

2010

THE 2010 NATIONAL ANTENATAL SENTINEL HIV & SYPHILIS PREVALENCE SURVEY IN SOUTH AFRICA



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

**DIRECTORATE:
EPIDEMIOLOGY & SURVEILLANCE
NATIONAL DEPARTMENT OF HEALTH**

Published by the National Department of Health, Civitas Building, Corner Struben and Andries Street,
Pretoria © 2011 Department of Health

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Suggested citation: The National Antenatal Sentinel HIV and Syphilis Prevalence Survey, South Africa, 2010, National Department of Health.

Search citation: *South Africa antenatal sentinel HIV prevalence, 2008, 2009, 2010 HIV prevalence trends, antenatal sentinel HIV survey South Africa, HIV and AIDS Estimates SA, 2008, 2009, 2010 Syphilis trends, HIV incidence South Africa, HIV and TB Burden South Africa*

Prepared and obtainable free of charge from:

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The HIV epidemic in South Africa has a profound impact on society, the economy, as well as the health sector. It contributes to a decline in life expectancy, increased infant and child mortality and maternal deaths as well as a negative impact on socio-economic development.

In 2010, the South African Government adopted an outcome-based approach to service delivery and performance management, using 12 key outcomes. The public health sector has been mandated to play a pivotal role in leading the country in its efforts to ensure: *“A long and healthy life for all South Africans”*. The findings presented in this report contribute directly to the Negotiated Service Delivery Agreement's (NSDA) objectives of *“Increasing Life Expectancy; Decreasing maternal and child mortality; Combating HIV, AIDS and Tuberculosis”* and *“Strengthening of the Health System Effectiveness”*.

The National Department of Health in South Africa has been conducting the Antenatal Sentinel HIV and Syphilis Prevalence Survey annually, for the past 21 years. This survey has been used as an instrument to monitor the HIV prevalence trends since 1990. HIV prevalence is currently the only parameter that is measured accurately, whilst the country depends on the use of mathematical modeling to estimate HIV incidence and HIV related mortality. The UNAIDS spectrum and EPP and ASSA mathematical models were used respectively to project new HIV infections (incidence), HIV-associated morbidity and mortality and number of people eligible for antiretroviral treatment (ART).

The objectives of the 2010 Antenatal Sentinel HIV & Syphilis prevalence survey are:

- To determine the HIV sero-prevalence amongst first time antenatal clinic attendees (seen as a particularly suitable “sentinel” group to represent most closely the HIV prevalence of the general adult sexually active part of the population);
- To provide baseline information for national, provincial estimates and future projections of HIV infection.

The specific objectives are:

- To estimate the national prevalence of HIV and syphilis infection among pregnant women then establish HIV prevalence estimate among the adult population of 15-49 year olds; those aged under 15 years and those above 49 years in the country, using pregnant women attending antenatal clinics in public health institutions as a proxy;
- To determine the geographical distribution pattern of HIV and syphilis infection among pregnant women attending antenatal clinics at national and provincial level, by district and age groups;

- To monitor trends for both HIV and syphilis prevalence in the country;
- To estimate HIV prevalence in the general population, in children, men and those who need treatment;
- To provide scientific evidence to measure progress towards meeting the Millennium Development Goal 6, Target 7, indicator 18, which is HIV prevalence amongst 15 – 24 year old pregnant women.

By the end of 2010/2011, 11.4 million South Africans had responded to the President call, by undergoing HIV counselling, with 9.7 million people agreeing to be tested for HIV.

Through epidemiological surveillance, the HIV epidemic in South Africa has in the last 5 years shown stabilization, particularly among antenatal care first time bookers, in the public health sector clinics. For the first time this report will present, the HIV prevalence of young adolescents i.e. 10-14 year old survey participants in the past three years. The sample in this age group is small, nevertheless it provides insights such as HIV incidence rate, the impact of PMTCT, determinants of HIV epidemic in young adolescent.

In 2010, a total of 32 225 first time antenatal care attendees participated in the survey, the target was 36 000. This was a representative sample to make conclusive inferences on the HIV and syphilis occurrence at National, Provincial and district level. Intravenous blood samples were collected from the surveyed pregnant women in 1 424 public sector antenatal clinics during the month of October 2010. These biological specimens were collected and sent to central laboratories in the various provinces for HIV and syphilis analysis. The blood test used was the Enzyme Linked Immuno Sorbent Assay (ELISA) for HIV antigen testing and the Rapid Plasma Reagin (RPR) card test for active syphilis.

Given that the sentinel sites were chosen on a probability proportional to size basis by district, the sampling period was fixed and the districts samples were self-weighting. The provincial HIV prevalence estimates were calculated as the total of the results from the districts in the provinces. The national prevalence was weighted according to the total number of women aged 15 - 49 years including non pregnant women and those who use the private health sector in each province.

The sample realization rate has decreased over the last 3 years of testing, with 33 927 in 2008, 32 861 in 2009 and 32 225 in 2010 of the targeted 36 000 pregnant women attending antenatal care. The sample population realization rate in 2010 was 90.0% and exceeds 70% compliance as outlined in the survey protocol.

The National HIV prevalence

The national HIV prevalence estimate among antenatal women in 2010 was 30.2% (95%CI of 29.39 - 30.91), the increase of 0.8% from 2009 HIV prevalence is not statistically significant as indicated in the 95%CI (Confidence Intervals) of the years 2007 to 2009 below. The HIV prevalence remains stable.

The 2009 antenatal HIV prevalence estimate of: 29.4% (95%CI of 28.5 – 30.2)

The 2008 antenatal HIV prevalence estimate of: 29.3% (95%CI of 28.5 – 30.1)

The 2007 antenatal HIV prevalence estimate of: 29.4% (95%CI of 28.5 – 30.1)

The WHO/UNAIDS model estimates that in the general population the overall HIV prevalence to be at 17.9% and the number of people living with HIV in South Africa for 2010 at 5.575 million. Of these, and estimated 518 000 were children under 15 years and 2.95 million were adult females over 15years. The UNAIDS model also estimates that there were 332 512 new infections for adults above 15years.

Indicator	UNAIDS ¹ 2008	UNAIDS ² 2009	UNAIDS 2010
Total HIV population (Adults & children)	5 570 000	5 630 000	5 575 096
HIV+ Adults(15+)	5 240 000	5 300 000	5 056 294
Adult (15-49) prevalence(%)	17.9	17.8	17.9
Adult HIV+female population(15+)	3 230 000	3 270 000	2 945 686
HIV population (children <15)	325 000	334 000	518 802
Total annual AIDS deaths	330 000	314 000	282 578
AIDS orphans	1 850 000	1 950 900	2 138 909
Adult AIDS deaths (15+)	297 000	284 000	252 348
Adult New HIV infections (15+)	352 000	344 000	332 512
New infections (children<15)	49 800	42 700	48 088
Need for ART among adults (15+)	1 475 000	1 584 000	1 407 026
Need for ART(children)	156 800	158 600	304 535
Infected mothers needing PMTCT	218 700	213 800	260 280

HIV prevalence by province

The highest provincial HIV prevalence was recorded in KwaZulu-Natal which increased from 38.7% in 2008 to 39.5% in 2009 and stabilised at 39.5% in 2010. Provinces with 'higher' HIV prevalence estimates compared with 2009 are: Eastern Cape (29.9%), Gauteng (30.4%), Limpopo (21.9%), Mpumalanga (35.1%), Northern Cape (18.4%), and Western Cape (18.5%). These small increases fell within the expected sampling variability. The provinces with 'lower' HIV prevalence estimates were: North West (29.6%) and Free State (30.6%). Their estimates were also within the expected sampling variability, which means that the HIV prevalence is stabilizing, but there are statistical differences in HIV prevalences between provinces from a low of 18.4% in the Northern Cape to a high of 39.5% in Kwazulu-Natal.

HIV prevalence by district

In 2010 there were five(5) districts recording HIV prevalence above 40% namely: Umkhanyakude (41.9%), eThekweni (41.1%), uMgungundlovu (42.3%), iLembe (42.3%) and Ugu (41.1%). All these are located in KZN. The district level HIV epidemic is significantly heterogeneous, with prevalences ranging from a low of 8.5% in Central Karoo in the Western Cape to a high of 42.3% in uMgungundlovu and iLembe. When data are pooled over the four years, this heterogeneity has persists. **The number of districts recording prevalences between 30% and 40 % has increased from 14 out of 52 in 2009 to 21 out of the 52 districts in 2010.**

HIV incidence estimates projected in the general population 2010

In 2010 UNAIDS EPP & Spectrum model estimated that the National HIV prevalence in the general was 17.9% compared with 17.8% in 2009. The estimated provincial HIV prevalence in the general population for 2010 compared to (2009 estimates) were as follows: Eastern Cape (18.5%) (18.5%); Free State (19.7%) (19.5%); Gauteng (16.9%) (16.6%); KwaZulu-Natal = (24.9%) (25.9%); Limpopo (14.0%) (13.8%); Mpumalanga (21.7%) (21.8%); North West (19.1%) (19.2%); Northern Cape (8.9%) (9.3%) and Western Cape (6.2%) (6.2%).

HIV prevalence estimate by age

From 2007 to 2010, the peak in HIV prevalence now occurs in the age category 30 - 34 years. The HIV prevalence in this age group increased from 41.5% in 2009 to 42.6% in 2010. When comparing the HIV prevalence in the different age categories with previous years it has gone up slightly in all age groups. The higher prevalence in older age groups could be partly explained by ART use but it is very worrying that the trend in young people (15-24yrs) is not showing a decline (this age group should not be much affected by ART). The baseline HIV prevalence in the 15-24 pregnant MDG group in 2001 was 23.1% and it is expected to be reduced by 75% in 2015, which translate to 5.3%. The 2010 HIV prevalence among the 15-24yrs pregnant women is 21.8%.

The Department of Basic Education survey of teenage pregnancy among school going learners (2004 - 2008) in South Africa findings showed that teenage pregnancy was more prevalent in KZN (15 027), EC (11 852) and LP (12 848). There is no published data on HIV prevalence of teenage pregnancy among non-school going young adolescent in South Africa. The findings of this Department of Health antenatal HIV and syphilis survey has shown that some of the survey participants were young adolescents who are HIV infected. Of these 121 (10-14 year olds) that participated in the 2010 antenatal HIV survey, 11 of them (9.4%) were HIV positive, which has increased from 7.3 % in 2008. The majority of the 121 came from KZN, LP, FS, EC and WC. The trends in numbers of the 10-14 years pregnant women and their HIV status in the past 3 years are presented in this report. The realized sample size for the under 15 years was statistically significant hence the findings of their HIV outcome in this age group is significant. The sample size of the 10-14 years age group was more than the 45 – 49 years in 2008, 2009 and 2010, hence their HIV status outcome on this age group is now documented and can no longer be ignored.

Regression analysis of determinants of HIV infection

The tree model identified age, population group and marital status as the top three determinants of the HIV outcome in the 2008 survey. The first split was on age of the women at 22 years: The model shows that women younger than 22 years had a prevalence of 17.2% compared to 35.9% in the older women. None of the risk factors available were important enough to split the younger sub group further. In 2010, the older subgroup was split on population group: non-African women had a prevalence of 7.8% compared with African women with a prevalence of 39.0%. No further splits were made in the non-African women. In the sub group of older African women marital status was the most important determinant: married women had a prevalence of 29.4% compared to 42.2% in unmarried women. In these unmarried African women those older than 27 years constituted a total of 7 722 women (24% of the total survey). In this sub group the HIV prevalence was 48.7%. This sub group as identified by the tree regression had the highest HIV prevalence within the model. The model identified that unmarried African women older than 27 years have the highest HIV prevalence. This indicates a significant shift in HIV risk exposure towards women of older age groups than what was observed in 2008.

National syphilis prevalence trends

The 2010 estimated syphilis prevalence has decreased by 0.4% from 1.9% (1.7 - 2.1) in 2009 to 1.5% (1.4 - 1.7) in 2010.

The Northern Cape remained the only province that still had the highest syphilis prevalence of 5.6% whilst the lowest syphilis prevalence was recorded in Limpopo at 0.3%. HIV prevalence trends were inversely proportional to the syphilis prevalence: some of those districts with very high HIV prevalence had no women infected with syphilis, especially in KwaZulu-Natal.

The department will look at more literature to determine which sexually transmitted disease such as Human Papilloma Virus, Hepatitis C and *Herpes simplex* etc, could have more significant correlations as potential HIV co-factors than syphilis.

This is further illustrated where for example zero per cent (0.0%) or no syphilis infection was recorded in Amajuba (HIV prevalence = 35.9%), Ugu (HIV prevalence = 41.1%); Umkhanyakude (HIV prevalence = 41.9%); UMzinyathi (HIV prevalence = 31.1%); uThukela (HIV prevalence = 36.7 %), Zululand (HIV prevalence = 39.8%), eThekweni (HIV prevalence = 41.1%), iLembe (HIV prevalence = 42.3%), uMgungundlovu (HIV prevalence = 42.3%). The detailed description of syphilis vs. HIV prevalence trends for all the 52 health districts are presented in the section describing syphilis trends in this report.

The findings of this survey in the past 14 years show that there is an inverse correlation between HIV and Syphilis and since 1997, there is scientific evidence that Syphilis is not a cofactor for onset of HIV infection.

Conclusion

The 2010 national HIV prevalence estimate indicates a slight increase by 0.8% in the prevalence of antenatal women between 2009 and 2010. Prevalence usually reflects the burden of HIV on the health care system and changes (increases) may be the cumulative effect of many factors that may work individually or collectively to drive the epidemic. The prevalence might increase under circumstances where new infections (incidence) are declining, for example where large number of people are receiving ART and surviving for longer periods. There is still heterogeneity (great variation in HIV infection rate) among provincial HIV prevalence estimates.

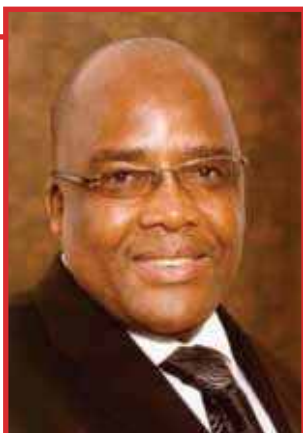
It is essential to ensure that all pregnant women, including 10-14 year-old young adolescents, are included in strategic HIV prevention and care programmes aimed at reducing HIV incidence, morbidity and mortality.

