in Latin America and the Caribbean, one-third of childhood deaths will be due to AIDS

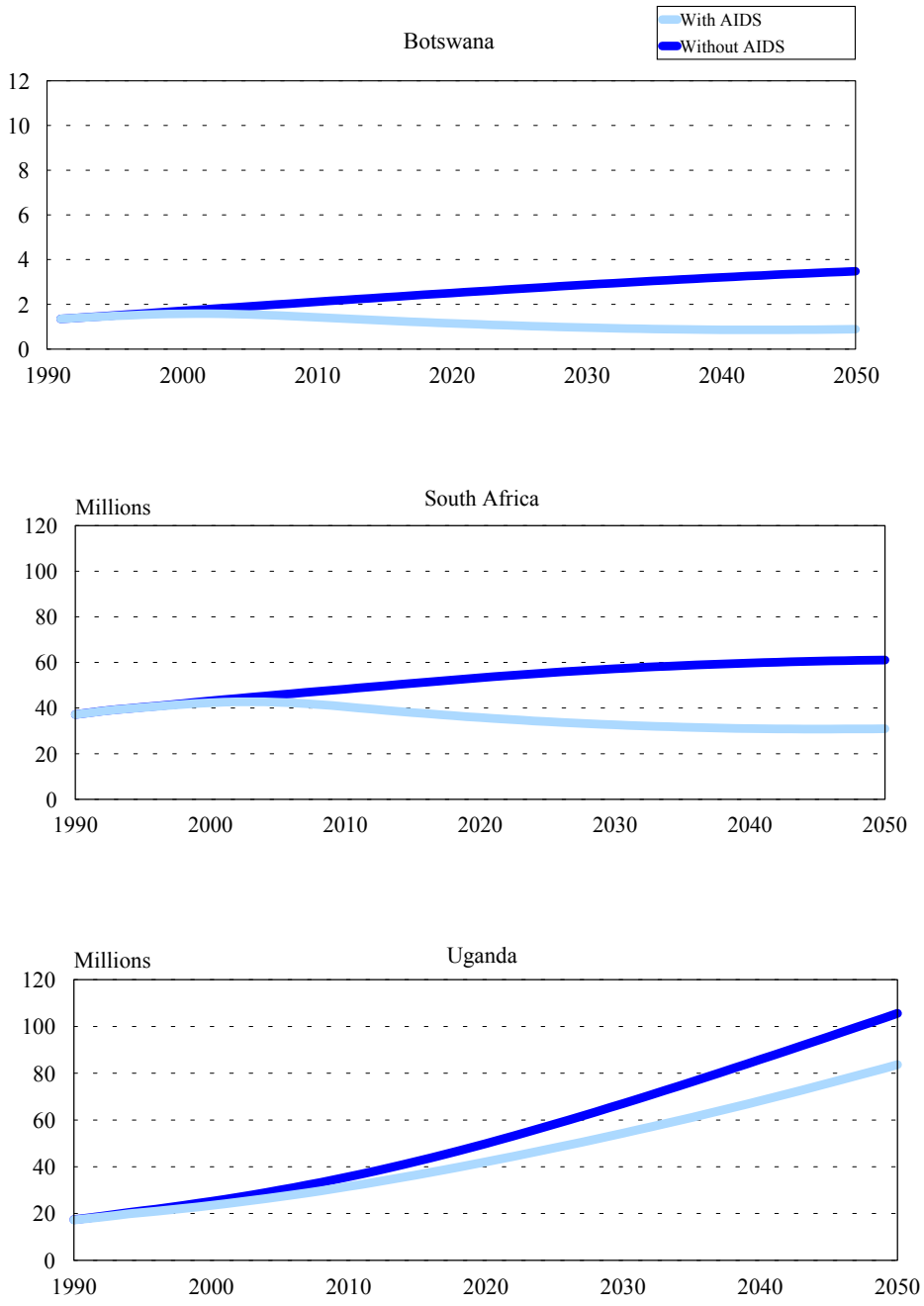
In Asia, child mortality rates will be 3 to 7 percent higher with AIDS mortality in Burma, Cambodia, and Thailand, than they would have been without AIDS.

