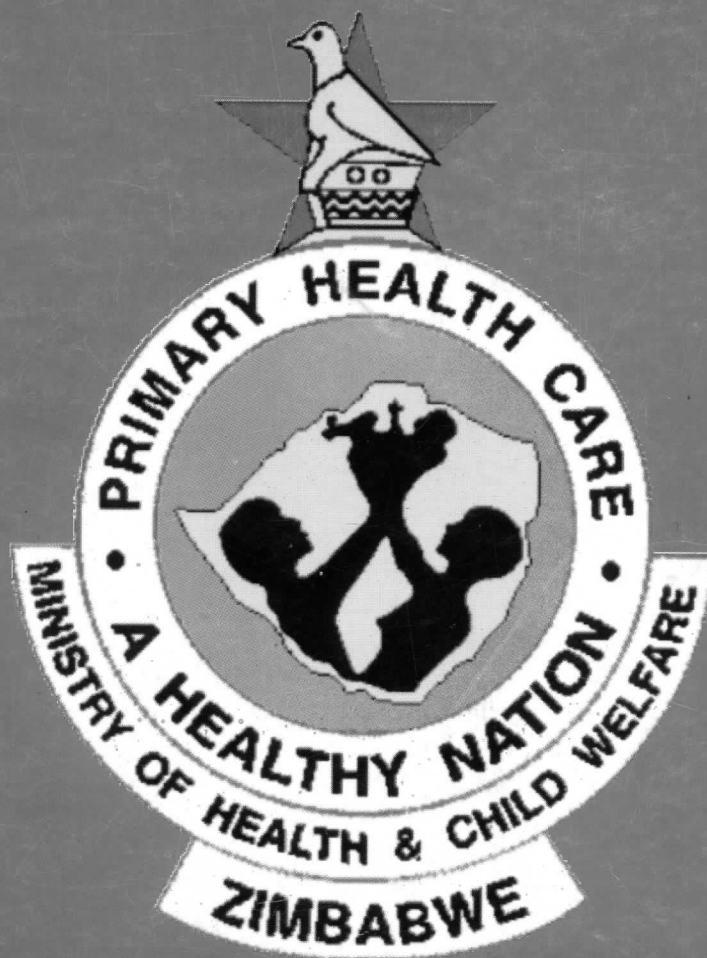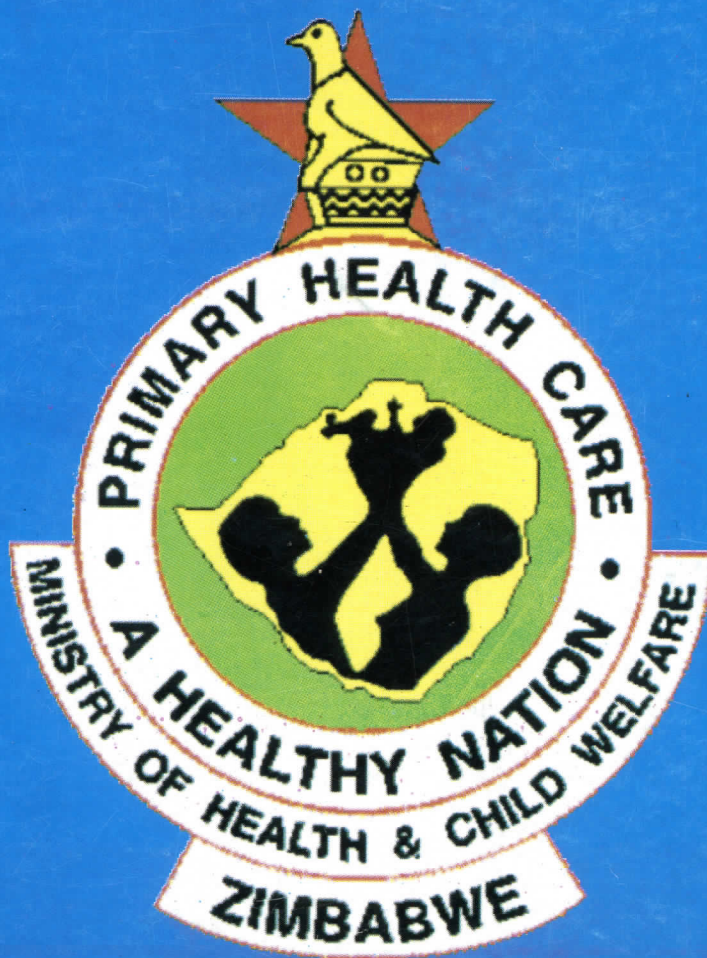# Zimbabwe National HIV/AIDS Estimates, 2007

AIDS & TB Programmes

Zimbabwe National HIV/AIDS Estimates, 2007

AIDS & TB Programmes

Foreword

To track the epidemic and monitor the response to HIV and AIDS, the Ministry of Health and Child Welfare (MOHCW) produced the Zimbabwe National HIV and AIDS Estimates, 2007. Zimbabwe continues to be one of the countries in the world with high HIV infection rates. However, a decline in HIV prevalence that started in 1997 was reported by the 2005 national estimates process. The estimated HIV and AIDS prevalence in adults (age 15 to 49 years) in Zimbabwe was 20.1% (13.2-27.5%) in 2005 with an estimated 1,610,000 Zimbabweans living with HIV and AIDS.

The Zimbabwe National HIV and AIDS Estimates 2007 report is the third locally produced compilation of estimates. UNAIDS and other organizations continued to provide technical assistance and training in order to build capacity to produce this report. Using data from HIV surveillance at sentinel antenatal clinics, HIV and AIDS estimates were generated using the 2007 version of Epidemic Projection Package (EPP) software and HIV prevalence curves and projections were generated using the Spectrum software package.

The results of the 2007 national HIV and AIDS estimates process are reported in this document. Of particular interest was the continued decline in the HIV prevalence trend. This decline began in the late 1990s and is a result of a combination of mortality and decreases in HIV incidence through adoption of protective behavior changes promoted by various HIV prevention programs. These positive signs in our fight against HIV and AIDS should spur every Zimbabwean to redouble his and her efforts and commit themselves to further reduce the burden of HIV and AIDS.

Dr. E.T Mabiza

Permanent Secretary for Health and Child Welfare

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Executive Summary

The MOHCW led the National HIV and AIDS Estimates process to confirm the decline in HIV prevalence first reported in 2005. The national estimates process is designed to describe the impact of the HIV and AIDS epidemic on the country in 2007 and estimate HIV and AIDS prevalence and incidence, AIDS-related deaths, the impact of care and treatment on HIV and AIDS prevalence, and the number of pregnant women and children affected by HIV and AIDS, including the current number of HIV and AIDS orphans. The 2007 national HIV and AIDS estimates were generated using the Epidemic Projection Package (EPP) software and HIV prevalence curves and projections were generated using the software package Spectrum. Data from HIV surveillance at sentinel antenatal clinics (ANC) and other population-based surveys stratified by geographic areas defined as urban, rural or other to accurately describe the HIV and AIDS epidemic in Zimbabwe.

The National HIV and AIDS Estimates Working group estimated HIV and AIDS to be 15.6% for adults age 15 to 49 years in 2007. The lower and upper bound for this estimate is 14.9 to 16.3%. An estimated 1,320,739 (1,252,299-1,384,440) Zimbabweans of all ages were living with HIV and AIDS at the end of 2007. The EPP HIV prevalence estimate curve continued to show a declining HIV epidemic in Zimbabwe. The decline started around 1997. A review of available data in Zimbabwe determined the decline in HIV prevalence resulted from a combination of an increase in adult mortality in the early 1990s and a decline in HIV incidence starting in the mid 1990s. Survey data show there is improvement in the adoption of protective behavioral measures, especially in decreasing number of sexual partners and increasing condom use.

Adult and child ART coverage and PMTCT uptake may affect the numbers of people living with HIV and AIDS. People with HIV and AIDS will survive longer if they are on ART, so increased coverage will initially tend to increase HIV prevalence as there are fewer deaths. Increasing the number of children on treatment can extend life significantly, increase the number of children living with HIV and AIDS and decrease the number of deaths among children. PMTCT uptake will also decrease transmission of HIV from mothers to babies. The estimates reporting on the impact of HIV and AIDS reflect the provision of ART to approximately 40% of children in need of ART and PMTCT services to approximately 30-40% of HIV-positive mothers. As the MOHCW moves to universal coverage of ART for adults, the 2009 national estimates process is expected to report an increase in HIV prevalence and the number of adults living with HIV and AIDS similar to what is seen among children in 2007.

While the decline in HIV prevalence estimated by the working group is encouraging, overall, more than one in seven Zimbabweans are still infected with HIV. Zimbabwe will continue to invest in interventions targeting behavior change, improve prevention strategies and improve care and treatment services for those affected by HIV in order to decrease the number of people becoming infected with HIV and dying from the infection.

Background

In 2005, Zimbabwe reported a decline in the estimated National HIV and AIDS prevalence. This was the first decline in prevalence noted in the country's generalized HIV epidemic. The estimated prevalence level of 20.1% in 2005 was supported by the point prevalence of 18.1% measured by the Zimbabwe Demographic and Health Survey Plus (ZDHS+).

Zimbabwe has a wealth of HIV and AIDS data that is used locally and nationally for advocacy and planning purposes. HIV sentinel surveillance of pregnant women receiving antenatal care services at public clinics has been ongoing since 1989. Two population based sero-surveys were conducted in the last six years. In 2001, Zimbabwe conducted a Young Adult Survey to measure HIV prevalence and risk behaviors among 15 to 29 year old Zimbabweans. In 2005 and 2006, Zimbabwe conducted a ZDHS+ to measure HIV prevalence and health and nutrition markers among Zimbabwean households. Although targeted surveillance data (e.g., pregnant women, youth) and population-based surveys are valuable for planning both prevention programmes and care and treatment services, regular national estimates using all available data provide timely and affordable information on the magnitude and trends of the HIV epidemic and the impact on health care services and other sectors of the economy. In addition, estimates are needed to measure progress towards the targets established at the United Nations General Assembly Special Session on HIV and AIDS (UNGASS) and the Millennium Development Goals.

Since 2000, the Estimation and Projection Package (EPP) software from UNAIDS and WHO has been used to estimate each country's HIV prevalence, primarily using data collected from antenatal clinics as part of national HIV sentinel surveillance programmes. The estimated HIV prevalence determined by EPP is then used by another software package, Spectrum, from Constella Futures, which generates the separate projections of HIV prevalence for adults and children, the numbers of new HIV infections, new AIDS cases, and AIDS deaths and orphans. Using the available versions of EPP and Spectrum in 2005, the MOHCW reported that the estimated HIV prevalence among adults age 15 to 49 years in Zimbabwe was 20.1%.

To increase individual country capacity and participation in making these estimates, UNAIDS and WHO conducted a series of workshops from March through August 2007 to train participants from each country in estimation methods and the application of the EPP and Spectrum software. The Zimbabwe team attending the workshops included representatives from MOHCW, NAC, UZ, CDC-Zimbabwe, UNAIDS and WHO.

The final 2007 national HIV prevalence estimate and projections were developed by the National HIV and AIDS Estimates Working Group chaired by the MOHCW AIDS & TB Unit. The working group reviewed the work completed during the 2003 and 2005 national HIV estimates process and updated the data, methods and software used to accurately and reliably describe the epidemic in Zimbabwe. Because the data, methods and software change during each estimate process, the prevalence estimates from each

separate national estimates process are not directly comparable. Only the estimates produced by a single curve or model can be compared to each other to assess changes in HIV prevalence and describe the trend in the epidemic.

Objectives

The objectives of this report are to present the national HIV and AIDS estimates for Zimbabwe in 2007, specifically:

- the HIV prevalence and incidence at the end of 2007;
- the total number of people living with HIV and AIDS at the end of 2007;
- the number of adults age 15 to 49 years living with HIV and AIDS at the end of 2007;
- the number of women age 15 to 49 years living with HIV and AIDS at the end of 2007;
- the number of children age 0 to 14 years living with HIV and AIDS at the end of 2007;
- the number of AIDS deaths among adults and children in 2007;
- the number of pregnant women living with HIV and AIDS at the end of 2007;
- the prevention, care and treatment needs among adults and children in 2007; and
- the number of children orphaned by AIDS in 2007.

The estimates presented in this report was shared by the MOHCW with UNAIDS and WHO for inclusion in the *AIDS Epidemic Update 2007* and was used in calculating the indicators reported to monitor Zimbabwe's progress towards the UNGASS goals.

This report describes the methods and underlying assumptions used in making these estimates.

Methods

This section briefly describes the methods used to produce the estimates in this report. A detailed description of the processes and methods is located in Appendix 2.

The National HIV and AIDS Estimates process led by the MOHCW's AIDS & TB Unit included staff from the MOHCW, NAC, UZ, BRTI, Imperial College, CDC-Zimbabwe, UNAIDS, UNFPA, UNICEF and WHO. The working group produced the final national HIV and AIDS estimates for 2007 and this report.

Preparation of the National HIV Estimates are based on Zimbabwe's ANC data using the EPP and Spectrum software packages to produce the national adult (age 15-49 years) HIV prevalence estimate for Zimbabwe.

ANC data from 1989 through 2006 were used to develop the HIV prevalence estimates and projections. The data from 1989 through 2001 used results determined using the Biorad Genscreen ELISA test kit. The Biorad Genscreen ELISA was sensitive to

contamination and not specific which may have resulted in a higher than accurate HIV prevalence. In 2002, 2004 and 2006 the ANC Survey Protocols were modified and all samples were tested by a parallel testing algorithm using the Biorad Genscreen ELISA kit and the Thermo Labsystems ELISA kit. Samples that were still discordant after retesting were resolved using the Western blot. The 2002-2006 ANC Survey data used in the 2007 national estimates process were from the more accurate parallel testing algorithm. Since the parallel testing algorithm data are considered accurate, the data were not adjusted prior to entering into EPP as was previously described in the 2003 and 2005 national estimates processes.(1;7)

Other data decisions made during the 2003 National Estimates Workshop were continued through the development of the 2007 National Estimates, specifically:

- sentinel sites and population sectors were classified as urban, rural and other using the 2002 Zimbabwe Census data;
- prevalence rates from 1989 through 2001 for six rural ANC sites were adjusted down by 30% to correct for excessively high HIV prevalence;
- data points for Chiredzi were excluded prior to 2001 due to inconsistencies; and
- data for Musume was excluded in 2000 because the prevalence rate year was inconsistent with other years.

EPP Curve Fits

The most recent version of EPP was used to determine the 2007 HIV prevalence estimate using the most current ANC data with the adjustments described above for the urban, rural and other areas. HIV prevalence results from the ZDHS+ 2005-2006 were used to calibrate the urban and rural curves. Since data describing the point prevalence for other census strata were not available from the ZDHS+, the third, EPP curve categorized as "other", was not calibrated. The ZDHS+ survey year was specified as 2005, the year the majority of the data collection for the survey was completed. The three curves for the different population strata were combined to provide one national HIV prevalence estimate by applying the population distribution by urban, rural and other categories from the 2002 Census data projected to 2007.

Creating the HIV and AIDS Estimates in Spectrum

The HIV estimate curve generated by EPP was input to the most recent version of the Spectrum software package, to generate projections relevant to the HIV and AIDS epidemic.