A comprehensive strategy focusing on this age group should be incorporated into the programmes of the Department of Health, Department of Basic Education, Department of Social Development and the Ministry of Women, Child and Persons with Disabilities, in order to formulate a more coordinated and integrated response to this problem. HIV prevention must remain the mainstay of our efforts to combating HIV and AIDS.

The 2010 findings produced by the tree model reflect that the significant contributor to the high HIV prevalence is a small group less than 8 000 pregnant and unmarried African women aged 27 years and over, where the HIV prevalence is 48.7%.

The 2011 report will include findings of triangulation of other HIV and AIDS related data, to understand the age distribution of the HIV infected persons receiving ART treatment, and to monitor pregnant women and 15-24 year old MDG group enrolled in the ART in order to monitor the impact of HIV and AIDS interventions on the prevalence and incidence rate.

In steering the country's efforts towards the NSDA 2010-2014, the common theme that will be sustained by the Health sector is to continue with the advocacy and community mobilizations through campaigns aimed at ensuring that more PLWHA have access to treatment. The common trend amongst South Africans in the past has seen two million people on average voluntarily testing for HIV annually. The HCT campaign was launched by the Honourable President of South Africa in April 2010. By the end of 2010/11 financial year, a total of 9.7 million people had agreed to be tested. This marked a three fold increase from the previous annual trends. By the end of March 2011, the anti-retroviral programme had enrolled 1.4 million HIV infected people since its inception.



The HIV epidemic is one of the most significant public health challenges South Africa is facing with impacts of the epidemic clearly visible at all levels of our society. At the macro level, the HIV epidemic is threatening achievement of the Millennium Development Goals through reversal of post apartheid developmental gains. Communities have not been spared either as the traditional social safety mechanisms are overstretched and at the brink of collapse.

For an effective response to the HIV epidemic, South Africa requires robust data to inform policy formulation, programme planning and implementation. The antenatal sentinel surveillance survey contributes to this intelligence, by providing data on trends of the HIV epidemic and anticipated burden of HIV disease. The 2010 surveillance results reaffirm stabilization of HIV prevalence among antenatal clinic attendees since 2007 albeit at unacceptably higher levels. Results from the 2010 survey will guide the development of the new National Strategic Plan 2012-2016.

Government is committed to respond to the HIV epidemic effectively. In April 2010, the President of South Africa, His Excellency Mr. Jacob. G. Zuma, launched the national HIV Counselling and Testing campaign, targeting 15 million South Africans by June 2011. In August 2011, the Deputy President of South Africa announced changes in the eligibility criteria for ART, with all HIV positive people with a CD4 count of ≤ 350 being eligible for treatment.

I have also directed that TB and HIV and AIDS services be integrated. This move will go a long way towards improving efficiencies as the two epidemics of HIV and TB will be managed under one roof. One of the key deliverables in the Health Sector Negotiated Service Delivery Agreement (NSDA) which I have signed with the other Ministers and Health MECs is to combat HIV and AIDS and the burden of TB, with the aim of improving the lives of all South Africans.

I am fully aware that HIV prevalence cannot be used singularly and is not the only useful measure of success, particularly in South Africa, a country with the largest ART programme in the world. We must not forget that we have a generalized epidemic with between 5.4 to 5.6 million persons already HIV infected.

While there is no globally agreed method to measure HIV incidence, the Department of Health is actively collaborating with partners to come up with a consensus position for the estimation of HIV incidence and how best we can measure HIV related mortality trends.

In 2010 the sample size of the survey was increased to come up with more precise HIV prevalence estimates at district level. However, I strongly recommend that in the years ahead, the Department should isolate the effect of the ART programme on the observed HIV prevalence and mortality rates.

In conclusion, the findings presented in this report contribute directly to the Negotiated Service Agreement's (NSDA) objectives of *Increasing Life Expectancy; Combating HIV, AIDS and Tuberculosis; Decreasing maternal and child mortality; and Strengthening of the Health System Effectiveness*. These results will strengthen our ability to plan interventions to reduce morbidity and mortality from HIV and AIDS.



DR. P. A. MOTSOLEDI (MP)

MINISTER OF HEALTH

DATE: 8/11/2011

ACKNOWLEDGEMENTS



I would like to extend my appreciation to all nurses in the public sector for their continued dedication and support over the past 21 years in the implementation of this survey and their professionalism in adherence to the survey protocol for the collection, handling and transportation of blood specimens to laboratories.

Special thanks goes to the National Department of Health's coordinating team, in particular Dr. Thabang Mosala, for her technical and managerial oversight of the survey and for providing strategic leadership in the compilation this report. My thanks also go to the Epidemiology and Surveillance Directorate staff, Ms. Manti Maifadi and Mr. L. Ratya for taking the lead in coordinating the survey and compiling the tables and the figures; Ms. T. Maomela and Mr. J. Masemene for assisting with technical support visits to the provinces. Thanks to Ms. C. Nagel, Ms. M. de Jong and Ms. T. Maluleke for their administrative support.

Our sincere gratitude also to the provincial survey co-ordinators: Mr. Z. Merile (EC), Mr. M. Toli (FS), Dr. M. Likibi & Dr. B. Ikalafeng (GA), Ms Z. Mthembu and Ms. N. Moodley (KZN), Mr E. Maimela (LP), Mr. M. Machaba (MP), Mr. M. Khumalo and Ms. T. Naicker (NC), Ms. S. Malakane (NW), Dr. I. Govender (WC), and their teams who coordinated the survey in the respective provinces and districts. Sincerest gratitude, is also extended to the testing laboratories and coordinators: Ms. Y. Gardee and Ms A. Burell (PE), Mr. L. Hildebrand (Pelonomi), Mr. B. Singh and Mr. L Reddy (UKZN), Mr. T.J. Chephe (MEDUNSA), Ms. R. Thompson (Middleburg), Ms. E. Weenink and Ms. B. Gool (Kimberley Hospital) and Ms. T. Stander (Stellenbosch University) and all staff at these laboratories and Ms. B. Singh and Dr. Adrian Puren (NICD).

Special thanks to Mr. Calle Herdberg of HISP, who developed the new DHIS Antenatal Survey data capturing tool, collated all the 9 provincial data, validated the laboratory data and produced a clean dataset. A very special thanks to all the women who agreed to participate in the survey and made this report on HIV and syphilis trends possible.

The Department also acknowledges and expresses gratitude for the technical support from the HIV Surveillance Expert Task Team members and NDoH senior managers, who advised and assisted in the analysis and interpretation of the results, and provided scientific review of the report namely: Dr. Anban Pillay, Dr. Yogan Pillay, Mr. Thulani Masilela (NDOH), Prof. Carl Lombard (MRC) Prof. Samuel Manda (MRC), Prof. Rob Dorrington (UCT), Dr. Eleanor Gouws (UNAIDS), Mr. Henry Damisoni (UNAIDS), Dr. Heston Phillips (UNAIDS) and Dr. Patrick Abok (WHO).

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DATE: 8/11/2011

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ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal Care
ART	Anti-retroviral Therapy
BCC	Behavior Change Communication
BoD	Burden of Disease
BSS	Behavioural Surveillance Survey
CCMT	Comprehensive Care Management and Treatment
CI	95% Confidence Interval
DHIS	District Health Information System
DoH	Department of Health
EC	Eastern Cape Province
ELISA	Enzyme Linked Immuno Sorbet Assay
EPP	Estimation and Projection Package
FS	Free State Province
GA	Gauteng Province
HCW	Health Care Worker
HCT	HIV Counseling and Testing
HIV	Human Immunodeficiency Virus
HSRC	Human Science Research Council
HST	Health Systems Trust
KZN	KwaZulu-Natal Province
LP	Limpopo Province
MDG	Millennium Development Goals
MEDUNSA	Medical University of South Africa
MP	Mpumalanga Province
MRC	Medical Research Council
NC	Northern Cape Province
NDoH	National Department of Health
NHC	National Health Council
NHLS	National Health Laboratory Service
NICD	National Institute for Communicable Diseases
NTP	National Tuberculosis Programme
NSP	National Strategic Plan for HIV, AIDS and STI
NW	North West Province
PCR	Polymerase Chain Reaction
PAC	Provincial AIDS Councils
PHC	Primary Health Care

ACRONYMS

PMTCT	Prevention of Mother-to-Child Transmission
PPS	Probability Proportional to Size
PSU	Primary Sampling Unit
Prya	Persons per year per annum
QA	Quality Assurance
RPR	Rapid Plasma Reagin (A screening test for syphilis)
SA	South Africa
SACEMA	South African Centre of Excellence in Epidemiological Modelling & Analysis
SANAC	South Africa National AIDS Council
StatsSA	Statistics South Africa
STI	Sexually Transmitted Infection
TB	Tuberculosis
UCT	University of Cape Town
UKZN	University of KwaZulu-Natal
UNAIDS	United Nations Joint Program on HIV & AIDS
UNGASS	United Nations General Assembly Special Session on HIV & AIDS
UNICEF	United Nations Children's Fund
UNISA	University of South Africa
USAID	United States Agency for International Development
WC	Western Cape Province
WHO	World Health Organisation

1. INTRODUCTION

The history of the annual HIV antenatal sentinel prevalence survey in South Africa dates back to 1990 when the department realized that the epidemic was increasing exponentially in the general population and an instrument had to be developed to monitor trends for strategic response and policy planning. Since 1990, women attending antenatal care (ANC) for their first time in their current pregnancy were requested to participate in the survey in selected public health clinic across the country to assess their HIV and syphilis status. Initially these sentinel surveys only allowed for national and provincial level estimates. Due to the differences among districts within provinces, with regard to population distribution, poverty levels, access to services etc; the need was identified to have information on the HIV prevalence at district level. The survey sites have increased from 461 sites in (1990) to 1 424 sites from (2006). The target sample was 36 000 pregnant women presenting for ANC health services for their first time on the current pregnancy, during the month of October each year. These antenatal sites are located in both urban and rural areas and provide health services to urban, rural, semi-rural, township, and informal settlement communities.

The HIV epidemic in South Africa is unfolding at different paces in different provinces and districts. There was a considerable variation in HIV prevalence among the 52 health districts observed over the four year period 2006 to 2010. The HIV prevalence ranged from a high of over 46.4% in uThukela (KwaZulu-Natal) to a low of 0.0% in Namaqua (Northern Cape) in 2009. When data are pooled over the four years this heterogeneity persists. Since 2003, the national syphilis prevalence estimate has been fluctuating between a prevalence of 1.5% and 2.8%. There was a significant increase in syphilis prevalence in the Western Cape from 1.9% in 2006 to 5.6 % in 2007, but it decreased to 3.8% in 2008 and Northern Cape from 6.8% in 2008 to 3.6% in 2010. Western Cape, Gauteng, Mpumalanga, Eastern Cape, North West and Limpopo all experienced an increase in syphilis prevalence between 2006 and 2007. Mpumalanga syphilis prevalence has more than halved from 1.8 % in 2007 to 0.7% in 2008 (NDoH, Antenatal sentinel HIV Survey, 2009).

Limpopo, Western Cape and Northern Cape have consistently recorded lower HIV prevalence levels compared with other provinces. In contrast, Northern Cape has the highest syphilis prevalence while KwaZulu-Natal has shown the lowest syphilis prevalence trends in the past 4 years. KwaZulu-Natal province and districts have consistently reported the highest HIV prevalence's in the country since 1990. There is still significant variation in HIV and syphilis prevalence between the 9 provinces (NDoH, Antenatal sentinel HIV Survey, 2009).

1.1 The purpose of the survey

The purpose of undertaking an annual sentinel antenatal point prevalence survey is to assess the HIV sero-prevalence amongst first time antenatal clinic attendees (seen as a particularly suitable “sentinel” group to represent most closely the HIV prevalence of the generally sexually active part of the population) and to assess trends in HIV prevalence over time.

1.2 The general objective

The general objective is to determine the distribution of HIV and syphilis infection among pregnant women attending public health antenatal clinics at National, Province and District Level and disaggregated by age.

1.3 The primary objectives are:

- To assess HIV and syphilis sero-prevalence among women attending public sector antenatal clinics;
- To monitor HIV and syphilis trends over time among women attending public antenatal clinics and;
- To use this data for estimation and projection of HIV sero-prevalence trends and the burden of AIDS in the general population.

1.4 The secondary objectives are:

- To estimate the national prevalence of HIV and syphilis infection among pregnant women then establish HIV prevalence estimate among the adult population of 15-49 year olds; those aged under 15 years and those above 49 years in the country, using pregnant women attending antenatal clinics in public health institutions as a proxy;
- To determine the geographical distribution pattern of HIV and syphilis infection among pregnant women attending antenatal clinics at national and provincial level, by district and age groups;
- To monitor trends for both HIV and syphilis prevalence in the country;
- To estimate HIV prevalence in the general population, in children, men and those who need treatment;
- To provide scientific evidence to measure progress towards meeting the Millennium Development Goal 6, Target 7, indicator 18, which is HIV prevalence amongst 15 – 24 year old pregnant women.

The HIV prevalence results remain as one of the most important sources of robust surveillance data to provide a basis for the projection and estimation of the epidemic and measurement of HIV and AIDS impact in the general population.

For the first time the 2010 survey will report on the following:

1. Description of the demographic characteristics of the survey participants and provide insight into the description of the 10-14 year old pregnant women who participated in the survey.
2. The HIV prevalence trends (2001 – 2010) among the pregnant 15-24 year old pregnant women, which is the MDG 6, Target 7, Indicator 18.
3. Map the distribution of HIV prevalence by individual province from 2007 to 2010.
4. The syphilis trends by province and district from 2007 to 2010.
5. The association between HIV and syphilis prevalence by province and by districts
6. A comparison of the HIV prevalence distribution among 15-49 year old women with the number of PTB cases at district level.
7. The ecological association between HIV outcomes of antenatal women and TB Burden and syphilis in South Africa

In the discussion section, we attempt to triangulate findings of published data on HIV mortality among 15-49 year-olds by district (StatsSA 2008 Death Notification Report) and the Department of Basic Education report on “Teenage pregnancy in South Africa (2009) with specific focus on school going learners” and provide evidence supporting the findings of teenage sexual and reproductive health in the two reports.