Populations in Most Sub-Saharan African Countries Will Continue to Increase, Despite the High Levels of Mortality. The Exceptions Are Botswana, Lesotho, Mozambique, South Africa, and Swaziland

Although AIDS mortality has resulted in lower growth rates, fertility is still high and population growth is still positive in most countries affected by AIDS. Populations will continue to increase. Populations in Botswana and South Africa however, will take a long time to rebound from the current levels of HIV prevalence and AIDS mortality even if current AIDS control programs result in lowering future HIV incidence and prevalence.

Figure 20.
Population of Selected African Countries With and Without AIDS: 1980-2050

The populations of Botswana and South Africa will decline over the next few decades whereas in Uganda, population growth will continue



Source: U.S. Census Bureau, International Data Base, and unpublished tables.

At the Beginning of the 21st Century, AIDS Is the Number One Cause of Death in Africa and Fourth Globally[10]

Emerging just 20 years ago, few would have predicted the current state of the epidemic, particularly in Sub-Saharan Africa. That over 30 percent of adults would be living with HIV/AIDS in any country was unthinkable. Yet, this is the current situation in four countries. In seven Sub-Saharan African countries, at least one out of five adults are living with HIV/AIDS and in an additional six Sub-Saharan African countries, one out of ten adults is HIV positive.[11]

Many individuals and governments have difficulty grasping the reality of these high prevalence levels. The resulting AIDS mortality is difficult to comprehend. Yet given these current rates, many more millions of individuals will die due to AIDS over the next decade than have over the past two decades. Many of the southern African countries are only beginning to see the impact of these high levels of HIV prevalence.

There have been success stories: Thailand, Senegal, and Uganda. In Thailand and Uganda, concerted efforts at all levels of civil society have turned around increasing HIV prevalence rates. In Senegal, programs put into place early in the epidemic have kept HIV prevalence rates low. These successes can be repeated. However, the current burden of disease, death, and orphanhood will be a significant problem in many countries of Sub-Saharan Africa for the foreseeable future.

[10] The World Health Report 1999, Making a Difference. World Health Organization, 1999.
[11] Report on the global HIV/AIDS epidemic. UNAIDS/WHO June 2000.

Appendix A
Population Projections Incorporating AIDS

Population Projections Incorporating AIDS

Background

Although it has been clear for a number of years that mortality estimates and projections for many countries would have to be revised due to AIDS mortality, the lack of accurate empirical data on AIDS deaths, the paucity of data on HIV infection among the general population, and the absence of tools to project the impact of AIDS epidemics into the future have all hampered these efforts. Currently, although the accuracy of data on AIDS deaths has not substantially improved, knowledge of HIV infection has expanded and modeling tools have become available to project current epidemics into the future.

The methodology used to project AIDS mortality into the future for this report follows generally the method adopted for ***World Population Profile: 1994***, ***World Population Profile: 1996,*** and ***World Population Profile: 1998*** with continuing modifications. The method consists of the following steps:

1. Establish criteria for selecting countries for which AIDS mortality will be incorporated into the projections.

2. For each selected country, determine the empirical epidemic trend and a point estimate of national HIV prevalence.

3. Model the spread of HIV infection and the development of AIDS in the population, generating alternative scenarios ranging from super high to low AIDS epidemics, and produce the seroprevalence rates and AIDS-related age-specific mortality rates which correspond to each epidemic.

4. Use the empirical levels and trends (from step 2) to establish a factor representing each country's position on a continuum between super high and low epidemics (from step 3). Use the derived factor to generate a unique interpolated epidemic.

5. Use weighted country total adult seroprevalence to determine an appropriate location on the total country epidemic curve implied by the interpolation factor. This projects adult HIV seroprevalence for the total country.

