Republic of Namibia

Ministry of Health and Social Services

Estimates and Projections of the Impact of HIV/AIDS in Namibia

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Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Clinic
ARV	Antiretroviral
ART	Antiretroviral Therapy
AZT/3TC	Zidovudine and lamivudine (anti retroviral medicines)
DHS	Demographic and Health Survey
EPP	Estimates and Projection Package
GRN	Government of the Republic of Namibia
HIV	Human Immuno-deficiency Virus
HSS	HIV Sentinel Surveillance
M&E	Monitoring and Evaluation
NVP	Nevirapine (anti retroviral medicines)
PMTCT	Prevention of mother to child transmission
UNAIDS	UN Joint Program on HIV and AIDS
WHO	World Health Organisation

Foreword

HIV/AIDS has had a tremendous impact on Namibia over the past 20 years. The epidemic has affected our health, livelihoods, economic perspectives, demographic future as well as many individual lives. The national effort to reduce the impact of the disease has been substantial; yet the numbers of people in need of prevention, treatment and support continue to grow.

An efficient and effective response requires a clear understanding of the epidemic and its likely projection into the future. Government, civil society, development partners and all stakeholders need reliable information on the numbers of people their services need to reach. This report aims at helping stakeholders understand Namibia's current HIV epidemic and plan future programmes and services.

The report presents our best current understanding of Namibia's HIV/AIDS epidemic as well as future trends over the coming five years. It is intended that as more baseline and input data become available, the models employed to generate the various estimates will be rerun from time to time in order to update our understanding of the epidemic and its future course.

The projections indicate that we have a substantial amount of work ahead of us in responding to the HIV epidemic. The data show that without a rapid scale up in prevention efforts, hundreds of thousands of our sisters, brothers, cousins, children, friends and colleagues will have their lives disrupted by this disease. In addition, our already stretched health and social services which provide treatment, care and support will be required to reach more people living with and affected by HIV.

I am pleased to release this report and trust that it will be widely used to improve our national response to the HIV/AIDS epidemic.

Mr. K. Kahuure,
Permanent Secretary
Ministry of Health and Social Services

Executive Summary

Twenty-two years into the HIV epidemic, Namibia is developing a response that is based on increasing amounts of evidence. Information on the trends and distribution of HIV prevalence are available from the HIV Sentinel Surveillance among pregnant women attending antenatal clinics. Data on services provided such as the number of people receiving anti-retroviral therapy or the number of pregnant women receiving anti-retroviral prophylaxis are available from routine health information systems.

Information which is also critical to our understanding of the epidemic are estimates and projections of the numbers of people living with HIV and in need of treatment. UNAIDS and partners have developed modeling software which create estimates and projections based on available information from sentinel surveillance and programme data. These estimates can then be used for advocacy, to inform planning, and to guide decision-making.

The Estimation and Projections Package (EPP) model calculates national HIV prevalence based on ANC HIV prevalence and other information. (The current round of estimates and projections include the 2006 HIV Sentinel Surveillance results.) The results of EPP are fed into another modeling software called Spectrum. Using national demographic data, programme coverage data, and assumptions of future programme coverage, patient retention, and survival, Spectrum estimates the number of people newly infected, number of people living with HIV, the number of women who will need PMTCT services, and the number of people in need of ART. The model can project these estimates for up to five years into the future, beyond that period the estimates become unreliable. The models also provide confidence bounds to reflect our certainty around the estimates.

The results of the models suggest that estimated adult (ages 15-49) HIV prevalence in 2007/08 was 15.4 percent. HIV prevalence is estimated to remain stable at around 15 to 16 percent assuming there are no significant changes to HIV prevention activities. Despite stabilizing HIV prevalence, the number of people living with HIV will continue to increase as the total population size in that age range grows. In 2007/08 approximately 204,000 people were living with HIV while in 2012/13 this value is predicted to be 247,000 people.

In 2007/08 approximately 14,100 people are newly infected with HIV. This translates to about 39 new infections per day. Of the new infections, about 44 percent are among young people ages 15-24, 77 percent of which are among young women. In 2007/08 9,400 women were in need of PMTCT services. This number will grow to 10,200 by 2012/13.

Namibia has made remarkable strides to roll out ART services to those in need. However the number in need of treatment is still increasing: from 69,500 to 114,500 by 2012/13. This includes 5,900 children under the age of 14 who are in need of treatment in 2007/08. Despite the rollout of ARVs the number of people dying of AIDS related causes will continue to grow. This is due to the increasing numbers of people on treatment who might default or have adverse reactions as well as the increasing ages of those on treatment. This highlights the importance of programmes to improve adherence and patient retention in the ART services.

This report presents our best current understanding of the HIV epidemic in Namibia.

1. Introduction

Namibia is a country of approximately 2 million inhabitants with a growth rate of approximately 2.6 percent per year (2001 Population Census). Namibia is classified as a middle income country; however, it has one of the largest differentials between rich and poor in the world.

The first HIV infection was reported in Namibia in 1986. The epidemic grew rapidly in the 1990s until 2002, apparently stabilizing thereafter. Three multi-sectoral strategic plans have been developed by the country with the current being the Medium Term Plan III. There are large variations in prevalence within the country as measured through HIV Sentinel Surveillance in Antenatal Clinics (ANC).

HIV surveillance in Namibia is conducted by testing blood collected from women attending selected ante-natal clinics throughout the country using methods recommended by the WHO (UNAIDS, WHO 2003). The proportion of women testing positive to HIV provides an estimate of HIV prevalence among pregnant women who attend antenatal clinics. To calculate national prevalence the ANC prevalence must be adjusted to account for males and other women that are not represented in the ANC surveillance.

UNAIDS, WHO and partners have developed a model to estimate and project national HIV prevalence based on ANC HIV prevalence and other information. The model is called the Estimation and Projections Package (EPP) and complements a further modeling software called Spectrum. Using national demographic data, programme coverage data, and assumptions of future programme coverage, patient retention, and survival, Spectrum can estimate the number of people newly infected, number of people living with HIV, the number of women who will need PMTCT services, and the number of people in need of ART. The model can project these estimates for up to five years into the future, beyond that period the estimates become unreliable.

The estimates generated in this process are critical for planning purposes. For example, the estimates, combined with programmatic data, can assist planners to make informed decisions on purchasing ARVs and allocating staff. Programme managers can project variations in the numbers of maintenance grants or home based care kits required. By providing an estimate of the number of HIV positive women who became pregnant during the year, the estimates also help track whether services were provided to all women in need of PMTCT (required for measuring progress on the UNGASS Declaration of Commitment). The results provide a representative estimate of HIV prevalence for Namibia, which is currently not available from other sources. Finally, the results of the models should also be used for advocacy efforts to understand the magnitude of the epidemic if no increase occurs in our prevention efforts.

The following report presents these estimates and projections for Namibia. Before the results are presented a brief background is provided on the methodology of the estimates and the process undertaken in Namibia to arrive at these estimates. In addition, section III describes the assumptions used in the models. The resulting estimates and projections are presented in the final five sections. Though Spectrum also estimates the number of orphans, these estimates and projections are not presented in this report as significant differences were observed between Spectrum and the direct estimates based on the 2006 Demographic and Health Survey preliminary results. The variations between the two estimates are currently under review.

Spectrum provides estimates for the mid year of each year, however the Government of Namibia (GRN) runs on a fiscal year that starts on April 1 and ends on March 31. The estimates provided in this report have been interpolated (assuming linear growth) to provide estimates that reflect the GRN fiscal year. For example, values for fiscal year 2001/02 reflect the value on 31 March 2002.

2. Background

The EPP and Spectrum packages were developed and are maintained by the Futures Institute and the East-West Center. The UNAIDS/WHO Reference Group on Estimates, Modeling and Projections provides the technical background for the software including the changes required to the assumptions in the model. The Reference Group includes epidemiologists, demographers, medical doctors, and others from academic institutions and other agencies that provide advice on surveillance of HIV. The reference group produces reports and publishes articles documenting their recommendations and conclusions.

Over 150 countries use the EPP software to calculate their national HIV prevalence. Every year the estimates created at national level are sent to the UNAIDS secretariat where regional estimates are produced. The regional estimates are published in the Epidemiology Update every year. Every other year the national estimates are published in the UNAIDS Global Report on AIDS.

To increase individual country capacity and participation in making these estimates, UNAIDS, WHO and partners conducted a series of workshops from March through June 2007 to train participants from each country in estimation methods and the application of the EPP and Spectrum software.

