The Republic of Malawi

Ministry of Health

HIV and Syphilis Sero –Survey

and

National HIV Prevalence and AIDS Estimates

Report for 2007

National Aids Commission

Epidemiology Unit,
Community Health Sciences Unit,
Department of Preventive Health Services
P/Bag 65,
Lilongwe

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Foreword

Malawi has consistently been monitoring HIV and Syphilis prevalence through antenatal clinic (ANC) attendees in 19 sentinel sites since 1994. The 19 sites are distributed in all the three regions of Malawi but in selected districts. In 2007, number of sites were increased to 54, covering all the districts in the country. This is in line with the current decentralization process in place that created demand for data to assist in developing district specific plans. The HIV and Syphilis Sero-Surveys, and National HIV Prevalence Estimates are done to provide data which can be used for making evidence-based decisions for public health actions.

Although HIV sentinel surveillance data are not representative of the general population, there was need to have at least a site in each district for providing indicative data for monitoring trends.

Overall HIV prevalence in Malawi appears to have stabilized around 12% and there has been a general decline in HIV prevalence in ANC attendees aged 15 to 24 years since 1999. However, there is still need to scale up interventions in order to control the HIV and AIDS epidemic in the country.

Syphilis prevalence in pregnant women attending antenatal care continues to decline in Malawi. The decline in the syphilis prevalence may be due to effective management and treatment of the disease. There is need to further reduce syphilis prevalence by strengthening programme interventions.

I am pleased to disseminate the results of the 2007 HIV and Syphilis Sero-Survey and National HIV Prevalence Estimates. This will further assist in strengthening the implementation process of HIV and AIDS as well as other sexually transmitted infection programmes.

Khumbo Kachali
MINISTER FOR HEALTH

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B. H. Sande
Principal Secretary

Executive Summary

Surveillance in antenatal clinics has been the primary source of data for monitoring trends of HIV and syphilis to provide estimates for tracking the epidemic in Malawi. The 2007 sentinel surveillance sites were increased from 19 to 54 so as to ensure district representation in the country's HIV prevalence estimates.

The main objective of the sentinel surveillance was to monitor HIV and Syphilis prevalence trends in Malawi.

Between 20th August and 15th October 2007, women attending routine antenatal services in the selected 54 sentinel sites were consecutively sampled. Dried blood spots were prepared from the residual blood samples of the routine syphilis testing of the sampled ANC clients. These were sent to the Central Reference Laboratory at CHSU for HIV testing, using Vironostika HIV Uni-Form II Ag/Ab (Biomerieux, Boxtel - Netherlands) EIA test kit, which detects antigens and antibodies to HIV.

Data entry and cleaning were done using Epi-Info for windows. SPSS was used to calculate site HIV prevalence rates and other important demographic factors. EPP and Spectrum were used to estimate national HIV prevalence in the general population by taking into account the epidemiology of HIV infection, impact of ART and PMTCT programs, and HIV prevalence from the 2004 Demographic and Health Surveys.

The overall median HIV prevalence in 54 sites was 12.6% and in the 19 original sites was 13.5% which is lower than the 15% in 2005. In the 54 sites, HIV prevalence ranged from 2% to 38.0% at Nthalire health centre in Chitipa district and Thyolo District Hospital respectively. Whereas, in the 19 sites it ranged from 5.9% to 26.7% at Thonje Health centre in Dowa district and Mianga health centre in Thyolo district respectively.

Pooled HIV prevalence was high in the Southern Region at 20.5% (19.7 - 21.3%) followed by Central Region at 10.7% (10 - 11.4%) and the Northern Region was the lowest at 10.2% (9.4 - 11.2%). HIV prevalence in the urban sites continues to be high at 17.1% (15.9 – 18.4%) followed by the semi-urban sites at 16.4% (15.8 – 17.1%) and rural sites at 12.1% (11.4 – 12.9%).

Overall, there is a downward trend in HIV median prevalence from 22.8% in 1999 to 13.5% in 2007 in the original 19 sites. Similarly, urban and semi-urban sites showed declining trends in HIV prevalence. However, in the rural sites HIV prevalence remained stable.

Overall syphilis prevalence in 2007 was estimated at 1.1% which is lower than 1.9% in 2005. It ranged from 0% to 12.7%.

Using EPP and spectrum, the reported national HIV prevalence in 2007 was estimated at 12.0% (CI: 11.1 – 12.9%) among those aged between 15 and 49 years. The regional prevalence rates were estimated at 6.5% in the north, 8.6% in the centre and 16.5% in the south. It should be noted that this is not a decline in prevalence compared to the 14% that was estimated in 2005, but rather due to an improved methodology of estimating prevalence. The 2007 HIV prevalence estimates were adjusted by the 2004 DHS results.

Using Spectrum, it was estimated that in 2007, a total of 898,888 people were living with HIV and of these 89,025 were children aged less than 15 years. It is projected that in 2008 these figures would increase to 924,248 and 101,939 people living with HIV and children with HIV aged less than 15 years respectively. It is further projected that in 2008, 263,334 adults and 26, 454 children living with HIV will be in need of ART.

Overall HIV prevalence in Malawi has stabilized at around 12.0% for the past 9 years. However, there is a decline in urban areas although prevalence is still higher than national average. Although HIV prevalence rates in rural areas are lower than in urban, the majority of the population are in the rural areas. Consequently, greater numbers of people infected by HIV in the country are in the rural areas. Hence, there is urgent need to scale up and intensify HIV prevention activities that target rural communities.

The Southern Region needs special attention since it has continuously reflected higher HIV prevalence than the other two regions. Although prevalence declines are being noted in young women, there is still need to increase the coverage of prevention services targeting the youth in particular to sustain and accelerate the declines. Studies to find out reasons for geographical disparities in the distribution of HIV infection need to be carried out so as to aid in the planning of appropriate interventions.

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal care
ART	Anti-Retroviral Treatment
CDC-GAP	Centre for Disease Control (Government Assistance Project)
CHAM	Christian Health Association of Malawi
CHSU	Community Health Sciences Unit
CTX	Cotrimoxazole
DBS	Dried Blood Spot
DHO	District Health Office(r)
DHS	Demographic Health Survey
DPHS	Director of Preventive Health Services
EIA	Enzyme Immuno Assay
EPP	Estimation and Projection Package
HMIU	Health Management Information Unit
HTC	HIV Testing and Counseling
MDHS	Malawi Demographic and Health Survey
NAC	National Aids Commission
PLWHA	People Living With HIV and Aids
PMTCT	Prevention of Mother to Child Transmission
UNAIDS	United Nations for AIDS
UNICEF	United Nations Children's Fund
WHO	World Health Organization

1.0 Background

The HIV epidemic in Malawi started in the early 1980s and the first AIDS case was reported and confirmed in 1985. Several studies were conducted in different sub populations to determine HIV and AIDS prevalence and identify risk factors. However, the studies focused on urban sub-populations. Since 1994 routine data on pregnant women attending antenatal clinics (ANC) has been consistently collected in 19 sites across the country which has been increased to 54 sites in 2007.

Surveillance in antenatal clinics has been the primary source of data for monitoring trends of HIV and Syphilis and to provide estimates for tracking the epidemic in Malawi. In addition, HIV data is obtained from Demographic and Health Surveys (DHS). According to MDHS 2004, HIV prevalence in 15 - 49 year old adults was estimated at 12.7% which was similar to 14.0% (12 - 17%) estimated through HIV Sentinel Surveillance in 2005 for the same age group.

The HIV and AIDS epidemic in the country is classified as generalized because the HIV prevalence among pregnant women attending ANC is consistently more than 1%. HIV transmission is predominantly through unprotected heterosexual intercourse. While there are limitations of surveying pregnant women for estimating HIV prevalence, it is acknowledged that data from ANC sero-surveys continue to be a valuable and convenient source of information on the current epidemiological situation in the general population.

This report contains the findings of 2007 HIV Sentinel Surveillance Survey that can be used by policy makers, academics, Non Governmental Organizations, multilateral partners and the general public.

2.0 Objectives

The main objective was to provide data for monitoring HIV and Syphilis trends in Malawi. The specific objectives were to: -

- Determine the HIV and syphilis prevalence among pregnant women attending antenatal clinics.
- Determine the trends of HIV and syphilis among pregnant women in antenatal clinics.
- Estimate the national HIV and AIDS prevalence, incidence, mortality and impact.
- Project the national HIV and AIDS prevalence, incidence, mortality and impact.

3.0 Methods

3.1 ANC Sentinel Surveillance

3.1.1 Study Design

This was a cross sectional survey targeting women attending antenatal clinics in selected antenatal clinics in Malawi. Testing for syphilis is part of routine antenatal clinic care in Malawi, therefore pregnant women were tested for HIV after syphilis screening.

3.1.2 Target population

All pregnant women attending antenatal care services for the first time during the survey were sampled for the study**.**

3.1.3 Selection of sentinel sites

Government and Christian Health Association of Malawi (CHAM) health facilities were targeted for the survey. In the initial 19 sites, urban sites were purposefully selected whereas semi-urban and rural sites were selected using simple random sampling. In 2007, the sites were increased to 54. The additional sites were selected through the consultative process with the district health officials using a set of criteria shown in Appendix 1.

Out of the 54 sites, 17 were sampled from 8 districts previously not participating in the surveillance. Ten sites were from 10 districts that were already participating but only had urban/semi urban sites whereas 8 sites were from 8 districts that were participating with only rural sites. This was done to ensure that in each district there was one rural and one urban sentinel site. Names and location of existing sentinel sites and districts included in the 2007 sentinel surveillance survey are listed in Appendix 2.

3.1.4 Sampling

3.1.4.1 Sample Size

The required sample sizes per site were: - 300 women in rural areas, 500 women in semi-urban areas and 800 women in urban areas[1]. The targeted number of women from the 54 sites was 22,500.

3.1.4.2 Sampling scheme

Consecutive sampling method was used to recruit all eligible women in all the sites for a period of up to 8 weeks.

3.1.4.3 Sampling period

Sample collection was done from 20th August to 15th October 2007. All sites stopped sampling at the end of the defined sampling period regardless of whether they had reached the planned sample size or not.

3.1.4.4 Inclusion and exclusion criteria

All women attending the antenatal clinic for the first time during the survey were enrolled into the survey. Women attending ANC for the subsequent visit during the survey were excluded.

[1] WHO recommendation stipulates that the desired minimum sample size per site should be 300

3.1.5 Capturing of surveillance data

A surveillance data form was filled by a nurse for every woman meeting the inclusion criteria. The data collected included client and partner demographics, and site syphilis result as shown in Appendix 3.

3.1.6 Specimen handling and laboratory testing

3.1.6.1 Specimen preparation and handling

Blood samples were collected using dried blood spots (DBS) from the residual blood. All DBS cards were labeled with unique identification numbers with the corresponding data collection instruments and transported to Community Health Sciences Unit (CHSU) Reference Laboratory for anonymous and unlinked HIV testing. Sample collection and preparation of dried blood spots were done by qualified and experienced nurses and laboratory technicians. After HIV testing at CHSU Reference Laboratory, the forms were sent to Epidemiology Unit for data entry and statistical analysis.

3.1.6.2 Case management

All women were tested for syphilis on site using Determine Syphilis rapid tests. All reactive samples were considered to be infected with syphilis and the women were offered treatment on site.

3.1.6.3 HIV testing

Blood samples were tested using Vironostika HIV Uni-Form II Ag/Ab (Biomerieux, Boxtel - Netherlands) Enzyme Immuno Assay (EIA) test kit. All samples testing positive were regarded as reactive to HIV antibody/antigen. All borderline positives were retested to ensure correct results. Of the 1672 initial borderline positives, 13.6% remained positive on the second EIA test.