2. METHODOLOGY

During the month of October 2010 the 21st National Antenatal Sentinel HIV Prevalence Survey was conducted in South Africa, across the nine provinces and 52 health districts using the standard unlinked and anonymous methodology (WHO/UNAIDS). The survey is used as a proxy to estimate the trend in the prevalence of HIV and syphilis among pregnant first bookers aged 15 - 49 years presenting to a public sector ANC facility for the first time. A total of 36 000 pregnant women were targeted to participate in 2010. The number of Primary Sampling Units (PSU) were 1 424, selected from all 52 health districts in South Africa.

Health Care Service-based HIV surveillance is recommended by WHO as an entry point, because PMTCT services are available in all sites to provide women an option of HIV Counselling and Testing and further care. The survey design is an unlinked anonymous testing method using blood samples collected for other purposes in selected sentinel primary health care facilities. This sampling approach is convenient because, as part of the antenatal care services it is mandatory to routinely draw blood from the first bookers, and this minimises participation bias and reduces costs. In addition, pregnant women are universally the most common Sentinel Population for HIV and in South Africa the most common mode of transmission is the heterogeneous sexual route. It is not perfectly representative of all women and even less of men, children and non-pregnant women, but it is an important means of coverage for countries that have a generalized HIV epidemic (i.e. where HIV prevalence among pregnant women is >1%) and it also has a wide geographic coverage (urban; informal settlements and rural communities).

2.1 Survey design

The national antenatal HIV and syphilis prevalence survey is an anonymous, unlinked, cross-sectional survey targeting pregnant women attending antenatal clinics in the public health sector. Only first-time attendees are recruited, to minimize the chance of any woman being included more than once. Since 2006, this survey has expanded its sample population to target 36 000 pregnant women recruited from 1 424 PSU compared with 16 000 women recruited from 461 clinics in 2005. This has expanded geographic coverage considerably to include a representative sample from all 52 health districts in all the nine provinces and includes urban and rural comparison.

2.2 Sampling

2.2.1 Sentinel population

This survey was conducted as an unlinked anonymous survey amongst women who attended public health antenatal clinic services for the first time during their current pregnancy. Pregnant women

attending ANC services at public health facilities were used as the target population as they are sexually active; constitute an easily accessible and stable population, and are more likely than other groups to be representative of the general population. In addition, they obtain antenatal care at facilities that draw blood as part of routine medical services offered to this group.

2.2.2 Selection of survey population

Inclusion criteria

All pregnant women attending antenatal clinics for the first time during their current pregnancy were eligible for inclusion.

Exclusion criteria

Pregnant women who had previously visited the ANC clinic during their current pregnancy during the survey period were excluded (to avoid duplicate sampling during the same month). No pregnant women were excluded from participation on the basis of their known HIV status.

2.2.3 Selection of sentinel surveillance sites

The basic goal was to select sentinel surveillance sites representative of the population size estimate of the area to be surveyed. Sentinel sites were selected using the 'Probability Proportional to Size' (PPS) method as this combines a random approach with a bias towards the larger clinics. By using this approach, it made the analysis easier as it introduced a "natural weighting" process. The geographic distribution of sentinel sites is shown in Figure 1.

2.2.4 Selection of Primary Sampling Units (PSU)

The following are the criteria that were applied in selecting sentinel surveillance sites to be eligible for inclusion in the sample:

- Any randomly selected health establishment in the public health sector, providing antenatal care services and routinely drawing blood from attendees on the first visit of the current pregnancy with facilities to store sera at 4°C;
- The sentinel site should provide ANC services to sufficient first time antenatal clinic attendees to ensure that a minimum of 20 first time bookers be recruited over one month;
- Availability of transport arrangements in place that will allow for biological specimens to be taken to a reference laboratory within 24 hours or if the blood samples are centrifuged then transferred to referral laboratory within 72 hours.
- The clinic staff must be willing to cooperate and have the capacity to conduct the survey.

It should be noted that no other criteria were applied in selecting sites. In particular, sites were not selected specifically to monitor either high risk or low risk sub-populations, nor with the aim of monitoring interventions. These criteria are strictly adhered to in order to limit bias and promote comparability.



Figure 1: Geographical location of sentinel sites for the 2010 National Antenatal HIV and Syphilis survey.

2.3 Sample Collection

Full blood analysis for pregnant first bookers at the ANC clinic was used as an entry point for HIV testing using anonymous unlinked procedures. One blood sample was taken by veni-puncture and labeled with the bar code number of the individual pregnant woman and stored at 4°C. The demographic details of the participants, with the exclusion of any particulars from which it may be possible to ascertain the identity of a patient, were collected using a standardized collection form (Appendix A). The data collection form with the woman's demographic details was labeled with the same bar code number. At the close of each day the supervisors checked the forms against the blood samples for any mistakes and for completeness. The samples, together with the forms, were transported in a cooler box to the participating provincial laboratory where HIV and syphilis testing was done.

2.4 Laboratory Methods

2.4.1 Laboratory techniques

In accordance with the recommendations of the WHO on HIV screening for surveillance purposes, blood samples were tested with one ELISA (Abbott Axysm System for HIV-1 HIV-2) assay. The samples were also screened for active syphilis using the RPR test. Participating laboratories included the National Health Laboratory Services (NHLS) laboratories in Bloemfontein, Johannesburg, Kimberley, Middleburg, Port Elizabeth and Stellenbosch, MEDUNSA, and the Virology laboratory of the University of KwaZulu-Natal.

2.4.2 Laboratory quality assurance

Internal quality assurance was the responsibility of the individual laboratories. While most laboratories participate in external quality assurance programmes, for the purposes of this study the NICD was responsible for overall external quality assurance. The National Institute for Communicable Diseases (NICD) compiled a battery of 20 HIV positive and negative sera which was sent to each participating lab to test. Results were sent back to the NICD. In addition, each lab compiled a batch of 20 sera comprising HIV positive and negative sera, including some "borderline" cases. These were forwarded to the NICD for confirmatory testing.

After completion of the survey the NICD produced a quality assurance report on the performance of the laboratories for HIV testing and University of Limpopo (Medunsa Campus) Microbiology Department for RPR testing.

2.5 Quality Control of Fieldwork

District level monitoring of the sentinel sites was done weekly by a team from the district health office. Provincial coordinators also undertook provincial level monitoring and visited the sites in their province. The national team conducted supervisory visits to at least two districts per province. The main purpose of the visits, was to monitor that the protocol was being adhered to by observing practices and reconciling the number of submitted specimens to the calculated expected number which was derived from the routine data collection. A monitoring checklist (Appendix B) was used to ensure that monitoring and supervision was standard for all sites.

2.6 Data Management

Raw data was captured at provincial level, using the Antenatal HIV and Syphilis Prevalence Survey DHIS 1.4 Patient Module. This database is designed with range restrictions to ensure that data captured are not out of range. Additionally extensive internal data consistency checks against the original data capture form were done by each provincial coordinator to ensure the data were accurate. After data were entered, frequency tables were produced for each data element to identify missing or inconsistent values that may have originated from incorrect entry of data into the computer. Further data cleaning and validation and quality assessment was done at the national office.

Data analysis was carried out by independent statisticians, actuarial scientists and epidemiologists from the NDoH and various other institutions. The analysis was mainly descriptive and focused on determining national, provincial, district and age group specific prevalence rates of HIV and syphilis.

2.6.1 Exclusions from analysis

The following entries were excluded from the analysis:

- Those which had no HIV status result was not indicated.
- Those with no age of the survey participant

2.6.2 Calculation of confidence intervals

For the 95% confidence intervals, the normal approximation to the binomial distribution was used. In a few cases where the sample size or prevalence was small, the exact binomial calculation was used and adjusted for the design effect of the domain.

2.6.3 Weighting

The national estimate was weighted according to the total number of women aged 15 - 49 years in the different provinces using the StatsSA mid-year population estimates current at the time of the survey. Given that the sentinel sites were chosen on a probability proportional to size basis by district, the sampling period is fixed and the districts are self-weighting, the provincial prevalence estimates were simply calculated as the total of the results from the districts in the provinces.

2.6.4 Biases with Antenatal data

- Only pregnant women and not all reproductive age women were tested
- Only pregnant women who attend public sector antenatal clinics are tested
- Clinics selected may not be representative
- In general terms, ANC data:
 - underestimate prevalence in the general female population
 - overestimate prevalence in the rural population

2.7 National population based HIV surveys vs. sentinel antenatal HIV surveillance

Sentinel surveillance and population-based surveys each have strengths and weaknesses but taken together provide complementary information and can provide a clear picture of both overall trends and geographic distribution of HIV in South Africa.

2.7.1 Sentinel Series Antenatal HIV Surveys

Strengths

- Easy access to a cross-section of sexually active women from the general population.
- Testing among pregnant women is a good proxy for prevalence in the general population.
- Provides data on trends in the HIV epidemic over time.
- Biases are recognized and can be corrected.
- Geographical coverage can be expanded.

Weaknesses

- Women attending ANC may not be representative of all pregnant women
- ANC does not provide data on the prevalence among men. Estimates for men are based on assumptions about the ratio of male to female prevalence derived from community based studies (HSRC).

2.7.2 National Population based HIV Surveys

Strengths

- Can provide representative estimates of prevalence in the general population (for generalized epidemics) as well as for different subgroups.
- Results can be used to adjust estimates from sentinel surveillance (ANC).
- Provides an opportunity to link HIV status with social, behavioural and other biomedical information.

Weaknesses

- Sampling from households may not adequately represent high risk and mobile populations.
- Non-response can bias population-based estimates.
- Population based surveys are expensive and logistically difficult to carry out.

2.8 Extrapolation of HIV Infection to the General Population

2.8.1 WHO/UNAIDS estimation process

The Estimation and Projection Package (EPP) recommended by UNAIDS was used to estimate and project adult HIV prevalence from surveillance data and to estimate HIV incidence from prevalence and ART coverage data. After surveillance data from various sites and years showing HIV prevalence among pregnant women were included in the model, the package fitted the best epidemic curve, scaled to be consistent with estimates of the general population prevalence. Separate estimates and time trends were developed for each of the provinces, and combined within EPP to produce a national estimate for HIV prevalence and its trends over time. The resulting national estimated adult HIV prevalence was transferred to a demographic package (Spectrum: a computer modelling for demographic projections) to calculate the number of people infected and other variables, such as the number of adults and children who need to be receiving ART, and the estimated number of AIDS deaths and other information.

Adjusting HIV prevalence curve using EPP

For South Africa:

1. Adjusting for race-based relative attendance rates at ANC:
 - Based on race-standardized prevalence.
2. Adjusting for the use of HIV prevalence among pregnant women:
 - Based on ratio of prevalence among adults in the general population, using data from the National population based HIV survey and prevalence among pregnant women.

Required inputs in Spectrum are: Country data on

- Demographic data projected by age and sex over the time period of interest
- Adult prevalence / Incidence curve
- MTCT program description
- PMTCT coverage
- Adult ART coverage
- Child treatment coverage

Epidemiologic assumptions

- Effect of HIV on fertility
- Progression from infection to need for treatment and AIDS death
- Age distribution of infections
- Sex ratio of incidence
- Mother-to-child transmission rates by regimen and feeding options
- Effect of child treatment

2.8.2 The ASSA 2008 estimation process

The ASSA model can be described as a behavioral cohort component projection model. It comprises two aspects, the first being, a standard demographic cohort projection model that projects the population at a point of time from the population a year earlier taking into account births, deaths and migration. The second is a 'behavioral' component that projects the numbers of people by age and sex newly infected with HIV, and thereby, the impact of HIV on mortality and to a lesser extent fertility.

The number of new infections is estimated by assuming:

1. That the population is comprised of four risk groups
 - a small, high-risk group representing commercial sex workers and their regular clients
 - a larger high-risk group, not part of the above, who are regularly infected with STDs and often have unprotected sexual intercourse
 - a larger group who are at risk of getting infected by sometimes having unprotected sexual intercourse and assumed to average one new partner per year
 - the balance, assumed not to be much at risk of getting infected.
2. That the amount of sexual activity and whether or not a condom is used differs by risk group.
3. That the proportion of all sex that occurs at a particular age follows a uni-modal curve, which in the case of females is similar to the fertility curve with a peak in the young, high-fertility, ages.
4. Risk-group dependent probabilities of transmission from a person in one risk group to his or her partner, which are dependent on how long the person has been infected.
5. Probabilities of transmission from infected mother to child.
6. That ART impacts on the probability of transmission of the virus and the amount of sex.
7. That the prevalence of pregnant women attending public antenatal clinics is higher than that of women attending private antenatal clinics. Following this, the model assumes certain proportions of those infected survive each year after infection. The survival is a function of age at infection and duration of infection. From this, the number of deaths due to HIV are estimated.

The proportion surviving increases for those receiving ART.

In addition, the model allows for the following interventions:

- Information and education campaigns (via impact on condom use)
- Syndromic management of STIs (via reduction in probability of transmission)
- PMTCT (via the probability of transmission from mother to child)
- ART (via reduced HIV mortality and a reduction in the probability of transmission)

Calibration

In order to ensure that the output from the model tracks reality, the model is calibrated to empirical evidence of the epidemic. This means that certain parameters (the percentage in the risk group and possibly the amount sexual activity and the ages at which it occurs) are altered to ensure that the output from the model (in particular the number of deaths by age and sex, and the prevalence by age and sex) match independent estimates of these output.

The ASSA model has been calibrated to fit data for each of the provinces and the country as a whole.

2.9 Ethical considerations

Participation in the survey was voluntary, with informed consent for answering the questions on the forms and for collecting the blood samples. For reasons of confidentiality, testing was done on anonymous unlinked samples. A unique bar code was allocated to each of the participants and it is this number that was recorded on the form and also used for labelling the blood samples and linking laboratory results with demographic data. The bar code was used to link the demographic information with the laboratory results while maintaining anonymity of the survey participant. For future surveys, a revised proposal will be submitted to the MRC Ethics Committee to request that the results of all HIV positive women be communicated to the clinic to ensure that each woman is aware of her status and is provided with a choice to participate in the PMTCT programme, without the survey investigators knowledge of her identity.