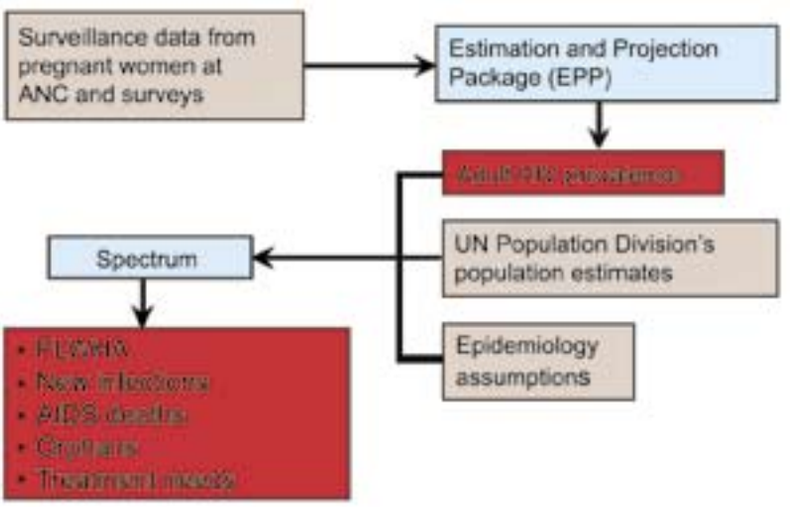
National estimates of HIV prevalence are based on data collected from pregnant women who attend antenatal clinics, and in many countries (though not Namibia) on nationally representative population based sero-surveys. The ANC data are entered into the EPP software which fits a simple epidemiological model to find the best fitting curve that describes the evolution of adult HIV prevalence over time, and calibrates that curve to the prevalence found in the national survey (if available). This adult prevalence curve, along with national population estimates and epidemiological assumptions, is then entered into the Spectrum software program to calculate the number of people infected, new infections and deaths. In addition the software produces the number of people in need of antiretroviral therapy (ART), the number of orphaned children, and the number of pregnant women living with HIV.

One of the major limitations of the Spectrum model is that it does not capture changes in most of our prevention efforts. Programmes that result in reducing the number of sexual partners or increased condom use are difficult to accurately quantify and their impacts are difficult to model. These prevention programmes are thus not reflected in the estimates and projections. The values in this report reflect the situation if our prevention efforts remain constant over the next five years.

Namibia conducted HIV sentinel surveillance in 2006. The results of this survey provided critical data to update the national estimate of HIV prevalence. Four members of the national HIV M&E Committee attended the regional workshop in Pretoria from 19-21 March 2007 where participants were trained on the estimation process. A training seminar was held in Windhoek on the estimation process the following week. The Namibian team met again in Windhoek on 2 May 2007, after the launch of the HIV sentinel surveillance results. The process was repeated to calculate the final national estimates.

The process for deriving the estimates requires multiple steps (see Figure 1). First the surveillance data are input into the EPP software along with estimates of population size and some other demographic assumptions. EPP creates a curve that estimates the pattern of the HIV epidemic. This curve is then included into Spectrum which uses additional information on the coverage of HIV services and estimates the number of people living with HIV, deaths due to AIDS, number of orphans, pregnant women in need of PMTCT, and other useful information for decision making.

Figure 1. Process for creating estimates



3. Assumptions and Sources of Data for Models

Both models require a number of assumptions as well as additional data to create the estimates. These sources and assumptions are described in detail in this section to transparently show how the estimates were derived.

3.1 Assumptions and Sources for EPP

The first model, EPP, allows us to fit a curve to the HIV surveillance data. Separate urban and rural curves are then created and combined to form a national curve. The curve projects adult HIV prevalence for up to five years into the future. Beyond five years the curve projections become unreliable.

The model relies primarily on HIV surveillance data from 1992 to 2006 in sites classified as urban or rural and estimates of rural and urban population. The quality of the HSS improved over time so we can assume that the more recent estimates are more accurate than the older estimates. Additional demographic indicators (such as the proportion male, birth rate, survival to age 15, mortality among persons 15 years and over and the population growth rate) are provided as defaults by the software. The demographic indicators are based on the UN Population Division and are based on projections from census results.

3.2 Assumptions and Sources for Spectrum

As noted above, Spectrum includes the adult HIV prevalence curve created by the EPP, population estimates from the UN Population Division, Epidemiological assumptions related to HIV/AIDS, and information on HIV services (ART, PMTCT prophylaxis) to generate estimates and projections of epidemic impact currently and in the future. As noted above, estimates from the EPP (and hence estimates from Spectrum) are not reliable for more than 5 years in the future; thus the estimates and projections presented are through fiscal year 2012/13. Spectrum provides default values for all assumptions and these were accepted in the Namibia model unless country-specific data were available (as described below).

3.2.1 Type of Epidemic and Age/Sex Distribution

We are first required to choose between concentrated and generalized epidemic patterns and the Namibia Spectrum model uses a generalized pattern because prevalence in the general population is above 1 percent, a standard definition for generalized epidemics.

Spectrum then allows us to specify sex-specific HIV prevalence ratios between various age groups in the population. This consists of the HIV prevalence among 5-year age groups between the 0 and 74 years separately in women and men. This is entered as the probability of HIV infection in the given age group compared to the 25-29 year group and separate estimates are made by year. For example, according to Spectrum default values for a generalized epidemic, women age 20-24 in 2007 have a prevalence ratio of 0.65 relative to women 25-29 years old. For the Namibian Spectrum model we accepted the default inputs for sex-specific HIV prevalence by age groups.

Finally, Spectrum allows us to specify the sex ratio (number of females infected per infected male) of HIV infection by year because this ratio tends to vary as the epidemic matures. Specifically, this ratio is lower earlier in the epidemic as men are more likely to be infected during this stage of the epidemic. However, it becomes higher later in the epidemic as women are more likely to be infected. The default pattern was accepted in the Namibia model, estimating that in 2007 1.5 women were HIV infected for every one male (a ratio of 1.5).

3.2.2 Survival and HIV Progression

Spectrum contains a number of assumptions related to survival of individuals with HIV infection. The first of these is the progression from HIV infection to the need for treatment, estimated separately for male adults, female adults, and children. This is specified as the percentage of people who require treatment X years after HIV infection where X ranges from 1-19. Two defaults are available for this assumption, a normal pattern and a fast pattern. Given Namibia's relatively high ranking in the Human Development Index, the normal default was accepted in the Namibia Spectrum model. The median value for this assumption is about 8.5 years for adult women, about 7.5 years for adult men, and about 1.5 years for children.

The second survival assumption specifies the period between need for ART to death in adults assuming treatment is not available. This assumption is made separately for women and men. As above, Spectrum provides two patterns for this, normal and fast. Namibia again chose the normal pattern due to the country's relatively high status on the human development index. The median value for this assumption was 3 years for both women and men.

The third survival assumption is year-on-year survival of patients on ART. Separate values may be entered for adults and children with children separated into those less than 1 year old and age 1 and older. Within adults and children 1 year or older, separate survival estimates are entered for the first year of treatment and subsequent years. For these, the Namibia Spectrum model accepted the default assumptions presented below:

Age/duration on Treatment	% surviving after 12 months
Adult	
First year	85%
Subsequent years	95%
Children	
Under 1 year	80%
Age 1 year and older	
First year	90%
Subsequent years	95%

The fourth and final survival assumption is annual AIDS mortality among children in need of treatment. Default patterns were again accepted for this assumption. These assumptions propose that mortality rates among children in need of treatment are 90 percent per year for children under 3 years of age and decrease rapidly for children who have survived past those first three years.

3.2.3 Prevention of Mother-to-Child HIV Transmission

Coverage of prevention of mother-to-child HIV transmission (PMTCT) services requires another set of assumptions included in the model as the extent of PMTCT contributes to the calculation of the number of children infected with HIV. Spectrum allows us to indicate two key assumptions related to mother-to-child HIV transmission: Antiretroviral (ARV) prophylaxis coverage of HIV positive pregnant women and infant feeding behaviors of HIV positive pregnant women.