3.1.7 Quality assurance

Quality control during data collection, specimen handling and analysis were done by using standardized site supervision which was conducted regularly by the Epidemiology Unit and CHSU Reference Laboratory staff. Shortcomings and breaches of protocol/s were immediately addressed on the spot by the supervisors. All supervision forms were reviewed and summarized in order to address future short-comings.

To ensure quality of the results, 3 negative and 2 positive internal controls were included on each run after undergoing several steps in the EIA procedures, optical densities were read on ELX80 Spectrophotometer. The KC4 software, which automatically calculates the optical density cut offs, classified the sample results as either positive or negative to HIV antibody or antigen.

3.1.8 Ethics of HIV and syphilis testing

Routinely, all pregnant women are screened for syphilis as per recommended ANC protocol. Specimens for HIV testing were made using residual blood after finger prick for syphilis screening. Therefore, no consent was obtained from the participating clients as per provision of the Government policy on HIV testing for surveillance purposes. In addition, the surveillance protocol was approved by the National Health Sciences Research Committee.

3.1.9 Data management and analysis

Data were entered into an Epi-Info database at the Epidemiology unit. Verification of data entered was done through exploratory analysis to identify inaccuracies in data entry or collection. Discrepant entries were corrected by checking the filled data collection instrument.

Data analysis was done using SPSS and Epi-Info. Confidence intervals were calculated using exact binomial method. Chi square statistics were used to assess associations between HIV status and risk factors. Fisher's Exact test was used for small expected frequencies. Trend analysis was carried out in the original 19 sites to assess linear trends for HIV prevalence. Associations with a p value less than 0.05 was regarded to be significant.

3.2 Estimation and projection

3.2.1 Estimation of national HIV prevalence

National HIV prevalence and its demographic impacts were estimated and projected using the UNAIDS/WHO recommended methods[1] using HIV prevalence from sentinel surveillance data in pregnant women attending antenatal clinics (ANC). All surveillance data were entered into Estimation and Projection Package (EPP) to generate a national adult prevalence curve over time as described in Appendix 4. Data was entered by region, urban and rural. The combined national prevalence curve was weighted according to the population sizes in the different areas. HIV prevalence from a national population based survey in 2004 that included HIV testing was used to calibrate the ANC based prevalence. [6]

3.2.2 Projection of national HIV prevalence and impacts

The national HIV prevalence curve generated in EPP was entered in Spectrum together with estimates of the population, epidemiological assumptions (Appendix 5), and treatment coverage. The Spectrum programme calculated the numbers of adults and children living with HIV/AIDS, AIDS related deaths, new HIV infections, and treatment needs.

3.2.3 The major new assumptions are:

- Net survival of people living with HIV is 11 years instead of previously 9 years for all countries except those where subtype E constitutes the majority of infections. (paper in press, AIDS)[2]
- In countries with a generalized HIV epidemic that have not conducted a national population-based survey, prevalence data from pregnant women attending ANC should be adjusted downward by a factor of approximately 0.8, for both rural and urban ANC.
- People living with HIV become in need of ART on average 3 years before they would die in the absence of ART in countries where subtype E does not constitute the majority of infections, and on average 2.5 years in countries where subtype E does constitute the majority of infections.

[2] The new recommendation is based on a review of data showing that survival from HIV sero-conversion is somewhat longer than previously assumed in most areas, except where subtype E is dominant. Published study results from South-Africa, Tanzania, Rwanda and Uganda suggests that net survival (excluding background mortality due to other causes) is close to 11 years (Paper in press, AIDS).

4.0 Results

4.1 Sentinel surveillance

4.1.1 Demographic distribution of the sample

4.1.1.1 Number of women enrolled by site and site locality

There were a total of 26 rural sites, and 28 urban or semi-urban sites in the 2007 sentinel surveillance survey. A total of 21,997 (97.8%) out of the targeted 22,500 pregnant women were enrolled in the survey. Of these, 20.8% came from the northern region, 33.5% from the centre and 45.7% from the southern region as shown in Table 1.

Overall, 33.6% of the sampled women came from rural sites, 51.3% from semi-urban and 15.1% from urban sites as shown in Table 1. Most of the sites managed to recruit over 80% of the targeted sample sizes except for Neno, Phalombe, Chikwawa, Chiradzulu, Bolero, Thonje and Kalemba, Gawanani, Domasi health facilities (Appendix 6).

Table 1: Number of women sampled by region and locality

	Total	Percent
Region		
North	4,578	20.8
Centre	7,369	33.5
South	10,049	45.7
Locality		
Rural	7,384	33.6
Semi urban	11,286	51.3
Urban	3,326	15.1

Table 2 shows the age distribution of the sampled women. The median age of sampled women was 24 years and ranged from 12 to 57 years. About 55% of the sampled population was aged below 25 years.

Table 2: Distribution of the sample by age

Age group	Number	Percent
Less than 15	50	0.2
15 – 19	4,152	18.9
20 – 24	7,830	35.6
25 – 29	5,172	23.5
30 – 34	2,775	12.6
35 – 39	1,310	6.0
40 – 44	282	1.3
45 – 49	62	0.3
50 and above	10	0.0
Missing	354	1.6
Total	21,643	100

Table 3 shows the distribution of the sampled women by marital status. Most of the women recruited in the survey were married (90.4%) and about 7% of the women were missing their marital status.

Table 3: Distribution of the sample by marital status

Category	Number	Percent
Missing	1,514	6.9
Married	19,889	90.4
Single	335	1.5
Divorced	132	0.6
Widowed	35	0.2
Separated	62	0.3
Cohabitated	30	0.1
Total	21,997	100.0

Over 80% of the women had attended at least primary school education, 14.3% had no formal education, and 15.9% had attended secondary education as shown in Table 4.

Table 4: Distribution of the sample by level of education

Education level	Number	Percent
Missing	324	1.5
None	3,148	14.3
Std 1 – 5	7,060	32.1
Std 6 – 8	7,859	35.7
Form 1 – 2	1,924	8.7
Form 3 – 4	1,593	7.2
Post Secondary	87	0.4
Other	2	0.0
Total	21,997	100.0

Of the sampled women, about 30% had some kind of employment while 90% of them had spouses who were involved in activities that earned them some income (Table 5).

Table 5: Distribution of the sample by Mother's and partner's Occupation

	Mothers		Partners	
Occupation	**Number**	**Percent**	**Number**	**Percent**
Business	786	3.6	3,594	16.3
Driver	21	0.1	438	2.0
Fishing	16	0.1	502	2.3
Housewife	14,726	66.9	1,313	6.0
Millitary / Police	14	0.1	81	0.4
Professional	84	0.4	440	2.0
Skilled	84	0.4	1,960	8.9
Student	73	0.3	264	1.2
Subsistence farmer	4,976	22.6	8,073	36.7
Teacher	158	0.7	325	1.5
Unskilled	589	2.7	3,143	14.3
Security guard	20	0.1	599	2.7
Other	88	0.4	688	3.1
Missing	362	1.6	577	2.6
Total	21,997	100	21,997	100.0

About 63% of the women sampled had gravidity of <=3 of which 23% had gravidity of 1, whereas 11% had gravidity of 6 and above.

Table 6: Distribution of the sample by gravidity

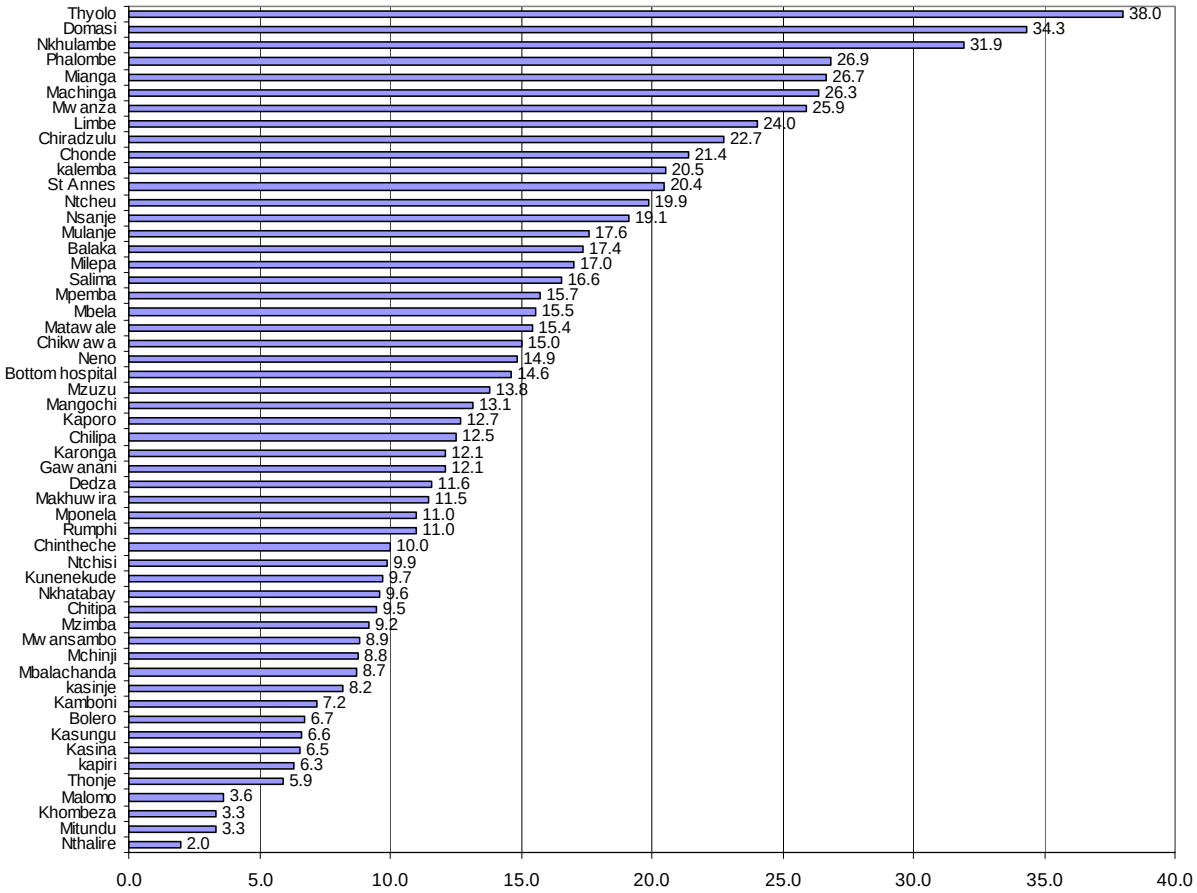
Gravida	**Number**	**Percent**
1	5,029	22.9
2	4,632	21.1
3	4,246	19.3
4	3,119	14.2
5	2,105	9.6
6	1,276	5.8
7 and above	1,126	5.1
Missing	464	2.1
Total	21,533	100

4.1.2 HIV Prevalence

4.1.2.1 HIV prevalence by site

HIV prevalence rates by sites ranged from 2.0% to 38.0% at Nthalire health centre in Chitipa district and Thyolo district hospital respectively as shown in Figure 1 and Appendix 7. The median prevalence for all the 54 sites was 12.6 % and when the new sites were excluded from the analysis median prevalence was 13.5%.

Figure 1: HIV prevalence by site 2007



4.1.2.2 HIV Prevalence by demographic factors of sampled women

HIV prevalence by demographic factors is shown in Table 7. HIV prevalence in women with no formal education was 16.6% which was significantly higher than 14.8% in those with at least primary education (p=0.036).