Spectrum uses demographic, epidemiologic and other data to create a national HIV projection. The projection for Zimbabwe was created for the years 1980 to 2007. Demographic data were selected using the EasyProj feature of Spectrum, which uses data prepared from the United Nations Population Division and updated with data provided by the Zimbabwe Central Statistical Office (CSO) with data from the 1982, 1992 and 2002 Censuses with projections to up 2007. Epidemiologic data were read from the EPP file and entered from national data sources.

The following demographic data Spectrum defaults specific to Zimbabwe were used

- first year population;
- Age Specific Fertility Rate (ASFR)
- Total Fertility Rate (TFR);
- sex ratio at birth;
- life expectancy;
- Model Life Tables (Coale Demeny North); and
- international migration.

The following epidemiologic data Spectrum defaults specific to Zimbabwe were used:
- HIV progression; and
- TFR reduction.

The following epidemiologic data were adjusted or changed from the Spectrum software default:
- HIV Prevalence (EPP data);
- HIV age distribution (generalized with data applied from population-based serosurveys;
- Prevention of Mother to Child Transmission (PMTCT) service provision;
- Antiretroviral Treatment (ART) service provision(11); and
- child treatment(12).

Impact of disease data used the Spectrum software default specific to Zimbabwe. Orphanhood data describing the number of women never married were adjusted using ZDHS+ data but the percent of women in a monogamous marriage used the Spectrum software default. Detailed description of the data inputs for EPP and Spectrum used in developing the 2007 National Estimates are found in Appendix 2 of this report.

Current Status of the HIV and AIDS Epidemic in Zimbabwe

National HIV Prevalence Estimates in Zimbabwe, 2007

Table 1 : Overall Estimates

Estimated number of people living with HIV and AIDS in Zimbabwe at the end of 2007

	Estimated Number	Upper and Lower Bounds
Total (adults and children)	1,320,739	1,252,299 - 1,384,440
Adults (15-49)	1,085,671	
Women (15-49)	651,402	
Children (0-14)	132,938	124,235 - 142,059
Adult Prevalence (15-49)	15.6%	14.9% - 16.3%

Using Zimbabwe's ANC data to generate prevalence curves in EPP and Spectrum to generate HIV and AIDS estimates (detailed methods are described in Appendix 2), an estimated 1,320,739 (1,252,299-1,384,440) Zimbabweans were living with HIV and AIDS at the end of 2007. Among the estimated 1,085,671 people age 15 to 49 years living with HIV and AIDS, 60.0% were women. Among children age 0-14 years, an estimated 132,938

(124,235-142,059) were living with HIV and AIDS. The estimated HIV prevalence was 15.6% for adults 15 to 49 years old at the end of 2005. The lower and upper bounds for this estimate are 14.9% to 16.3%.

Table 2: Estimated New Infections

Estimated number of new HIV infections in Zimbabwe during 2007

	Estimated Number	Upper and Lower Bounds
Adults (15-49)	22,518	6,639 - 38,662
Women (15-49)	10,199	
Children (0-14)	17,370	15,666 - 19,256
Adult Incidence (15-49)	0.40%	

Of the estimated 22,518 new adult (age 15 to 49 years) HIV infections during 2007, slightly less than half (45.3%) were among women, while an estimated 17,370 were among children (age 0 to 14 years).

Table 3: Estimated AIDS Deaths

Estimated number of AIDS deaths in Zimbabwe during 2007

	Estimated Number Annual Deaths	Upper and Lower Bounds	Estimated Deaths/Week
Adults (15-49)	115,114		2,214
Women (15-49)	67,375		1,296
Children (0-14)	12,448	10,728 - 14,289	240

During 2007, 58.5% of the estimated adult AIDS deaths were in women. The estimated numbers of AIDS deaths in adults (115,114) was greater than the estimated numbers of new HIV infections in adults (22,518) in 2007. An estimated 2,214 adults and 240 children died of AIDS per week in Zimbabwe in 2007.

Table 4: Estimated Orphans

Estimated number of orphans (age 0-14 years) living in Zimbabwe at the end of 2007

	Estimated Number	Upper and Lower Bounds
HIV and AIDS Orphans[1] (0-14)	975,956	904,307 - 1,047,462
Total Orphans (0-14)	1,265,473	

[1] Children who have lost one or both parents to HIV and AIDS

At the end of 2007 there was an estimated 975,956 (904,307-1,047,462) HIV and AIDS orphans (age 0 to 14 years), 77.1% of total orphans.

Table 5: EPP HIV Prevalence Estimates by Census Strata

Estimated adult (age 15-49 years) HIV and AIDS prevalence in Zimbabwe by census strata at the end of 2007

Census Strata	Estimated HIV Prevalence
Total	15.3%
Urban	14.5%
Rural[1]	14.5%
Other[2]	21.7%

[1] Communal lands, small-scale commercial farms, resettlements

[2] Large-scale commercial farms, administrative centers, growth points, other urban areas (e.g., mines), state land (e.g., national parks), special category

The highest EPP HIV and AIDS prevalence estimate was among those residing in "other" areas, followed by urban areas, and lowest among those residing in rural areas. The EPP estimated total prevalence does not take into account survival of those on antiretroviral treatment and is lower than the national estimated prevalence of 15.6% reported in Table 1.

Zimbabwe HIV and AIDS Trends
Figure 1: Trends in Adult HIV Prevalence

Trends in the estimated adult (age 15-49 years) HIV and AIDS prevalence, Zimbabwe, 1980-2007
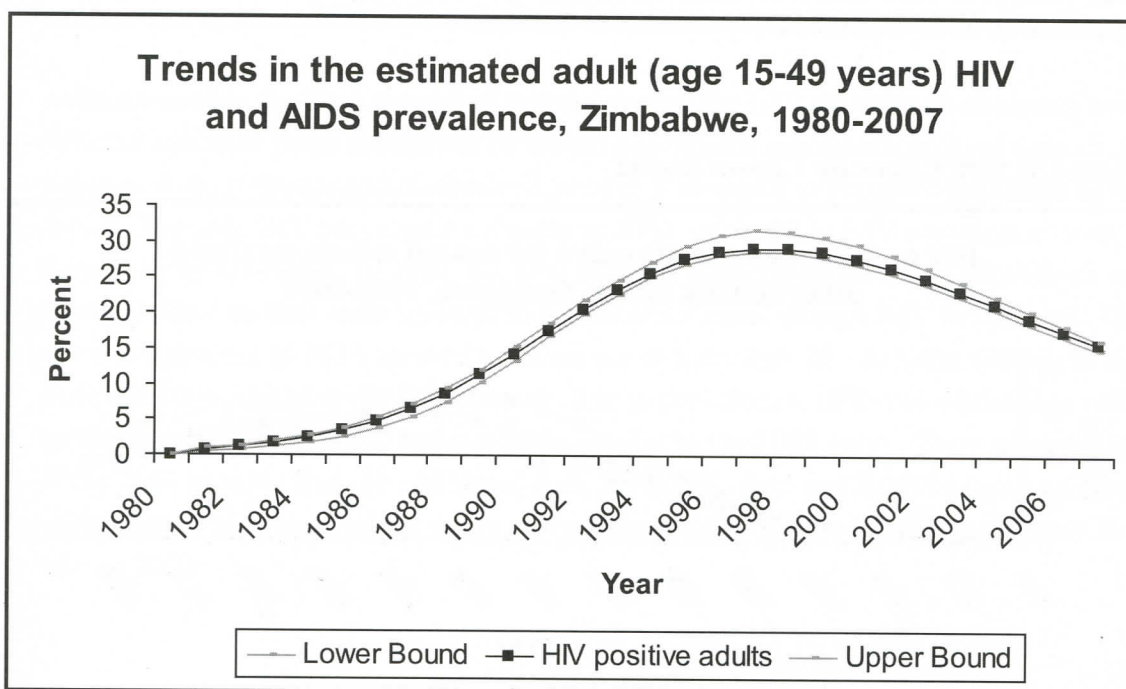
Figure 1 above shows the estimated trend in adult HIV and AIDS prevalence in Zimbabwe over time. There was a gradual increase in adult HIV and AIDS prevalence, the total number of people infected with HIV and AIDS in a year from an estimated <1%

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in 1986 to a peak of 29.3% in 1997. The 2007 National Estimate curve estimates HIV prevalence in 2001 as 26.5%, 2003 as 23.2%, 2005 as 19.4%, and 2007 as 15.6%; a drop of approximately 1.8 percentage points/year.

Figure 2: Trends in Adult HIV Prevalence and Incidence

Trends in the estimated adult (age 15 to 49 years) HIV and AIDS prevalence and incidence, Zimbabwe, 1980-2007
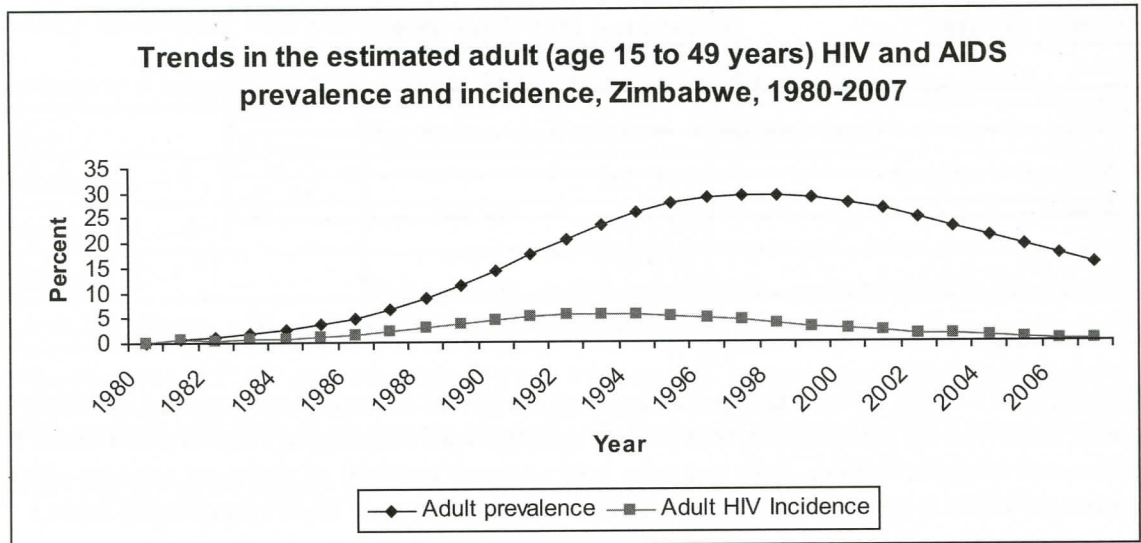
HIV incidence, the number of people newly infected with HIV and AIDS during each year, peaked in 1993 at 5.6% and declined after that date. The estimated adult HIV incidence in 2007 was 0.4%.

Figure 3: EPP Curve by Census Strata

HIV prevalence estimate curve for overall, urban, rural and other census strata, Zimbabwe, 1980-2007
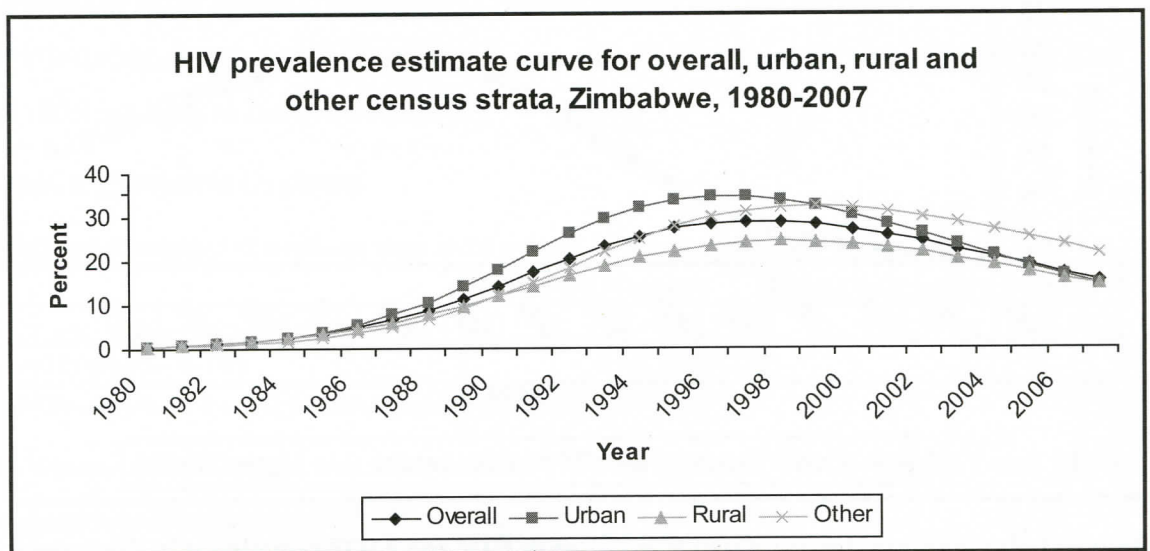
The EPP curves are useful to review patterns of the trends in the epidemic by census strata even if the level of prevalence will be underestimated because survival on ART is not part of the model. The epidemic peaked first in urban areas in 1996, followed by the peak in the total population in 1997, the peak in the rural area in 1998, and finally the

peak in the "other areas" in 1999. Estimated prevalence was highest in "other areas" after the peak in 1999 compared to urban and rural areas. Adult HIV and AIDS prevalence by census strata for 2005 is presented in Table 5.

Figure 4: EPP Curves, 2001 through 2007

EPP HIV prevalence estimate curves, Zimbabwe, 2001 through 2007
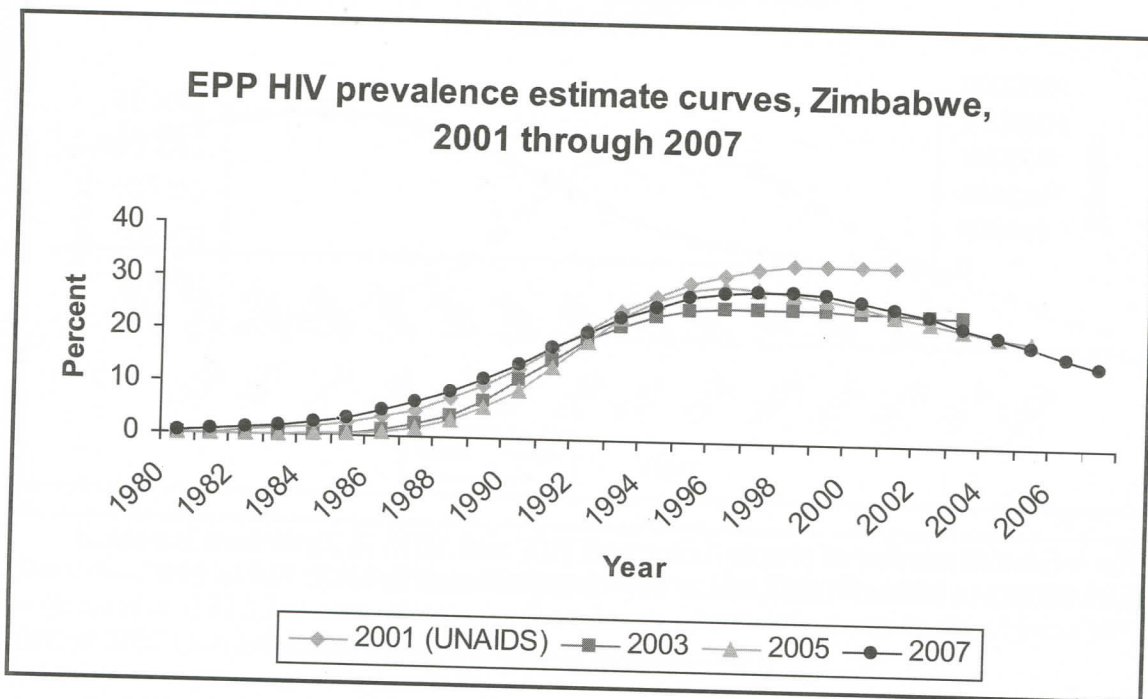
As mentioned in the Background of this document, the HIV prevalence estimates from different estimate years should not be directly compared since each process uses slightly different data, software and methods. However, it is useful to compare the shape of the curves. The first HIV prevalence estimate in 2001, with stable HIV prevalence, was developed by UNAIDS. In 2003, the first national estimate produced in Zimbabwe was adjusted down as data were updated to reflect other areas of high HIV prevalence. The estimates process in 2003 showed no evidence of a decline. In 2005, the additional data from the 2004 ANC Survey showed a decline in prevalence. EPP was adjusted to reflect the decline. The 2007 curve appears to be similar to the 2005 curve. The main addition to the 2007 process was the additional data, e.g., ANC data and ZDHS+ data used for calibration, which updated the curve and confirmed the decline in HIV prevalence first seen in 2005.