Data on ARV prophylaxis for PMTCT are entered by year. Options for PMTCT interventions include no treatment, single dose nevirapine, dual prevention ARV, and triple prevention ARV. It is important to realize that the triple prevention ARV does not include HIV positive pregnant women who are taking triple drug ART for their own health as these are included in the model under another set of assumptions (see Section 8). In Namibia, only PMTCT data from the public sector were entered. Though PMTCT services are available through private healthcare providers, these data are currently not available at the MoHSS. As of the writing of this report, the only PMTCT regimen available in the public sector was single dose nevirapine provided to the mother during labor and to the baby shortly after delivery and this intervention has been available since 2002. Hence, for the years 2003 – 2007, the Namibia Spectrum model included the numbers of HIV positive pregnant women receiving ARV prophylaxis as reported through the MoHSS routine reporting system.

For subsequent years (2008-2013), assumptions in the Namibia Spectrum model were based on two sources: (1) future PMTCT coverage estimated by Programme Officers and (2) proposed revisions to the PMTCT guidelines. PMTCT programme officers estimated the number of women who will receive ARV prophylaxis from 2008 - 2012. These estimates were used in the Namibia Spectrum model for the total ARV prophylaxis provided in a PMTCT setting by year. However, as noted above, the Spectrum model requires the user to specify the proportion of mother/child pairs receiving each type of ARV prophylaxis. For the year 2008, half of the mother/infant pairs were assumed to receive single dose nevirapine while the other half were assumed to receive AZT/3TC from 36 weeks gestation and NVP at birth with a 1-week AZT tail. In subsequent years all mother/infant pairs were assumed to receive dual prophylaxis. These assumptions were made because the proposed revisions to the PMTCT guidelines dictate that women will be offered dual therapy rather than single dose nevirapine and these revised guidelines are scheduled to take effect during the early part of 2008.

The other Spectrum assumption related to PMTCT is the distribution of infant feeding methods by HIV positive mothers. For this Spectrum allows the user to assign for each year the number or percentage of women in three groups: mixed feeding, exclusive breastfeeding, and replacement feeding. The only Namibia-specific data for this variable comes from the Demographic and Health Survey (DHS), but it is not possible to disaggregate this data by HIV status. In light of this lack of data, the default assumption of 100 percent mixed feeding was accepted for all years (past and future).

3.2.4 Antiretroviral Therapy in Adults

The number or percent of adults on ART by year is another key input into the Spectrum model. This influences the survival of HIV positive adults and children and hence impacts a wide variety of model outputs including HIV prevalence, need for ART, need for PMTCT, number of orphans, and mortality.

For adults, Spectrum allows us to input separate data on eligible patients receiving first-line therapy and second line therapy and these data can be entered as either a number or percent of eligible patients. Default values for this input are zero for all years, but these were modified to reflect the coverage in Namibia (see below). Default values for the sex/age distribution of ART coverage were accepted in the Namibia model as country-specific data on this set of inputs is not available.

For first-line ART, we included routine ART programme monitoring data from the public sector and best estimates from the private sector for previous years (1998 – 2007) and coverage targets set by the MoHSS for future years (2008 – 2012). As per targets set during the Round 6 Global Fund proposal process, future coverage targets were assumed to ramp up from 70 percent in 2008 to 80 percent by 2010 and stay at that level until 2012. Coverage of second line ART was assumed to be 50 percent in 1998, remaining at that level until 2003 when the public ART programme began. After 2003 the coverage of second line treatment was assumed to increase gradually to 80 percent in 2008 as this is the universal access target set by the MoHSS. (Future coverage targets were set by MoHSS upper management during a target setting exercise conducted for the Round 6 Global Fund proposal.)

3.2.5 Child Treatment

For children, Spectrum allows us to specify annual estimates for past and future coverage of ART as well as past and future coverage of cotrimoxizole prophylaxis. Similar to the adult inputs, we may enter either a number or a percent coverage for these assumptions, but unlike for adult treatment, no differentiation is made between first and second line ART regimens. Default values for these assumptions are zero for all years. Spectrum also allows us to specify if early infant diagnosis is available in country.

Similar to the adult data, ART coverage for children was specified based on programme data from the public sector and best available estimates for the private sector for previous years (1998 – 2007) and on MoHSS targets for future years (2008 – 2013). For future years, the coverage target was set at 85 percent of those in need since, current and projected ART coverage in children is somewhat higher than for adults.

For cotrimoxizole prophylaxis in children, routine programme monitoring data in the public sector was again used for past years. No estimates were made for the private sector since no reliable information was available. After 2007, cotrimoxizole coverage was set to be 85 percent of those in need, remaining at that level until 2013.

Another input in Spectrum is the reduction in mortality due to cotrimoxizole by age of the child. Default values in Spectrum were used for this input, which are 33 percent for ages 0-4, 17 percent for age 5, and zero for ages 6 and above.

One final Spectrum input for children is the availability of early infant HIV diagnosis using polymerase chain reaction (PCR) testing of infants who are either known or suspected to be exposed to HIV from their mothers. As normal HIV antibody tests cannot accurately diagnose a child until maternal antibody has cleared by 18 months of age, PCR testing is a critical way to diagnose children early in their life and thus obtain care and treatment to improve survival. This input influences the survival of HIV positive children and the number of children on ART and cotrimoxizole. The default value in Spectrum for this input is 'no', but Namibia rolled out an infant diagnosis programme in 2006 and hence this was changed to 'yes' in the Namibia Spectrum model. However the PCR testing is not yet available consistently across the country.

3.2.6 Fertility

Spectrum utilizes data from the UN Population Division as well as assumptions entered by the users to estimate and project the need for PMTCT. UN Population Division data utilized includes the overall population, the population profile by age/sex groups, and fertility estimates. Existing and new HIV infections are produced from EPP and PMTCT, ART, and fertility of HIV positive women assumptions are entered directly by the users. Spectrum combines this information to estimate and project the number of pregnant women needing PMTCT services per year. As noted above, this is not the same as the number of HIV positive pregnant women as some of these women will already be receiving HAART and thus will not require PMTCT. In addition, not all pregnancies will be carried to term.

Spectrum allows us to modify assumptions about the fertility of HIV positive women. This assumption, in combination with assumptions about PMTCT and child prophylaxis and treatment, allows the program to estimate key outputs related to HIV infection in children. The default values were used as no other evidence is available in country. Default values assume fertility in HIV positive women ages 15-19 is higher than their HIV negative counterparts by a factor of 1.5. This is because HIV positive women in this age range are more likely to be sexually active than their HIV negative counterparts (most of these women will have been infected by HIV through sexual transmission so they have been sexually active without using a condom consistently for protection from pregnancy or HIV infection) and their HIV disease is assumed not to have progressed to a point where it markedly decreases fertility. However, the default values assume fertility is reduced among HIV positive women 20 years and older compared to their HIV negative counterparts since as their HIV disease progresses and they fall ill these women are likely to be less sexually active.

4. Accuracy of Estimates and Plausibility Bounds

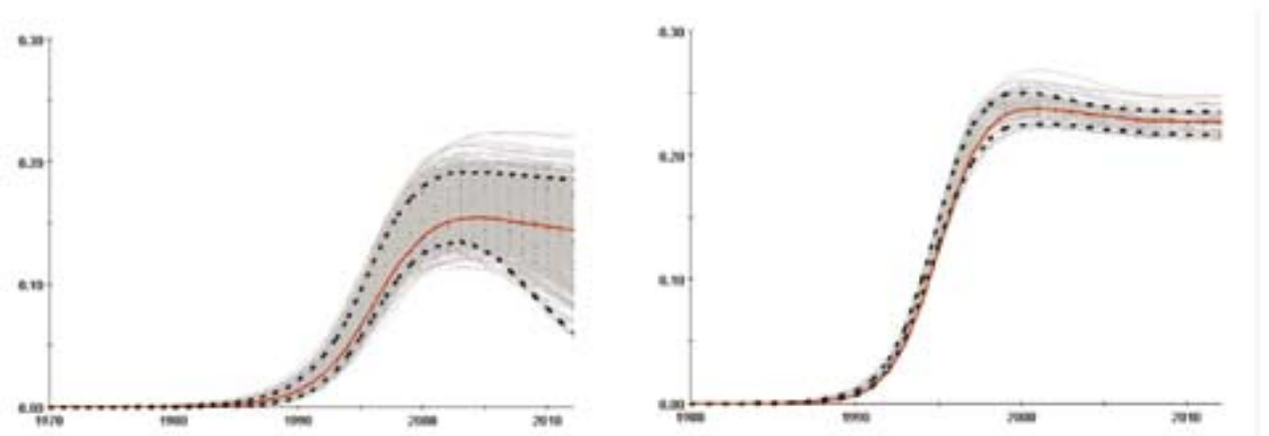
The accuracy of these estimates and projections is only as good as the data and the assumptions used in the model. We can estimate uncertainty, or plausibility bounds, around these data based on the confidence we have in the data we use in the model. For example, since we do not have population-based HIV prevalence we have estimated male to female ratio of HIV prevalence based on information from nearby countries, this increases our uncertainty of the estimates.