Table 7: HIV Prevalence by education level

Education level	Total	HIV +	%Positive	95% CI
None	3,148	521	16.6	(15.3, 17.9)
Std 1 – 5	7,060	1,092	15.5	(14.6, 16.3)
Std 6 – 8	7,858	1,090	13.9	(13.1, 14.7)
Form 1 – 2	1,924	274	14.2	(12.7, 15.9)
Form 3 – 4	1,593	279	17.5	(15.7, 19.5)
Post secondary	87	13	14.9	(8.2, 24.2)
Other	2	1	50.0	(1.3, 98.7)
Missing	324	52	15.7	
Total	21,996	3,321	15.1	(14.6, 15.5)

HIV prevalence in women who were married or living with a partner (14.8%) was significantly lower than in women who were divorced or separated (29.4%; p<0.0001). similarly, the prevalence was significantly higher among women who were widowed (32.6%) compared to married or cohabiting (p=0.0006). However, no significant difference existed between married or cohabiting women and women who were single (p=0.3).

Table 8: HIV Prevalence by marital status of sampled women

Marital status	Total	HIV +	%Positive	95% CI
Married	19,888	2,939	14.8	(14.3, 15.3)
Single	335	58	17.3	(13.5, 21.9)
Divorced	132	43	32.6	(24.7, 41.3)
Widowed	35	15	42.9	(26.3, 60.6)
Separated	62	14	22.6	(12.9, 35.0)
Cohabiting	30	4	13.3	(3.8, 30.7)
Missing	1,514	248	16.4	(14.8, 18.6)
Total	21,996	3,321	15.1	(14.6, 15.5)

Overall HIV prevalence significantly increased with gravidity of the sampled women ($p<0.0001$). HIV prevalence in women with gravida 1 was significantly lower than those in gravida 2 and above.

Table 9: HIV Prevalence by gravidity of sampled women

Gravida	Total	HIV +	%Positive	95% CI
1	5,029	508	10.1	(9.3, 11.0)
2	4,631	701	15.1	(14.1, 16.2)
3	4,246	716	16.9	(15.8, 18.0)
4	3,119	605	19.4	(18.0, 20.8)
5	2,105	347	16.5	(14.9, 18.2)
6	1,276	213	16.7	(14.7, 18.9)
7	1,126	153	13.6	(11.7, 15.8)
Missing	464	78	16.8	(13.6, 20.6)
Total	21,996	3,321	15.1	(14.6, 15.5)

HIV prevalence in women who were drivers, fish mongers, professional or skilled workers, and security guards were relatively higher than the other occupation categories. When partner's occupation was assessed based on the HIV status of the sampled women, HIV prevalence was high for women whose partners were drivers, professional or skilled work, Military/police as shown in Table 10.

Table 10: HIV Prevalence by occupation of the women and that of their Partners

Occupation of sampled women				
	Total	**HIV positive**	**%**	**95% C.I**
Business	786	172	21.9	(19.1, 25.0)
Driver	21	5	23.8	(8.2, 47.2)
Fishing	16	5	31.3	(11.0,58.7)
Housewife	14,731	2,231	15.7	(15.1, 16.3)
Military / Police	14	2	14.3	(1.8, 42.8)
Professional	84	21	25.0	(16.2, 35.6)
Skilled	84	25	29.8	(20.3, 40.7)
Student	73	7	9.6	(3.9, 18.8)
Subsistence farmer	4,976	605	12.2	(11.3, 13.1)
Teacher	88	20	22.7	(14.5, 32.9)
Unskilled	589	135	22.9	(19.6, 26..6)
Security guards	20	5	25.0	(8.7, 49.1)
Jobless	495	37	7.5	(5.4,10.2)
Other	158	10	6.3	(3.1, 11.3)
Missing	362	72	19.9	(16.0, 24.5)
Total	**21,997**	**3,352**	**15.1**	**(14.6, 15.5)**
Occupation of sampled women's partners				
Category	**Total**	**HIV positive**	**%**	**95% C.I**
Business	3,594	642	17.9	(16.6, 19.2)
Driver	438	99	22.6	(18.8, 26.9)
Fisherman	502	77	15.3	(12.4, 18.9)
Jobless	1,313	171	13.0	
Military / Police	81	16	19.8	(11.7, 30.1)
Professional	440	79	18.0	(14.5, 21.9)
Skilled	1,960	368	18.8	(17.1, 20.6)
Student	264	30	11.4	(7.8, 15.8)
Subsistence farmer	8,073	929	11.5	(10.8, 12.2)
Teacher	325	53	16.3	(12.6, 20.9)
Unskilled	3,142	529	16.8	(15.5, 18.2)
Watchman	599	112	18.7	(15.7, 22.1)
Other	688	122	17.9	(15.1, 21.0)
Missing	577	120	20.8	(17.6, 24.4)
Total	**21,996**	**3,321**	**15.1**	**(14.6, 15.5)**

HIV prevalence of the sampled women significantly increased with age up to age group 30-34 and thereafter showed a declining trend ($p<0.0001$) as shown in Table 11.

Table 11: Prevalence of HIV by age distribution of the sample

Age groups	Total	HIV positive	% HIV +	95% C.I.
Less than 15	50	4	8.0	(2.2, 19.2)
15 – 19	4,152	394	9.5	(8.6, 10.4)
15 – 24	11981	1476	12.3	(11.7, 12.9)
20 – 24	7,829	1,082	13.8	(13.1, 14.6)
25 – 29	5,170	981	19.0	(17.9, 20.1)
30 – 34	2,775	527	19.0	(17.6, 20.5)
35 – 39	1,310	224	17.1	(15.1, 19.3)
40 – 44	282	32	11.3	(7.9, 15.6)
45 – 49	62	9	14.5	(6.9, 25.8)
50 and above	10	2	20.0	(2.5, 55.6)
Missing	354	66	18.6	(14.8, 23.2)

4.1.2.3 HIV Prevalence in women aged 15 to 24 and 15 to 49 by locality and region

HIV prevalence in the southern region was similar between rural and urban or semi-urban areas in both 15 to 24 and 15 to 49 age categories. However, HIV prevalence was lower in rural areas compared to urban or semi-urban in the centre or north in the two age categories as shown in Table 12. In the central region, HIV prevalence was significantly lower in the rural areas compared to urban and semi urban areas in both age groups.

Table 12: Distribution of HIV Prevalence by age and locality and region

Women aged 15 – 24						**Women aged 15-49 years**			
	Total	HIV +	%HIV+	95% CI		Total	HIV +	%HIV+	95% CI
Rural									
North	854	65	7.6	(6.0, 9.7)		1,383	113	8.2	(6.8, 9.8)
Centre	1,361	67	4.9	(3.9, 6.2)		2,622	154	5.9	(5.0, 6.9)
South	1,848	297	16.1	(14.4, 17.8)		3,251	610	18.8	(17.4, 20.2)
Semi urban									
North	1,399	120	8.6	(7.2, 10.2)		2,329	238	10.2	(9.0, 11.5)
Centre	1,988	208	10.5	(9.2, 11.9)		3,783	495	13.1	(12.0, 14.2)
South	2,661	462	17.4	(16.0, 18.9)		4,943	1,081	21.9	(20.7, 23.1)
Urban									
North	474	43	9.1	(6.7, 12.1)		797	110	13.8	(11.5, 16.4)
Centre	405	46	11.4	(8.5, 15.0)		827	117	14.1	(11.9, 16.8)
South	991	168	17.0	(14.7, 19.5)		1,647	331	20.1	(18.2, 22.1)
Total	11,981	1,476	12.3	(11.7, 12.9)		21,582	3,249	15.1	(14.6 15.5)
Median Prevalence			**10.5**	**9.2, 11.9**				**12.6**	**(2.0-38.0)**

4.1.2.4 HIV Prevalence by region

HIV prevalence was significantly high in the southern region at 20.5% (95% CI: 19.7-21.3%) compared to the centre at 10.7% (10.0 -11.4%) and north at 10.2% (9.4-11.2%). By locality, HIV prevalence was significantly high in urban and semi urban areas compared to rural areas as shown in Table 13.

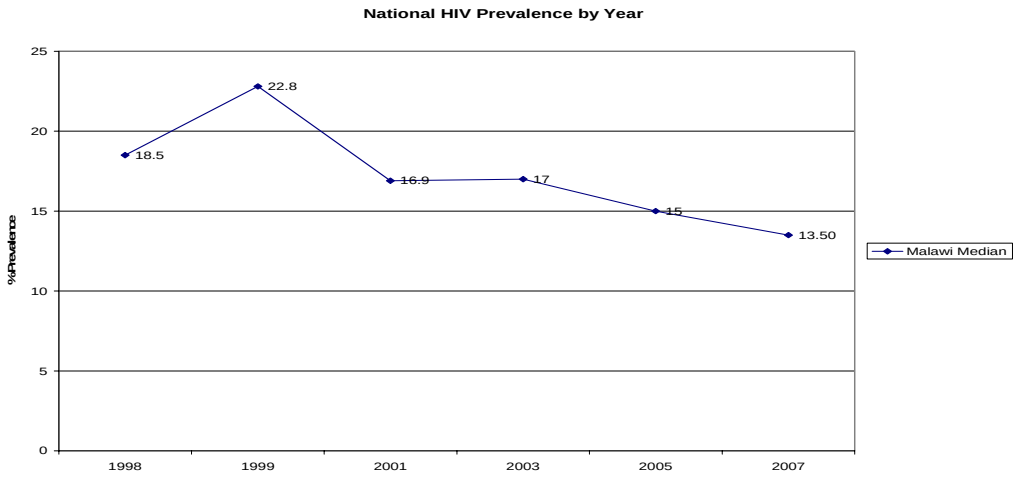
Table 13: HIV Prevalence by region and locality

	Total	HIV+	%HIV+	95% CI
Region				
North	4,578	469	10.2	(9.4, 11.2)
Centre	7,369	789	10.7	(10.0, 11.4)
South	10,049	2,063	20.5	(19.7, 21.3)
Locality				
Rural	7,384	897	12.1	(11.4, 12.9)
Semi urban	11,286	1,855	16.4	(15.8, 17.1)
Urban	3,326	569	17.1	(15.9, 18.4)

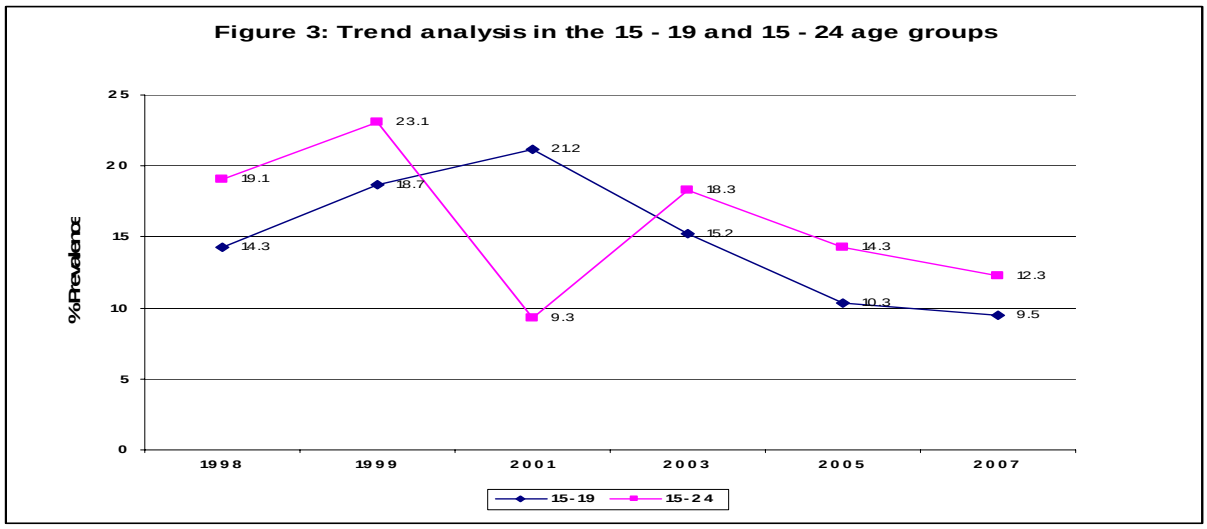
4.1.3 HIV Prevalence trends

At national level, median HIV prevalence trends done for the 19 sites showed that it consistently declined from 22.8% in 1999 to 13.5% in 2007 as shown in Figure 2.