Figure 5: Trends in the Number of People Living with HIV and AIDS

Trends in the estimated number of people living with HIV and AIDS, Zimbabwe, 1980-2007
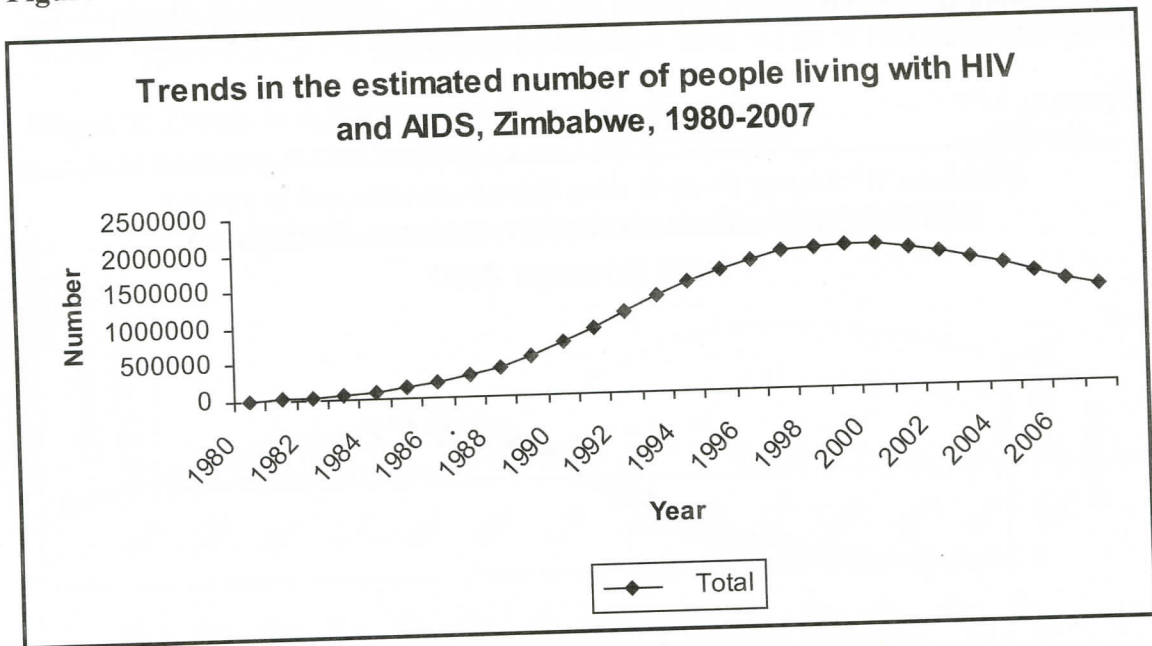
The estimated number of people living with HIV and AIDS in Zimbabwe increased from 28,285 in 1981 to 1,963,503 in 1999 and decreased to 1,320,739 in 2007.

Figure 6: Trends in the Number of Adults Living with HIV and AIDS by Sex

Trends in the estimated number of adults (age 15-49 years) living with HIV and AIDS by sex, Zimbabwe, 1980-2007
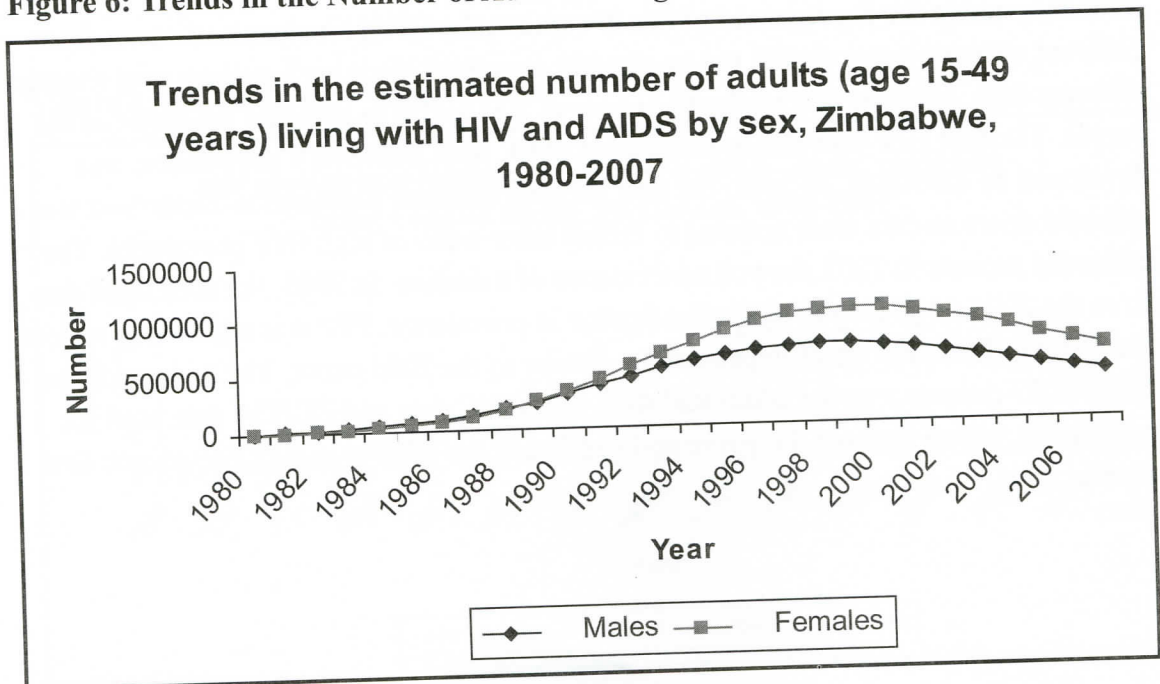
The estimated number of adult women living with HIV and AIDS has been higher than the number of men since 1989. The number of men infected peaked in 1998 and the number of women infected peaked in 1999. The numbers declined each following year.

Figure 7: Trends in New HIV Infections in Adults

Trends in the estimated number of new HIV infections in adults (age 15-49 years), Zimbabwe, 1980-2007
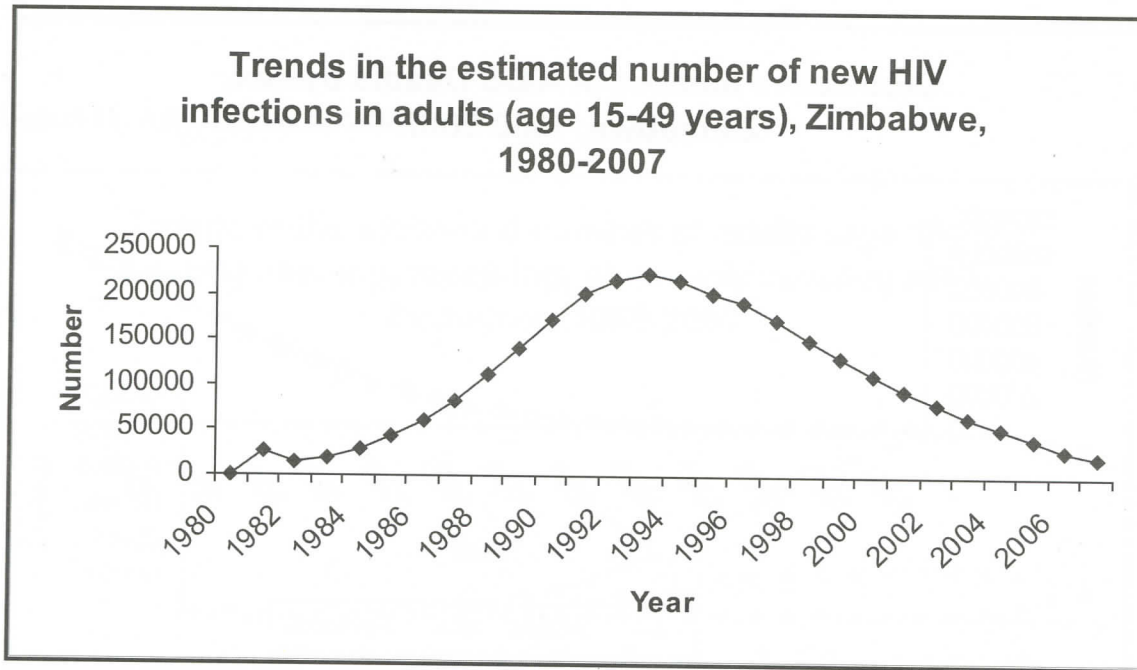
The estimated number of new HIV infections in adults (age 15 to 49 years) peaked in 1993 to an estimated 222,263 new infections. The number of new infections declined from 1993 though 2007 to an estimated number of 22,367 new infections.

Figure 8: Trends in Annual AIDS Deaths in Adults

Trends in the estimated number of annual AIDS deaths in adults (age 15-49 years), Zimbabwe, 1980-2007
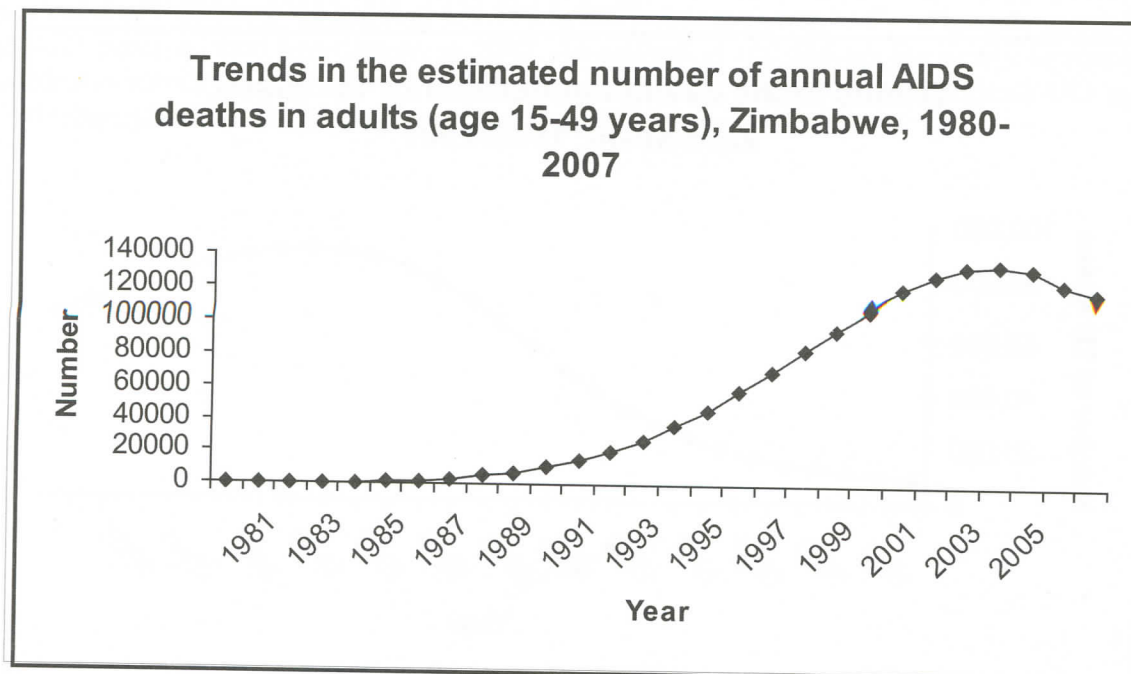
The estimated number of annual AIDS deaths in adults (age 15-49 years) increased from 20 in 1982 to a peak of 132,786 in 2004. The estimated number of deaths in 2007 was 115,114, approximately 2,214 deaths per week.

Figure 9: Trends in Cumulative AIDS Deaths in Adults

Cumulative number of AIDS Deaths by sex,
Zimbabwe, 1980-2007
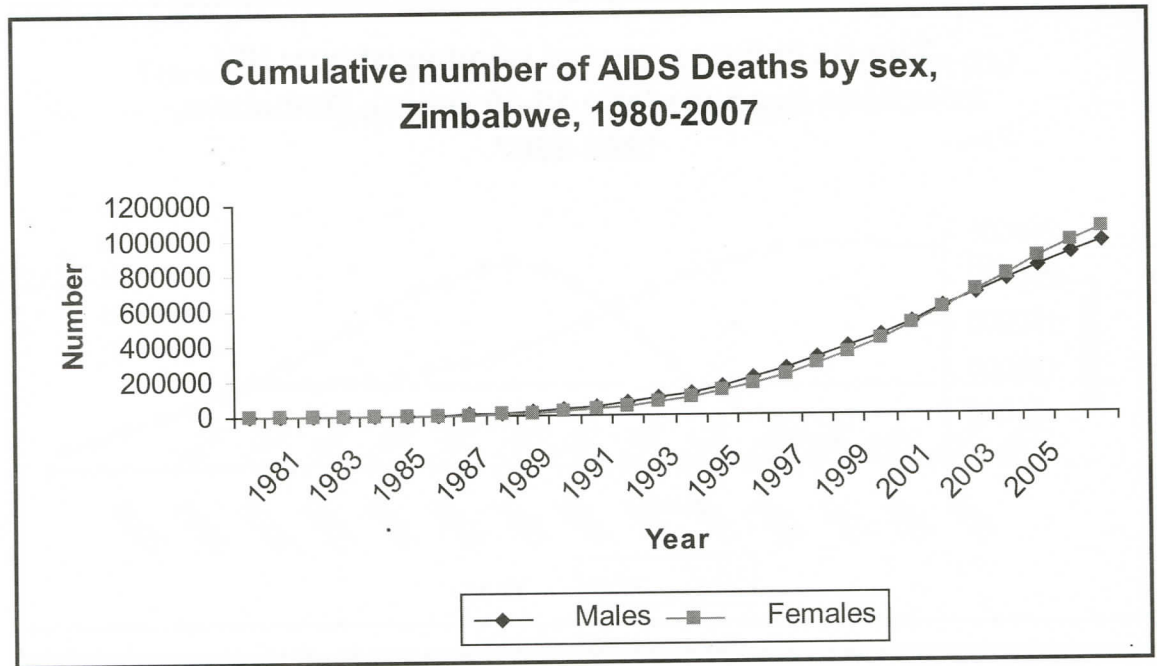
The estimated number of cumulative AIDS deaths increased steadily, with an estimated 2,020,679 cumulative deaths among all adults by 2007, with an estimated 1,051,337 total deaths among both women and men over the course of the epidemic.