The different input data used in the models have different levels of accuracy – in some instances the accuracy can be measured and statistical confidence intervals can be calculated, in other instances a statistical confidence bound is not measurable. Thus plausibility bounds are calculated instead of confidence intervals to show the possible error in our estimates (Grassley et al 2004, Morgan et al 2006). The uncertainty bounds are not statistically based; one can not say that we are 95 percent sure that the results would fall within these values. Instead the uncertainty bounds are rough estimates based on the errors from the input data

Uncertainty varies for different estimates. Our estimates of the number of children living with HIV are much less certain than our estimates of adults living with HIV. Much of this uncertainty is because of uncertainty around the survival of children living with HIV. The bounds should help decision makers and programme managers better understand the estimates they are using.

One of the most important aspects to reduce the uncertainty around HIV estimates is to be able to calibrate HIV prevalence among adults to the ANC HIV prevalence through a population-based survey. Figure 2 shows clearly the variation in our ability to estimate HIV prevalence in a country with results from a population-based survey versus a country without a survey. Our understanding of the level and trends in HIV prevalence are much more accurate with the added information from a population based survey. In Figure 2 the estimate of HIV prevalence in the country with no survey was between 8 percent and 20 percent; whereas the country with a population-based estimate was between 22 percent and 24 percent. The availability of data from a population-based survey reduces the margin of possible error in our estimates considerably.

Figure 2. Uncertainty around HIV prevalence estimates for a country without a population-based estimate of HIV prevalence and a country with population-based estimates



5. Results of the Modeling Exercise

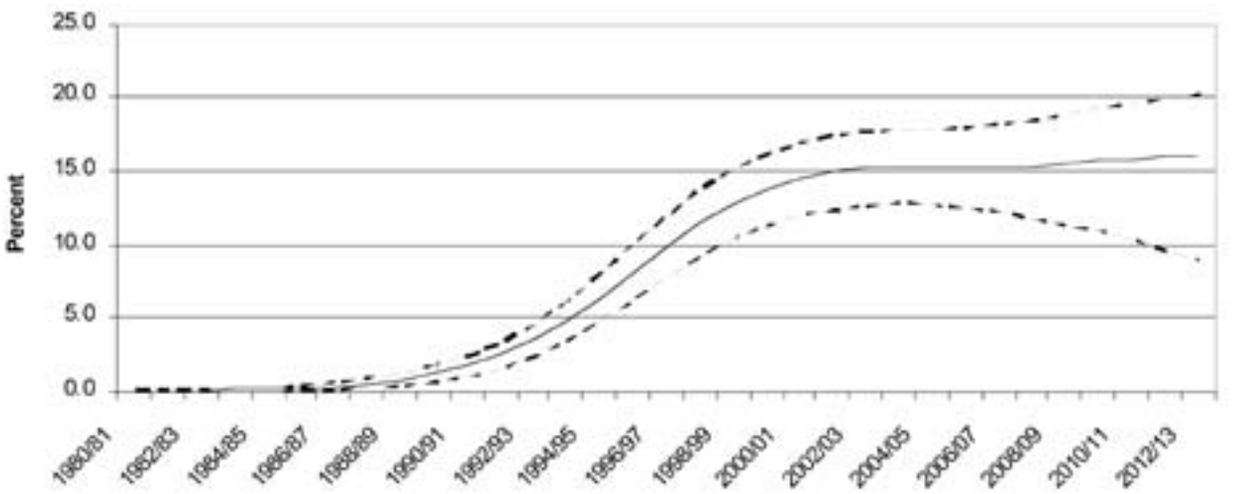
5.1 Estimates of HIV Prevalence and Number of People Living with HIV

The HIV sentinel surveillance provides an estimate of HIV prevalence among pregnant women attending antenatal clinics. This measure provides a good indicator of trends in HIV in the country in that it provides an understanding of whether HIV is increasing or decreasing in the general public. However, ANC prevalence does not inform us about HIV prevalence among men or among women not attending antenatal clinics. EPP uses research based assumptions to estimate the national HIV prevalence in adults 15-49 years based on findings among pregnant women 15-49. The Namibian estimates and projections for this quantity are presented below. The point estimates and plausibility bounds presented in the Figures and Tables below represent an estimate or projection for the end of the GRN fiscal year (for example a value for 2007/08 refers to 31 March, 2008.

In 2007/08 adult HIV prevalence was approximately 15 percent. (As described earlier, this is different than the 19.9 percent HIV prevalence found in the 2006 HIV Sentinel Surveillance because the sentinel surveillance only reflects HIV prevalence among pregnant women attending antenatal clinics.) The model projects HIV prevalence among the general population will reach 16 percent by

2012/13 suggesting a stabilizing of the epidemic (see Figure 3, Table 1 in Annex). The models do not take into account changes in prevention efforts so the stabilizing trend assumes that prevention efforts remain constant over the next five years. The curve also suggests that Namibia has not yet reached its peak prevalence, although the period of rapid prevalence growth ended in approximately 2001. The plausibility bounds for the 2006/07 HIV prevalence estimate are 12.3 and 18.2 suggesting that an estimate between these two figures would be compatible with the data provided.

Figure 3. Estimated HIV prevalence and uncertainty bounds among adults 15 years and over



Approximately 204,000 people (adults and children) were living with HIV in 2007/08 in Namibia (range of 156,000 and 242,000). This value is expected to increase to 247,000 by March 2013 (See Figure 4 and Table 2 in Annex). The number of people living with HIV increases over the next five years despite the stabilizing of HIV prevalence because HIV prevalence only refers to people 15-49 while the number of people living with HIV refers to all ages. Many of the people currently living with HIV will age out of the 15-49 year age group. In addition the absolute number of people ages 15-49 will grow over the next five years, causing a natural increase in the number of people living with HIV in this age group. It is possible to avoid this scenario if prevention efforts are rapidly rolled out. Otherwise the continuing increase in the number of people living with HIV will require a significant response in the coming years. Services including care and treatment will be required on an increasing scale until new infections can be reduced consistently over an extended time.

In 2007/08, among the 204,000 people living with HIV, 14,200 or 7 percent were under the age of 15 years and 58 percent or 119,000 of those infected were women. Over the past 10 years the number of women infected with HIV has grown at a faster pace than that of men. The population pyramids (see Figure 5) show how HIV has affected men and women differently over the years. Women are becoming infected with HIV at slightly younger ages than men.