Figure 2: Distribution of Median HIV Prevalence by year

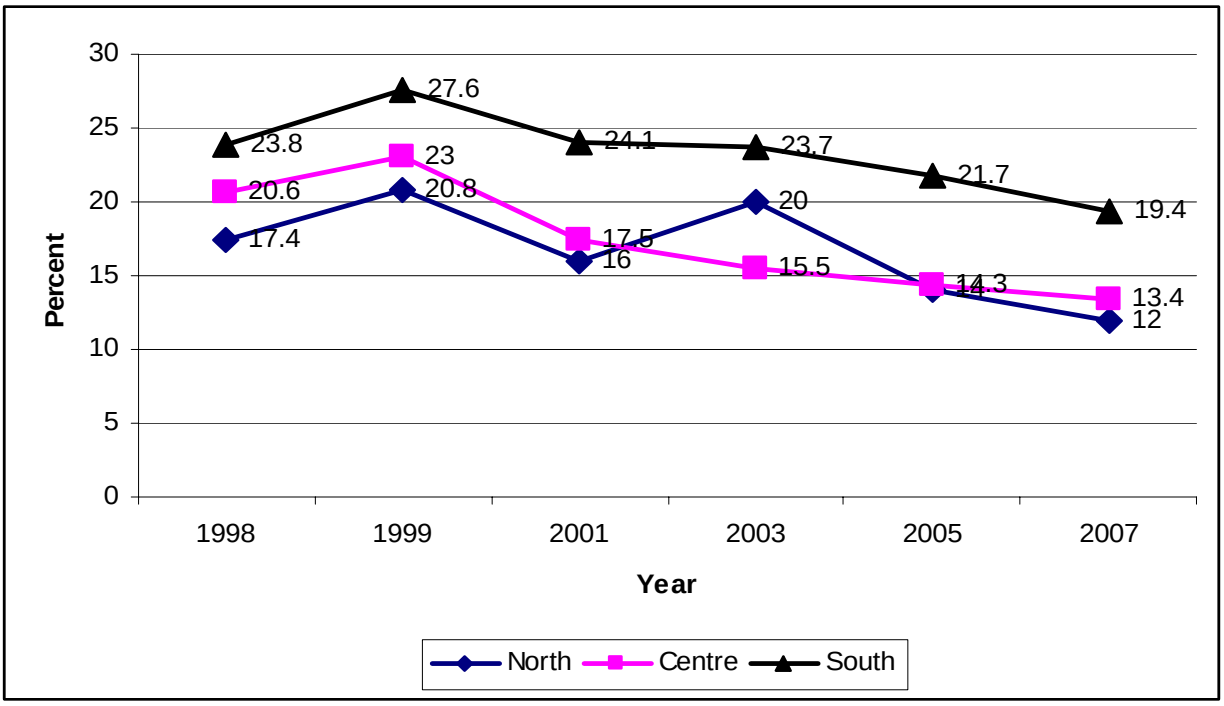


In the 15 – 24 age group, HIV prevalence declined from 18.3% in 2003 to 12.3% in 2007. Similar trends were observed in the age group 15-19 as shown in Figure 3.



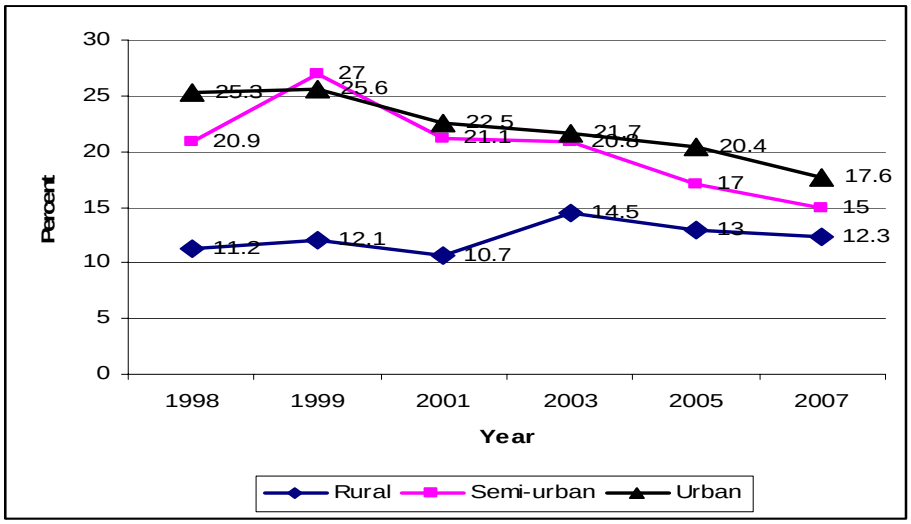
At region level, there was a downward trend in HIV prevalence since 1999 in all the three regions. HIV prevalence continues to be high the southern region compared to the other regions as shown in Figure 4.

Figure 4: HIV prevalence by region



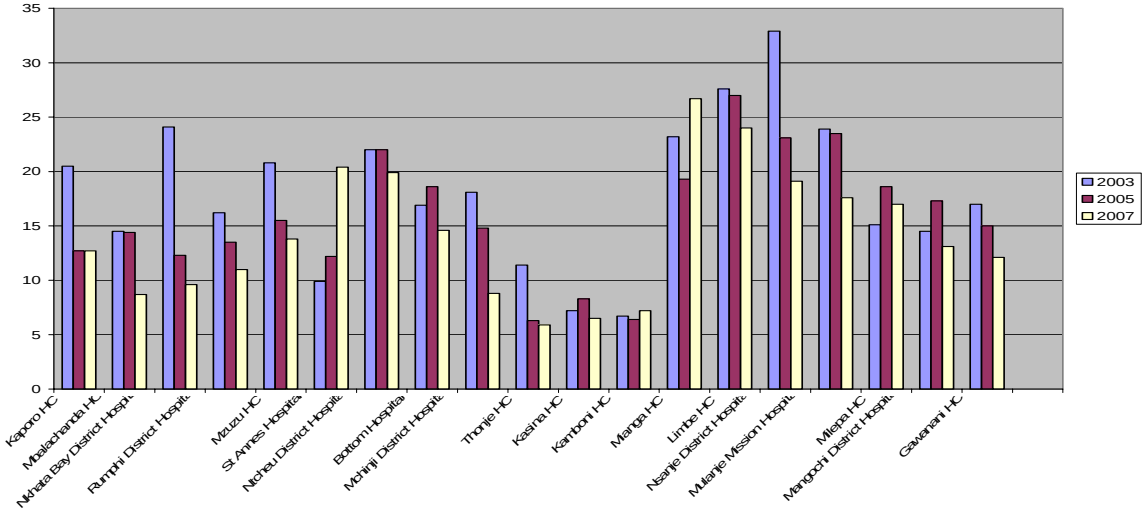
By locality of the sentinel sites, there was a downward trend in HIV prevalence since 1999 in urban and semi-urban sites. In the rural sites, HIV prevalence has been stable since 2003 as shown in Figure 5.

Figure 5: HIV prevalence by locality



At site level, HIV prevalence has declined in all sites since 2003 except for Mianga in Thyolo district, St Anne's in Nkhotakota district, and Kamboni in Kasungu District where the prevalence increased. HIV prevalence remained stable at Kaporo health centre in Karonga District since 2005 as shown in Figure 6.

Figure 6: Site HIV prevalence trends, 2003 - 2007



4.1.4 Syphilis prevalence results

4.1.4.1 Syphilis results by site

Syphilis prevalence in all the sites was estimated at 1.1% and ranged from 0% to 12.7% in 2007. The prevalence was the highest at Thyolo district hospital with 12.7%, followed by Phalombe (4%), Milepa (3.5%), Kaporo (3.1%) as shown Table 14.

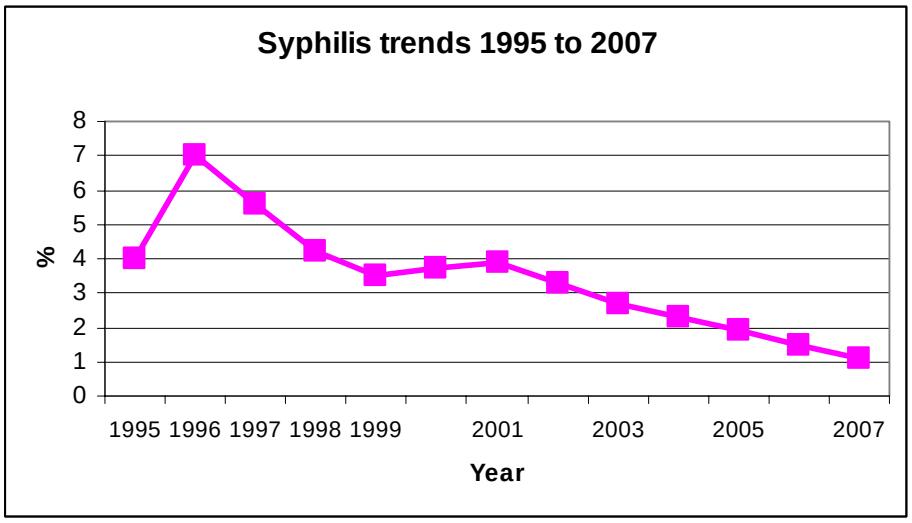
Table 14: Syphilis Prevalence by site

Sitename	Total	missing	Negative	Positive	%		Sitename	Total	missing	Negative	Positive	%
Balaka DH	524	5	519	0	0.0		Mangochi DH	495	22	471	2	0.4
Bolero HC	179	1	176	2	1.1		Matawale HC	785	19	755	11	1.4
Bwaila Hospital	842	20	813	9	1.1		Mbalachanda HC	299	5	293	1	0.3
Chikwawa DH	399	2	387	10	2.5		Mbela HC	322	1	314	7	2.2
Chilipa HC	296	23	269	4	1.4		Mchinji DH	500	9	490	1	0.2
Chintheche HC	300	1	299	0	0.0		Mianga HC	300	46	254	0	0.0
Chiradzulu DH	321	13	303	5	1.6		Milepa HC	288	10	268	10	3.5
Chitipa DH	495	14	479	2	0.4		Mitundu HC	331	6	323	2	0.6
Chonde HC	318	1	312	5	1.6		Mpemba HC	300	11	289	0	0.0
Dedza DH	405	27	373	5	1.2		Mponela HC	509	29	478	2	0.4
Domasi HC	207	8	197	2	1.0		Mulanje H	523	12	505	6	1.1
Gawanani HC	207	5	200	2	1.0		Mwansambo	305	7	298	0	0.0
Kalemba HC	190	0	189	1	0.5		Mwanza DH	599	4	595	0	0.0
Kamboni HC	319	12	305	2	0.6		Mzimba DH	500	2	495	3	0.6
Kapiri HC	300	6	294	0	0.0		Mzuzu HC	812	10	797	5	0.6
Kaporo HC	323	3	310	10	3.1		Neno HC	289	18	268	3	1.0
Karonga DH	413	11	401	1	0.2		Nkhata Bay	458	0	449	9	2.0
Kasina HC	260	2	256	2	0.8		Nkhulambe	304	5	295	4	1.3
Kasinje HC	294	1	292	1	0.3		Nsanje DH	512	7	497	8	1.6
Kasungu DH	500	3	497	0	0.0		Ntcheu DH	498	71	424	3	0.6
Khombeza HC	300	4	296	0	0.0		Ntchisi DH	465	23	442	0	0.0
KuneneKude HC	299	74	225	0	0.0		Nthalire HC	299	40	259	0	0.0
Limbe HC	887	33	850	4	0.5		Phalombe	350	6	330	14	4.0
Machinga DH	520	2	510	8	1.5		Rumphi DH	500	7	493	0	0.0
Makhuwira HC	305	2	301	2	0.7		Salima DH	501	34	467	0	0.0
Malomo HC	305	6	299	0	0.0		St Annes Hospital	499	9	487	3	0.6
Thonje HC	236	3	231	2	0.8		Thyolo DH	510	5	440	65	12.7
							Total	21,997	700	21,059	238	1.1

4.1.4.2 Syphilis prevalence trends

Syphilis prevalence trends have shown remarkable decline over the years since 1996 as shown in Figure 7. In the 19 sites prevalence declined from 3.9% in 2001, 3.7% in 2003, 1.9% in 2005 and 1.1% in 2007. Analysis of syphilis results from all the 54 sites shows a national prevalence of 1.1 percent. Fifteen of the 54 sites had syphilis prevalence above the national estimate with Thyolo (12%) having the highest prevalence followed by Phalombe (4%), Milepa (3.5%), Kaporo (3.1%) and Chikwawa (2.5%).