6. Interpolate AIDS-related mortality rates, by age and sex, associated with the estimated speed and level of HIV from epidemic results for the period 1990 to 2010.

In the sections that follow, each of these steps is described, and the method is illustrated.

Country Selection Criteria

The International Programs Center, U.S. Census Bureau, maintains the ***HIV/AIDS Surveillance Data Base***. This data base is a compilation of aggregate data from HIV seroprevalence and incidence studies in developing countries. Currently, it contains over 65,000 data items drawn from over 6,200 publications and presentations. As a part of the biannual updating of the data base, new data are reviewed for inclusion into a summary table which, for each country, lists the most recent and best study of seroprevalence levels for high- and low-risk populations in urban and rural areas[7]

A review of the data in the summary table suggested that a reasonable cut-off point for selection would be countries which had reached 5 percent HIV prevalence among their low-risk urban populations, or, based on recent trends, appeared to be likely to reach this level in the near future. Or, if the UNAIDS national prevalence estimates of the end-1999 had reached 1 percent.

A total of 51 countries met these criteria for the incorporation of AIDS mortality in the projections. Thirty-seven of these countries were in Africa. The African countries are as follows (newly added countries in italics):

Angola
Benin
Burkina Faso
Burundi
Cameroon
Chad
Central African Rep.
Côte d'Ivoire
Congo (Brazzaville)
Congo (Kinshasa)
Djibouti
Eritrea
Ethiopia
Gabon
Ghana

[7] High risk includes samples of prostitutes and their clients, sexually-transmitted disease patients, or other persons with known risk factors. Low risk includes samples of pregnant women, High risk includes samples of prostitutes and their clients, sexually-transmitted disease patients, or other persons with known risk factors. Low risk includes samples of pregnant women, volunteer blood donors, or others with no known risk factors. For a more complete description of the selection criteria, see U.S. Census Bureau (2002).

Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Malawi
Mali
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Sierra Leone
South Africa
Swaziland
Tanzania
Togo
Uganda
Zambia
Zimbabwe

Outside of Africa, the following countries met the criteria:

The Bahamas
Barbados
Belize
Burma
Cambodia
Dominican Republic
Guatemala
Guyana
Haiti
Honduras
Panama
Trinidad & Tobago
Suriname
Thailand

Empirical Epidemic Trends

For 50 of the countries meeting the selection criteria, staff members reviewed the HIV seroprevalence information available in the HIV/AIDS Surveillance Data Base to establish urban seroprevalence trends over time (Table A-1, col. 1-5) and to establish the estimated prevalence for the whole country (Table A-1, col. 6-7). The two data points judged to be most representative for the urban low-risk population were identified and used to calculate the annual change between the dates of the two studies. National prevalence figures were based on year-end 1999 estimates prepared by the World Health Organization and the United Nations Joint Programme on HIV/AIDS.

Alternative Scenarios

To project the impact in the selected countries, five alternative epidemic scenarios were developed, corresponding to low, medium, high, higher, and super high AIDS epidemics. The highest scenarios were added this round to incorporate the very explosive HIV epidemics in southern Africa, and those epidemics where there is little difference between the urban and rural HIV prevalence levels. These scenarios were developed using iwgAIDS, which is a complex deterministic model of the spread of HIV infection and the development of AIDS in a population. This model was developed under the sponsorship of the Interagency Working Group (iwg) on AIDS Models and Methods of the U.S. Department of State (Stanley et al., 1991).

All five of these epidemic scenarios incorporate increasing levels of behavior change in the form of increased condom use. This assumption corresponds to actual changes in behavior that are now beginning to occur in some countries. In addition, all five epidemics exhibit plateauing and subsequent declines in prevalence in the later stages of the epidemic, particularly in urban areas.

Interpolation of a Unique Epidemic

The empirical urban trend from each country was used to interpolate among the five epidemic scenarios to derive an epidemic trend line matching the observed HIV seroprevalence increase between the two points. Thus, both the level and the rate of increase of the urban epidemic were matched through this procedure and resulted in an interpolation factor used in subsequent steps (see figure A-1).