Figure 4. Number of people living with HIV, adults and children, 2007

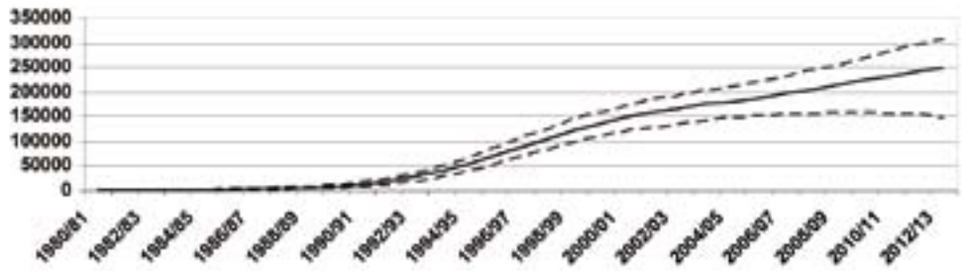
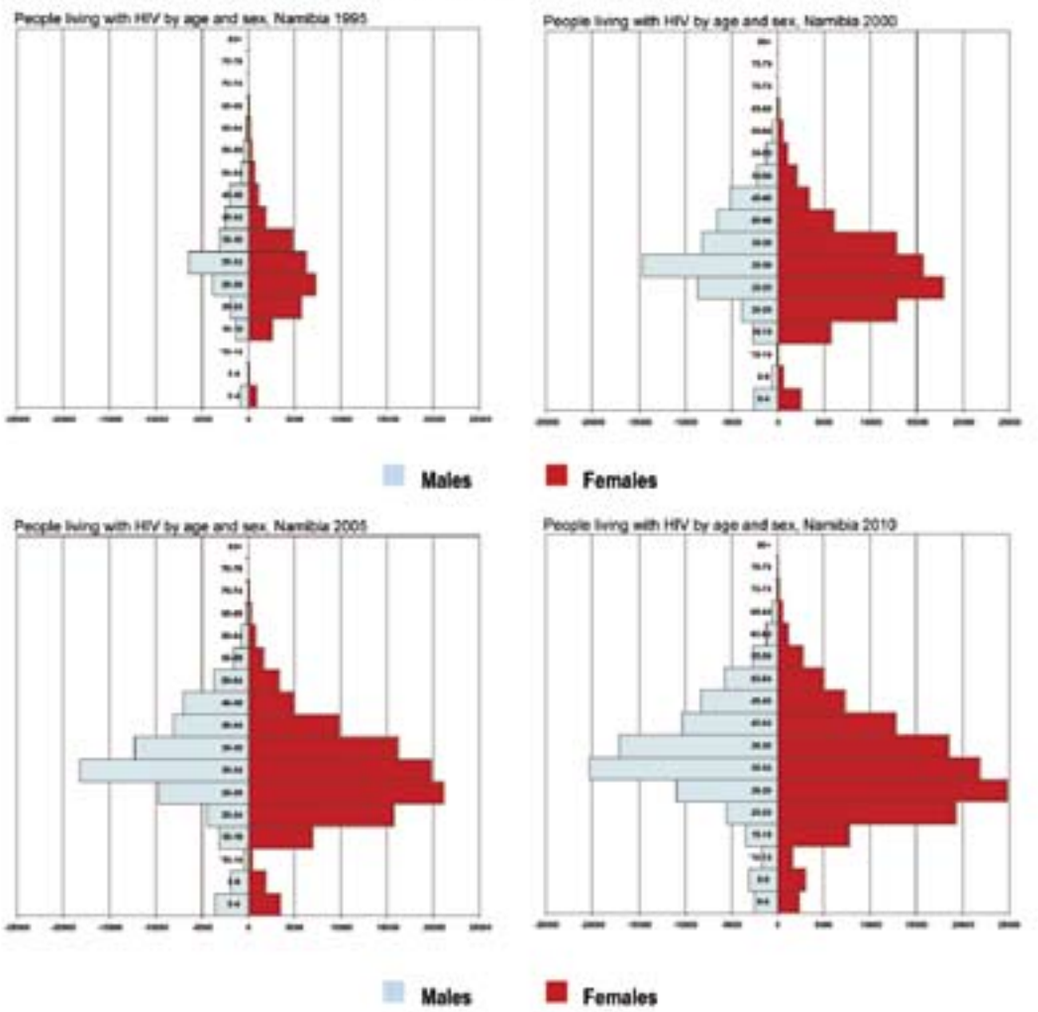


Figure 5. Population pyramids of those infected with HIV in 1995, 2000, 2005, 2010



5.2. Estimates of HIV Incidence

Estimates of the number of new HIV infections (HIV incidence) are critical because they reflect how well prevention interventions are performing and are a sign of the future of the HIV epidemic in Namibia. Even if we stopped all new infections tomorrow, HIV prevalence will remain high as people who start on ART live longer and Namibians living today with HIV were infected an average of 8-10 years ago. Currently Namibia does not measure new infections, however we can estimate the new infections based on the Spectrum model.

In 2007/08, the estimated total number of new infections was 14,100 (plausibility bounds between 2,300 and 18,700) and the expected annual number of new infections is expected to increase to 16,300 over the next 5 years (see Annex Table 3 and Figure 6). The estimate for 2007/08 implies that there are, on average, 39 new infections per day. Among the new infections, only 9 percent are estimated to be among children under the age of 15. The remainder occurs among adults. A large proportion of the new infections, 44 percent, are estimated to be among young people ages 15-24 (Figure 7). Among the new infections among those ages 15-24, 77 percent are estimated to be among young women ages 15-24 (see Figure 7). The estimated large proportion of new infections among young women is critical for programme managers to address.

Figure 6. New Adult HIV infections by year

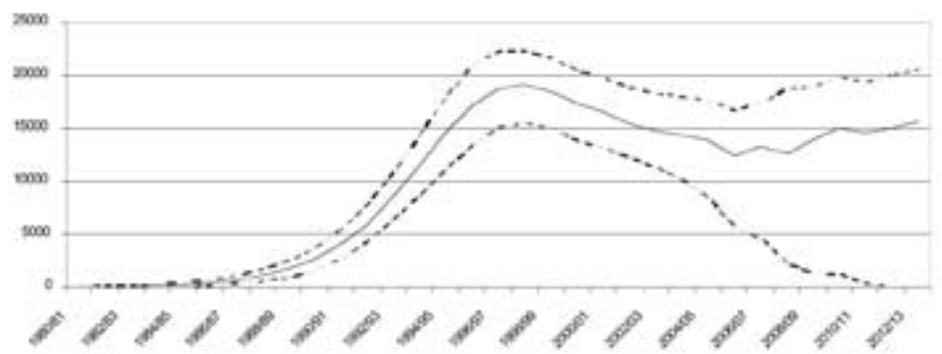
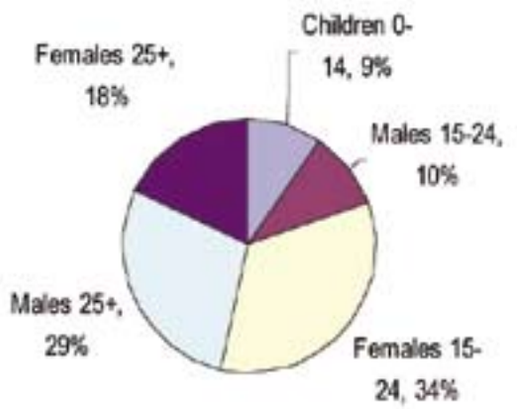


Figure 7. Distribution of new HIV infections in 2007

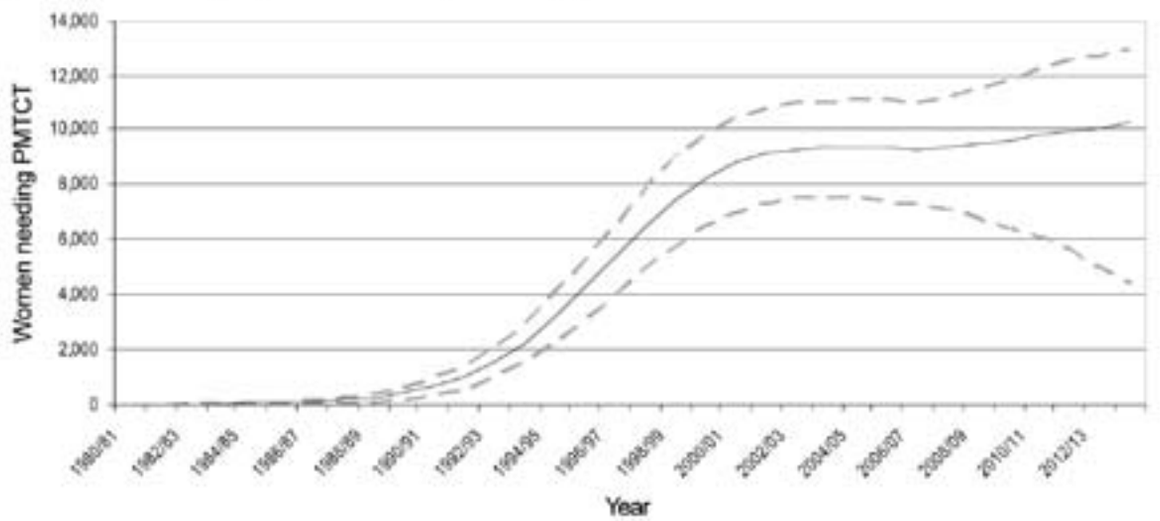


5.3 Estimates of Women in Need of PMTCT Services

In order to reduce new infections among children, prevention of mother to child services have been rapidly rolled out in Namibia. These services ensure that women receive the medicines required to reduce the risk of transmitting HIV infection to an infant during pregnancy, child birth or breastfeeding. Estimates and projections of the number of HIV positive, pregnant women in need of PMTCT services per year is essential for policy makers needing to allocate sufficient programme resources and evaluate service coverage and thus programme success. With this information, programme planners and policy makers are able to accurately predict the amount of antiretroviral medications required and thus make efficient and cost-saving procurements. This information also informs programme planners and policy makers as to the personnel resources, capacity building, and facility resources necessary for an appropriate response to the mother-to-child transmission dimension of the epidemic.