Figure 10: Trends in TB Cases

Trends in the estimated number of TB cases,
Zimbabwe, 1980-2007
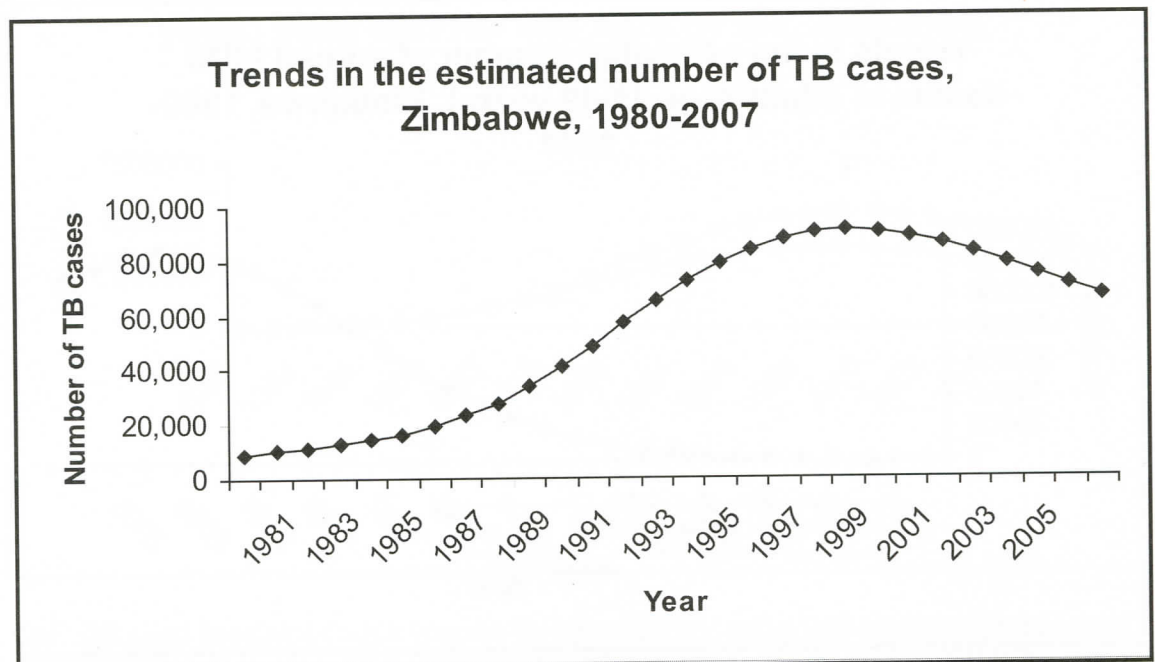
The TB caseload increased with the increase in HIV and AIDS in Zimbabwe, reaching a

peak of an estimated 90,855 cases in 1999. The number of cases appears to be decreasing, with an estimated 74,921 in 2007 according to the Spectrum software.

Figure 11: ART Trends in Adults

Trends in the estimated number of adults (age 15-49 years) needing, receiving, and newly needing ART, Zimbabwe, 1980-2007
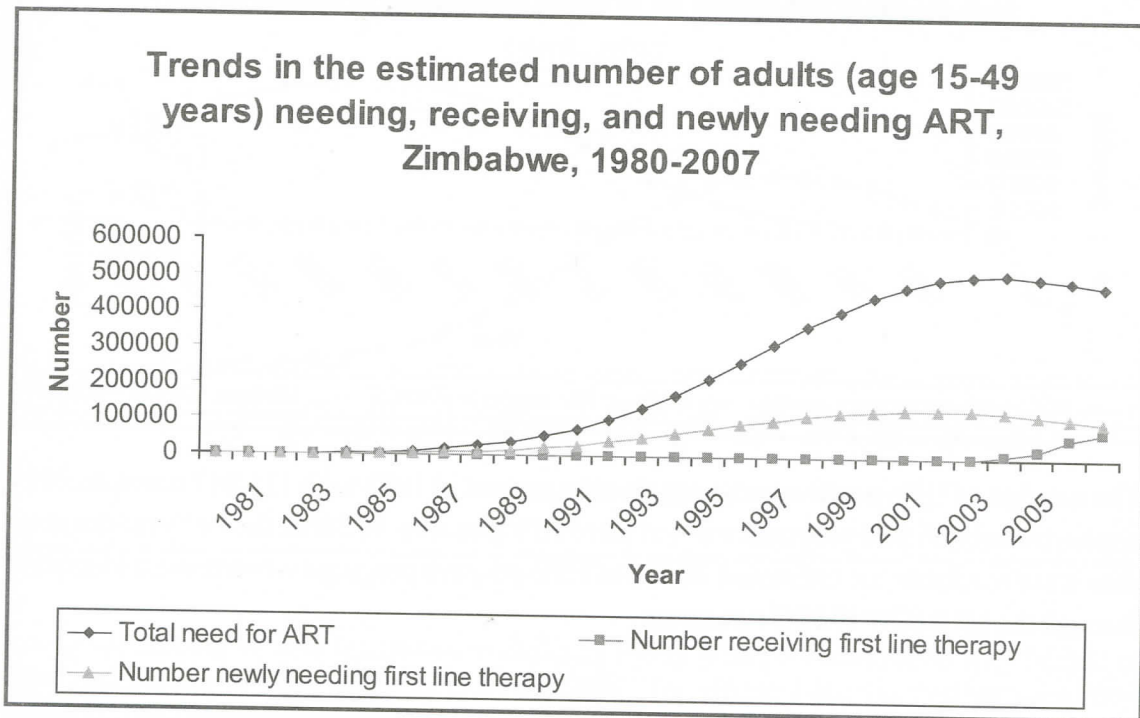
The estimated number of adults (age 15-49 years) needing antiretroviral therapy (ART) peaked at 510,356 in 2004 and is at 479,796 in 2007. An estimated 15.7% of people in need of ART received first line therapy in 2007. An estimated 102,566 people newly infected needed to initiate first line therapy in 2007. Approximately 86,000 people received ART in 2007 through the MOHCW ART rollout program which started in 2004.

Figure 12: PMTCT Trends

Trends in the estimated number of HIV-positive pregnant women, mothers receiving and HIV test in PMTCT settings, and mothers identified as HIV-positive, Zimbabwe, 2000-2007

— ◆ — HIV-positive pregnant women — ■ — Mothers HIV tested in PMTCT — ▲ — Mothers HIV+ in PMTCT
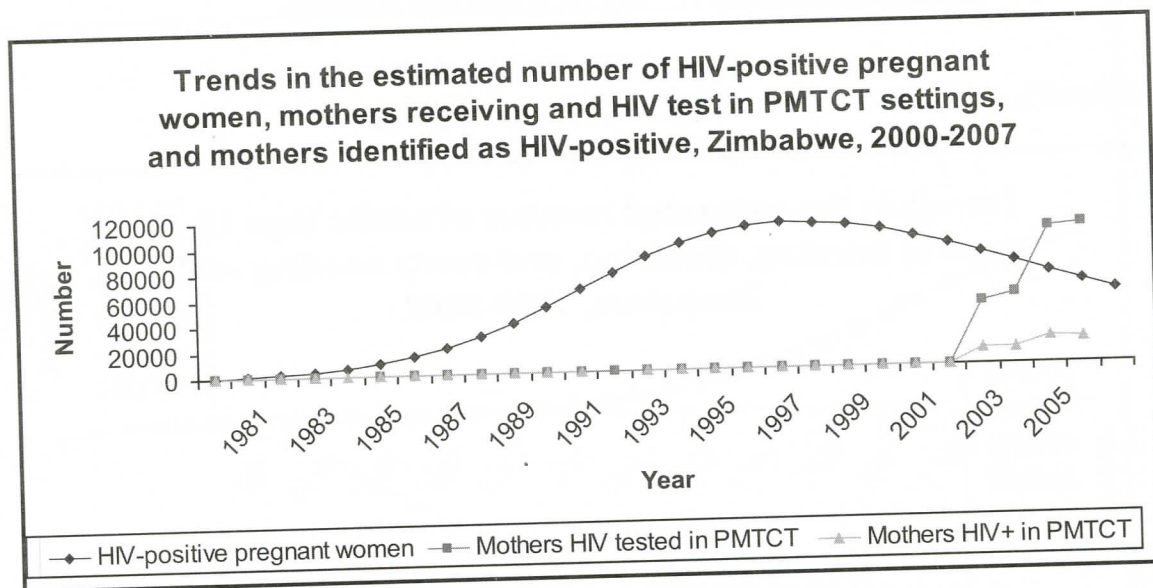
The number of HIV-positive pregnant women peaked in 1998 with 111,847 cases. In 2007 approximately 56,950 pregnant women were HIV-positive. In 2006, the last year program data were available, an estimated 30.4% of HIV-positive pregnant women were identified through the MOHCW PMTCT program.

Figure 13: Trends in the Number of Children Living with HIV and AIDS

Trends in the estimated number of children (age 0-14 years) living with HIV and AIDS, Zimbabwe, 1980-2007
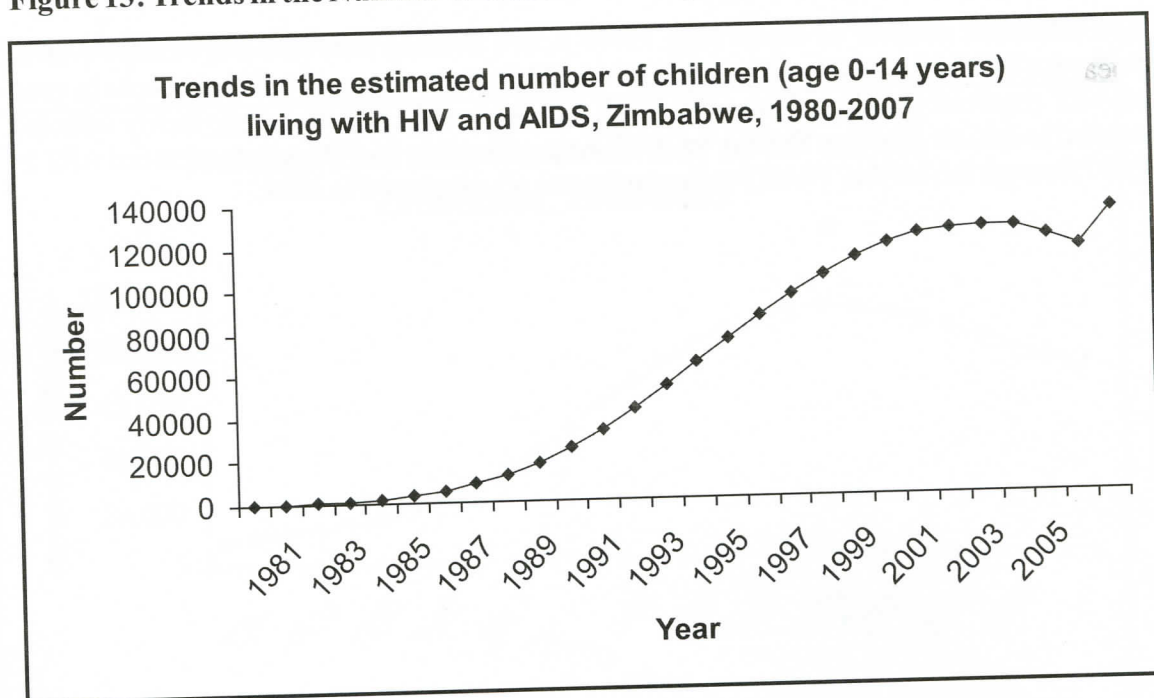
The number of HIV infections in children initially peaked at 125,161 in 2003 and declined to 115,147 children in 2006 and dramatically increased to 132,938 in 2007. The increase reflects the survival of children on cotrimoxazole and ART.

Figure 14: Trends in New HIV Infections in Children

Trends in the estimated number of new HIV infections in children (age 0-14 years), Zimbabwe, 1980-2007
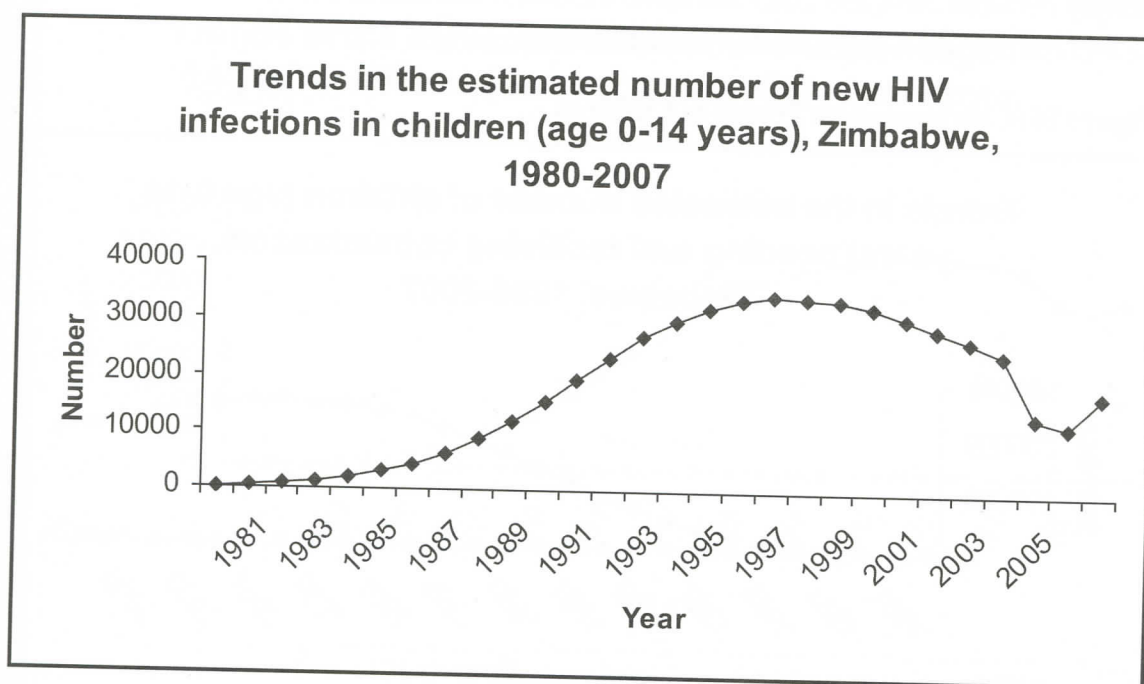
The peak number of new infections in children living with HIV and AIDS was 34,392 in 1997 and the number decreased to 11,996 in 2006. The steepest decline was between 2004 and 2005. The number increased in 2007 to 17,370.