Projected Total Seroprevalence

At this point in the estimation procedure, no direct linkage has been made to the total country prevalence or to a particular calendar year in this country's epidemic. The next step accomplishes these tasks. The total-country adult prevalence estimate (Table A-1, col. 6) was matched with the one implied using the interpolation factor. From this comparison, an "offset" figure was calculated, corresponding to the number of years of difference between the start of the epidemics in the five scenarios, and the empirical epidemic at the reference date (see figure A-2). The resulting projected epidemics for the 1990 to 2010 period for selected countries in Africa are shown in figure A-3.

AIDS-Related Mortality Rates

Based on the "interpolation factor" and the "offset" described above, AIDS-related age-sex-specific mortality rates (${}_nm_x$ values) at 5-year intervals from 1990 to 2010 were interpolated and added to non-AIDS ${}_nm_x$ values for the same period.[8] Population projections were prepared with the combined ${}_nm_x$ values as input, using the rural/urban projection program of the U.S. Census Bureau.

[8] Non-AIDS ${}_nm_x$ values were derived by making standard assumptions concerning the improvement in mortality conditions as described earlier in this appendix.

Table A-1.

Empirical Seroprevalence Data for Urban and Rural Areas for Selected Countires

Country	Urban trend, pregnant women				Estimated total country
	Date	Percent seropositive	Date	Percent seropositive	Percent seropositive [3]
Angola	1995.00	1.20	1999.00	3.40	2.78
Benin	1994.50	1.10	1998.50	2.50	2.45
Botswana	1994.50	27.80	1997.30	34.00	35.80
Burkina Faso	1991.00	7.80	1996.75	10.00	6.44
Burundi	1986.00	14.70	1998.90	19.10	11.32
Cameroon	1992.60	3.95	1994.60	5.70	7.73
Chad	1995.00	2.40	1999.00	6.20	2.69
C.A.R.	1986.50	4.70	1996.50	11.70	13.84
Congo (Brazzaville)	1987.50	3.10	1993.50	7.20	6.43
Congo (Kinshasa)	1985.50	6.90	1991.50	9.20	5.07
Djibouti	1993.00	4.00	1995.50	6.10	6.10
Eritrea	1987.50		1994.00	3.00	2.87
Cote d'Ivoire	1989.50	6.00	1997.00	15.90	10.76
Ethiopia	1991.00	10.70	1996.50	17.90	10.63
Gabon	1998.50	0.50	1994.50	1.70	4.16
Ghana	1992.50	1.20	1996.50	2.20	3.60
Guinea	1990.00	1.10	1996.00	2.10	1.54
Guinea-Bissau	1990.00	0.90	1997.00	2.50	2.50
Kenya	1992.50	14.40	1995.50	18.50	13.95
Lesotho	1991.50	5.50	1996.50	20.60	23.57
Liberia	1992.00	3.70	1993.00	4.00	2.80
Malawi	1991.50	22.00	1995.50	27.60	15.96
Mali	1988.00	1.30	1994.00	4.40	2.03
Mozambique	1994.90	10.70	1998.90	17.00	13.22
Namibia	1991.50	4.20	1996.60	16.00	19.54
Niger	1988.00	0.50	1993.00	1.30	1.35
Nigeria	1992.00	2.90	1994.00	5.40	5.06
Rwanda	1989.00	26.80	1992.00	28.90	11.21
Senegal			1991.00	0.30	1.77
South Africa	1994.90	6.40	1997.90	16.10	19.94
Swaziland	1993.50	21.90	1998.50	31.60	25.50
Tanzania	1986.50	3.70	1996.50	13.70	8.09
Togo	1995.50	6.00	1997.50	6.80	5.98
Uganda--High	1987.50	24.00	1992.00	29.50	12.00
Uganda--Low Stable	1996.50	15.30	1997.50	14.70	8.30
Zambia	1990.00	24.50	1994.75	27.50	19.95
Zimbabwe	1990.00	23.80	1995.00	30.00	25.06
Bahamas, The	1990.50	3.00	1993.50	3.60	4.13
Barbados	1991.00	1.30	1996.00	1.10	1.17
Belize	1993.50	0.20	1995.50	2.30	2.01
Dominican Republic	1995.50	1.20	1999.50	1.70	2.80
Guatemala	1991.50	0.00	1998.50	0.90	1.38
Guyana	1990.50	1.50	1991.50	1.87	3.01
Haiti	1989.80	7.10	1993.50	8.40	5.17
Honduras	1992.35	2.00	1995.50	4.10	1.92
Panama	1993.50	0.80	1995.50	0.90	1.54
Trinidad & Tobago	1991.50	0.20	1999.50	3.40	1.05
Suriname	1991.50	0.80			1.26
Burma	1992.50	0.50	1997.50	1.42 [2]	1.99
Cambodia	1995.75	3.00	1998.75	4.90	4.04
Thailand [1]					2.15