2.10 Reliability of this report results

To ensure that we publish a robust report which provides reliable scientific evidence the National DoH does the following:

1. Continuously liaises with the scientific HIV Surveillance Task Team
2. Uses a reliable DHIS data, capturing and verification management tool to ensure data validity and plausibility.
3. Revises the protocol with the provincial survey coordinators and laboratory technicians annually before the implementation of the next survey
4. Receives critical technical inputs from experts in different fields of Public Health
5. The report goes through a thorough scientific peer-review process
6. Data is subjected to internal and external independent scientific analysis including 4 internationally renowned Epidemiologists, Bio-Statisticians, DoH directorate technical staff, WHO HIV Specialists, UNAIDS HIV M&E Specialists and Statisticians, MRC and UCT.

3. 1. RESULTS – HIV PREVALENCE

3.1 Characteristics of Survey Population

This section of the report will firstly present the characteristics of the survey population, and secondly the association between HIV prevalence in relation to demographic factors collected when the women were interviewed by nurses before collecting the biological specimens. Third, this section will present the descriptive summary of HIV prevalence at national and provincial level, by district and by age distribution.

3.1.1 Participation

Facility and individual level

A total of 32 225 out of the targeted 36 000 pregnant women attending antenatal care sentinel clinics, at selected public health facilities in the nine provinces (Table 1), representing the 52 health districts in South Africa participated in the survey during October 2010. The sample population realization rate was 90.0% with women recruited from 1 424 sentinel clinics. The number of pregnant women who participated in the survey by district in 2010 ranged from 76 in Namaqua district to 2 656 in the Cape Metropole, as shown in Annexure 1.

Table 1: Sampled population distribution at national and provincial level, 2008 to 2010.

Province	2008		2009		2010	
	N	%	N	%	N	%
Eastern Cape	4 220	12.4	4 225	12.9	3 994	12.4
Free State	2 016	5.9	2 336	7.1	2 223	6.9
Gauteng	7 500	22.1	7 187	21.9	6 714	20.8
Kwa-Zulu Natal	6 985	20.5	6 744	20.5	6 887	21.4
Limpopo	3 908	11.5	3 412	10.4	3 117	9.7
Mpumalanga	2 224	6.5	2 049	6.2	2 202	6.8
North West	2 113	6.2	2 227	6.8	1 963	6.1
Northern Cape	1 113	3.2	1 002	3.0	1 144	3.6
Western Cape	3 848	11.3	3 679	11.2	3 981	12.4
National	33 927	100.0	32 861	100.0	32 225	100.0

N = Realized sample size.

3.1.2 The demographics characteristics of the sample population

3.1.2.1 National participation rate by age

Age is an important risk factor and is central to monitoring the epidemic among the highly sexually active group. The HIV prevalence in the 15 - 24 year age group is crucial when reporting the outcome of the MDG 6, Target 7, indicator 18. The age pattern of the women recruited in the survey was similar to the previous three surveys (Table 2) as described later in the results section.

The age distribution of pregnant women who participated ranged from girls aged 10 years to women aged over 50 years as shown below in Table 2 and Figure 2 below. The antenatal distribution in the past 4 surveys, was concentrated in the 20-24 year old age group, which was more than 30% of the survey population. Antenatal women older than 39 years and younger than 15 years were under-represented in the survey compared to the 15 to 39 year old. Seven (7) pregnant women were more than 50 years old. Pregnant women above 40 years and under 15 years are classified as the high risk pregnancy group.

Table 2: National participation by age group, 2008 to 2010.

Age group	2008		2009		2010	
	N	%	N	%	N	%
<15	138	0.4	114	0.3	121	0.4
15- 19	6 589	19.4	6 143	18.7	6 171	19.2
20 – 24	10 539	31.1	10 224	31.1	9 723	30.2
25 – 29	8 082	23.8	7 864	23.9	7 939	24.6
30 – 34	4 966	14.6	4 776	14.5	4 690	14.6
35 – 39	2 717	8.0	2 650	8.1	2 498	7.8
40 – 44	707	2.1	732	2.2	703	2.2
45 – 49	82	0.2	82	0.2	58	0.2
>49	5	0.0001	6	0.00	7	0.02
Not specified	102	0.3	270	0.8	315	1.0
Total	33 927	100.0	32 861	100.0	32 225	100

N = Realized sample size.

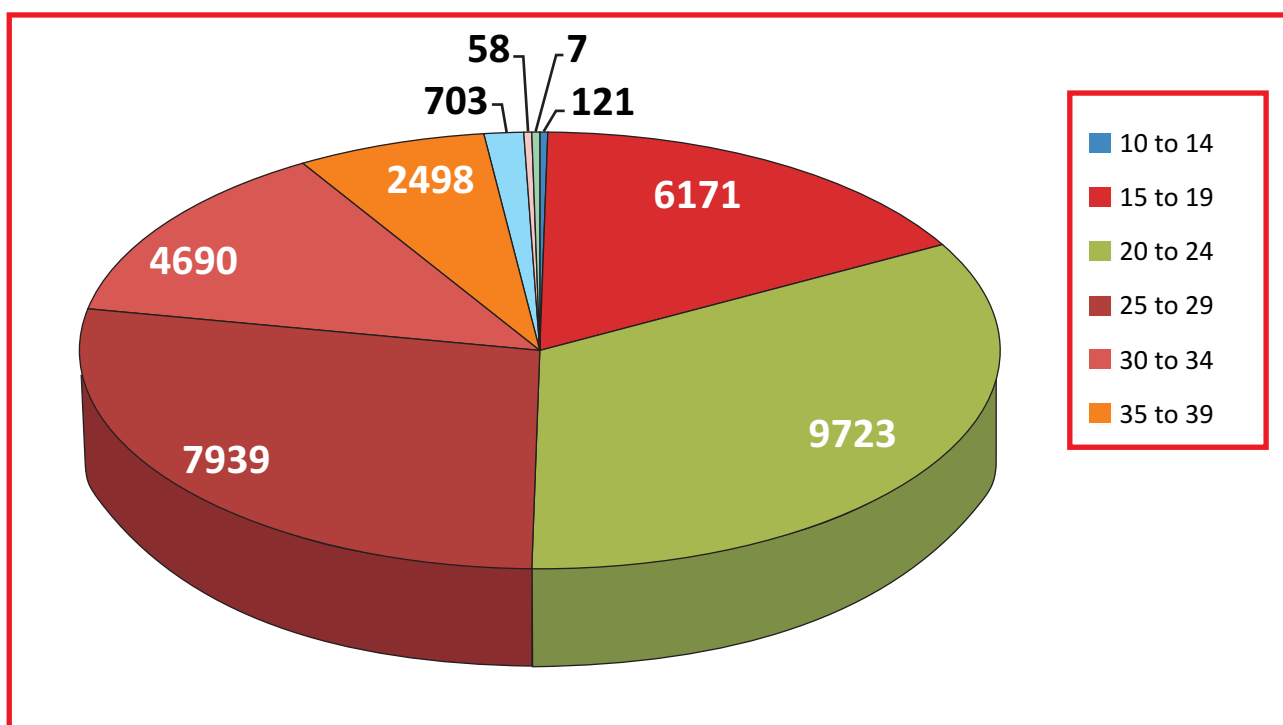


Figure 2: National distribution of survey participants by age group, 2010

3.1.2.2 National participation by population group

The distribution by race of the women recruited in the 2010 survey was similar to the previous three surveys as shown in Table 3. Eighty eight percent (88.5%) of the survey participants were African women, while 9.1% were Coloured. Asians and Whites together accounted for less than 1% of the total tested, and 1.4% were not specified. The number of Asians and Whites who participated was too small to provide reliable estimates for these two population groups.

Table 3: National participation by population group from 2008 to 2010.

Population Group	2008		2009		2010	
	N	%	N	%	N	%
African	30 502	89.9	29 062	88.4	28 533	88.5
Asian	149	0.4	185	0.6	144	0.5
Coloured	2 930	8.6	2 783	8.5	2 930	9.1
White	140	0.4	176	0.5	166	0.5
Not specified	206	0.7	655	2.0	452	1.4
Total	33 927	100	32 861	100.0	32 225	100.0

N = Realized sample.

3.1.3 HIV prevalence in relation to various demographic and background characteristics of the survey participants

There are a number of variables that either alone or in combination promote or prevent the risk of acquiring HIV infection. The precise linkages between these different risk factors for the disease are difficult to ascertain and to separate from the effects of other variables. The antenatal survey is not designed to collect comprehensive data on potential risk factors. However, it does include the collection of a number of discrete demographic variables.

3.1.3.1. Participants knowledge of their own HIV status

Analysis of Table 4 indicates that a high percentage (58.1%) of the survey participants knew their HIV status, of these 65.0% were HIV infected. The 35% did not know their HIV status, of these, 26.9% were found to be HIV positive. There were significant differences between provinces regarding the percentage of women who said they knew their HIV status, with women from Gauteng having the lowest percentage of 57% compared with 77% of women from KwaZulu-Natal.

3.1.3.2. HIV prevalence and marital status

More than 75% of the survey participants were single women, of which 31.2% were HIV infected, only 19.6% of the 32 225 pregnant women were married and 25.1% of these were HIV infected. Furthermore, thirty nine per cent (39%) of the 105 divorced women who participated in the survey were also HIV infected (Table 4).

3.1.3.3. HIV prevalence by level of education

The majority (76.4%) of the survey participants had secondary school qualifications with 30.2% of them being HIV positive. These findings showed that most women had the same HIV risk exposure, irrespective of their level of education (Table 4).

3.1.3.4. HIV prevalence and parity

HIV prevalence was higher (37%) among women who had two children before this pregnancy than women who had more, particularly those who had more than 6 children (Table 4).

Table 4. Association between the demographic and background characteristics and HIV outcome status of survey participants, 2010.

Variable	Level	N	% HIV Prev.
Population group	African	28 533	32.5
	Asian	144	7.1
	Coloured	2 930	7.0
	White	166	3.0
Level of Education	None	562	33.5
	Primary	3 786	33.3
	Secondary	24 627	30.2
	Tertiary	2 576	22.7
Marital Status	Single	24 802	31.2
	Married	6 317	25.1
	Widowed	72	41.7
	Divorced	105	39.0
Parity Number of Live born children	none	12 805	20.7
	1	10 531	35.9
	2	5 324	37.7
	3	2 146	34.9
	4	763	33.4
	5	301	26.9
	6	110	28.2
	More than 6	71	21.4
Age of Partner	<15	2	50
	15 - 19	280	23.4
	20 - 24	1 745	34.2
	25 - 29	3	38.9
	30 - 34	301	42.2
	35 - 39	1 037	40.2
	40 - 44	66	25.8
	>45	2	1.0
Aware of their HIV status	Yes	20 943	65.0
	No	10 173	35.0

3.1.3.5. HIV prevalence by partner's age

We assessed HIV prevalence by report of current partner's age (Table 4). The age of partners for the survey participants ranged from 14 years to 75 years. The greatest likelihood of being HIV infected was in women who had partners aged 22 years to 49 years.

3.2 National HIV prevalence trends (1990 – 2010)

In 2010, the overall HIV prevalence amongst antenatal women who presented for their first antenatal care visit in October in public health clinics was 30.2% (95% CI: 29.4 – 30.9). The estimated national HIV prevalence amongst the women surveyed has remained stable over the past four years: 29.1% in 2006; 29.4% in 2007, 29.3% in 2008 and 29.4% in 2009 and has increased by 0.8% to 30.2% in 2010. The HIV prevalence trends from 1990 to 2010, show that the Error Bars between 2007 to 2010 overlap, which indicates that there is no statistical difference in the HIV estimates in the past 3 years as shown in Figure 3.

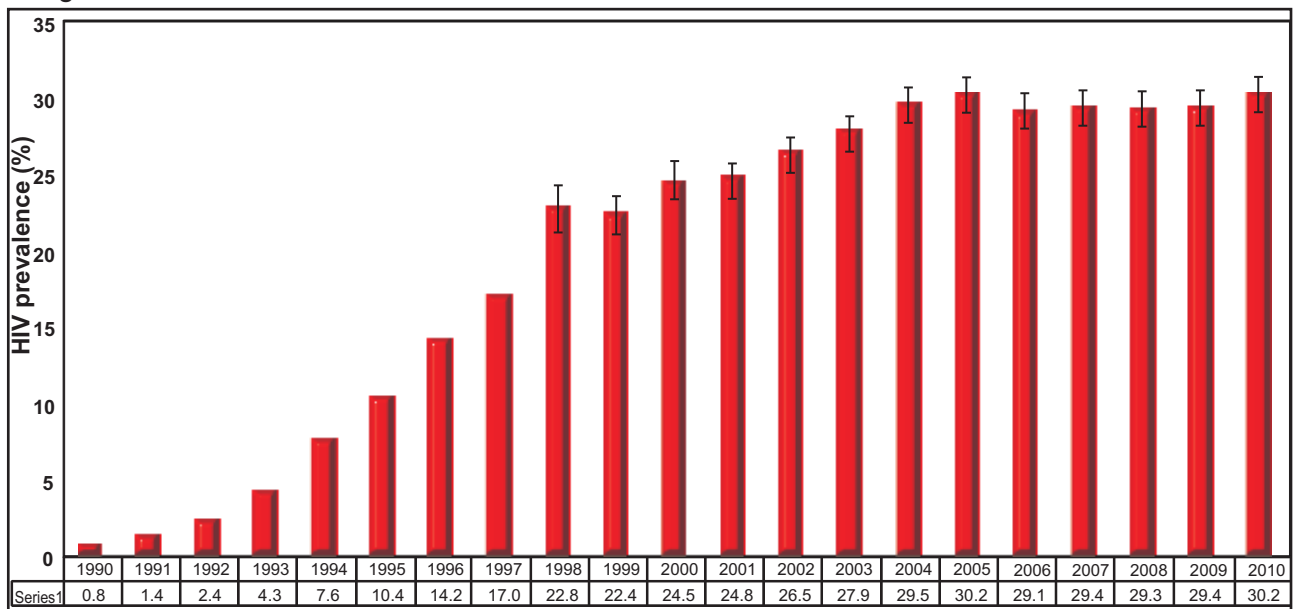


Figure 3: HIV prevalence trends among antenatal women, South Africa 1990 to 2010. The estimates from 2006 are based on a different sample to the previous years.