Figure 7: Syphilis prevalence trends



4.2 HIV Estimation and Projection

4.2.1 National HIV prevalence estimates

In 2007 the National HIV prevalence in the 15 to 49 age group was estimated at 12.0% (11.1% - 12.9%). In total there were 898,888 people living with HIV and AIDS in 2007. Of these 89,055 were children less than 15 years. At regional level, HIV prevalence was estimated to be at 6.5% in the north, 8.6% in the centre and 16.5% in the south. The estimated prevalence was 15.6% in urban areas and 11.2% in rural areas as shown in Table 15.

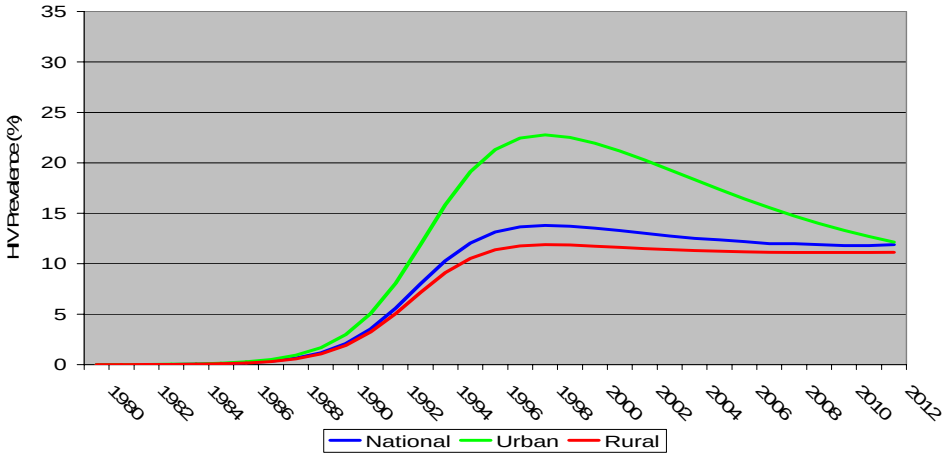
Table 15: National HIV Prevalence Estimates, 2007

Indicator	Value	Low 2.5%	High 97.5 %
National adult prevalence(15-49)	12.0%	11.1%	12.9%
Number of infected persons (15+)	809,833	752,782	873,922
Number of infected women (15+)	473,348	437,972	513,574
Urban adult prevalence (15-49)	15.6%		
Number of infected urban persons (15+)	179,745		
Rural adult prevalence (15-49)	11.2%		
Number of infected rural persons (15+)	630,088		
Number infected (50+)	45,338		
Number of infected children (0-14)	89,055	79,360	98,760
Total HIV+ population	898,888	834,605	968,353

4.2.2 National trends in adult HIV prevalence

The national adult HIV prevalence trends shown in Figure 8 indicate that HIV prevalence has been stable since 1999. In urban areas, there is an appreciable decline in HIV prevalence during the same period while in the rural areas, HIV prevalence remains stable.

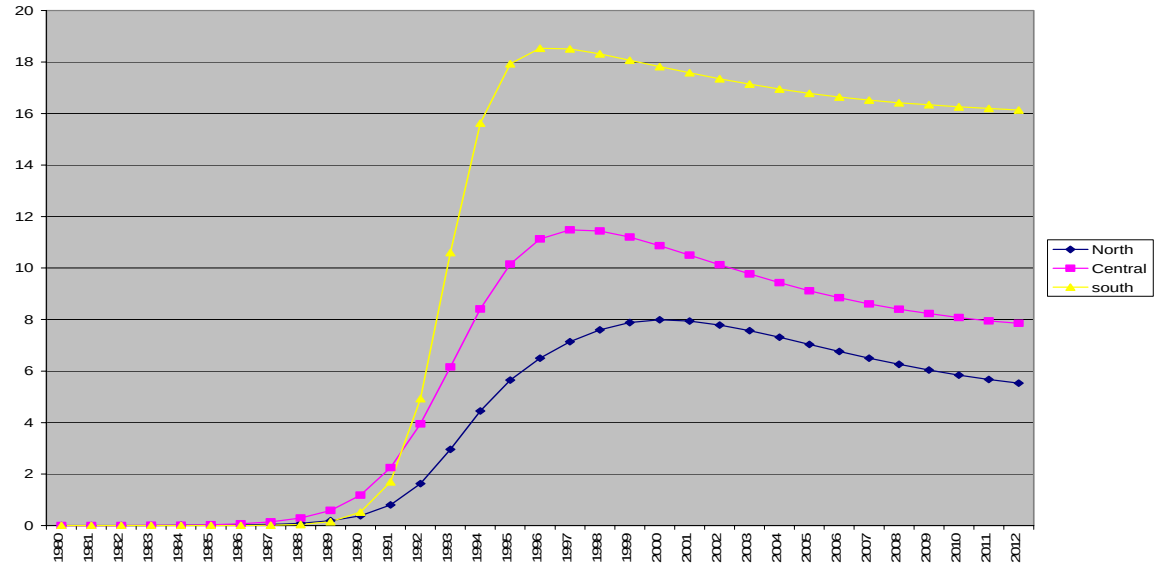
Figure 8: Estimated HIV Prevalence trends by national, urban and rural, 1980 - 2012



4.2.3 Regional trends in adult HIV prevalence

At region level, there was a downward trend in HIV prevalence as estimated from the EPP after calibrating the sentinel surveillance results with the 2004 DHS regional data and before considering program factors in the projection model. Estimated HIV prevalence continues to be high the Southern Region compared to the other regions as shown in Figure 9.

Figure 9: Trends in HIV Prevalence by Region EPP output.



4.2.4 National trends in estimated number of people living with HIV and AIDS

In Malawi, number of persons living with HIV and AIDS continues to increase as shown Figure 10. However, the estimated number of AIDS related deaths continues to decline as a result of increased survival of the persons living with HIV and AIDS as shown Figure 11.

Figure 10: Estimated total number of people living with HIV and AIDS by year

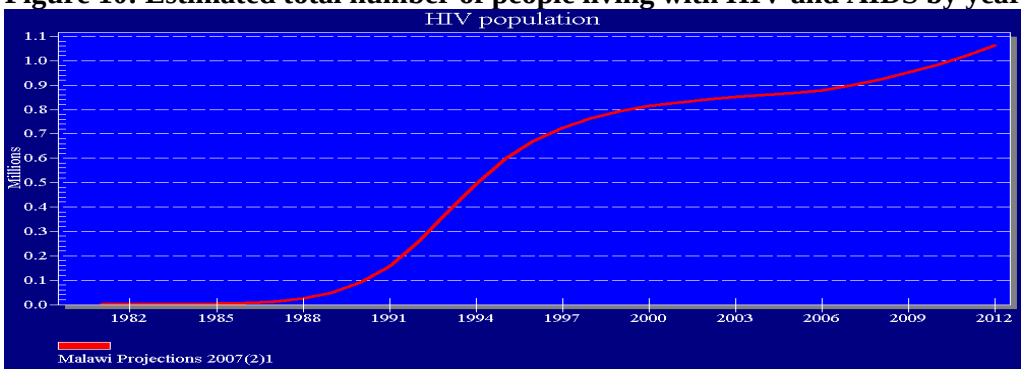
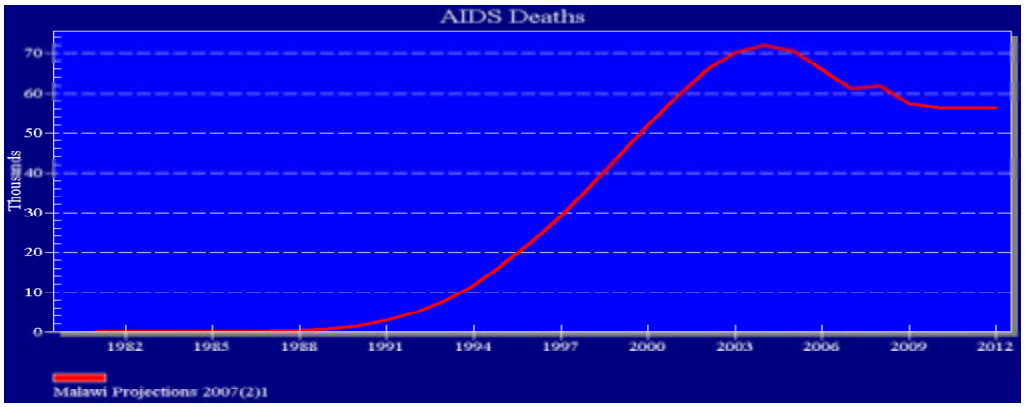


Figure 11: Trends in estimated AIDS related Deaths



4.2.5. Projected AIDS Incidence, Mortality and ART Needs

Estimates for AIDS incidence, mortality and Anti Retro-viral Treatment (ART) needs, and as well as projections up to 2012 are shown in Table 16. A total of 276,161 People Living With HIV and AIDS (PLWHA) were in need of ART in 2007 (252,720 adults and 23,441 children under the age of 15 years). In 2008, it was projected that 289,788 (263,334 adults, 26,454 children under 5 years) of persons living with HIV and AIDS will be in need o ART. By the end of 2012, a total of 363,270 PLWHA would be in need of ART and 33,564 of those would be children less than 15 years.

Estimated annual new HIV infections in adults show an increasing trend after 2007 and decreasing for children less than 15 years of age as shown in Table 16.