Figure 15: Trends in Annual AIDS Deaths in Children

Trends in the estimated number of annual AIDS deaths in children (age 0-14 years), Zimbabwe, 1980-2007
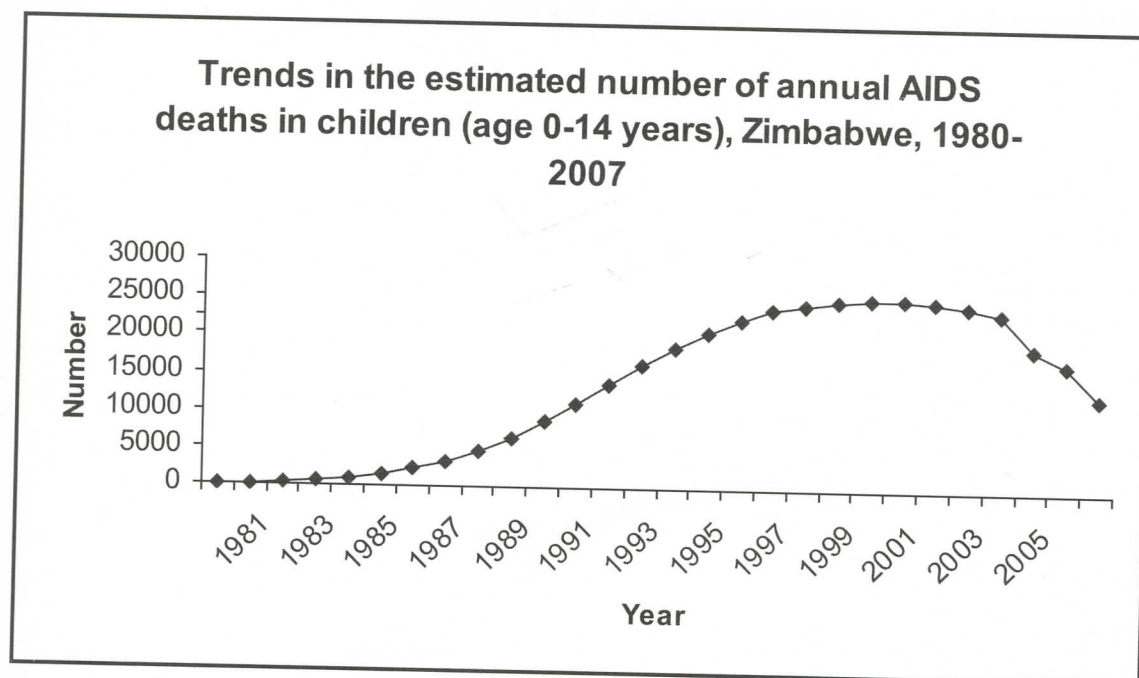
The number of deaths increased from 125 per year in 1981, less than 3 per week, to

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25,418 per year in 2000, approximately 489 per week. The numbers of deaths dropped sharply between 2004 and 2005 and again between 2006 and 2007. In 2007, an estimated 12,448 children died, approximately 240 per week.

Figure 16: Cotrimoxazole Trends in Children

Trends in the estimated number of children (age 0-14 years) needing and receiving cotrimoxazole, Zimbabwe, 1980-2007
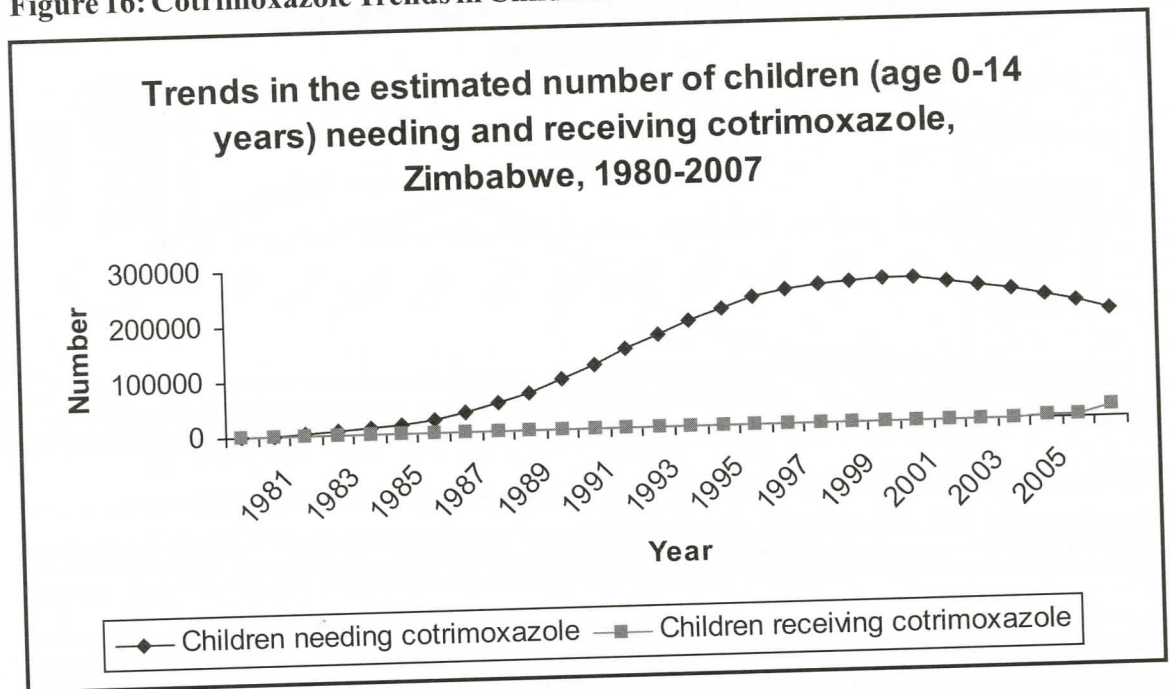
In 2000, a peak number of 259,843 children needed cotrimoxazole. While in 2007 the estimated number decreased to 194,296. The MOHCW started 392 children on cotrimoxazole in _____(year), increasing to 18,475 in 2007.

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Figure 17: ART Trends in Children

Trends in the estimated number of children (age 0-14 years) needing and receiving ART, Zimbabwe, 1980-2007

Legend: Children needing ART — Children receiving ART
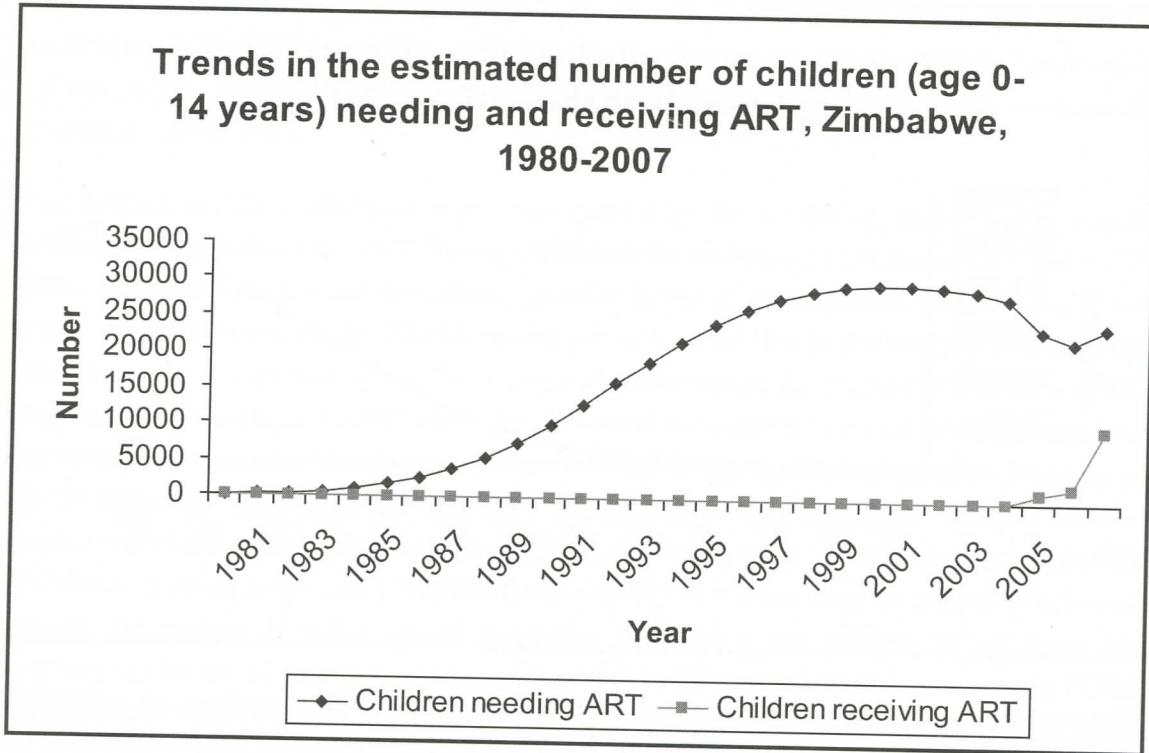
Children needing ART peaked in 2001 at 29,945. The lowest level was 22,212 children needing ART in 2006 and that increased to 24,194 children in 2007. MOHCW started ART for 90 children in 2004, increasing to 1,985 children in 2006. By the end of 2007, 10,000 children in need of ART received ART.

Figure 17: Orphanhood Trends

Trends in the estimated number HIV and AIDS orphans, Zimbabwe, 1980-2007
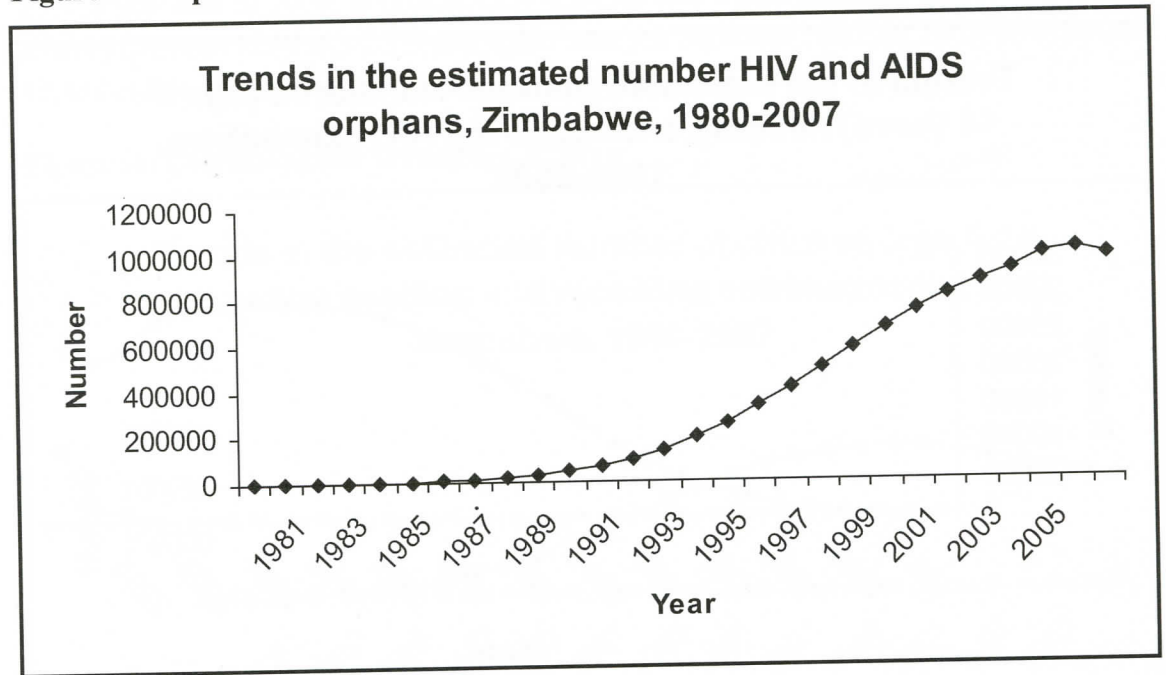
The number of orphans steadily increased since the early 1990s, reaching an estimated peak of 1,008,542 total AIDS orphans in 2006 before decreasing to 975,956 orphans in 2007.

Figure 18: Crude Death Rate Trends

Estimated Crude Death Rates (CDR), Zimbabwe, 1980-2007
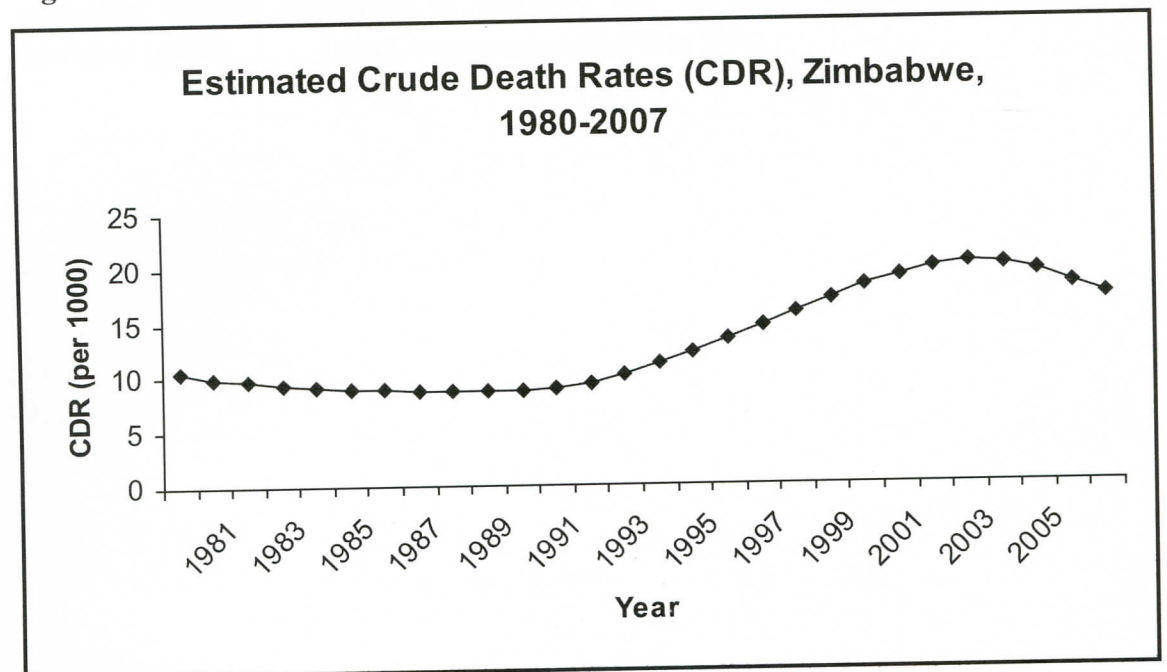
The Crude Death Rate decreased from a high of 20.1/1000 persons in 2003 to 17.2/1000 persons in 2007.

Discussion and Conclusions

Using the EPP and Spectrum software, HIV and AIDS prevalence was estimated to be 15.6% for adults age 15 to 49 years in 2007. The lower and upper bound for this estimate is 14.9 to 16.3%. The EPP HIV prevalence estimate curve shows a declining HIV epidemic in Zimbabwe since 1997.

The decline in HIV prevalence was first reported by the MOHCW in 2005 after results became available from the ANC Survey 2004 and the National Estimates of HIV and AIDS 2005. While the single point prevalence reported by the ZDHS+ cannot support a decline in a HIV prevalence curve, the ZDHS+ point prevalence of 18.1% did support that the HIV prevalence level reported by the 2005 national estimates of 20.1% was conservative. The results of the most recent ANC Survey in 2006 and the current national estimates reported here support a continued decline in HIV prevalence. Since the first report of the decline, an epidemiological review of data available in Zimbabwe determined the decline resulted from a combination of an increase in adult mortality in the early 1990s and a decline in HIV incidence starting in the mid 1990s. A decline in HIV incidence may be related to behavior change, including delaying sexual initiation, decreasing the number of partners, and increasing the use of condoms. Although surveys in Zimbabwe do not consistently define or measure behavioral risk factors over time, looking at survey data where measurements are comparable shows there is improvement in adoption of protective behavioral measures, especially in decreasing number of sexual partners and increasing condom use.