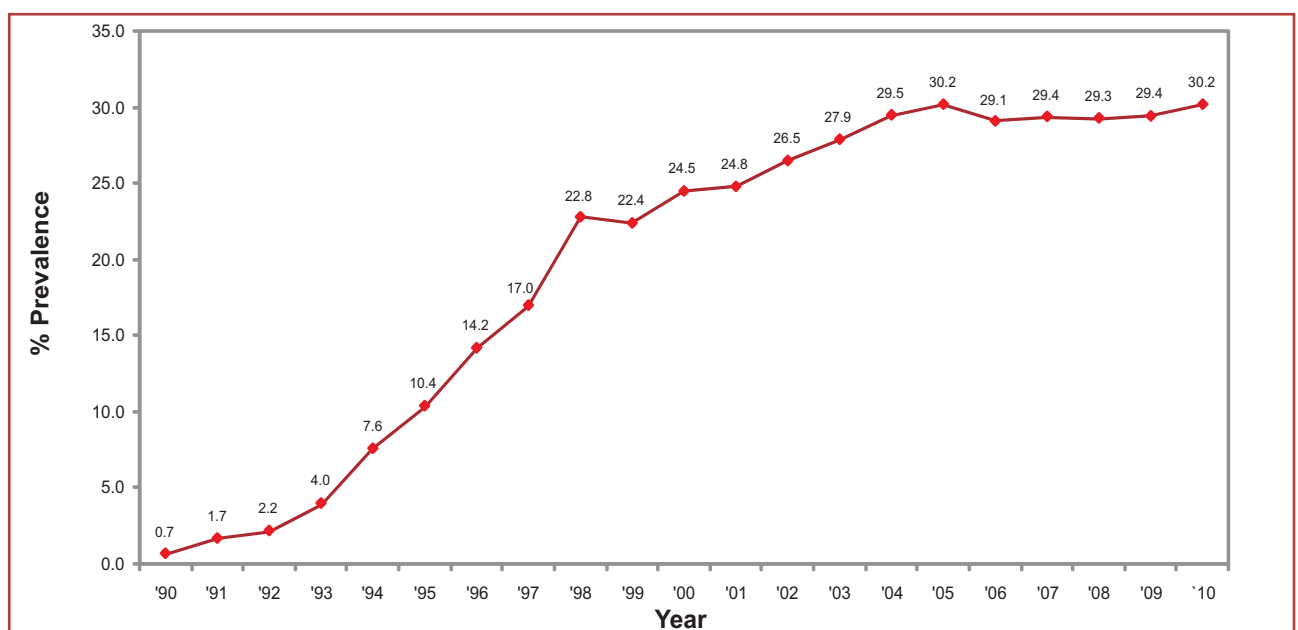


Figure 4: HIV prevalence epidemic curve among antenatal women, South Africa, 1990 -2010

3.3 HIV prevalence by province, 2008 to 2010

The results of this survey are used to estimate the HIV prevalence in the entire population based on assumptions. The provincial HIV prevalence estimate have remained largely unchanged when compared to 2009. However, these changes are not statistically significant and form part of the unusual variance with sampling variability. The point prevalence estimate may be “higher” and “lower” in some cases relative to 2009. In the past twenty years the highest HIV prevalence among the 15-49 year olds has been recorded in KZN which remained stable at 39.5% in 2009 and 2010. Provinces with 'higher' HIV prevalence estimates in 2010 compared with 2009 were: EC, LP, MP, NC, GA, FS and WC. Their estimates were also within the expected sampling variability (Figure 5). These small increases fell within the expected sampling variability. The only province with 'lower' HIV prevalence estimate was North West and Free State. The HIV prevalence in the Western Cape has increased significantly (because of the large sample size) from 16.9% in 2009 to 18.5% in 2010 .

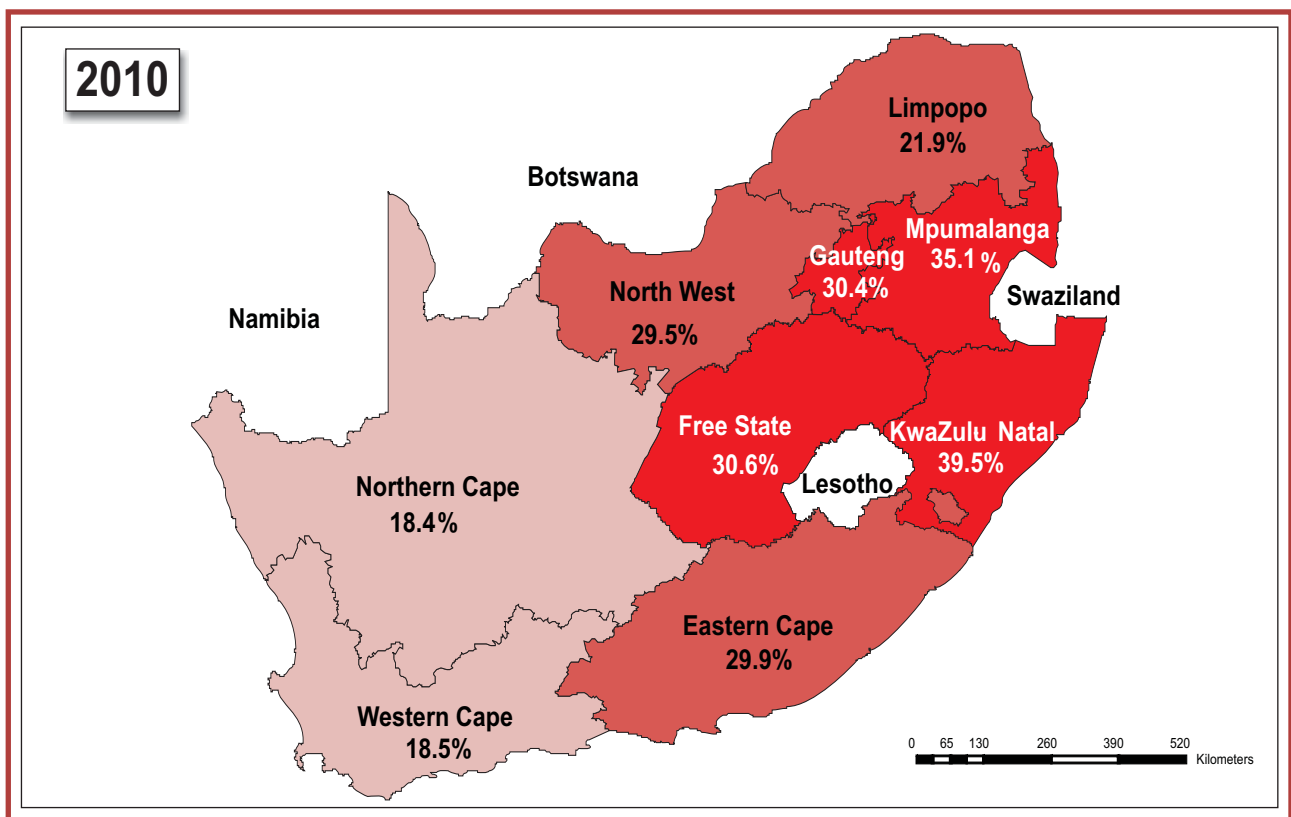


Figure 5: HIV prevalence distribution by province, South Africa, 2010

The results still show that the highest HIV prevalence rates are located in the Central and Eastern parts of the country, and the lowest prevalences in the Western Cape, Northern Cape and Limpopo.

KwaZulu-Natal has the highest HIV prevalence followed by Mpumalanga and Free State and Gauteng with overall prevalences greater than 30.0%. North West, Limpopo, the Eastern Cape recorded prevalences between 20.0% and 30.0% and Northern Cape and Western Cape are the only provinces that have HIV prevalences below 20.0% (Table 5 and Figure 5).

Table 5: The HIV prevalence (%) among antenatal women by province, 2008 to 2010. N = total

Province	2008			2009			2010		
	N	% HIV+	95% CI	N	% HIV+	95% CI	N	% HIV+	95% CI
Eastern Cape	4 216	27.6	25.6 – 29.6	4 225	28.1	26.1 – 30.1	3 994	29.9	28.2 – 31.7
Free State	2 016	32.9	30.5 – 35.3	2 336	30.1	28.1 – 32.1	2 223	30.6	28.3 – 33.0
Gauteng	7 498	29.9	28.4 – 31.2	7 187	29.8	28.6 – 31.1	6 714	30.4	29.1 – 31.8
KwaZulu-natal	6 963	38.7	37.2 – 40.1	6 744	39.5	38.1 – 41.0	6 887	39.5	38.0 – 41.0
Limpopo	3 835	20.7	19.1 – 22.4	3 412	21.4	19.7 – 23.1	3 117	21.9	20.3 – 23.6
Mpumalanga	2 224	35.5	33.1 – 37.8	2 049	34.7	32.5 – 36.9	2 202	35.1	32.6 – 37.7
North West	2 112	31.0	28.8 – 33.3	2 227	30.0	27.5 – 32.6	1 963	29.6	27.3 – 31.9
Northern Cape	1 111	16.2	13.7 – 18.9	1 002	17.2	14.3 – 20.5	1 144	18.4	16.1 – 21.1
Western Cape	3 828	16.1	12.6 – 20.2	3 679	16.9	13.8 – 20.5	3 981	18.5	15.1 – 22.5
South Africa	33 803	29.3	28.5 – 30.1	32 861	29.4	28.7 – 30.2	32 225	30.2	29.4 – 30.9

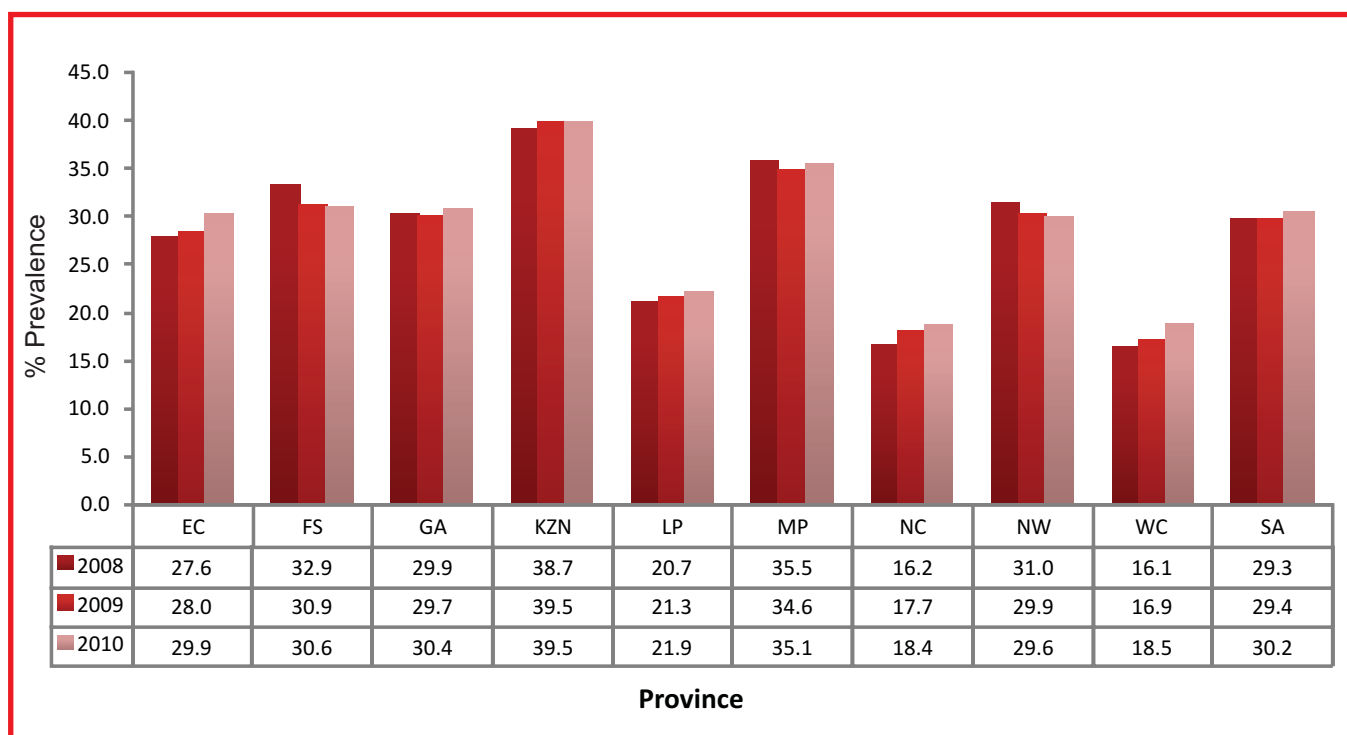


Figure 6: HIV prevalence trends among antenatal women by province, South Africa, 2008 - 2010.

3.4 HIV prevalence by district, 2008 to 2010

The WHO/UNAIDS HIV Reference group has recommended categorization of the HIV epidemic (for the purpose of targeting surveillance efforts) as follows:

1. Concentrated epidemic, with HIV concentrated in high risk populations;
2. Low-level epidemic where HIV prevalence is less than 1.0% in the general population and less than 5% in high risk populations.
3. Generalized epidemic where the prevalence in the general population is above 1%.

In 2010 there was no single district that recorded prevalence below 8%. Five districts located in KwaZulu-Natal recorded HIV prevalence above 40%. **The number of districts recording prevalences between 30% and 40 % has increased from 14 out of 52 in 2009 to 21 out of the 52 districts in 2010** (Figure 7 and 8).

In 2009, twenty one (21) districts, recorded HIV prevalences **above the national average** compared to 23 out of the 52 districts in 2010. There were 31 out of 52 districts that recorded HIV prevalences **below the national average** of 29.4% in 2009 compare to 28 out of 52 districts in 2010 (Figure 8).

The HIV prevalence distribution among antenatal women by district, from 2007 to 2010 is shown in Figure 9 a-d. There was considerable variation in HIV prevalences between the 52 health districts observed over this four year period, particularly where the sample size in a district was small, making it difficult to interpret any trends.

The districts are clearly heterogeneous with respect to the epidemic, with prevalences ranging from a high of 42.3% in uMgungundlovu and iLembe in KZN to a low of around 8.5% in Central Karoo in the Western Cape. When data are pooled over the four years this heterogeneity persists.