Table 16: Trends in Estimated and Projected AIDS Incidence, Mortality and ART Needs

Indicator	1998	2003	2005	2007	2010	2012
Adult prevalence(15-49)	13.9%	12.9%	12.4%	12.0%	11.8%	11.9%
New HIV infections (15+)	63,394	67,248	66,114	65,027	70,320	80,423
New HIV infections (0-14)	20,847	20,787	20,423	19,791	12,024	12,219
Annual AIDS Deaths (15+)	23,728	55,140	55,597	47,774	43,512	42,170
Annual AIDS Deaths (0-14)	12,830	14,941	14,904	13,158	10,889	10,667
Adults needing ART	113,928	222,138	239,300	252,720	295,395	329,706
Children (0-14) needing ART	14,894	17,638	19,040	23,441	28,796	33,564
Adults newly needing ART	41,290	60,679	55,831	45,005	41,768	37,098
Adults on ART (15+)	0	2,880	34,575	108,948	185,273	239,986
Children on ART (0-14)	0	0	1,820	9,440	17,576	23,000
Adults on 2nd Line Therapy	0	0	0	388	3,849	9,986
Children on CTX (0-14)	0	33	665	5,611	37,810	59,192
Mothers receiving PMTCT	0	2,198	5,054	15,200	63,000	68,152
Adult Population (15+)	6,041,434	6,884,159	7,203,704	7,541,674	8,101,830	8,524,303
Child Population (0-14)	5,049,867	5,552,196	5,802,997	6,077,872	6,515,336	6,790,661

5.0. Discussion

5.1 HIV and Syphilis sentinel surveillance

The HIV prevalence for the ANC sentinel survey is used to develop national estimates, and to obtain trends in 15-24 year olds as an estimate for HIV incidence in pregnant women. For the 54 sites the results of the 2007 sentinel survey indicated HIV prevalence rates ranging from 2.0% to 38.0%, with a median of 12.6%. Results from the 19 original sites showed that HIV prevalence rate ranged from 5.9 % to 26.7% with a median prevalence of 13.5% indicating that the median HIV prevalence for the 54 sites and 19 sites were similar.

In Malawi, we continue to observe a trend of stable HIV prevalence in rural areas and declining prevalence in urban areas resulting in overall minimal decline at national level. Within the 19 original sites the median HIV prevalence has reduced from 15% in 2005 to 13.5% in 2007, reflecting continued decline in HIV prevalence which was reported in 2005. However, this rate could be influenced by several factors. The observed decline may be due to impact of programmatic interventions especially in urban areas where we have observed sharp declines in prevalence. Secondly, in 2007 our sampling frame included more sites in the rural areas where HIV prevalence is low. This is accounted for in national estimates by weighting rates to reflect the national urban-rural rates. Thirdly, the decline in HIV prevalence may be due to the impact of declining fertility rates as more HIV positive women are less likely to be pregnant.

Monitoring HIV prevalence in the 15-19 and 15-24 year age groups is important because infection in younger women (associated with more recent infections) is a proxy for incidence trends, since these women are more likely to have only recently become sexually active. For this reason, HIV prevalence in the 15-24 year age group is a national indicator as well as a Millennium Development Goals indicator. Based on the 54 sites, mean prevalence in the 15-19 and 15-24 age group was 9.5% and 12.3% respectively, and is significantly lower than in older women. As HIV positive individuals can live for approximately 11 years, HIV prevalence is expected to be higher in older women. Trend analysis based on the 19 original sites suggests that between 2003 and 2007 there has been a decline in prevalence in both the 15-19 and 15-24 year age groups. Further, there has been a general decline in HIV prevalence in the younger age-groups since 1999. This may be attributable to HIV prevention efforts targeted at the youth, particularly in urban areas. But for the southern region; the prevalence is still higher than the national average irrespective of whether the youth are in rural or urban areas. Implementation of the modes of transmission model coupled by a national impact assessment of the national response should therefore be a major focus in future in order to inform design of interventions.

Syphilis prevalence in pregnant women attending antenatal care clinics continues to decline in Malawi. The syphilis prevalence is also much lower than HIV prevalence. The decline in the syphilis prevalence in women attending antenatal care may be due to either behavioral change or effective management and treatment programmes for syphilis in the country.

5.2 HIV estimation and projection

The estimated adult HIV prevalence in 2007 was 12.0% with a low and high estimate of 11.9% and 12.9% respectively. The 2007 national HIV prevalence estimate was lower than that obtained in 2005 due to methodological improvements in the estimation and projection[1] and the availability of national population based data in 2004 and not necessarily a decline in HIV prevalence. Using the improved estimation methodology, the 2005 HIV prevalence was estimated at 12.4% which is similar to 12.0% (11.9 - 12.9%) obtained in 2007 that translates to 809,833 infected adults and 898,888 persons living with HIV/AIDS in the total population.

The national HIV prevalence projection indicates stable prevalence since 1999. This is contrary to observed prevalence trends in ANC sentinel results where overall minimal declines were observed. This is due to rural-urban weighting effect in the estimation process that gives more weight to rural areas with stable HIV prevalence where the majority of the population is.

As noted in 2005, HIV prevalence in urban areas remains higher than in rural areas. This is consistent with the pattern observed in most countries in Africa. Trend analysis for HIV prevalence by locality showed that urban prevalence remains generally higher in all three regions while significant declining trend continues to be observed, whereas, in rural areas HIV prevalence trends remained stable. This could in part be due to effective interventions in urban areas where services are more available than in rural areas.

Annual AIDS-related deaths are projected to reduce from 70,501 in 2005 to 60,932 in 2006 and decline further to 54,401 in 2010. These projections are based on current ART coverage targets. More ambitious targets for ART coverage would result in more drastic declines in AIDS deaths. It is estimated that 43% of those needing ART were receiving therapy in 2007 increased from 14% in 2005. It is projected that continued scale up will provide 72% of needed coverage by 2012.

Notable programmatic impact is the effect of PMTCT on the number of children that are HIV infected. Further reductions in projected infections may result from improved promotion in the PMTCT program of both provision of ARV treatment and promotion of exclusive breast feeding and weaning after 6 months.

6.0 Conclusion and Recommendations

Overall HIV prevalence in Malawi has stabilized at around 12.0% for the past 9 years. However, there is a decline in urban areas though prevalence is still higher than national average. Although HIV prevalence rates in rural areas are lower than in urban, the majority of the population are in the rural areas. Consequently, greater numbers of people infected by HIV in the country are in the rural areas. Hence, there is urgent need to scale up and intensify HIV prevention activities that target rural communities.

The Southern Region needs special attention since it has continuously reflected higher HIV prevalence than the other two regions. Although prevalence declines are being noted in young women, there is still need to increase the coverage of prevention services targeting the youth in particular to sustain and accelerate the declines. There is also a need to continue the scale up and increase access to ART, and PMTCT services including exclusive breastfeeding for persons living with HIV/AIDS; which would have an impact on prevalence, AIDS-related deaths and hence less orphans. Studies to find out reasons for geographical disparities in the distribution of HIV infection need to be carried out so as to aid in the planning of appropriate interventions.

While the increased number of ANC sentinel surveillance provides improved regional representation and estimates, there is need to increase the sample size in rural sites. Current sites should not be used to determine district prevalence. A separate triangulation exercise should be undertaken in order to allow estimates of district prevalence rates. In addition, district health surveys should be conducted in selected districts in order to analyze HIV prevalence at community level.

In conclusion the 2007 HIV Sentinel surveillance results confirm that HIV prevalence in the country is stable and this is driven by the stable trend in the rural areas. There are some areas and population segments that are still showing high HIV prevalence despite depicting declining trends and these need particular attention.

7.0 References

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8.0 Appendices

Appendix 1: Inclusion criteria for additional sites

The following criteria were used for selection of additional sites:

- The site offering antenatal care services
- Site not already participating in the sentinel surveillance
- Government or CHAM facility used by majority of people in the catchment area
- Site with at least 150 antenatal clients per month (new and subsequent visits)
- Sites with adequate staff and already offering HIV testing e.g. PMTCT, HTC (were preferred).

Appendix 2: Location of sentinel sites

Participating Sites		Location		
District	Name of facility	Urban	Semi urban	Rural
Northern Region				
Chitipa	Chitipa District Hospital		†	
	Nthalire Health Centre			†
Karonga	Kaporo			√
	Karonga District Hospital		†	
Rumphi	District hospital		√	
	Bolero District Hospital			†
Mzimba	Mbalachanda			√
	Mzuzu health centre	√		
	Mzimba District Hospital		†	
Nkhatabay	District hospital		√	
	Chintheche District Hospital			†
Central Region				
Nkhotakota	St Anne's hospital		√	
	Mwansambo			†
Kasungu	Kamboni health centre			√
	Kasungu district Hospital		†	
Dowa	Thonje health centre			√
	Mponela Health Centre		†	
Lilongwe	Bottom hospital	√		
	Mitundu Health Centre			†
Ntcheu	District hospital		√	
	Kasinje Health Centre			†
Mchinji	District hospital		√	
	Kapiri Health Centre			†
Dedza	Kasina health centre			√
	Dedza District Hospital		†	
Ntchisi	Ntchisi District Hospital		†	
	Malomo Health Centre			†
Salima	Salima District Hospital		†	
	Khombeza Health Centre			†
Southern Region				
Chiradzulu	Milepa health centre			√
	Chiradzulu District Hospital		†	
Mangochi	District hospital		√	
	Chilipa Health Centre			†
Mwanza	Mwanza District Hospital		†	
	Kunenekude Health Centre			†
Balaka	Balaka District Hospital		†	
	Mbela Health Centre			†
Zomba	Matawale Health Centre	†		
	Domasi Health Centre			†
Blantyre	Limbe health centre	√		
	Mpemba Health Centre			†
Machinga	Gawanani health centre			√
	Machinga District Hospital		†	
Thyolo	Mianga health centre			√
	Thyolo District Hospital		†	
Mulanje	Mulanje Mission hospital		√	
	Chonde Health centre			†
Nsanje	District hospital		√	
	Kalemba Health Centre			√
Neno	Neno District Hospital		†	
Phalombe	Phalombe Health Centre		†	
	Nkhulambe			†

† new sites √old sits

Appendix 3: ANC Surveillance data collection form

ANTENATAL SEROPREVALENCE STUDY
Ministry of Health
Data collection form

PART A: For site result (Remains at the facility)

Date ___/___/_____ **Clinic Site**: _____

Client name:

Education level: **1. None 2. Std 1-5 3. Std 6-8 4. Form 1-2 5. Form 3-4 6. Post Secondary 7. Other**

SYPHILIS RESULT

Non-Reactive ☐

Reactive ☐

Instructions: Enter the Syphilis results and demographic information below and results of PMTCT service if the facility has routine PMTCT service.