Figure 8 (see Annex Table 4 for details) below illustrates the estimated need for PMTCT in the past and present as well as the projected need in the future. It is estimated that 9,400 pregnant women needed PMTCT services in 2007/08 and that this number will increase to 10,200 by 2012/13. However, as illustrated by the plausibility bounds, the potential range for this estimate increases dramatically in future years.

Figure 8: The number of pregnant women needing PMTCT by year in Namibia, 1980-2013.



5.4. Estimated Individuals Needing and Receiving ART

The number of adults and children requiring and receiving ARV treatment is another key piece of information needed by policy makers and programme planners to respond effectively and efficiently to the HIV/AIDS epidemic. HIV treatment services are a critical and complex medical intervention requiring extensive and highly trained staff to care for and counsel HIV positive individuals as well as a reliable supply of medication all over the country.

5.4.1 Estimated Individuals Needing ART

According to the Namibia Spectrum model, 63,600 adults and 5,900 children were in need of ART as of 31 March, 2008 giving a total of 69,500 people in need of treatment. As illustrated in Figures 9 and 10 (see Annex Tables 5 and 6 for details), the number of adults in need of ART is projected to continue growing at a steady rate between 2007 and 2013, growing to 114,500 by March 2013. However, the number of children needing ART is projected to continue growing and then to stabilize at about 7,500 in 2012/13. The likely reason for this slowing of growth in ARV needs for children is the anticipated implementation of a much improved and highly effective PMTCT regimen in 2008 as well as further expanded coverage.

Figure 9: The number of adults needing ART by year in Namibia, 1980-2013.

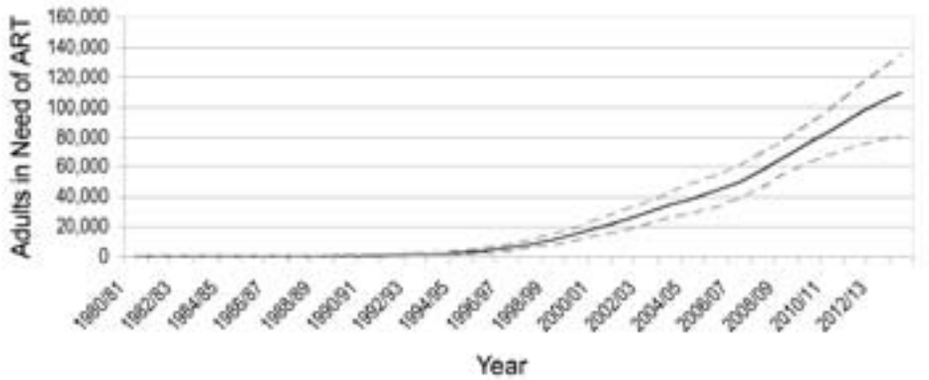
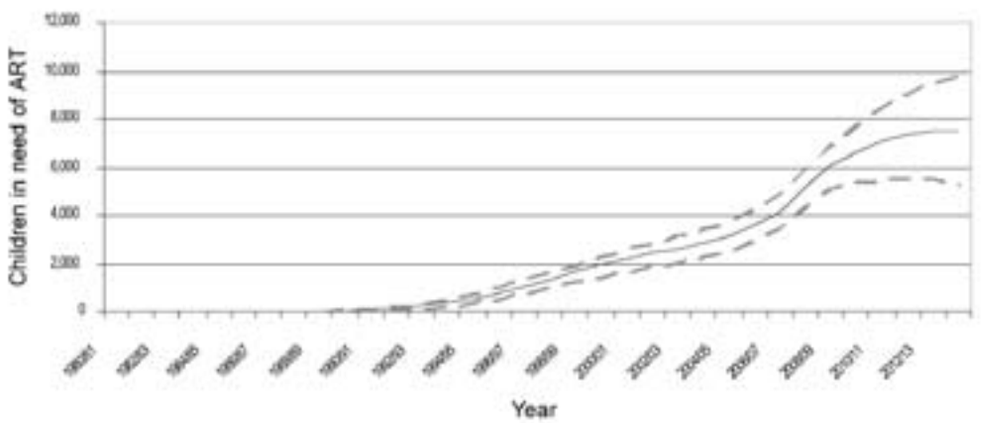


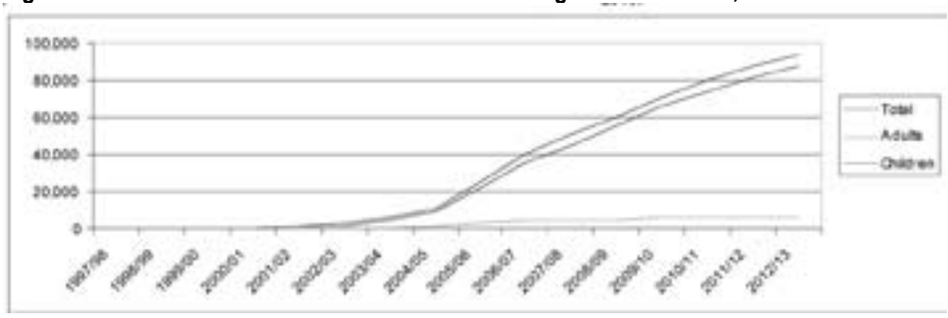
Figure 10: The number of children needing ART by year in Namibia, 1980-2013.



5.4.2 Estimated Individuals Receiving ART

As detailed in Section 3, the estimated and projected numbers of individuals receiving ART is provided by Spectrum based on routine information systems monitoring this indicator and based on assumptions of year-to-year survival on ART and coverage of those needing treatment. Programmatic data (including estimates for private sector ART provision) tells us that approximately 50,600 individuals (both adult and children) were receiving ART as of the end of March, 2008. Based on our assumptions in the model we expect this number to grow to 94,300 by the end of March, 2013 (see Annex Table 7 for details). It should be noted that the number receiving ART in the private sector is most likely underestimated, but reliable numbers are not available.

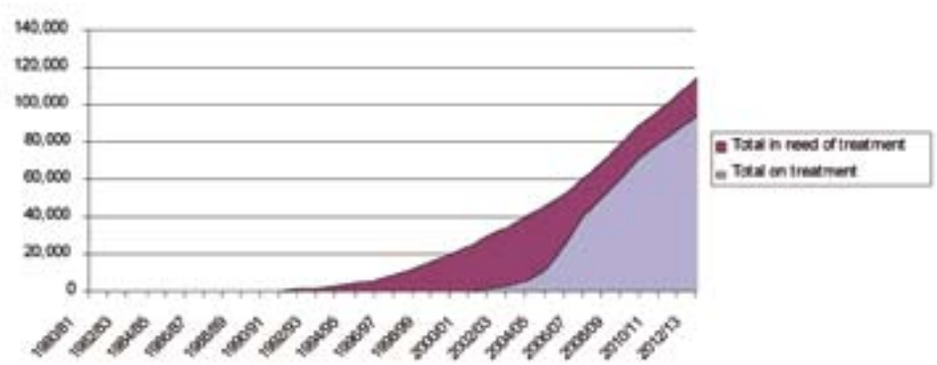
Figure 11: The number of adults and children receiving ART in Namibia, 1980-2013.



5.4.3 Estimated Coverage of ART

Combining the two prior sub-sections, Figure 12 presents both the need for ART and coverage by year in Namibia. It shows that a rapid roll out of ART services between 2003 and 2007 brought coverage of ART from less than 3 percent to almost 60 percent, with future projections of coverage estimated to be about 80 percent. It is useful to recognize that future ART coverage was established during a target setting process: 80 percent was set to be a realistic and feasible target.

Figure 12: The number of adults and children receiving ART in Namibia, 1980-2013.