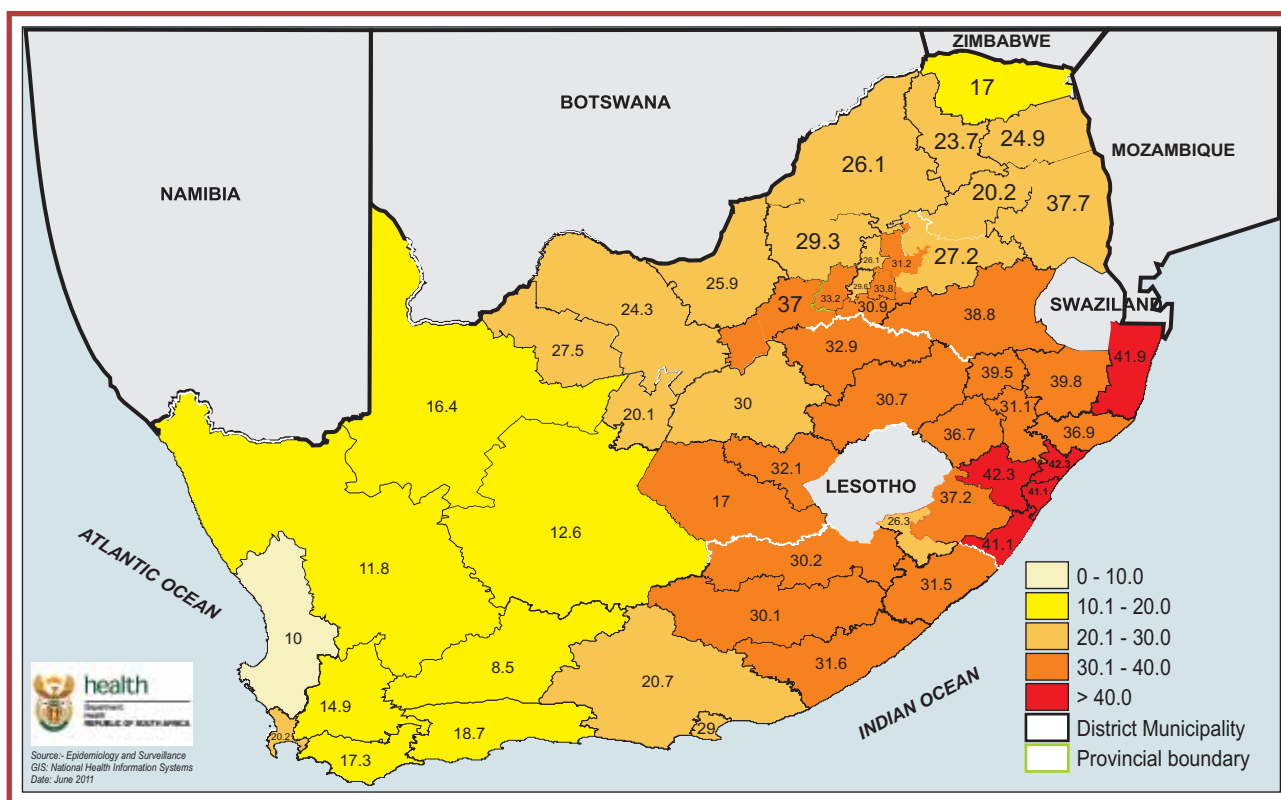


Figure 7: Map of the HIV prevalence distribution pattern among antenatal women in the 52 Health districts in South Africa, 2010.

In 2010, four health districts, all located in KwaZulu-Natal recorded the highest HIV prevalence ranging between 41.1% and 42.3%. Two out of three districts in Mpumalanga recorded high prevalence levels of 37.7% in Ehlanzeni and 38.8% in Gert Sibande.

Dr. Kenneth Kaunda is the only district among the four in North West that recorded an HIV prevalence of 37.7% and the other three recorded prevalence rate of between 24.3% in Dr. Ruth S. Mompati and 29.3% in Bojanala.

The Western Cape has, for the first time (in 2010), recorded district prevalences of above 20% (Figure 7).

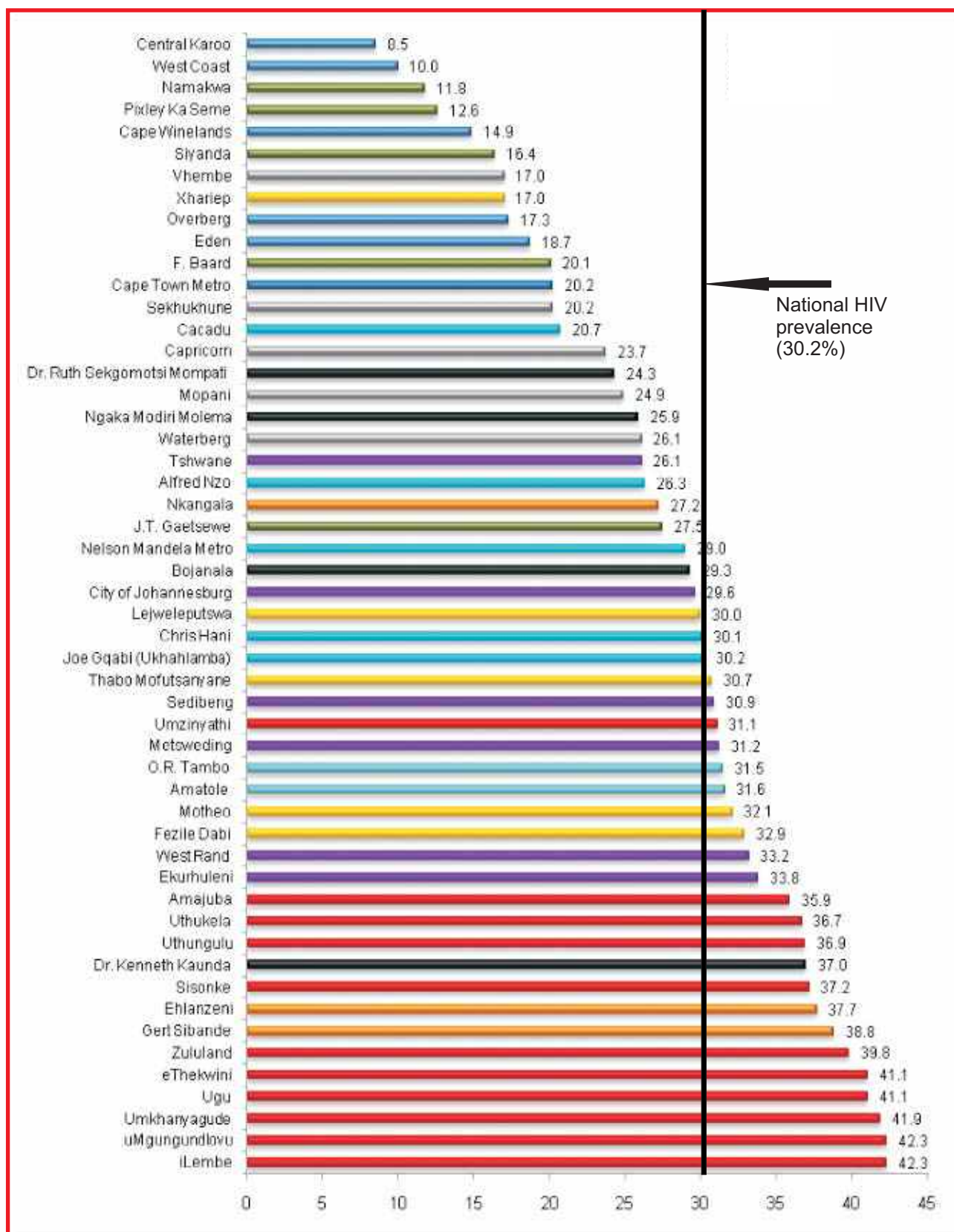


Figure 8: HIV prevalence among antenatal women by district, South Africa, 2010.

3.5 HIV prevalence by age

The age group 15-24 years is the most important indicator to use for providing evidence when monitoring HIV incidence (new infections). HIV prevalence in this age group has been suggested as a proxy measure for incidence because of sexual onset and hence prevalent infections are assumed to be recent while this age group is less likely to be affected by AIDS mortality. The HIV prevalence among the 15 - 24 year old pregnant women was 21.7% in 2008 compared with 22.1 % in 2007, a decline of 0.4%. In 2010, the South African MDG (15-24 year old pregnant women) baseline HIV prevalence was 21.8%. This MDG group constituted almost 50% (N = 16 367) of the survey population. The specific MDG target is that by 2015 the expected HIV prevalence reduction (by two thirds) should be 75% (to two-thirds) less than the baseline prevalence in of 23.1% in 2001, to an expected MDG target of 5.3% in 2015. The findings of monitoring trends in this age group in South Africa show that efforts to achieve the MDG target must be significantly strengthened (Figure 10).

There was a slight increase in HIV prevalence rates in the age group 15 -19 years, from 13.1% in 2007 to 14.1% in 2008. There was a slight decrease in HIV prevalence among young women in the age group 15 - 19 years from 14.1% in 2008 to 13.7% in 2009, an increase of 0.3% to 14.0% in 2010 however these increases were not statistically significant (Figure 11 and Table 6).

The higher prevalence in older age groups could partly be explained by ART use but it is very worrying that the trend in young people (15-24 years) has not shown a significant decline (the HIV prevalence in this age group should not be much affected by ART). This age group will be used as proxy to monitor new infections in a parallel survey targeting the pregnant women under fifteen years old. It becomes more important, that triangulation of the ART data be included in future surveys and reports, in order to understand the age patterns of HIV infected patients receiving ART.

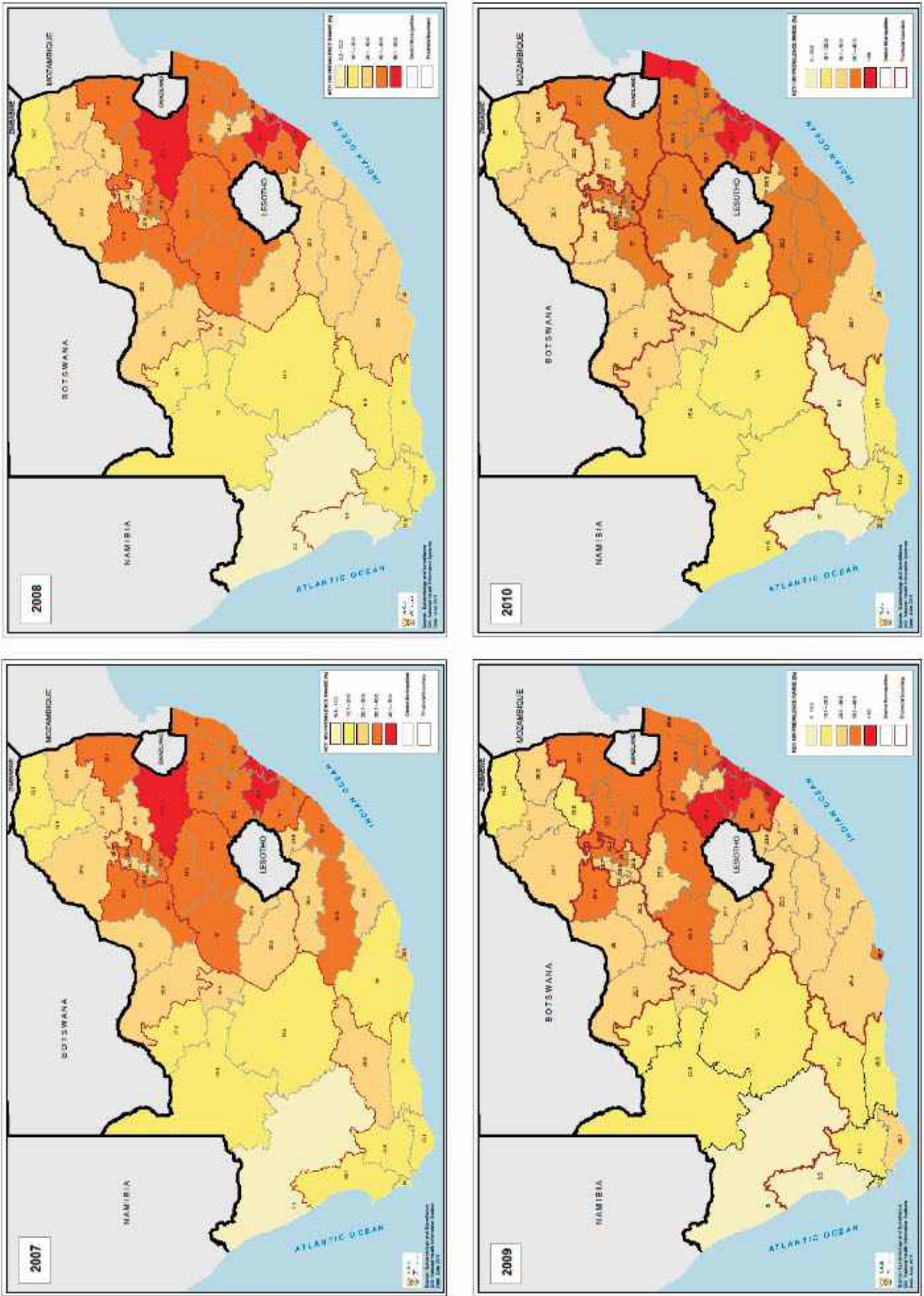


Figure 9 a-d HIV prevalence by district among 15-49 years antenatal women in 2007, 2008, 2009 and 2010.