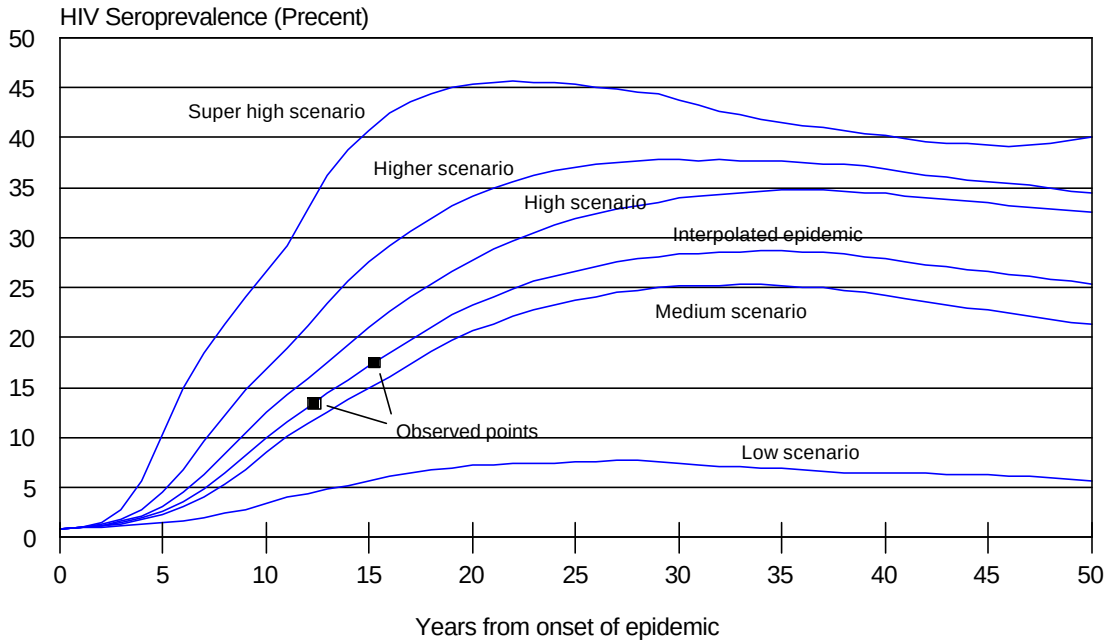
[1] Country-specific modelling was undertaken for Thailand.

[2] Burma military recruit data

[3] Estimated Total Country HIV percentage is for Jan. 1, 2000 except for Djibout which is from 1995.