The National HIV and AIDS Estimates process was led by the MOHCW's AIDS & TB Unit and included staff from the MOHCW, NAC, UZ, BRTI, Imperial College, CDC-Zimbabwe, UNAIDS, UNFPA, UNICEF and WHO. The working group received training from UNAIDS on the use of the EPP and Spectrum software packages to produce the national adult (age 15-49 years) HIV prevalence estimate for Zimbabwe. The working group openly reviewed the methods of previous national estimate processes and available data to ensure the most accurate data were included in the estimates. The core data used in the national estimates is the ANC data. The ANC Survey in Zimbabwe is conducted in 19 sentinel sites as an anonymous, unlinked serosurveys of women attending antenatal clinics for the first time during the current pregnancy. Uptake of ANC services in Zimbabwe is almost universal. Of the 19 sites which form the consistent core of the survey, 18 sites have been used since 2000 and one since 2001. The survey protocol was designed to ensure consistent HIV test measures over time. The use of data from consistent ANC sites and inclusion of data from a total of 19 sites contributed to high data quality and data consistency, resulting in very tight plausibility bounds shown in Figure 1 of this document.

ANC data are available in Zimbabwe since 1989 and all data were considered in the development of the 2007 national estimate. Since 2002, two HIV test results were available in the ANC Survey, the Biorad Genscreen ELISA kit results and the parallel testing algorithm results. The Biorad Genscreen ELISA test kit alone was found to be sensitive to contamination and not specific which may have resulted in a higher than

accurate HIV prevalence. In part to reduce this effect, the national estimate processes in 2003 and 2005 adjusted the ANC data. The working group reviewing the data for this years estimate decided to use the more accurate parallel HIV testing algorithm data from the three most recent ANC surveys rather than continue to adjust the Genscreen data.

The most current version of EPP allows calibration to the point prevalence determined by a national population-based serosurveys. The working group calibrated the urban EPP curve to the ZDHS+ urban prevalence of 18.9% in 2005, the rural EPP curve to 17.6%, forcing the data through those known measurements. The other curve was not calibrated since the data were not readily available from the ZDHS+. The calibration improved the accuracy of our final estimate of 15.6%.

The working group maintained the decision of the 2003 national estimates process to model the data as urban, rural and other census strata. The original decision was made to adjust for the over representation of clinics from other census strata which traditionally have a higher HIV prevalence. The overrepresentation is still in effect. In the ANC 2006 Survey, 23.3% of women reported living in an other census strata, which represents approximately 11% of the total population of the country (Table 11). If the group had not maintained this decision, the other census strata would have been classified as rural. The EPP rural curve was adjusted to the ZDHS+ rural prevalence of 17.6% which might have underestimated overall HIV prevalence. The decision to continue using an other census strata will be reviewed during each estimate process as data continue to be collected and reviewed.

Each estimates process builds on the work of the previous process but is also an independent process. The current working group produced an estimate of 15.6% (14.9-16.3%) in 2007 with a curve showing a declining HIV epidemic. While the HIV prevalence estimates from different estimate years should not be directly compared since each process uses slightly different data, software and methods, the current curve can be used to back calculate the estimated prevalence of previous years with the most updated data and software. The 2007 curve estimated a 2005 HIV prevalence of 19.4% with a range of 18.6-20.3%, which included the 2005 national estimate of 20.1%. The 2007 curve estimated a 2003 HIV prevalence of 23.2% (22.3-24.3%) and 2001 HIV prevalence of 26.5% (25.6%-28.1%) which does not include the previously reported estimates of 24.6% in 2003 or 33.7% in 2001. However, the majority of the data available during the 2001 and the 2003 national estimates processes did not support a declining HIV epidemic in Zimbabwe.

The first HIV prevalence estimate in 2001, with stable HIV prevalence, was developed by UNAIDS. In 2003, the first national estimate produced in Zimbabwe was lower than the 2001 estimate as data were classified to reflect other areas of high HIV prevalence. The estimates process in 2003 showed no evidence of a decline. In 2005, the additional data from the 2004 ANC Survey showed a decline in prevalence. EPP was adjusted to reflect the decline. The 2007 curve appears to be similar to the 2005 curve. The main addition to the 2007 process was the additional data, e.g., ANC data and ZDHS+ data used for calibration, which updated the curve and confirmed the decline in HIV prevalence first seen in 2005.

The 2009 national estimate process will include any updates made to EPP and Spectrum software, as well as updated data from the ANC Survey scheduled for 2008. The national estimates process will continue to be revised as new data and methods become available. Each updated process will inform the understanding of the epidemic in Zimbabwe and guide the local response.

The current curve reflects the majority of the data which shows a decline in HIV prevalence from 26.5% in 2001 to 15.6% in 2007. For the first time, the working group is reporting HIV prevalence from the Spectrum software rather than the EPP software. While EPP uses census, ANC and population survey data to calculate the level of HIV prevalence, Spectrum uses additional data, e.g., adult and child ART coverage and PMTCT uptake, which may affect the numbers of people living with HIV and AIDS. People living with HIV and AIDS will survive longer if they are on ART, so increases in treatment coverage will initially tend to increase HIV prevalence as there are fewer deaths. The 15.3% estimated HIV prevalence calculated by EPP does not take into account the 86,000 Zimbabweans living with HIV and AIDS who are currently receiving ART and underestimates prevalence. The 15.6% estimated HIV prevalence calculated by Spectrum reflects the survival of those on treatment and is the more correct and accurate HIV prevalence estimate. As the MOHCW moves to universal coverage of ART, the 2009 national estimates process is expected to report an increase in HIV prevalence.

Increasing the number of children on treatment can extend life significantly, increase the number of children living with HIV and AIDS and decrease the number of deaths among children. PMTCT uptake will also decrease transmission of HIV from mothers to babies. The curves shown in Figures 13 through 17 of this report reflect the provision of ART to approximately 40% of children in need of ART and PMTCT services to approximately 30-40% of HIV-positive mothers.

While the decline in HIV prevalence estimated by the working group is encouraging, overall, more than one in seven Zimbabweans is still infected with HIV. Zimbabwe will continue to invest in interventions targeting behavior change, improve prevention strategies and improve care and treatment services for those affected by HIV in order to decrease the number of people becoming infected with HIV and dying from the infection.

Recommendations

Although this decreasing trend is encouraging, the overall estimates of HIV seroprevalence remains high at 15.6%. Therefore, it is recommended that;

- Zimbabwe should continue to monitor the HIV Epidemic using biannual ANC Surveys and periodic population based surveys to provide timely and accurate information on the HIV epidemic
- Zimbabwe should continue improving survey methodology and laboratory capacity to ensure high data quality.
- Zimbabwe should continue to scale up interventions promoting behavior change among youth and adults. Evidence based strategies to increase coverage of HIV

- testing and adoption of safer sexual behavior, e.g., decreasing the number of sexual partners, should be implemented with high quality assurance.
- Zimbabwe should continue to scale up PMTCT to reduce neonatal infection and increase child survival.
- Zimbabwe should make access to antiretroviral therapy universal to reduce mortality.
- Zimbabwe should continue encouraging multisectoral investment in technical and financial resources to maintain and build the laboratory, medical and public health infrastructures to help in the fight against this deadly epidemic.

Summary Tables

Table 6: Demographic Indicators Summary

Summary Demographic Indicators - Total	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Zimbabwe Genscreen and Parallel																												
Fertility																			4	3.9	3.81	3.71	3.61	3.52	3.45	3.38	3.3	3.23
Input TFR	7.02	6.91	6.8	6.63	6.42	6.2	5.98	5.77	5.57	5.39	5.22	5.04	4.86	4.7	4.55	4.41	4.27	4.12	4	3.9	3.81	3.71	3.61	3.52	3.45	3.38	3.3	3.23
Calculated TFR	7.02	6.91	6.8	6.63	6.42	6.2	5.98	5.77	5.57	5.39	5.22	5.04	4.86	4.7	4.55	4.41	4.27	4.12	4	3.9	3.81	3.71	3.61	3.52	3.45	3.38	3.3	3.23
GRR	3.48	3.42	3.37	3.28	3.18	3.07	2.96	2.86	2.76	2.67	2.58	2.5	2.41	2.33	2.25	2.18	2.11	2.04	1.98	1.93	1.89	1.84	1.79	1.74	1.71	1.67	1.63	1.6
NRR	2.91	2.88	2.86	2.8	2.73	2.65	2.57	2.5	2.43	2.37	2.32	2.26	2.2	2.13	2.06	2	1.93	1.86	1.8	1.75	1.71	1.66	1.61	1.57	1.54	1.52	1.48	1.45
Mean Age of Childbearing	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29	29	29	29	29	29.1	29.1	29.1	29	28.9	28.8	28.7	28.6	28.5	28.4	28.3	28.3	28.2
Child-woman ratio	0.95	0.93	0.93	0.92	0.91	0.91	0.89	0.86	0.83	0.8	0.78	0.75	0.72	0.69	0.67	0.65	0.63	0.6	0.59	0.57	0.56	0.55	0.54	0.54	0.54	0.53	0.53	0.53
Fertility table: Average																												
Immigration																												
Male immigration	2,000	6,880	11,760	13,990	13,570	13,150	12,730	12,310	8,970	2,710	-3,550	-9,810	-16,070	-18,780	-17,940	-17,100	-16,260	-15,420	-14,250	-12,750	-11,250	-9,750	-8,250	-7,050	-6,150	-5,250	-4,350	-3,450
Female immigration	2,000	6,880	11,760	13,990	13,570	13,150	12,730	12,310	8,970	2,710	-3,550	-9,810	-16,070	-18,780	-17,940	-17,100	-16,260	-15,420	-14,250	-12,750	-11,250	-9,750	-8,250	-7,050	-6,150	-5,250	-4,350	-3,450
Total immigration	4,000	13,760	23,520	27,980	27,140	26,300	25,460	24,620	17,940	5,420	-7,100	-19,620	-32,140	-37,560	-35,880	-34,200	-32,520	-30,840	-28,500	-25,500	-22,500	-19,500	-16,500	-14,100	-12,300	-10,500	-8,700	-6,900
Vital Rates																												
CBR per 1000	47	46.5	46	45.1	44	42.8	41.6	40.5	39.4	38.5	37.6	36.8	35.9	35.1	34.3	33.6	33.1	32.4	31.8	31.5	31.3	31	30.7	30.5	30.4	30.3	30	29.7
CDR per 1000	10.5	9.9	9.6	9.3	9.1	8.9	8.8	8.7	8.6	8.6	8.7	8.9	9.3	10	11	12.1	13.3	14.6	15.8	17	18.1	19	19.7	20.1	20	19.3	18.2	17.2
RNI percent	3.65	3.66	3.64	3.58	3.49	3.39	3.29	3.18	3.07	2.98	2.89	2.78	2.66	2.51	2.33	2.15	1.97	1.78	1.6	1.46	1.32	1.2	1.11	1.05	1.04	1.1	1.17	1.25
GR percent	3.7	3.84	3.94	3.92	3.81	3.69	3.56	3.43	3.26	3.04	2.82	2.6	2.36	2.17	2.02	1.85	1.7	1.52	1.37	1.25	1.14	1.05	0.98	0.94	0.95	1.02	1.11	1.2
Doubling time	19.1	18.4	17.9	18	18.5	19.1	19.8	20.5	21.6	23.2	24.9	27	29.7	32.2	34.7	37.8	41.2	45.9	50.9	55.8	61.2	66.4	71.2	74.3	73.4	68.4	62.9	58.2
Annual births and deaths																												
Births	342,355	352,147	362,575	370,096	375,111	378,946	382,061	384,684	387,186	390,123	392,736	394,491	394,331	394,183	393,527	392,523	392,788	390,391	389,256	390,570	391,493	392,525	393,033	393,938	396,228	398,240	398,779	400,423
Deaths	76,723	75,019	75,731	76,443	77,468	78,750	80,471	82,725	84,972	87,451	91,054	95,986	102,276	112,393	126,445	141,918	158,588	175,763	193,141	210,363	226,265	240,094	251,413	258,958	260,285	253,628	242,698	231,973
Population																												
Total population	7,284,500	7,570,170	7,876,883	8,197,590	8,524,047	8,852,093	9,180,601	9,508,511	9,832,201	10,145,783	10,445,269	10,728,454	10,992,055	11,237,306	11,467,202	11,682,361	11,882,875	12,065,508	12,231,844	12,385,224	12,526,733	12,658,502	12,782,579	12,902,347	13,025,221	13,160,792	13,308,896	13,484,659
Male population	3,622,100	3,764,393	3,917,197	4,076,904	4,239,335	4,402,346	4,565,326	4,727,706	4,887,667	5,042,268	5,189,522	5,328,359	5,457,189	5,576,729	5,688,607	5,793,319	5,891,156	5,980,748	6,063,160	6,140,304	6,212,867	6,282,002	6,348,740	6,414,678	6,483,222	6,558,843	6,640,799	6,736,729
Female population	3,662,400	3,805,777	3,959,686	4,120,686	4,284,712	4,449,747	4,615,275	4,780,805	4,944,535	5,103,515	5,255,747	5,400,095	5,534,866	5,660,578	5,778,595	5,889,042	5,991,719	6,084,761	6,168,683	6,244,921	6,313,866	6,376,499	6,433,839	6,487,669	6,542,000	6,601,949	6,668,097	6,747,930
Percent 0-4	19.96	19.68	19.52	19.44	19.4	19.38	19.01	18.58	18.12	17.67	17.23	16.81	16.41	16.02	15.64	15.28	14.95	14.64	14.37	14.15	13.98	13.84	13.75	13.69	13.64	13.64	13.63	13.67
Percent 5-14	29.01	29.28	29.42	29.45	29.39	29.25	29.41	29.56	29.69	29.76	29.77	29.54	29.35	29.19	29.07	28.99	28.67	28.31	27.93	27.55	27.17	26.8	26.44	26.09	25.76	25.43	25.11	24.84
Percent 15-49	41.78	41.86	41.95	42.07	42.24	42.45	42.71	43.01	43.37	43.75	44.17	44.8	45.35	45.84	46.3	46.71	47.37	48.05	48.72	49.31	49.84	50.29	50.67	51.02	51.34	51.64	51.96	52.22
Percent 15-64	48.12	48.11	48.11	48.14	48.22	48.37	48.59	48.86	49.19	49.57	49.99	50.62	51.19	51.7	52.15	52.56	53.18	53.81	54.43	54.99	55.51	55.98	56.41	56.79	57.14	57.44	57.73	57.93
Percent 65 and over	2.92	2.93	2.95	2.97	2.99	3	3	3	2.99	2.99	3.01	3.03	3.06	3.09	3.13	3.17	3.2	3.24	3.27	3.31	3.34	3.37	3.4	3.43	3.46	3.49	3.53	3.56
Percent females 15-49	41.8	41.88	41.96	42.08	42.24	42.44	42.7	43.01	43.36	43.75	44.17	44.81	45.37	45.87	46.32	46.73	47.37	48.02	48.65	49.19	49.64	50	50.29	50.52	50.72	50.92	51.14	51.32
Sex ratio	98.9	98.91	98.93	98.94	98.94	98.93	98.92	98.89	98.85	98.8	98.74	98.67	98.6	98.52	98.44	98.37	98.32	98.29	98.29	98.32	98.4	98.52	98.68	98.87	99.1	99.35	99.59	99.83
Dependency ratio	1.08	1.08	1.08	1.08	1.07	1.07	1.06	1.05	1.03	1.02	1	0.98	0.95	0.93	0.92	0.9	0.88	0.86	0.84	0.82	0.8	0.79	0.77	0.76	0.75	0.74	0.73	0.73
Median age	15	15	15	16	16	16	16	16	16	16	16	17	17	17	17	17	18	18	18	18	18	18	19	19	19	19	19	20