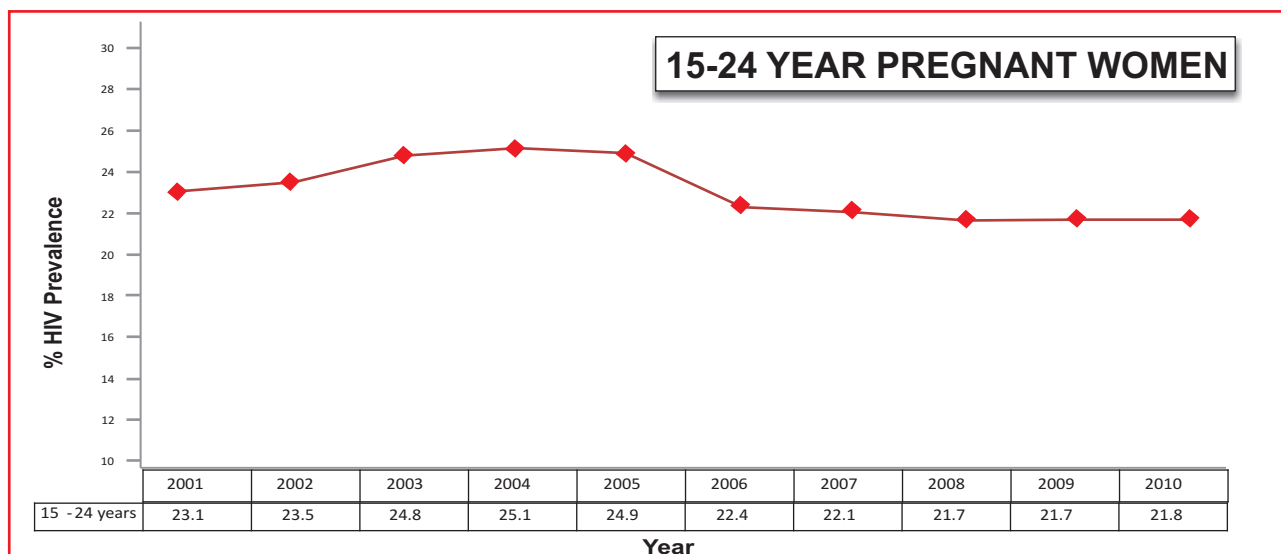


Figure 10: The 15-24 year old antenatal women HIV prevalence (MDG 6, Target 7, indicator 18) from 2001 to 2010. The MDG Target for 2015, is to reduce the HIV prevalence amongst this age group by 75% which is equivalent to 5.3%.

Table 6: The HIV prevalence trend among antenatal women in South Africa, 2008- 2010. N= Sampled population; CI= 95% Confidence Interval.

Age group	2008			2009			2010		
	N	% HIV +	95% CI	N	% HIV +	95% CI	N	% HIV +	95% CI
10 - 14	138	7.3	3.6 - 13.0	114	7.9	3.7-14.6	121	9.1	5.12– 15.8
*15 - 24	17 065	21.7	21.0 – 22.3	16	21.7	20.9 - 22.5	15 894	21.8	21.0– 22.6
15 -19	6 563	14.1	13.1 – 15.0	6 143	13.7	12.9 -14.7	6 171	14.0	13.1– 14.9
20 – 24	10 502	26.9	25.9 – 27.9	10	26.6	25.6 - 27.6	9 723	26.7	25.7– 27.8
25 – 29	8 051	37.9	36.4 – 39.3	7 864	37.1	35.8 - 38.4	7 939	37.3	36.0– 38.7
30 – 34	4 465	40.4	38.7– 42.0	4 776	41.5	39.9 - 43.1	4 690	42.6	40.9– 44.2
35 – 39	2 712	32.4	30.5 – 34.3	2 650	35.4	33.5 - 37.3	2 498	38.4	36.3– 40.5
40 – 44	702	23.3	20.3 – 26.6	732	25.6	22.5 - 29.0	703	30.9	27.5– 34.5
45 – 49	82	17.6	10.7 – 27.7	82	23.9	15.8 - 34.6	58	28.2	18.1– 41.2

* Prevalence among the age group 15 – 24 years used as an indicator for goal 6 of the MDG
Source: Antenatal Sentinel HIV Survey, National Department of Health

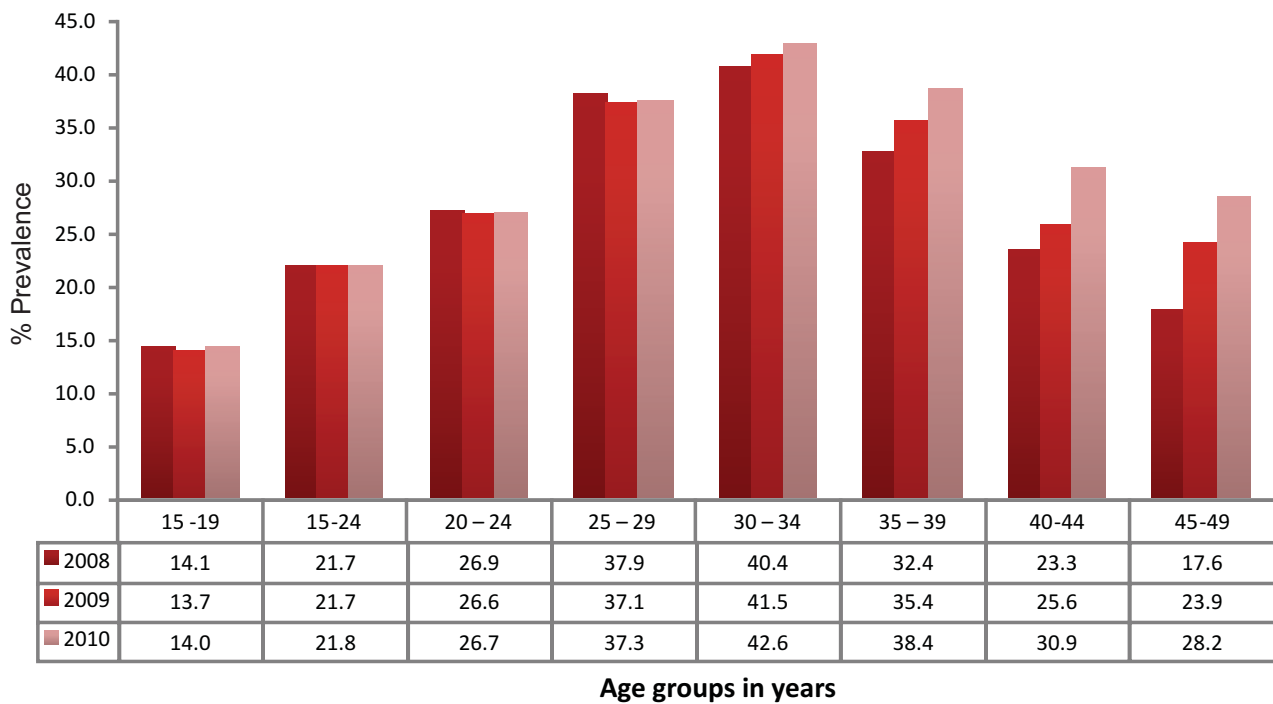


Figure 11: HIV prevalence trends among antenatal women by age group, South Africa, 2008 to 2010.

Nationally, the HIV prevalence among women in the age group 30 - 34 years remains the highest from 40.4% in 2008 to 42.6% in 2010. This age group constituted 14.6% of the sampled survey population.

The age groups 15 – 19yrs, 20 – 24yrs and 25 – 29yrs show a small increase in HIV prevalence whereas the older age groups show significant increase. The HIV prevalence in the age group 35 - 39 years has increased significantly by 9.1% in the last four years from 29.3% in 2006 to 32.4% in 2008 and 38.4% in 2010 (Figure 11).

The HIV prevalence among women under 30 years has stabilized in the four age-specific intervals since 2006 while the prevalence in the women above 30 years continues to increase significantly (Table 6).

3.6 HIV prevalence trends by individual province

For each province, comparison of the provincial, district level and age distribution HIV prevalences are reported from 2008 to 2010. **Due to the smaller sample size in some districts, the sampling error is much larger than at the provincial level. Therefore changes of 4% in either direction between the years within a district can be expected due to chance, if the sample size was less than 500, and even greater for smaller sample sizes.**

3.6.1 THE EASTERN CAPE PROVINCE

In 2010, the Eastern Cape provincial HIV prevalence amongst antenatal women was 29.9% (95% CI: 28.2 – 31.7). The estimated overall HIV provincial prevalence in this province has increased by 2.3% from 27.6% in 2008 to 29.9% in 2010, as shown by the epidemic curve (Figure 12). The trends in district prevalence rates from 2008 to 2010 are presented in Table 7.

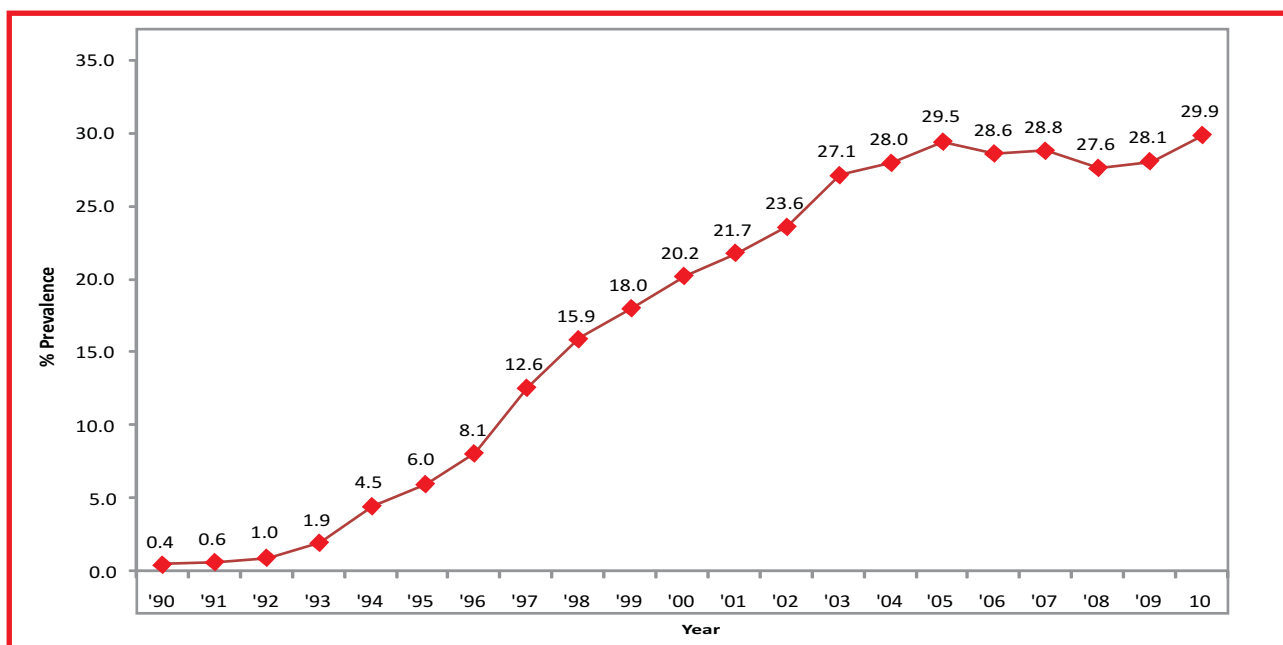


Figure 12: HIV prevalence epidemic curve among antenatal women, Eastern Cape from 1990 to 2010

Table 7 HIV prevalence among antenatal women by district in the Eastern Cape, 2008 - 2010.

YEAR	2008			2009			2010		
	N	%HIV+	95% CI	N	%HIV+	95% CI	N	%HIV+	95% CI
Provincial	4 216	27.6	25.9 – 29.6	4 225	28.1	26.1 – 30.1	3 994	29.9	28.2 – 31.7
Alfred Nzo	201	29.8	22.3 – 38.6	186	23.7	16.3 – 33.0	133	26.3	21.5 – 31.8
Amatole	1 128	26.5	23.0 – 30.3	1 116	27.2	24.5 – 30.2	1 029	31.6	28.7 – 34.6
Cacadu	281	23.8	17.7 – 31.2	255	24.3	16.4 – 34.5	275	20.7	14.8 – 28.2
Chris Hani	529	27.0	22.9 – 31.5	491	27.1	23.1 – 31.4	548	30.1	26.5 – 34.0
N.M.M.	795	29.0	23.4 – 35.4	785	30.7	24.0 – 38.4	677	29.0	23.6 – 35.0
O.R. Tambo	1 063	29.6	26.2 – 33.2	1 192	29.8	27.1 – 32.6	1 097	31.5	28.5 – 34.7
Joe Gqabi (Ukhahlamba)	219	21.9	15.2 – 30.5	200	23.5	16.0 – 33.2	235	30.2	23.4 – 38.0

N = Realized sample; CI= Confidence Interval.
Source: Antenatal Sentinel HIV Survey, National Department of Health

In 2010 there were four districts in the Eastern Cape that recorded HIV prevalence above 30%. Only one district i.e. Cacadu where the HIV prevalence decreased from 24.3% in 2009 to 20.7% in 2010. The decrease HIV prevalence in Cacadu district is encouraging, however the sample size is too small to draw any statistical conclusions in the trends recorded (Figure 13 and Table 7).

As might be expected, significant year on year changes were observed in the districts with smaller sample sizes). The HIV prevalence in Joe Gqabi district (formerly known UKhahlamba significantly increased by 8.3%, from 21.9% in 2008 to 30.2% in 2010.

The O.R. Tambo and Chris Hani district HIV prevalence rate have slightly increased from 29.6% in 2008 to 31.5% in 2010 and 27.0% in 2008 to 30.1% in 2010 respectively, which is nearly equal to the national overall prevalence of 30.2%. Alfred Nzo, Amatole and Nelson Mandela Metro have recorded increased HIV prevalences in 2010 than 2009 (Table 7).