Cut Here

ANTENATAL SEROPREVALENCE STUDY
Ministry of Health
Data collection form

PART B: For Reference Lab: (Should be sent to SHSU) **Put label Here:** ☐

Date ___/___/_____ **Clinic Site**: _____

a) Age in years: ☐ b) **Gravida**: ☐

c) Education leve **1. None 2. Std 1-5 3. Std 6-8 4. Form 1-2 5. Form 3-4 6. Post Secondary**

d) Marital status: 1. Married 2.Single 3.Divorced 4. Widowed 5.Separated 6.Cohabiting

e) Occupation

Occupation: Client: ☐

Partner of client ☐

SYPHILIS RESULT

Non-Reactive ☐
Reactive ☐

PMTCT RESULTS

Non-Reactive ☐

Reactive ☐

Client opted out PMTCT ☐

No PMTCT service ☐

(**HIV SEROLOGY To be filled at CHSU)**

Non-Reactive ☐
Reactive ☐

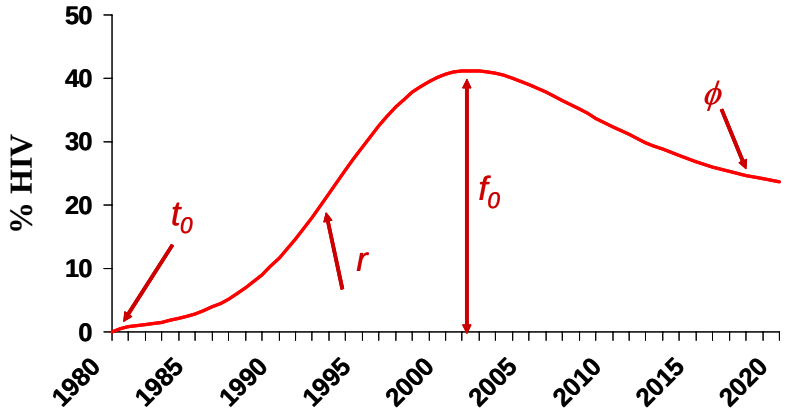
Demographic and syphilis results should be filled during antenatal clinic
Put numbered labels on this part of form and DBS cards bag. Send this part of form and DBS bag to CHSU Reference Laboratory

Appendix 4: UNAIDS/WHO estimation and projections methods

UNAIDS and WHO, with the guidance and recommendations from an external group of scientists and researchers (the UNAIDS Reference Group on Estimates, Modeling and Projections) have developed a set of methods and assumptions to model epidemic trends, to determine annual estimates of HIV prevalence in countries, and to make demographic projections of the epidemic.[1] For countries with generalized epidemics in which HIV is firmly established in the general population, the **Estimation and Projection Package (EPP)** has been designed as a tool to construct national and sub-national (e.g., urban and rural, or provincial) epidemic curves, an essential step in the estimation of levels and trends in the epidemic and its impact.[3,4]

For each defined sub-epidemic, the EPP fits a simple epidemic model to a full set of HIV surveillance data points collected from sentinel surveillance sites over time. This produces an estimate of the time trend of adult HIV prevalence for each sub-epidemic, which are then combined (using population estimates assigned to the different sub-populations) to produce national prevalence estimates and trends. The EPP model incorporates population change over time and fits curves to epidemics by varying four parameters (shown in Figure 1): [3] the rate of growth of the epidemic (r); the start year of the epidemic (t_0); the fraction of the population considered to be at risk of infection at the start of the epidemic (f_0); and a behavioral response parameter which determines the final epidemic prevalence (ϕ). It further provides the user with the ability to apply prevalence adjustments to surveillance data, or to calibrate the curve using, for example, more representative data from national population based surveys.

Parameters in the EPP model that are varied to produce the best fitting epidemic curve [3]



Once epidemic curves are produced in EPP, they are then incorporated into the **SPECTRUM Projection Package**, developed by the Futures Group, to generate estimates of national prevalence, incidence, mortality and treatment needs by sex and age groups.[5] The Spectrum module for HIV/AIDS projections uses the HIV prevalence curve produced in EPP together with assumptions about the epidemiology of HIV, including the ratio of female to male prevalence, distribution of infection by age, the survival distribution (assumed to be a Weibull function), and the effect of HIV on fertility, to calculate HIV prevalence, incidence and mortality by age and sex. It also calculates the number of child infections occurring through infections from the mother, child deaths, and the number of orphans as a results of AIDS.[5] Detailed data on treatment coverage for adults and children are needed in order to estimate the impact of antiretroviral therapy (ART) on the future course of the epidemic.

Appendix 5: Assumptions used in SPECTRUM

- Estimates of the population by age and sex projected over time were generated by Spectrum using data from the UN Population Division.
- Life expectancy was assumed to be about 46 for women and 49 for men in 2007. This resulted in a slightly lower overall population for 2007 than estimated in Spectrum using the UNPOP division estimates.
- Fertility rate was assumed to be 5.9 in 2004 (confirmed by the 2004 MDHS)
- The adult prevalence curve based on ANC data over time but calibrated according to the 2004 MDHS was read in from EPP.
- Age and sex ratios: data from the 2004 MDHS were used and replaced default ratios in Spectrum
- Progression periods: Default progression periods from HIV infection to the need for treatment (assuming a median of 8 years) and from treatment need to death in the absence of treatment (assuming a median of 3 years) were used. Annual survival on ART were changed as follows: Adult first year survival was assumed to be 75% and survival in subsequent years to be 90%; first year survival for children under 1 year was assumed to be 80%; first year survival for children 1 year and older was estimated at 85% and survival in subsequent years at 90%
- Ratio of fertility for HIV infected women to fertility among uninfected women was assumed to be 1.2 for women aged 15-19 years and 0.8 for women 20 years and older.
- Breastfeeding: it was assumed that 90% of HIV positive mothers provide mixed feeding while 10% provide exclusive breastfeeding to their babies. The median duration of breastfeeding in the population was assumed to be between 7 and 17 months.
- Data on treatment coverage (adults and children on ART) and mothers receiving PMTCT services, from the start of the program and projected to 2012, are summarized in table b.1.

Appendix 6: Distribution of pregnant women attending antenatal clinics enrolled by site

District	Name of site	Targeted number	Women enrolled	% enrolled
Balaka	Balaka DH	500	524	104.8
	Mbela HC	300	322	107.3
Blantyre	Mpemba HC	300	300	100.0
	Limbe HC	800	887	110.9
Chikwawa	Chikwawa DH	500	399	79.8
	Makhuwira HC	300	305	101.7
Chiradzulu	Chiradzulu DH	500	321	64.2
	Milepa HC	300	288	96.0
Nsanje	Nsanje District Hospital	500	512	102.4
	Kalemba HC	300	190	63.3
Mwanza	Mwanza DH	500	599	119.8
	Neno HC	500	289	57.8
	KuneneKude HC	300	299	99.7
Mulanje	Mulanje Mission Hospital	500	523	104.6
	Chonde HC	300	318	106.0
Mangochi	Mangochi District Hospital	500	495	99.0
	Chilipa HC	300	296	98.7
Machinga	Machinga DH	500	520	104.0
	Gawanani HC	300	207	69.0
Phalombe	Phalombe HC	500	350	70.0
	Nkhulambe HC	300	304	101.3
0Thyolo	Thyolo DH	500	510	102.0
	Mianga HC	300	300	100.0
Zomba	Domasi HC	300	207	69.0
	Matawale HC	300	785	261.7
Dedza	Dedza DH	500	405	81.0
	Kasina HC	300	260	86.7
Dowa	Mponela HC	500	509	101.8
	Thonje HC	300	236	78.7
Kasungu	Kasungu DH	500	500	100.0
	Kamboni HC	300	319	106.3
Lilongwe	Bottom Hospital	800	842	105.3
	Mitundu HC	300	331	110.3
Mchinji	Mchinji District Hospital	500	500	100.0
	Kapiri HC	300	300	100.0
Nkhotakota	St Annes Hospital	500	499	99.8
	Mwansambo HC	300	305	101.7
Ntchisi	Ntchisi DH	500	465	93.0
	Malomo HC	300	305	101.7
Ntcheu	Ntcheu District Hospital	500	498	99.6
	Kasinje HC	300	294	98.0
Salima	Salima DH	500	501	100.2
	Khombeza HC	300	300	100.0
Chitipa	Chitipa DH	500	495	99.0
	Nthalire HC	300	299	99.7
Karonga	Karonga DH	500	413	82.6
Mzimba	Kaporo HC	300	323	107.7
	Mzimba DH	500	500	100.0
	Mbalachanda HC	300	299	99.7
	Mzuzu HC	800	812	101.5
Nkhatabay	Nkhata Bay District Hospital	500	458	91.6
	Chintheche HC	300	300	100.0
Rumphi	Rumphi District Hospital	500	500	100.0
	Bolero HC	300	179	59.7
	Total	**22,500**	**21,997**	97.8

APPENDIX **7: HIV Prevalence by site**

District	Site name	Total	HIV +	% HIV +	95% CI	District	Site name	Total	HIV +	% HIV +	95% CI
Central Region						**Southern Region**					
Dedza	Dedza	405	47	11.6	(8.7, 15.2)	Balaka	Balaka	524	91	17.4	(14.3, 20.9)
Dedza	Kasina	260	17	6.5	(3.9, 10.3)	Balaka	Mbela	322	50	15.5	(11.8, 20.1)
Dowa	Mponela	509	56	11.0	(8.5, 14.1)	Blantyre	Limbe	887	213	24.0	(21.3, 27.0)
Dowa	Thonje	236	14	5.9	(3.3, 9.8)	Blantyre	Mpemba	299	47	15.7	(11.8, 20.3)
Kasungu	Kamboni	319	23	7.2	(4.7, 10.8)	Chikwawa	Chikwawa	399	60	15.0	(11.8, 19.0)
Kasungu	Kasungu	500	33	6.6	(4.7, 9.2)	Chikwawa	Makhuwira	305	35	11.5	(8.2, 5.7)
Lilongwe	Bottom hospital	842	123	14.6	(12.3, 17.2)	Chiradzulu	Chiradzulu	321	73	22.7	(18.4, 27.8)
Lilongwe	Mitundu	331	11	3.3	(1.8, 6.0)	Chiradzulu	Milepa	288	49	17.0	(12.9, 21.9)
Mchinji	Kapiri	300	19	6.3	(3.9, 9.7)	Machinga	Gawanani	207	25	12.1	(8.0, 17.3)
Mchinji	Mchinji	500	44	8.8	(6.5, 11.7)	Machinga	Machinga	520	137	26.3	(22.7, 30.4)
Nkhota kota	Mwansambo	305	27	8.9	(6.0, 12.8)	Mangochi	Chilipa	296	37	12.5	(9.0, 16.8)
Nkhota kota	St Annes	499	102	20.4	(17.0, 24.3)	Mangochi	Mangochi	495	65	13.1	(10.3, 16.5)
Ntcheu	Kasinje	294	24	8.2	(5.3, 11.9)	Mulanje	Chonde	318	68	21.4	(17.1, 26.4)
Ntcheu	Ntcheu	498	99	19.9	(16.5, 23.7)	Mulanje	Mulanje Mission	523	92	17.6	(14.5, 21.2)
Ntchisi	Malomo	305	11	3.6	(1.9, 6.5)	Mwanza	Kunenekude	299	29	9.7	(6.6, 13.6)
Ntchisi	Ntchisi	465	46	9.9	(7.4, 13.1)	Mwanza	Mwanza	444	599	25.9	(22.5, 29.6)
Salima	Khombeza	300	10	3.3	(1.6, 6.0)	Neno	Neno	289	43	14.9	(11.0, 19.5)
Salima	Salima	501	83	16.6	(13.5, 20.2)	Nsanje	Kalemba	190	39	20.5	(15.0, 27.0)
Northern Region						Nsanje	Nsanje	512	98	19.1	(15.9, 22.9)
Chitipa	Chitipa	495	47	9.5	(7.1, 12.5)	Phalombe	Nkhulambe	304	97	31.9	(26.8, 37.5)
Karonga	Kaporo	323	41	12.7	(9.4, 16.9)	Phalombe	Phalombe	350	94	26.9	(22.3, 31.9)
Karonga	Karonga	413	50	12.1	(9.2, 15.7)	Thyolo	Mianga	300	80	26.7	(21.7, 32.1)
Mzimba	Mbalachanda	299	26	8.7	(5.8, 12.5)	Thyolo	Thyolo	510	194	38.0	(33.8, 42.4)
Mzimba	Mzimba	500	46	9.2	(6.9, 12.2)	Zomba	Domasi	207	71	34.3	(27.9, 41.2)
Mzimba	Mzuzu	812	112	13.8	(11.5, 16.4)	Zomba	Matawale	785	121	15.4	(13.0, 18.2)
Mzimba	Nthalire	299	6	2.0	(0.7, 4.3)						
Nkhata Bay	Chintheche	300	30	10.0	(6.8, 14.0)						
Nkhata Bay	Nkhatabay	458	44	9.6	(7.1, 12.8)						
Rumphi	Bolero	179	12	6.7	(3.5, 11.4)						
Rumphi	Rumphi	500	55	11.0	(8.5, 14.2)						