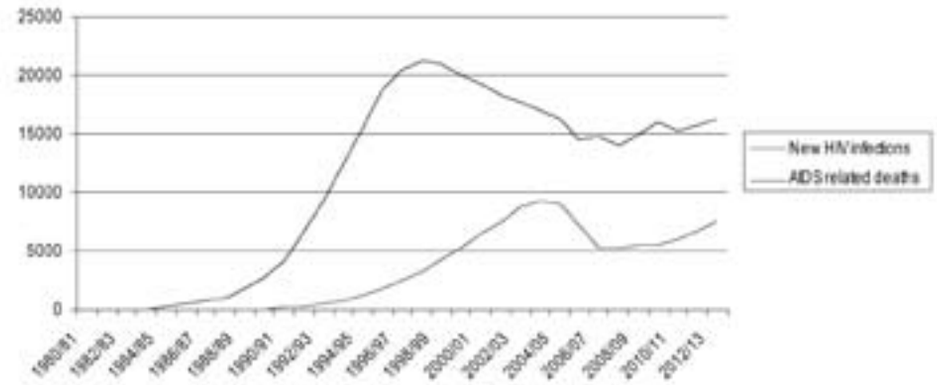


5.5. Deaths Due to AIDS

Approximately 5,400 persons died of AIDS related causes in 2007/08 in Namibia (plausibility bounds 3,700 to 7,300). This is reduced from an estimated 9,200 deaths per year in 2003/04 – before the roll out of ARVs. Even with the continued rapid roll out of ARVs, the number of deaths per year due to AIDS will likely increase slightly over the next 5 years to 7,500 in 2012/13. This increase is due to the increasing size of the population starting on treatment. Some of those individuals will die because their body's systems do not respond to treatment, they avoid starting treatment because of the stigma, they stop taking medicines because of the side effects, or they default on their medication. In addition this increase is due to the larger population on treatment reaching older ages. The number of HIV positive people over age 50 will increase by 70 percent between 2006/07 and 2012/13. As the size of the treatment population increases, the absolute number of deaths will grow and eventually approach the number of deaths prior to treatment, though patients would have lived longer.

The relation between new HIV infections and deaths due to AIDS is shown in Figure 13 while details on mortality are found in Annex Table 8. The small fluctuations between 2007 and 2009 are due to changes in ARV and PMTCT coverage in the model.

Figure 13. Deaths due to AIDS related illness and new HIV infections over time



6. Conclusion

The use of EPP and Spectrum software packages entails application of sophisticated and widely agreed upon methods to estimate and project the impact of HIV/AIDS in countries. However, many assumptions are required by these methods and it is important to make these assumptions in the best possible manner for the country. It is therefore important to make concerted efforts to revisit these assumptions annually to obtain and incorporate the best inputs into the model every 2 years or when new HIV surveillance data are available.

Based on the EPP and Spectrum models, adult HIV prevalence in Namibia is estimated to be 15 percent. The curve suggests that although HIV prevalence is stabilizing (assuming current levels of prevention efforts), it has not yet reached its peak. There are still approximately 14,100 new infections occurring every year, or 39 new HIV infections every day. Forty-four percent of these new infections are among 15-24 year olds. A concerted effort is needed to prevent new infections especially in this young age group.

One of the major limitations to the Spectrum model is that it does not take into account changes in prevention efforts (aside from prevention of mother to child transmission). If the Government and stakeholders scale-up effective prevention efforts in the near future many of these grim statistics could change.

The need for PMTCT is currently estimated to be approximately 9,400 deliveries per year and is expected to rise gradually until March 2013. The model estimates the need for ART will increase by 65 percent in the next five years, offering important planning information for the Government Response.

The number of people living with HIV (all ages) increased (204,000 to 247,000) between 2007/08 and 2012/13 while the prevalence in adults (15-49) went up only slightly (15.4 percent to 16.1 percent).

There are two reasons for this increase in the number of people living with HIV. Firstly, a substantial number of people living with HIV are projected to age out of the 15-49 age group over the next 5 years, thus they are still counted in the total number of people living with HIV (all ages). However, these individuals will no longer contribute to adult prevalence (ages 15-49). Secondly, census projections (2001-2031) show that the total population ages 15-49 will grow by about 14 percent between 2007 and 2013, thus the total number of people living with HIV can grow substantially without an increase in prevalence.

The Spectrum model estimates that HIV-related mortality grew steadily from 1988 to 2005 but declined around the years 2006 and 2007. This decline is most likely due to the rapid roll out of treatment in the country. However, Spectrum projects HIV mortality to begin rising again after 2009. This is due to the increasing numbers of people on treatment as well as the increasing ages of those on treatment. This highlights the importance of programmes to improve adherence and patient retention in the ART services.

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Annex Tables

Table 1: Estimated Adult HIV Prevalence in Namibia
By year, 1980 - 2013, (GRN fiscal year)

Year	Adult (15-49) Prevalence	Low Bound	High Bound
1980/81	0.0	0.0	0.1
1981/82	0.0	0.0	0.1
1982/83	0.1	0.0	0.2
1983/84	0.1	0.0	0.2
1984/85	0.1	0.1	0.3
1985/86	0.2	0.1	0.4
1986/87	0.3	0.1	0.6
1987/88	0.5	0.2	0.9
1988/89	0.7	0.4	1.2
1989/90	1.1	0.6	1.7
1990/91	1.6	1.0	2.5
1991/92	2.4	1.6	3.4
1992/93	3.5	2.4	4.6
1993/94	4.8	3.5	6.2
1994/95	6.4	4.8	8.0
1995/96	8.2	6.3	10.0
1996/97	9.9	7.7	12.0
1997/98	11.5	9.2	13.7
1998/99	12.8	10.5	15.1
1999/00	13.8	11.3	16.2
2000/01	14.5	12.0	17.0
2001/02	14.9	12.4	17.4
2002/03	15.2	12.6	17.7
2003/04	15.3	12.8	17.8
2004/05	15.3	12.8	17.9
2005/06	15.2	12.5	18.0
2006/07	15.3	12.3	18.2
2007/08	15.4	11.8	18.5
2008/09	15.5	11.4	18.9
2009/10	15.7	11.0	19.3
2010/11	15.8	10.4	19.7
2011/12	15.9	9.6	19.9
2012/13	16.1	9.0	20.3

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008

Table 2: Estimated Number of HIV+ Adults and Children in Namibia
By year, 1980 - 2013 (GRN fiscal year)

Year	Adults (15+)	Children (0-14)	Total	Low Bound	High Bound
1980/81	<100	<100	<100	<100	300
1981/82	200	<100	200	<100	600
1982/83	300	<100	300	<100	800
1983/84	400	<100	400	200	1,200
1984/85	700	<100	700	300	1,700
1985/86	1,100	<100	1,100	500	2,400
1986/87	1,800	<100	1,800	900	3,500
1987/88	2,800	<100	2,900	1,500	5,200
1988/89	4,500	100	4,600	2,600	7,800
1989/90	7,100	200	7,300	4,300	11,700
1990/91	11,100	400	11,400	7,100	17,100
1991/92	16,900	600	17,500	11,400	24,600
1992/93	25,200	900	26,000	18,000	34,800
1993/94	36,200	1,300	37,500	27,000	48,300
1994/95	50,000	1,800	51,800	38,500	64,800
1995/96	66,000	2,500	68,600	52,100	84,400
1996/97	83,200	3,300	86,500	67,300	105,000
1997/98	100,000	4,200	104,000	82,600	125,000
1998/99	116,000	5,200	121,000	97,100	143,000
1999/00	129,000	6,300	135,000	110,000	158,000
2000/01	140,000	7,300	148,000	120,000	172,000
2001/02	150,000	8,300	158,000	128,000	184,000
2002/03	157,000	9,200	166,000	135,000	193,000
2003/04	163,000	10,400	174,000	140,000	202,000
2004/05	169,000	11,500	180,000	146,000	210,000
2005/06	174,000	12,600	187,000	152,000	218,000
2006/07	182,000	13,600	196,000	156,000	229,000
2007/08	190,000	14,200	204,000	156,000	242,000
2008/09	198,000	14,400	212,000	157,000	255,000
2009/10	208,000	14,400	222,000	157,000	269,000
2010/11	217,000	14,100	231,000	156,000	282,000
2011/12	225,000	13,800	239,000	154,000	295,000
2012/13	234,000	13,300	247,000	149,000	307,000

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008

Table 3: Estimated People Newly HIV Infected in Namibia.
By year and age group, 1980 - 2013 (GRN fiscal year)