Table 7: HIV and AIDS Total Population Summary

Zimbabwe Genscreen and Parallel	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
HIV population																												
Total	0	28,285	42,792	64,316	95,593	140,129	202,496	287,613	399,953	541,835	711,683	906,540	1,111,093	1,312,283	1,496,048	1,652,896	1,786,051	1,882,884	1,941,580	1,963,503	1,951,592	1,909,467	1,841,414	1,753,010	1,649,944	1,534,683	1,415,706	1,320,739
Males	0	22,613	31,202	43,426	60,466	83,438	114,601	155,168	208,301	271,562	347,109	428,612	514,085	595,021	665,281	724,178	771,661	804,795	824,931	826,515	817,176	798,279	768,703	730,629	688,881	641,586	592,562	555,400
Females	0	5,673	11,590	20,890	35,127	56,691	87,895	132,445	191,652	270,273	364,574	477,928	597,009	717,261	830,767	928,718	1,014,390	1,078,089	1,116,649	1,136,989	1,134,416	1,111,187	1,072,711	1,022,381	961,063	893,096	823,143	765,338
Prevalence (15-49)	0	0.85	1.22	1.75	2.49	3.49	4.81	6.54	8.7	11.3	14.25	17.38	20.48	23.32	25.72	27.54	28.72	29.27	29.25	28.71	27.75	26.45	24.89	23.15	21.29	19.37	17.45	15.6
Annual HIV+ births																												
Total	0	334	666	1,169	1,904	2,958	4,402	6,369	8,851	12,005	15,591	19,610	23,475	27,033	30,097	32,295	33,813	34,392	34,113	33,640	32,499	30,869	28,835	26,613	24,282	13,652	11,996	17,370
Percent	0	0.09	0.18	0.32	0.51	0.78	1.15	1.66	2.29	3.08	3.97	4.97	5.95	6.86	7.65	8.23	8.61	8.81	8.76	8.61	8.3	7.86	7.34	6.76	6.13	3.43	3.01	4.34
Cumulative AIDS deaths																												
Total	0	125	443	1,143	2,549	5,096	9,340	16,000	25,934	40,273	60,300	87,541	123,572	170,042	228,608	300,708	387,513	489,640	607,073	739,335	885,136	1,042,530	1,209,010	1,381,733	1,555,336	1,721,832	1,876,893	2,020,679
Males	0	63	230	627	1,475	3,051	5,687	9,781	15,781	24,261	35,860	51,309	71,341	96,680	128,014	165,874	210,615	262,294	320,640	385,185	455,123	529,395	606,745	685,840	764,302	838,457	906,781	969,342

Table 8: HIV and AIDS Adults Age 15-49 Years Summary

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Zimbabwe Genscreen and Parallel																												
HIV population																												
Total	0	26,853	40,388	60,440	89,552	130,956	188,717	267,419	371,133	501,735	657,323	835,054	1,020,641	1,201,331	1,365,216	1,502,694	1,616,585	1,697,205	1,742,832	1,753,748	1,732,654	1,683,779	1,612,317	1,523,761	1,423,537	1,316,640	1,206,857	1,098,175
Males	0	21,482	29,480	40,838	56,679	77,950	106,620	143,774	192,297	249,619	317,547	390,212	466,046	536,309	596,164	644,934	682,103	707,169	720,178	715,816	701,480	678,943	647,517	609,505	569,414	526,656	482,743	439,270
Females	0	5,371	10,908	19,602	32,874	53,006	82,097	123,646	178,836	252,115	339,776	444,842	554,595	665,023	769,052	857,760	934,481	990,036	1,022,654	1,037,932	1,031,174	1,004,836	964,800	914,256	854,123	789,984	724,114	658,905
Adult prevalence	0	0.85	1.22	1.75	2.49	3.49	4.81	6.54	8.7	11.3	14.25	17.38	20.48	23.32	25.72	27.54	28.72	29.27	29.25	28.71	27.75	26.45	24.89	23.15	21.29	19.37	17.45	15.6
New HIV infections																												
Total	0	26,853	13,874	20,602	30,131	43,219	60,774	83,461	110,931	141,494	171,548	200,469	216,952	222,263	216,618	202,270	191,714	172,283	151,487	130,797	111,498	94,314	79,194	66,451	53,845	42,200	28,934	22,367
Males	0	21,482	8,304	11,834	16,687	22,721	30,984	40,662	53,613	64,653	78,171	86,669	94,368	93,950	88,882	83,506	77,737	71,553	65,611	54,103	49,096	44,748	38,041	32,162	28,496	22,578	15,887	12,168
Females	0	5,371	5,570	8,769	13,443	20,498	29,791	42,799	57,318	76,841	93,377	113,800	122,584	128,313	127,736	118,765	113,977	100,730	85,875	76,694	62,401	49,566	41,153	34,289	25,349	19,622	13,047	10,199
Adult HIV incidence	0	0.85	0.43	0.61	0.86	1.19	1.63	2.18	2.85	3.59	4.34	5.05	5.47	5.63	5.49	5.11	4.78	4.2	3.59	3	2.47	2.01	1.63	1.31	1.02	0.77	0.51	0.38
Annual AIDS deaths																												
Total	0	0	20	134	433	971	1,812	3,040	4,760	7,145	10,392	14,723	20,381	27,548	36,342	46,733	58,494	71,200	84,255	96,962	108,619	118,605	126,452	131,879	132,786	130,241	121,388	115,114
Males	0	0	16	108	345	752	1,353	2,176	3,251	4,656	6,472	8,782	11,678	15,210	19,398	24,187	29,432	34,902	40,296	45,294	49,612	53,024	55,391	56,689	56,124	54,261	49,998	47,022
Females	0	0	4	26	88	219	459	864	1,509	2,489	3,919	5,941	8,702	12,338	16,945	22,546	29,062	36,298	43,959	51,669	59,007	65,582	71,061	75,190	76,662	75,980	71,389	68,092
Total need for ART																												
Total	0	0	265	1,374	3,362	6,338	10,834	17,043	25,650	37,627	53,473	74,440	101,152	133,919	172,888	217,041	264,936	314,290	362,648	407,240	445,722	476,037	497,009	508,444	510,356	504,378	493,021	479,796
Male	0	0	212	1,110	2,660	4,798	7,874	11,806	16,895	23,723	32,237	43,092	56,418	72,113	90,275	110,084	130,882	151,466	170,682	187,452	200,919	210,257	215,371	216,543	214,028	208,837	202,187	195,481
Female	0	0	53	264	702	1,541	2,960	5,237	8,755	13,904	21,236	31,347	44,734	61,805	82,613	106,957	134,054	162,824	191,966	219,788	244,803	265,780	281,637	291,900	296,329	295,541	290,834	284,315
Total number receiving ART																												
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,607	22,225	53,422	75,420
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,190	9,218	21,956	30,828
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,417	13,007	31,466	44,592
Number in need of first line therapy																												
Total	0	0	265	1,374	3,362	6,338	10,834	17,043	25,650	37,627	53,473	74,440	101,152	133,919	172,888	217,041	264,936	314,290	362,648	407,240	445,722	476,037	497,009	508,444	510,356	504,378	493,021	479,796
Male	0	0	212	1,110	2,660	4,798	7,874	11,806	16,895	23,723	32,237	43,092	56,418	72,113	90,275	110,084	130,882	151,466	170,682	187,452	200,919	210,257	215,371	216,543	214,028	208,837	202,187	195,481
Female	0	0	53	264	702	1,541	2,960	5,237	8,755	13,904	21,236	31,347	44,734	61,805	82,613	106,957	134,054	162,824	191,966	219,788	244,803	265,780	281,637	291,900	296,329	295,541	290,834	284,315
Number newly needing first line therapy																												
Total	0	0	246	1,048	1,981	3,198	5,135	7,549	10,974	15,792	21,743	29,716	39,360	50,584	63,368	76,737	90,267	102,992	114,393	123,671	130,522	134,469	135,612	134,398	128,774	121,274	109,720	102,566
Male	0	0	196	849	1,550	2,337	3,612	5,003	6,894	9,582	12,566	16,578	21,221	26,353	32,169	37,843	43,463	48,411	52,538	55,666	57,669	58,247	57,773	56,436	53,362	49,772	44,738	41,632
Female	0	0	49	199	430	861	1,522	2,546	4,080	6,210	9,178	13,139	18,139	24,232	31,199	38,894	46,804	54,581	61,855	68,005	72,853	76,222	77,839	77,962	75,411	71,502	64,982	60,934
Number receiving first line therapy																												
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,607	22,225	53,422	75,420
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,190	9,218	21,956	30,828
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,417	13,007	31,466	44,592
Number receiving second line therapy																												
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unmet need for first line therapy																												
Total	0	0	265	1,374	3,362	6,338	10,834	17,043	25,650	37,627	53,473	74,440	101,152	133,919	172,888	217,041	264,936	314,290	362,648	407,240	445,722	476,037	497,009	508,444	502,750	482,153	439,599	404,376
Male	0	0	212	1,110	2,660	4,798	7,874	11,806	16,895	23,723	32,237	43,092	56,418	72,113	90,275	110,084	130,882	151,466	170,682	187,452	200,919	210,257	215,371	216,543	210,838	199,619	180,231	164,653
Female	0	0	53	264	702	1,541	2,960	5,237	8,755	13,904	21,236	31,347	44,734	61,805	82,613	106,957	134,054	162,824	191,966	219,788	244,803	265,780	281,637	291,900	291,912	282,534	259,368	239,723
Adult population 15-49																												
Total	3,043,100	3,168,856	3,304,523	3,449,049	3,600,375	3,757,496	3,920,643	4,089,884	4,263,783	4,439,164	4,613,854	4,805,905	4,984,722	5,151,496	5,308,743	5,457,298	5,628,860	5,797,582	5,958,746	6,107,747	6,243,120	6,365,523	6,477,482	6,582,502	6,687,272	6,796,347	6,915,758	7,041,201
Male	1,512,100	1,575,042	1,642,925	1,715,174	1,790,707	1,868,967	1,950,022	2,033,878	2,119,820	2,206,273	2,292,164	2,386,201	2,473,618	2,555,131	2,632,133	2,705,238	2,790,614	2,875,495	2,957,879	3,035,793	3,108,737	3,177,130	3,242,119	3,305,131	3,368,846	3,434,914	3,505,452	3,578,385

Table 9: Child Summary (Age 0-14 Years)y

Child 0-14 Summary - Total																												
Zimbabwe Genscreen and Parallel	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
HIV population																													
Total	0	209	573	1,175	2,123	3,559	5,649	8,618	12,654	18,017	24,780	33,029	42,479	52,838	63,761	74,722	85,373	95,230	103,905	111,435	117,477	121,842	124,395	125,161	124,670	120,332	115,147	132,938
Males	0	105	289	593	1,071	1,795	2,849	4,346	6,381	9,084	12,494	16,653	21,416	26,637	32,141	37,662	43,026	47,988	52,352	56,140	59,176	61,367	62,645	63,023	62,769	60,572	57,952	66,917
Females	0	103	284	582	1,052	1,764	2,800	4,272	6,273	8,932	12,286	16,377	21,063	26,202	31,620	37,060	42,347	47,243	51,552	55,295	58,301	60,475	61,750	62,138	61,901	59,760	57,194	66,021
New HIV infections																													
Total	0	334	666	1,169	1,904	2,958	4,402	6,369	8,851	12,005	15,591	19,610	23,475	27,033	30,097	32,295	33,813	34,392	34,113	33,640	32,499	30,869	28,835	26,613	24,282	13,652	11,996	17,370
Males	0	168	336	590	961	1,494	2,223	3,216	4,469	6,062	7,873	9,902	11,854	13,650	15,197	16,307	17,074	17,366	17,226	16,986	16,410	15,587	14,560	13,438	12,261	6,893	6,058	8,771
Females	0	165	330	579	943	1,464	2,179	3,153	4,382	5,943	7,719	9,708	11,621	13,383	14,899	15,988	16,739	17,026	16,888	16,653	16,089	15,282	14,275	13,175	12,021	6,758	5,939	8,599
Annual AIDS deaths																													
Total	0	125	298	557	941	1,496	2,274	3,345	4,736	6,528	8,663	11,128	13,706	16,259	18,665	20,739	22,467	23,749	24,567	25,157	25,418	25,368	25,028	24,458	23,616	18,788	16,921	12,448
Males	0	63	150	281	475	755	1,147	1,688	2,390	3,294	4,371	5,615	6,916	8,204	9,418	10,463	11,334	11,980	12,391	12,687	12,817	12,791	12,618	12,328	11,902	9,464	8,522	6,271
Females	0	62	147	276	466	741	1,126	1,657	2,346	3,234	4,291	5,513	6,790	8,055	9,248	10,276	11,133	11,769	12,176	12,469	12,600	12,577	12,411	12,130	11,714	9,324	8,399	6,177
Population 0-14																													
Total	3,566,800	3,706,177	3,854,980	4,007,726	4,158,641	4,304,745	4,444,802	4,577,687	4,701,135	4,812,500	4,910,027	4,973,137	5,029,515	5,080,393	5,127,706	5,172,229	5,183,086	5,182,258	5,174,231	5,164,569	5,154,456	5,145,210	5,137,414	5,132,275	5,131,881	5,141,974	5,155,917	5,193,065
Male	1,790,600	1,860,154	1,934,449	2,010,695	2,085,983	2,158,809	2,228,564	2,294,692	2,356,085	2,411,451	2,459,948	2,491,679	2,520,034	2,545,631	2,569,438	2,591,831	2,597,292	2,596,923	2,592,950	2,588,162	2,583,136	2,578,529	2,574,632	2,572,047	2,571,821	2,576,843	2,583,760	2,602,327
Female	1,776,200	1,846,023	1,920,532	1,997,032	2,072,658	2,145,936	2,216,238	2,282,995	2,345,050	2,401,049	2,450,079	2,481,458	2,509,481	2,534,761	2,558,268	2,580,398	2,585,794	2,585,335	2,581,281	2,576,407	2,571,320	2,566,680	2,562,782	2,560,229	2,560,060	2,565,132	2,572,157	2,590,737
Children needing cotrimoxazole																													
Total	0	1,640	3,377	6,108	10,164	16,059	24,259	35,559	50,103	68,849	90,824	116,175	142,107	167,765	192,000	212,702	230,351	243,289	251,512	257,862	259,843	258,123	252,871	244,989	234,803	223,357	210,089	194,269
Male	0	828	1,705	3,084	5,131	8,107	12,246	17,950	25,291	34,752	45,843	58,637	71,723	84,668	96,893	107,333	116,229	122,745	126,881	130,070	131,054	130,171	127,506	123,516	118,365	112,580	105,877	97,890
Female	0	812	1,672	3,024	5,033	7,952	12,013	17,609	24,812	34,096	44,981	57,538	70,384	83,097	95,106	105,369	114,122	120,543	124,631	127,792	128,788	127,952	125,364	121,473	116,438	110,777	104,212	96,379
Children receiving cotrimoxazole																													
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Children needing ART																													
Total	0	140	337	634	1,073	1,711	2,604	3,837	5,441	7,509	9,979	12,839	15,845	18,835	21,671	24,139	26,213	27,779	28,811	29,568	29,940	29,945	29,605	28,985	28,130	23,680	22,212	24,194
Male	0	71	170	320	542	863	1,314	1,936	2,745	3,789	5,035	6,478	7,995	9,503	10,934	12,178	13,223	14,012	14,531	15,098	15,097	14,924	14,609	14,176	11,928	11,186	12,186	
Female	0	69	167	314	532	848	1,290	1,901	2,695	3,720	4,944	6,361	7,850	9,332	10,737	11,961	12,990	13,767	14,280	14,657	14,843	14,848	14,681	14,376	13,954	11,752	11,026	12,009
Children receiving ART																													
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	392	2,839	4,335	18,475
Male	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	197	1,431	2,184	9,308
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	194	1,408	2,151	9,167
Mothers needing PMTCT	0	1,094	2,183	3,833	6,243	9,699	14,434	20,882	29,020	39,361	51,119	64,294	76,967	88,633	98,678	105,885	110,863	112,761	111,847	110,294	106,554	101,209	94,540	87,256	79,612	72,017	64,319	56,950
Mothers receiving PMTCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	1,172	1,985	10,000
																										44	569	953
																										43	562	941
																											8,354	9,638	0

Appendices

Appendix 1. National Survey of HIV and Syphilis Prevalence Among Women Attending Antenatal Clinics In Zimbabwe, 2006 – Executive Summary

In 2006, the MOHCW conducted the bi-annual HIV sero-prevalence survey of women attending antenatal clinics (ANC) to monitor the level and trends in HIV prevalence. Leftover blood specimens collected from pregnant women for routine screening at their first ANC visit were used for HIV antibody testing. All personal identifiers were removed from the specimens ensuring that testing was unlinked and anonymous. A total of 7249 ANC clients were screened at 19 sentinel clinic sites located throughout Zimbabwe.