Treatment coverage up to 2007 and projected to 2012

	Number pregnant women receiving PMTCT		Adult ART		
Year	Nevirapine	Dual Therapy	Number receiving ART	% in need of 2nd line treatment actually receiving it	Number children receiving ART
2002	400		0		0
2003	2198		2880		120
2004	2719		12524		659
2005	5054		34575		1820
2006	10329		67953	2	5115
2007	15200		108560	3	9440
2008	5000	24333	132848	4	12152
2009		62248	157136	9	14864
2010		63000	181424	16	17576
2011		65576	205712	23	20288
2012		68152	230000	30	23000

Appendix 8. Orphan Summary table															
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Malawi Projections 2007(2)1															
Maternal Orphans															
AIDS	530	14,359	117,294	153,556	192,729	232,443	269,512	300,866	325,159	341,400	361,644	383,037	385,978	386,582	384,410
Non-AIDS	274,042	313,607	349,043	353,249	356,311	358,524	360,285	361,647	362,819	363,916	365,049	366,274	367,388	368,263	368,876
Total	274,573	327,966	466,337	506,805	549,040	590,967	629,797	662,513	687,978	705,315	726,694	749,311	753,367	754,845	753,286
Paternal Orphans															
AIDS	1,123	18,789	124,999	159,239	195,606	232,484	266,826	296,550	321,217	338,687	367,954	406,774	410,334	411,533	409,190
Non-AIDS	442,416	461,560	495,116	499,419	502,263	504,082	505,294	505,647	506,026	505,865	507,872	511,678	512,759	513,992	515,438
Total	443,539	480,349	620,114	658,658	697,868	736,566	772,120	802,197	827,243	844,552	875,825	918,452	923,094	925,525	924,628
Double Orphans															
AIDS	311	13,649	103,108	130,912	161,315	192,944	223,374	250,019	271,681	285,973	307,879	335,882	335,465	331,725	324,653
Non-AIDS	87,889	95,164	102,535	103,219	103,425	103,048	102,432	101,529	100,443	98,955	97,671	96,579	94,834	92,946	91,038
Total	88,201	108,813	205,643	234,132	264,740	295,991	325,806	351,548	372,123	384,928	405,550	432,461	430,298	424,671	415,691
Total Orphans	629,911	699,502	880,809	931,331	982,168	1,031,541	1,076,111	1,113,161	1,143,098	1,164,939	1,196,969	1,235,302	1,246,162	1,255,699	1,262,223
All AIDS orphans	1,446	21,761	155,902	203,322	253,373	303,114	348,335	386,121	415,818	436,503	466,250	501,146	507,512	512,245	513,673

Appendix 9. Adults 15+ Summary – Total

	1999	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Malawi Projections 2007(2)1												
HIV population												
Total	744,272	770,486	784,053	788,386	792,754	798,271	809,833	822,307	840,156	862,431	889,412	923,816
Males	322,734	332,987	337,828	339,311	336,667	335,955	336,485	338,766	341,934	348,849	356,737	368,530
Females	421,538	437,499	446,225	449,075	456,087	462,316	473,348	483,541	498,222	513,582	532,675	555,286
Adult prevalence	11.97	11.75	11.39	11.19	11	10.83	10.74	10.65	10.63	10.64	10.71	10.84
New HIV infections												
Total	60,115	62,302	67,248	67,642	66,114	63,568	65,027	66,021	67,548	70,320	74,027	80,423
Males	28,260	29,102	31,013	30,978	25,847	25,820	24,773	26,381	25,372	28,197	28,557	31,840
Females	31,855	33,201	36,235	36,664	40,268	37,748	40,254	39,640	42,176	42,124	45,469	48,583
Adult HIV Incidence	1.1	1.08	1.1	1.08	1.03	0.97	0.97	0.96	0.96	0.97	1	1.06
Annual AIDS deaths												
Total	30,835	44,851	55,140	57,023	55,597	52,095	47,774	48,161	44,692	43,512	42,888	42,170
Males	15,658	21,792	25,939	26,503	25,588	23,780	21,660	21,703	20,007	19,340	18,916	18,452
Females	15,177	23,059	29,201	30,520	30,009	28,315	26,114	26,458	24,685	24,172	23,971	23,718
Total need for ART												
Total	141,139	189,293	222,138	232,311	239,300	245,205	252,720	263,334	278,868	295,395	312,353	329,706
Male	70,189	90,513	103,352	107,087	109,392	111,357	114,184	118,286	124,501	131,009	137,557	144,201
Female	70,950	98,780	118,786	125,224	129,908	133,848	138,536	145,048	154,367	164,387	174,797	185,504
Total number receiving ART												
Total	0	0	2,880	12,524	34,575	68,096	108,948	133,613	159,018	185,273	212,226	239,986
Male	0	0	1,340	5,781	15,840	31,007	49,356	60,262	71,362	82,670	94,090	105,670
Female	0	0	1,540	6,743	18,735	37,089	59,592	73,350	87,656	102,603	118,136	134,316
Number in need of first line therapy												
Total	141,139	189,293	222,138	232,311	239,300	245,062	252,332	262,569	276,986	291,546	305,839	319,719
Male	70,189	90,513	103,352	107,087	109,392	111,291	114,008	117,940	123,653	129,284	134,653	139,776
Female	70,950	98,780	118,786	125,224	129,908	133,771	138,324	144,629	153,333	162,263	171,186	179,944

	1999	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number newly needing first line therapy												
Total	47,984	57,307	60,679	59,705	55,831	50,667	45,005	45,621	44,152	41,768	39,531	37,098
Male	23,161	26,794	27,764	27,219	25,223	22,792	20,165	20,216	19,387	18,135	16,965	15,772
Female	24,823	30,512	32,916	32,486	30,608	27,875	24,840	25,404	24,764	23,633	22,566	21,326
Number receiving first line therapy												
Total	0	0	2,880	12,524	34,575	67,953	108,560	132,848	157,136	181,424	205,712	230,000
Male	0	0	1,340	5,781	15,840	30,941	49,180	59,916	70,514	80,945	91,186	101,245
Female	0	0	1,540	6,743	18,735	37,012	59,380	72,932	86,622	100,479	114,526	128,755
Number receiving second line therapy												
Total	0	0	0	0	0	143	388	765	1,882	3,849	6,514	9,986
Male	0	0	0	0	0	65	176	346	848	1,725	2,903	4,425
Female	0	0	0	0	0	77	211	418	1,034	2,124	3,610	5,561
Unmet need for first line therapy												
Total	141,139	189,293	219,258	219,787	204,725	177,109	143,772	129,721	119,850	110,122	100,127	89,719
Male	70,189	90,513	102,012	101,307	93,552	80,350	64,828	58,024	53,139	48,339	43,467	38,531
Female	70,950	98,780	117,246	118,480	111,174	96,759	78,944	71,697	66,711	61,784	56,660	51,188
Adult population 15+												
Total	6,216,610	6,556,137	6,884,159	7,043,354	7,203,704	7,368,329	7,541,675	7,719,152	7,906,847	8,101,830	8,307,481	8,524,303
Male	2,982,946	3,150,260	3,313,933	3,393,911	3,474,701	3,557,782	3,645,356	3,735,267	3,830,296	3,929,057	4,033,274	4,143,179
Female	3,233,664	3,405,877	3,570,226	3,649,443	3,729,002	3,810,547	3,896,319	3,983,885	4,076,551	4,172,772	4,274,208	4,381,123

Appendix 10. Child 0-14 Summary - Total

	1999	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Malawi Projections 2007(2)1												
HIV population												
Total	48,966	58,675	66,487	70,108	74,105	80,510	89,055	101,939	111,510	122,089	133,028	144,199
Males	24,654	29,541	33,494	35,335	37,372	40,630	44,977	51,520	56,379	61,749	67,298	72,961
Females	24,312	29,134	32,993	34,773	36,734	39,880	44,079	50,419	55,131	60,340	65,729	71,238
New HIV infections												
Total	21,172	21,240	20,787	20,582	20,423	20,021	19,791	17,033	11,779	12,024	12,089	12,219
Males	10,742	10,777	10,547	10,443	10,362	10,158	10,042	8,643	5,976	6,101	6,134	6,200
Females	10,429	10,463	10,240	10,139	10,061	9,862	9,749	8,391	5,802	5,923	5,955	6,019
Annual AIDS deaths												
Total	13,449	14,344	14,941	14,982	14,904	13,647	13,158	13,419	11,470	10,889	10,678	10,667
Males	6,800	7,252	7,555	7,576	7,537	6,902	6,656	6,788	5,800	5,507	5,402	5,397
Females	6,649	7,092	7,387	7,406	7,367	6,745	6,502	6,631	5,669	5,381	5,276	5,270
Population 0-14												
Total	5,138,601	5,332,394	5,552,196	5,674,317	5,802,997	5,938,687	6,077,872	6,224,435	6,370,935	6,515,336	6,654,860	6,790,661
Male	2,544,824	2,642,807	2,755,903	2,819,507	2,886,865	2,958,146	3,031,544	3,108,652	3,185,328	3,260,572	3,333,026	3,403,279
Female	2,593,778	2,689,587	2,796,293	2,854,811	2,916,132	2,980,541	3,046,328	3,115,784	3,185,608	3,254,764	3,321,834	3,387,382
Children needing cotrimoxazole												
Total	143,204	153,952	161,481	164,392	168,168	172,248	178,854	187,551	201,278	213,749	226,040	239,071
Male	72,463	77,873	81,677	83,157	85,081	87,164	90,531	94,957	101,926	108,257	114,494	121,103
Female	70,741	76,080	79,804	81,235	83,086	85,083	88,323	92,594	99,351	105,492	111,546	117,969
Children receiving cotrimoxazole												
Total	0	0	33	180	665	2,359	5,611	16,360	27,106	37,810	48,501	59,192
Male	0	0	17	91	336	1,193	2,839	8,281	13,721	19,139	24,551	29,962
Female	0	0	16	89	328	1,166	2,772	8,079	13,385	18,670	23,950	29,230
Children needing ART												
Total	15,659	16,780	17,638	18,152	19,040	20,358	23,441	26,454	26,937	28,796	31,067	33,564
Male	7,915	8,482	8,916	9,177	9,626	10,293	11,854	13,378	13,620	14,561	15,712	16,978
Female	7,743	8,298	8,722	8,975	9,414	10,064	11,587	13,076	13,317	14,234	15,355	16,587
Children receiving ART												
Total	0	0	120	659	1,820	5,115	9,440	12,152	14,864	17,576	20,288	23,000
Male	0	0	0	57	314	871	2,446	4,517	5,831	7,121	8,402	9,694
Female	0	0	0	56	308	854	2,396	4,420	5,704	6,964	8,214	9,476
Mothers needing PMTCT	71,891	72,121	71,257	70,718	70,893	71,138	71,847	72,586	73,815	75,057	76,677	78,518
Mothers receiving PMTCT	0	0	2,198	2,719	5,054	10,329	15,200	29,333	62,248	63,000	65,576	68,152

Appendix 11: Sentinel surveillance versus national surveys

It is recognized that both sentinel surveillance and population-based surveys each have strengths and weaknesses but together provide complementary information.[2] Sentinel surveillance surveys provide data that are consistent over time so that estimates of HIV trends can be obtained.

Population-based surveys, on the other hand, provide much better geographic coverage of the general population, by sex, age and region, and can provide much more detailed information on social, economic, sexual behaviour and biomedical factors associated with HIV infection. Because of the cost, they are usually not conducted regularly and therefore provide limited temporal coverage. However, in countries where both surveys have been conducted, analysis of combined data from sentinel surveillance and population-based surveys can provide a clear picture of both overall trends and geographical distribution of HIV