				For adults only	
Year	Adults (15+)	Children (0-14)	Total	Low Bound	High Bound
1980/81	<100	<100	<100	<100	300
1981/82	<100	<100	<100	<100	200
1982/83	100	<100	100	<100	200
1983/84	200	<100	200	<100	300
1984/85	300	<100	300	100	500
1985/86	400	<100	400	200	800
1986/87	700	<100	700	400	1,200
1987/88	1,100	<100	1,100	600	1,700
1988/89	1,700	100	1,800	1,000	2,600
1989/90	2,700	200	2,800	1,700	3,800
1990/91	4,100	300	4,300	2,700	5,500
1991/92	6,000	400	6,400	4,300	7,800
1992/93	8,600	600	9,200	6,400	10,800
1993/94	11,500	900	12,400	8,700	14,400
1994/95	14,500	1,200	15,700	11,100	18,000
1995/96	17,100	1,500	18,700	13,400	20,900
1996/97	18,700	1,900	20,600	15,100	22,300
1997/98	19,000	2,200	21,200	15,500	22,300
1998/99	18,400	2,500	20,900	15,000	21,600
1999/00	17,300	2,600	20,000	13,900	20,500
2000/01	16,400	2,800	19,100	13,100	19,700
2001/02	15,400	2,800	18,200	12,200	18,800
2002/03	14,800	2,800	17,600	11,400	18,300
2003/04	14,400	2,700	17,000	10,200	18,000
2004/05	13,900	2,400	16,300	8,400	17,600
2005/06	12,500	2,000	14,500	5,600	16,700
2006/07	13,200	1,600	14,800	4,700	17,400
2007/08	12,700	1,400	14,100	2,300	18,700
2008/09	13,900	1,100	14,900	1,400	18,900
2009/10	15,000	900	15,900	1,300	19,800
2010/11	14,500	800	15,300	400	19,400
2011/12	14,900	800	15,700	<100	20,000
2012/13	15,600	800	16,300	<100	20,600

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2006

Table 4: Estimated Women in Need of PMTCT
By year, 1980 - 2013 (GRN fiscal year)

Year	Women in need of PMTCT	Low Bound	High Bound
1980/81	<100	<100	<100
1981/82	<100	<100	<100
1982/83	<100	<100	<100
1983/84	<100	<100	<100
1984/85	<100	<100	100
1985/86	<100	<100	200
1986/87	100	<100	300
1987/88	200	100	400
1988/89	400	200	600
1989/90	600	300	900
1990/91	900	600	1,300
1991/92	1,400	900	1,900
1992/93	2,100	1,400	2,800
1993/94	2,900	2,100	3,800
1994/95	4,000	2,900	5,000
1995/96	5,100	3,800	6,300
1996/97	6,200	4,700	7,600
1997/98	7,200	5,600	8,800
1998/99	8,100	6,400	9,700
1999/00	8,700	7,000	10,400
2000/01	9,100	7,300	10,800
2001/02	9,300	7,500	11,000
2002/03	9,300	7,500	11,100
2003/04	9,400	7,500	11,100
2004/05	9,400	7,400	11,100
2005/06	9,300	7,300	11,100
2006/07	9,400	7,200	11,200
2007/08	9,400	6,900	11,500
2008/09	9,600	6,500	11,800
2009/10	9,800	6,300	12,200
2010/11	9,900	5,800	12,600
2011/12	10,000	5,200	12,700
2012/13	10,200	4,600	12,900

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008

Table 5: Need for ART in Adults 15+ Years of Age
By year, Namibia 1980 - 2013 (GRN Fiscal year)

Year	Adults (15+)	Low	High
1980/81	<100	<100	<100
1981/82	<100	<100	<100
1982/83	<100	<100	<100
1983/84	<100	<100	<100
1984/85	<100	<100	<100
1985/86	<100	<100	100
1986/87	<100	<100	200
1987/88	100	<100	300
1988/89	200	<100	500
1989/90	400	200	700
1990/91	600	300	1,100
1991/92	900	500	1,600
1992/93	1,400	800	2,300
1993/94	2,200	1,300	3,400
1994/95	3,300	2,100	4,900
1995/96	4,900	3,300	7,000
1996/97	7,100	4,900	9,800
1997/98	10,000	7,000	13,400
1998/99	13,600	9,700	17,800
1999/00	17,700	12,900	23,100
2000/01	22,400	16,300	28,900
2001/02	27,300	20,100	34,900
2002/03	32,300	24,000	41,100
2003/04	37,200	27,900	47,100
2004/05	42,300	32,200	53,000
2005/06	47,700	37,100	59,100
2006/07	54,800	43,800	66,500
2007/08	63,600	52,700	75,100
2008/09	72,700	60,400	84,900
2009/10	81,800	66,600	96,100
2010/11	90,700	72,100	108,000
2011/12	99,200	76,000	120,000
2012/13	107,000	79,200	131,000

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008

Table 6: Need for ART in Children <15 Years of Age
By year, Namibia 1980 - 2013 (GRN Fiscal year)

Year	Estimate	Low	High
1980/81	<100	<100	<100
1981/82	<100	<100	<100
1982/83	<100	<100	<100
1983/84	<100	<100	<100
1984/85	<100	<100	<100
1985/86	<100	<100	<100
1986/87	<100	<100	<100
1987/88	<100	<100	<100
1988/89	<100	<100	100
1989/90	100	<100	200
1990/91	200	<100	300
1991/92	300	200	400
1992/93	400	300	500
1993/94	600	400	700
1994/95	800	600	1,000
1995/96	1,000	800	1,300
1996/97	1,300	1,000	1,600
1997/98	1,600	1,200	1,900
1998/99	1,900	1,400	2,300
1999/00	2,100	1,700	2,600
2000/01	2,400	1,900	2,800
2001/02	2,600	2,100	3,100
2002/03	2,900	2,300	3,400
2003/04	3,100	2,500	3,700
2004/05	3,500	2,900	4,200
2005/06	4,100	3,400	4,800
2006/07	5,000	4,200	5,700
2007/08	5,900	5,000	6,700
2008/09	6,500	5,400	7,600
2009/10	7,000	5,500	8,400
2010/11	7,300	5,600	9,000
2011/12	7,500	5,500	9,400
2012/13	7,500	5,400	9,700

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008

Table 7: Estimated People Receiving ART in Namibia
By year and age group, 1980 - 2013 (GRN Fiscal year)

Year	Adults (15+)	Children (<15)	Total
1980/81	0	0	0
1981/82	0	0	0
1982/83	0	0	0
1983/84	0	0	0
1984/85	0	0	0
1985/86	0	0	0
1986/87	0	0	0
1987/88	0	0	0
1988/89	0	0	0
1989/90	0	0	0
1990/91	0	0	0
1991/92	0	0	0
1992/93	0	0	0
1993/94	0	0	0
1994/95	0	0	0
1995/96	0	0	0
1996/97	0	0	0
1997/98	<100	<100	0
1998/99	200	<100	200
1999/00	300	<100	400
2000/01	600	<100	700
2001/02	1,300	200	1,400
2002/03	2,400	300	2,700
2003/04	5,100	700	5,800
2004/05	10,200	1,500	11,600
2005/06	21,600	3,100	24,600
2006/07	35,900	4,500	40,400
2007/08	45,500	5,100	50,600
2008/09	55,200	5,500	60,700
2009/10	65,900	5,900	71,900
2010/11	74,300	6,200	80,500
2011/12	81,300	6,300	87,700
2012/13	87,900	6,400	94,300

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008.

Table 8: Estimated Mortality Related to HIV Disease in Namibia
By year, 1980 - 2013 (GRN Fiscal year)

Year	HIV Deaths	Low Bound	High Bound
1980/81	<100	<100	<100
1981/82	<100	<100	<100
1982/83	<100	<100	<100
1983/84	<100	<100	<100
1984/85	<100	<100	<100
1985/86	<100	<100	<100
1986/87	<100	<100	<100
1987/88	<100	<100	100
1988/89	<100	<100	200
1989/90	200	<100	300
1990/91	200	100	400
1991/92	400	200	600
1992/93	600	400	900
1993/94	900	600	1,300
1994/95	1,300	800	1,800
1995/96	1,800	1,200	2,600
1996/97	2,400	1,700	3,400
1997/98	3,200	2,300	4,500
1998/99	4,200	3,000	5,800
1999/00	5,300	3,900	7,200
2000/01	6,400	4,800	8,700
2001/02	7,600	5,600	10,100
2002/03	8,700	6,400	11,300
2003/04	9,200	6,700	11,900
2004/05	9,100	6,600	11,800
2005/06	7,300	4,800	9,900
2006/07	5,400	2,900	7,900
2007/08	5,400	3,700	7,300
2008/09	5,600	4,000	7,900
2009/10	5,600	3,800	8,600
2010/11	6,100	4,000	9,800
2011/12	6,800	4,300	11,200
2012/13	7,500	4,600	12,300

SOURCE: Spectrum Policy Modeling System, Version 3.14 (2007); Namibia model May 2008