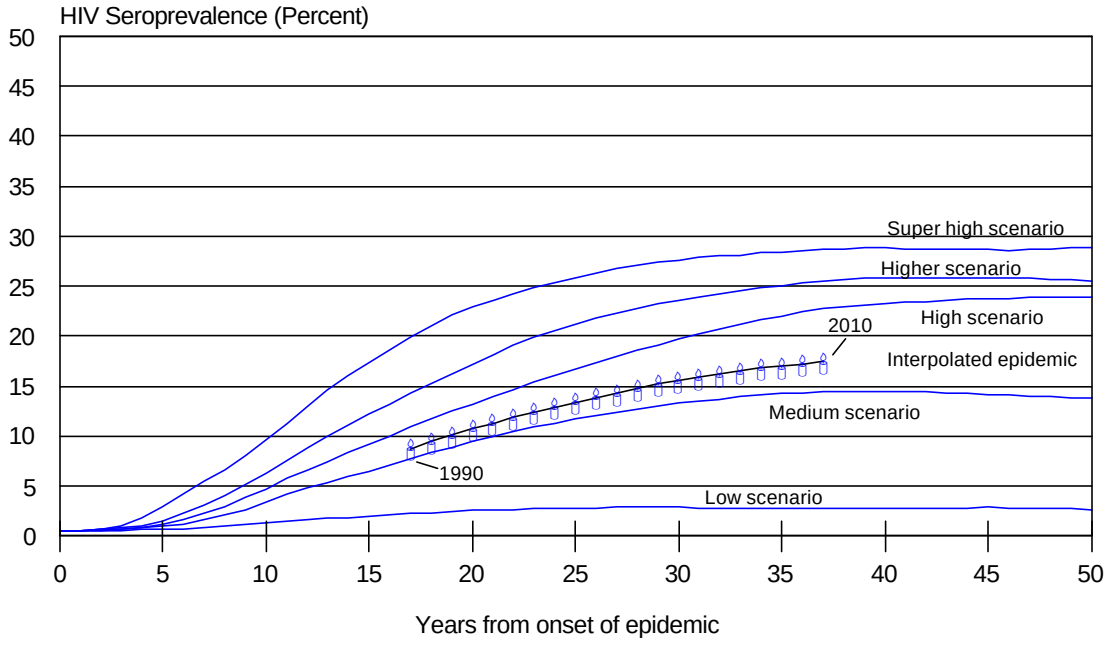
Source: Urban and rural data are from the HIV/AIDS Surveillance Data Base, International Programs Center, U.S. Census Bureau, January, 2000. Estimated Total Country HIV percentage is from UNAIDS (2000) and WHO (1994).

Figure A-1
Scenarios and Empirical Trend
Urban Female HIV Seroprevalence



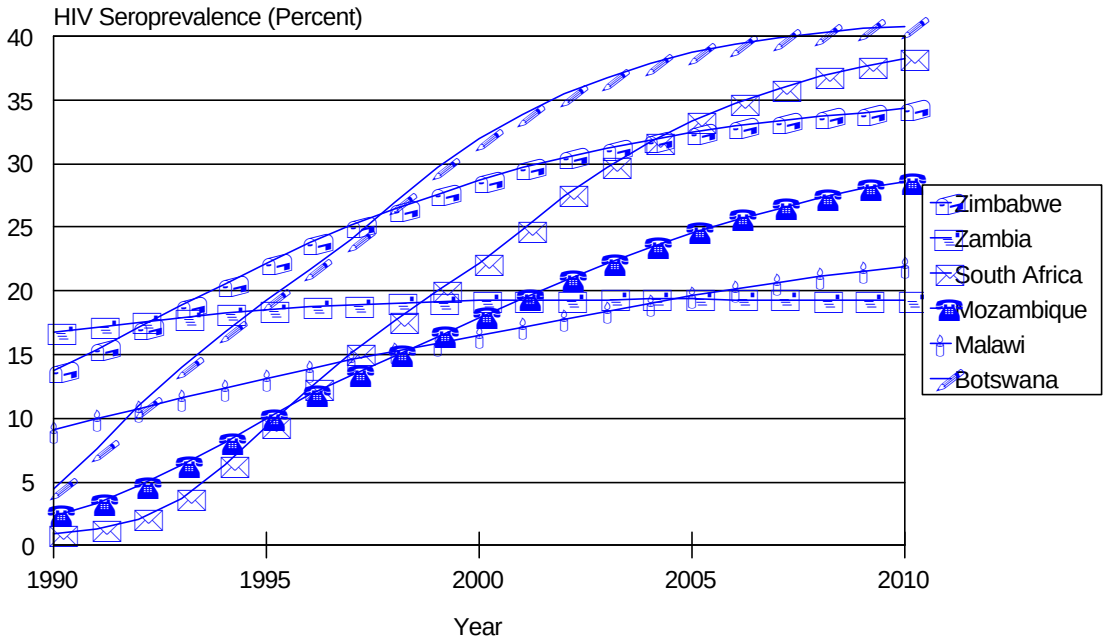
Source: U.S. Census Bureau, unpublished tables.