The overall prevalence among ANC attendees was 17.7% (N=7207) in 2006. The median HIV prevalence for all 19 sentinel sites was 17.3%. The HIV prevalence among women 15-24 years of age was 13.1% (N=4187).

Data from the antenatal clinic surveys in Zimbabwe indicated a decrease in HIV prevalence from 25.7% in 2002 to 17.7% in 2006. Investigation has shown that the decline most likely resulted from a combination of an increase in adult mortality and a decline in HIV incidence, resulting from adoption of safer sexual behaviors.

The decline in HIV prevalence among women accessing antenatal clinic services is encouraging, but overall over one in six women are still infected with HIV. The Country needs to continue investing in interventions targeting behavior change, improve prevention strategies and improve care and treatment services for those affected by HIV in order to increase the decline in HIV prevalence.

Appendix 2: Detailed Methods

Epidemic Projection Package (EPP)

EPP estimated the trend of adult prevalence by fitting a mathematical model to existing census and HIV surveillance data. The model was fit to urban, rural, and other census strata data separately, and the estimates are combined, using the population for each census strata as weights, to produce the national HIV prevalence estimate.

Zimbabwe was classified as having a generalized epidemic (i.e., the national HIV prevalence is consistently over 1% in pregnant women), and the most appropriate data to use in EPP were ANC data (5). HIV prevalence results from the ZDHS+ 2005-2006 were used to calibrate the urban and rural curves. The ZDHS+ survey year was specified as 2005, the year the majority of the data collection for the survey was completed.

The EPP software provided data files for Zimbabwe including population statistics. Updated ANC data, ZDHS+ data, program monitoring and evaluation data, and Zimbabwe 2002 Census data projected to 2007 were entered into Spectrum to generate the projections presented in this report.

Classification of the National Population and ANC Sites by Location

The 2003 National Estimates working group classified areas as urban, rural and other census strata based on 2002 Zimbabwe Census data. Prevalence curves were generated for each of these types of areas. Large-scale commercial farms, administrative centers, growth points, other urban areas, state lands and special categories, which were previously classified as part of the rural census strata, were reclassified as part of the other census strata. The other classification defined areas with typically higher levels of HIV prevalence than traditional rural areas (communal lands, resettlement areas and small-scale commercial farms). Clinics located in other census strata were over represented in ANC Surveys to capture additional data on the vulnerable, high prevalence population in these areas. Inclusion of this other census stratum, which is a relatively small percent of the population, in the rural classification, which is over fifty percent of the population, resulted in exaggerated estimates of rural HIV prevalence.

Table 10 presents census sectors defined by the Zimbabwe 2002 Census and the working group's classification of these sectors into urban, rural and "other" areas (7).

Table 10: Census Sectors and Estimates Classification

Zimbabwe 2002 Census sector and classification into urban, rural and "other" categories

Census Sector	National Estimate Category
Communal	Rural
Large Scale Commercial Farm	Other
Resettlement	Rural
Small Scale Commercial Farm	Rural
Urban	Urban
Administrative Center	Other
Growth Point	Other
Other Urban [e.g., Mines, Service Centers]	Other
State Land [e.g., National Parks]	Other
Special Category [e.g., Prisons, Army Camps]	Other

The 2002 Census data were projected to 2007 to determine the population distribution by urban, rural, and other category (Table 11). The resulting distributions of the population categories used in EPP.

Table 11: Population Distribution by Location

Zimbabwe 2002 Census projected to 2007 population distribution by urban, rural and "other" categories

	Proportion of total population	Number	Number age≥15 years
Urban	32%	3,695,825	2,458,883
Rural	57%	6,610,994	3,581,064
Other	11%	1,324,838	825,191
TOTAL	100%	11,631,657	6,865,138

Following the classification of population sectors into urban, rural and other categories, the working group classified each ANC sentinel site as urban, rural or other. The resulting classification of ANC sites is described in Table 12.

Table 12: ANC Sentinel Site Classification

Classification of Zimbabwe ANC sites by urban, rural and other census strata of women attending ANC clinics		
Urban	**Rural**	**Other**
Bindura	Antelope	Banket
Chinotimba	Binga	Beitbridge
Chitungwiza	Birchenough Bridge*	Chipinge
Edith Oppomon	Chitsungo	Chiredzi
Gweru	Gutu*	Eastern Highlands
Gweru Private Clinic	Hauna Growth Point*	Gokwe District
Kuwadzana	Karanda	Gwanda
Kwekwe	Karirangwe	Hwange Hospital
Masvingo City	Kezi/Matobo	Kadoma
Mbizo 11	Mary Mount Hospital	Kwekwe
Mkoba 1	Mashoko Mission	
Mkoba Polyclinic	Mberengwa Rural	Shabanie Mines
Mutare City (Sakubva)	Murambinda	Shurugwi Mines
Nkulumane	Musume	
Rusape Hospital	Mutoko*	
Seke North	Sadza (Chivhu)*	
St. Mary's	Sanyati Hospital	
Vengere	St. Albert's	
	Zvimba/Kadoma	

*Not truly rural – prevalence using the Genscreen test for these sites was adjusted down 30% for fitting the rural curve

Prevalence rates calculated using results from the Genscreen HIV test (1989 through 2001) for the rural ANC sites Birchenough Bridge, Gutu, Hauna Growth Point, Murambinda, Mutoko and Sadza were adjusted down by 30%. Most of the women attending ANCs at these sites live in or near a commercial center and data from local epidemiologic studies indicate that HIV prevalence rates are approximately 30% higher in these areas compared with the truly rural areas. Furthermore, HIV prevalence at these ANC sites was 30% higher than in the ANC sites that the working group classified as truly rural.

Adjustments for Unreliability of ANC Surveillance Estimates

The parallel testing algorithm data was considered reliable and adjustments were not made to the data from 2002 to 2006. However, prevalence findings at some sites during other years were implausibly high or inconsistent. Due to the inconsistency in the Chiredzi site data, the working group decided to exclude all data points for Chiredzi prior to 2001. The group also excluded data for the Musume site in 2000 because the prevalence rate that year was not consistent with other years. These data points were not included as input for the national estimates.

Representativeness of ANC Data of the Prevalence among Women and Men Age 15 to 49 Years in the General Population

HIV prevalence among pregnant women at ANC clinics may not be the same as among all men and women in the general population. On average, in sub-Saharan African populations, ANC estimates are approximately 10% too low for women in the general population and 10% too high for men, but the approximate HIV prevalence among men and women combined reasonably well (24). However, ANC estimates may more closely approximate HIV prevalence among women in the general population, and substantially overestimate the prevalence in men and women combined in more developed locations where age at first sex is relatively high. Spatial patterns of ANC clinic utilization may further complicate the pattern at the local level (25).

To determine the relationship between HIV prevalence in ANC attendees and HIV prevalence in men and women in the general population in Zimbabwe, data from the Zimbabwe Young Adult Survey (YAS), a population-based HIV prevalence and behavioral survey among 15 to 29 year olds in which pregnancy data were also collected, and the studies of bias in ANC and population-based estimates conducted in Manicaland from 1998-2000 were assessed(24;25).

The HIV prevalence rates in 2001 at the ANC sites in Harare (30.6%) and Bulawayo (27.9%) were averaged to give an overall estimate for urban areas in 2001 (29.3%)(7;26). Extrapolation of HIV prevalence among women age 15 to 29 years in the 2001 YAS to that among women age 15 to 49 years, using the ratio of HIV prevalence in these two age ranges for the more urban areas in the Manicaland project, indicated that HIV prevalence in ANC attendees (29.3%) is a reasonable estimate of that among all women (approximately 27%) in urban areas (8;25). A similar process of extrapolation of YAS data for men yields an HIV prevalence of approximately 20% among men age 15 to 49 years and suggests that the female-to-male HIV prevalence ratio is approximately 1.35:1 (27%/20%).

Data from large-scale commercial farms and subsistence farming areas in the Manicaland project indicated that ANC estimates in both the rural areas and the other areas understate the HIV prevalence among all women age 15 to 49 years by 15% and overstate the HIV prevalence among all men age 15 to 49 years by 15% (female-to-male HIV prevalence ratio 1.35:1) (25).

EPP Curve Fits

EPP was used to fit separate HIV epidemic curves to the ANC data with the adjustments described above for the urban, rural and other areas. The three curves for the different population strata were combined to provide one national HIV epidemic curve by applying the population distribution by urban, rural and other categories from the 2007 Census data as described in Table 11.

Creating the HIV and AIDS Projections in Spectrum

The HIV prevalence curve generated by EPP was used as an input to the software package Spectrum, to generate the estimates of HIV and AIDS prevalence for adults and children, the number of new HIV infections, new AIDS cases, AIDS mortality and orphans.

Spectrum uses demographic, epidemiologic and other data to create a national HIV projection. Detailed information about the standard demographic and epidemiologic assumptions can be found in the DemProj and AIM, respectively. Spectrum first creates a population projection using the estimates and projections from the United Nations Population Division. The projection for Zimbabwe was created for the years 1980 to 2007. Demographic data were selected using the EasyProj feature of Spectrum, which uses data prepared from the United Nations Population Division and updated with data provided by the Zimbabwe Central Statistical Office (CSO) with data from the 1982, 1992 and 2002 Censuses with projections to 2007 where appropriate. Epidemiologic and other data were read from the EPP file and entered from national data sources.

The following demographic assumptions were considered or changed. If a specific demographic parameter is not mentioned, the Spectrum default was used.

Population Figures

United Nations Population Division estimates of the population size and distribution in Zimbabwe were used for the base year (1980, or first year, of the demographic projections. From this baseline population, projections made by Spectrum for 2002 came close to the Zimbabwe 2002 Census data. Spectrum estimated the 2002 population at 11.9 million; the Zimbabwe 2002 Census figure was 11.6 million. Some of this discrepancy may be due to international migration.

Total Fertility and Age-Specific Fertility Rates

Total fertility (TFR) is the number of live births a woman would have if she survives to age 50 and has children at each age according to the prevailing pattern of childbearing at that age. Age-specific fertility rates (ASFR) are the rates at which women bear children at each age or within each age interval – taken here as 5-year age intervals from 15 to 19 through 45 to 49. TFR and ASFR estimates provided by Spectrum were similar to data from the 1988, 1994 and 1999 Zimbabwe Demographic and Health Surveys (ZDHS) and the 2002 Zimbabwe Census. The Spectrum estimates were used for the projections.

Life Expectancy at Birth

The baseline model setting for life expectancy at birth (the average number of years that males and females are expected to live from birth if they experience contemporary death rates), in the theoretical absence of the HIV epidemic, was set using United Nations Population Division estimates. Age patterns of non-AIDS mortality were derived using the UN General model life table. AIDS mortality is calculated independently using the projected trend in HIV prevalence and standard UNAIDS assumptions for the distribution of the interval between HIV infection and death.

The following epidemiologic data were considered or changed. If a specific parameter is not mentioned, the Spectrum default was used.

Adult HIV Prevalence

Adult HIV prevalence was read from the 2007 EPP file created using the methods described above.

HIV Progression

People infected with HIV usually experience an asymptomatic period during which they do not need treatment. After some period of time the patient is in need of treatment. The time from new infection to need for treatment varies by individual. Cohort studies provide information on the patterns for large numbers of individuals. Net survival of people living with HIV is 11 years instead of the previous 9 years. People living with HIV, in the absence of antiretroviral treatment (ART), will become eligible for treatment an average of 3 years before they are expected to die from an AIDS related cause, instead of previously 2 years. The Spectrum default was used.

HIV Age Distribution

AIM has two default patterns, one for generalized epidemics and one for low level and concentrated epidemics. The generalized epidemic pattern was used and the sex distribution was adjusted using data from the YAS 2001-2002 and the ZDHS+ 2005-2006.

Total Fertility Rate Reduction

HIV-infected women typically have higher birth rates at young ages compared with older women because they are more sexually active. HIV-infected women also typically have lower birth rates at older ages as those who are sub-fertile due to other STDs are at greater risk of acquiring HIV, and because HIV appears to reduce fertility. These differentials in fertility are important because they affect the overall impact of an HIV epidemic on infant and early childhood mortality and levels of orphanhood. The Spectrum default was used.

Mother to Child Transmission

MOHCW PMTCT program monitoring and evaluation data from 2005 and 2006 describing the number of women receiving a single dose of nevirapine and number of mothers reporting exclusive breast feeding were input into Spectrum. Spectrum defaults for probability of transmission were used.

Antiretroviral Treatment (ART) and Child Treatment Services

MOHCW care and treatment program monitoring and evaluation data from 2003 through 2007 describing the number of people on first line ART, the number of children on cotrimoxazole, and the number of children on ART were input into Spectrum.

Orphanhood

The percent of never married women (aged 15-19 years) was input from the ZDHS+. The Spectrum default was used for the percent of married women in monogamous unions.

Plausibility Bounds

Plausibility bounds are reported in this report to reflect the uncertainty inherent in the development of HIV and AIDS estimates. ANC data were used to generate 1000 alternate data points using a beta-binomial distribution to capture two sources of uncertainty, the sampling of women within a clinic and the selection of clinics. A curve was fitted for each set of points as previously described in this report. The curve was calibrated using data from population based surveys (9). The plausibility bounds are not statistical confidence intervals but are designed to help informed decision making by showing that the size and impact of the epidemic is not known with absolute certainty.

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