Figure A-2.
Five Scenarios and Empirical Trend
Total Female HIV Seroprevalence



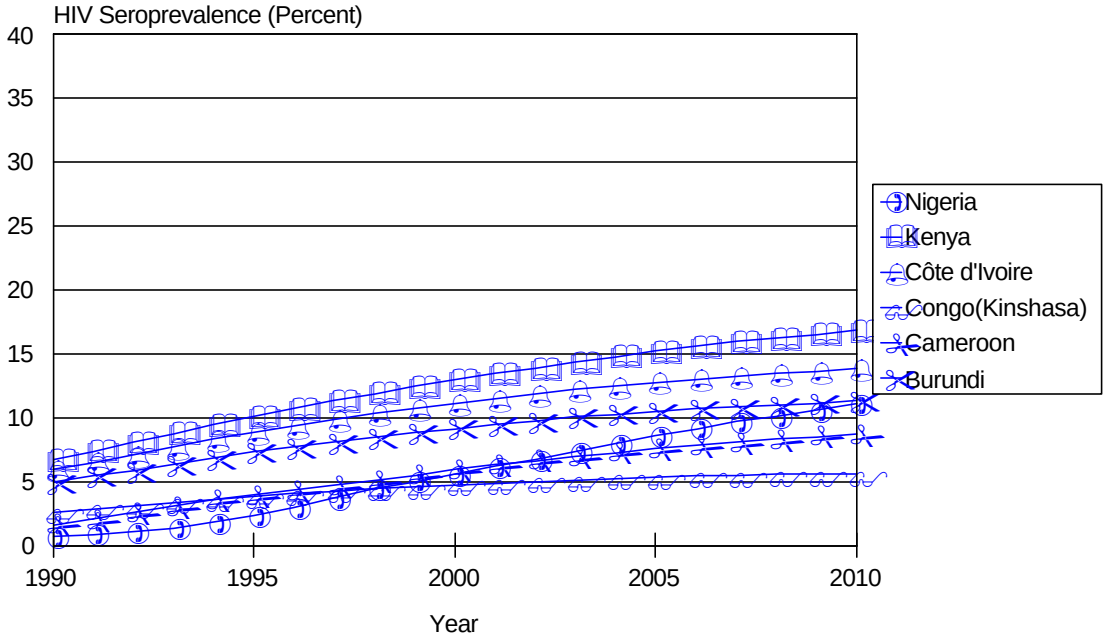
Source: U.S. Census Bureau, unpublished tables.

Figure A-3a.
Projected HIV Seroprevalence for
Selected Countries of Africa



Source: U.S. Census Bureau, unpublished tables.

Figure A-3b.
Projected HIV Seroprevalence for
Selected Countries of Africa



Source: U.S. Census Bureau, unpublished tables.

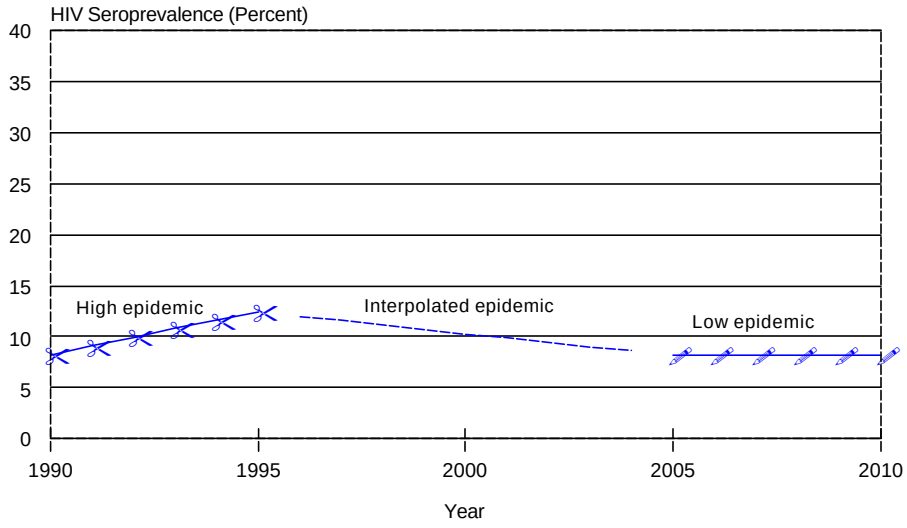
The future course of the AIDS pandemic is uncertain, but the projections require that some assumptions be made. It was assumed that the epidemics would peak in 2010, with no further growth in HIV infection after that year. AIDS mortality was assumed to decline from the level reached in 2010 to nil by 2070, thus implying a return to "normal" mortality levels in the latter year. To implement the projection process, life tables for 2070, assuming no AIDS mortality, were used.

The Special Case of Uganda

Prevalence levels for pregnant women in major urban areas in Uganda appear to have peaked in the early 1990s, with rather dramatic declines subsequently. Infection levels of nearly 30 percent were detected in 1992; by 1996, HIV prevalence rates had declined by nearly 50 percent (table A-1). Although discussion of the causes of these declines is still underway, it appears clear that a substantial change has occurred. Consequently, the approach described above needed to be modified to conform to the empirical evidence of declining HIV prevalence rates.

To handle this epidemiological pattern in Uganda, the 1990-2010 period was divided into a rising epidemic period (1990-1995), a transition period (1995-2005), and a period of a relatively low and stable epidemic (2005-2010). This classification is represented in figure A-4. Mortality rates corresponding to the rising epidemic and the stable epidemic were separately derived, and the transition between the two was accomplished by linear interpolation between the two epidemics.

Figure A-4.
Projected HIV Seroprevalence for Uganda



Source: U.S. Census Bureau, unpublished tables.

The Special Case of Thailand

Modeling activities have also been undertaken for Thailand with the supported of the Interagency Working Group. The AIDS epidemic in Thailand has substantial injecting drug use components, while those in Africa do not (WHO/GPA, 1993a). For Thailand, AIDS-related mortality rates from recent epidemiological and demographic projections (TNESDB, 1994) were added to the non-AIDS ${}_nm_x$ values for the 1990 to 2010 period.

Caveats and Limitations

In developing the methodology for these projections, the International Programs Center has attempted to maximize the use of both the empirical data and the modeling tools available. However, there is much that is unknown about the dynamics of AIDS epidemics in countries around the world, and the methodology is necessarily imprecise. The actual path of AIDS epidemics in the countries that were selected will undoubtedly differ from the course projected. As epidemics grow, future behavior changes and interventions being implemented in countries around the world may alter that course.

What if AIDS epidemics do not peak early in 2010 as projected? Will entire populations become infected with HIV and eventually die from AIDS? The simulations used for this report suggest that this will not happen in any population, although population declines are possible with a sustained wide-spread epidemic, particularly in the presence of low fertility levels. Variations in sexual behavior help to ensure that the majority of the population in countries around the world is not at high risk of HIV infection. With substantial proportions of the population at lower risk of infection, each of the epidemic scenarios displays a definite plateau in HIV seroprevalence after the initial rapid rise.

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