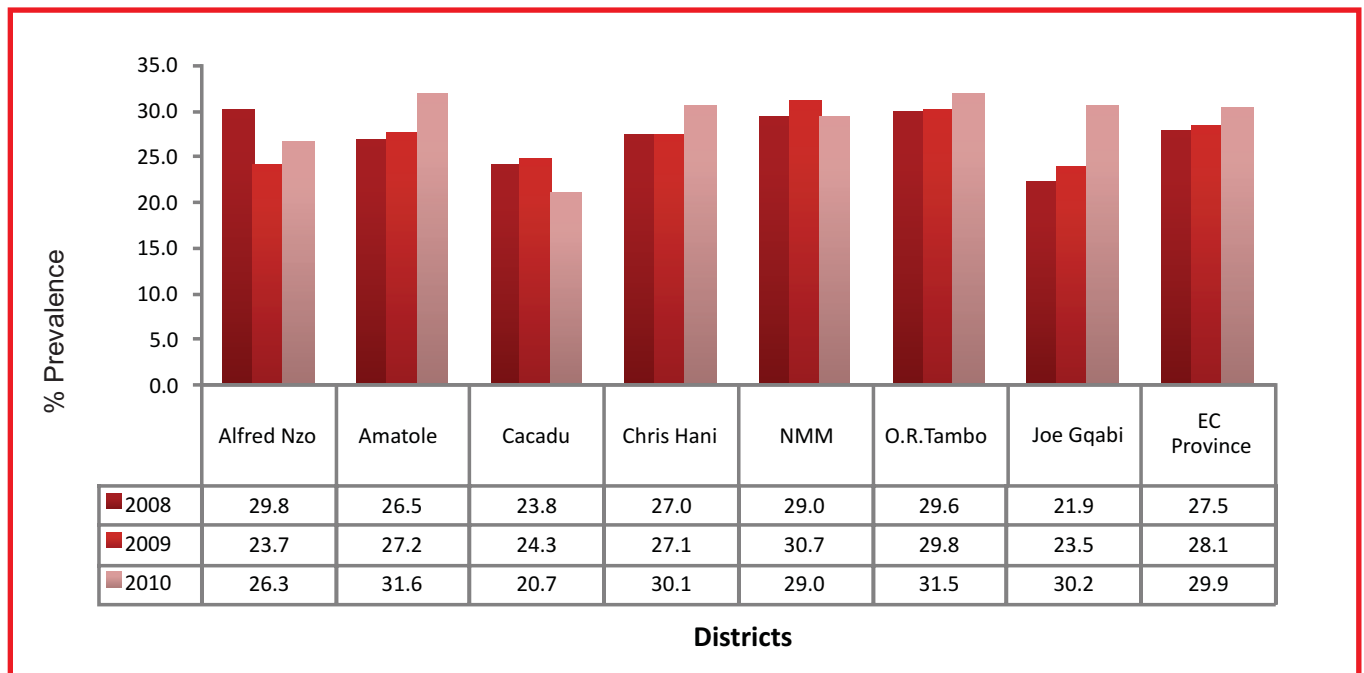


Figure 13: HIV prevalence trends among antenatal women by district, Eastern Cape, 2008, 2009, 2010

Table 8: HIV prevalence among antenatal women by age group, Eastern Cape, 2008 to 2010.

YEAR Age group	2008		2009		2010	
	N	%HIV+	N	% HIV+	N	%HIV+
*15 - 24	2 196	22.8	2 158	20.7	2 097	21.8
10-14	23	4.3	16	20.0	19	0.0
15 -19	930	12.6	964	12.1	907	12.0
20 – 24	1 266	30.3	1 194	27.6	1 190	29.3
25 – 29	914	36.7	908	38.2	868	39.7
30 – 34	607	35.3	624	37.0	504	44.4
35 – 39	326	25.5	341	33.7	324	34.6
40 – 44	109	16.5	109	25.7	112	28.6
45 – 49	10	0.0	15	20.0	14	21.4
>49	1	100	3	0.0	1	0.0

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the MDG.
N = Realised sample size.

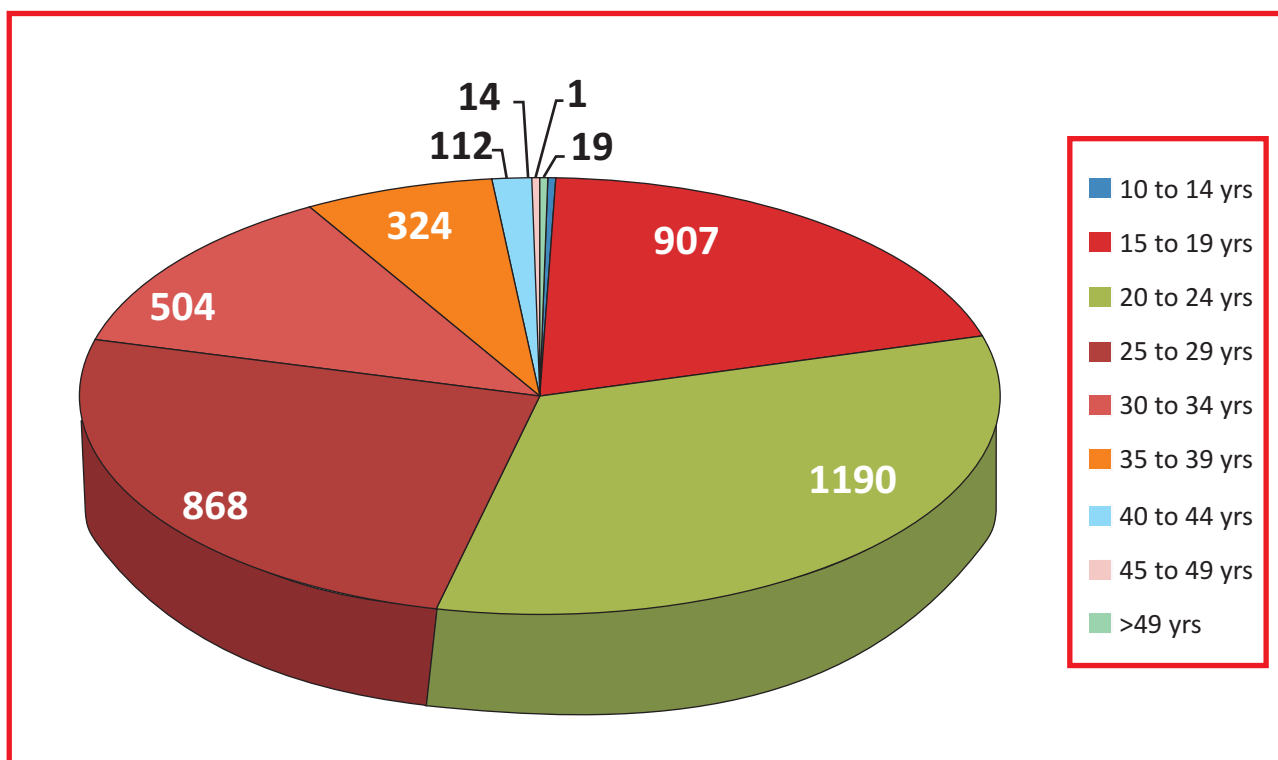


Figure 14: Sampled population distribution by age group, Eastern Cape, 2010.

The age distribution of pregnant women who participated ranged from nineteen 10 to 40 year olds. Women in these 2 extreme age categories are classified as high risk in pregnancy. The majority of the survey participants from this province were in the age group (15 – 24 years old women (Figure 14).

The HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) remained stable at around 21%, with prevalence ranging from 22.8% in 2008, to 20.7% in 2009 and to 21.8% in 2010. There was stabilization in the HIV prevalence among young women in the age group 15 - 19 years from 12.6% in 2008 to 12.1% in 2009 and 12.0% in 2010. All other age group categories in this province have shown an increase in HIV prevalence between 2009 and 2010.

The changes in HIV prevalence distribution by district in the Eastern Cape between 2008 and 2010 is shown in Figure 15.

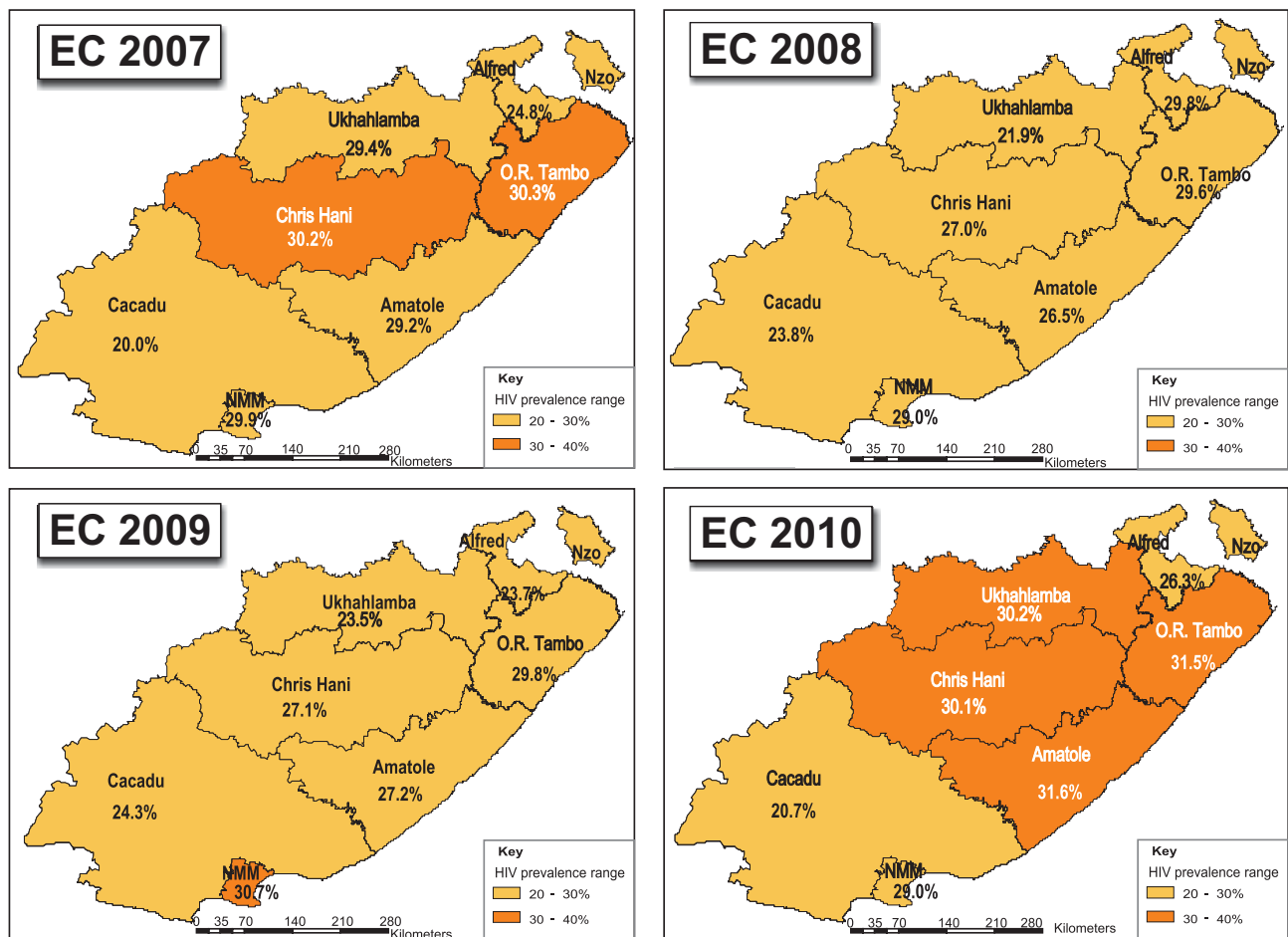


Figure 15: HIV prevalence distribution among antenatal women by district, Eastern Cape, 2007 - 2010

3.6.2 FREE STATE PROVINCE

In 2010, the Free State provincial HIV prevalence amongst antenatal women was 30.6% (95% CI: 28.3–33.0). This shows a slight increase of 0.5% from 30.1% recorded in 2009 (Figure 16).

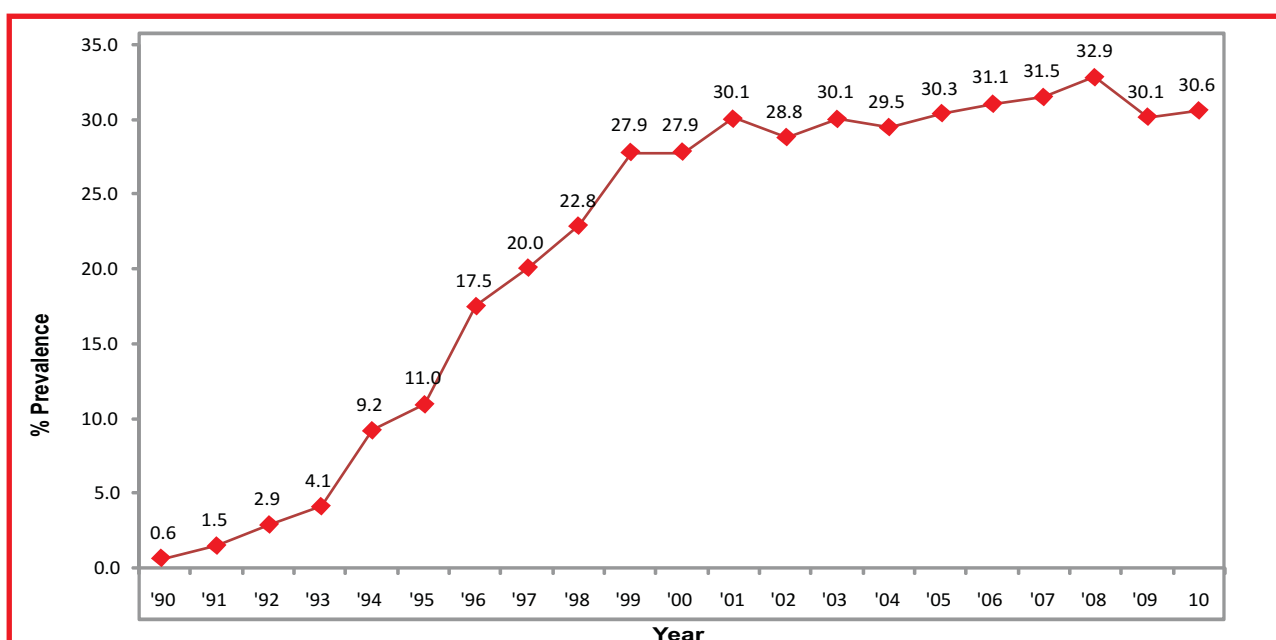


Figure 16: HIV prevalence epidemic curve among antenatal women, Free State, 1990 to 2010

Table 9: HIV prevalence among antenatal women by district, in the Free State, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	95% CI	N	% HIV+	95% CI	N	% HIV+	95% CI
Provincial	2 016	32.9	30.5 – 35.4	336	30.1	28.1 – 32.1	2 223	30.6	28.3 – 33.0
Fezile Dabi	336	34.5	29.7 – 39.6	416	27.9	24.5 – 31.5	413	32.9	28.0 – 38.3
Lejweleputswa	571	33.8	29.2 – 38.6	611	33.4	29.3 – 37.87	601	30.0	26.1 – 34.2
Motheo	486	31.6	26.6 – 37.1	601	27.8	23.7 – 32.2	545	32.1	27.2 – 37.4
Thabo Mofutsanyana	519	33.1	28.9 – 37.6	603	31.3	27.9 – 35.1	558	30.7	26.0 – 35.8
Xhariep	104	26.9	16.8 – 40.0	105	25.7	16.4 – 37.9	106	17.0	10.4 – 26.5

Source: Epidemiology & Surveillance National Department of Health

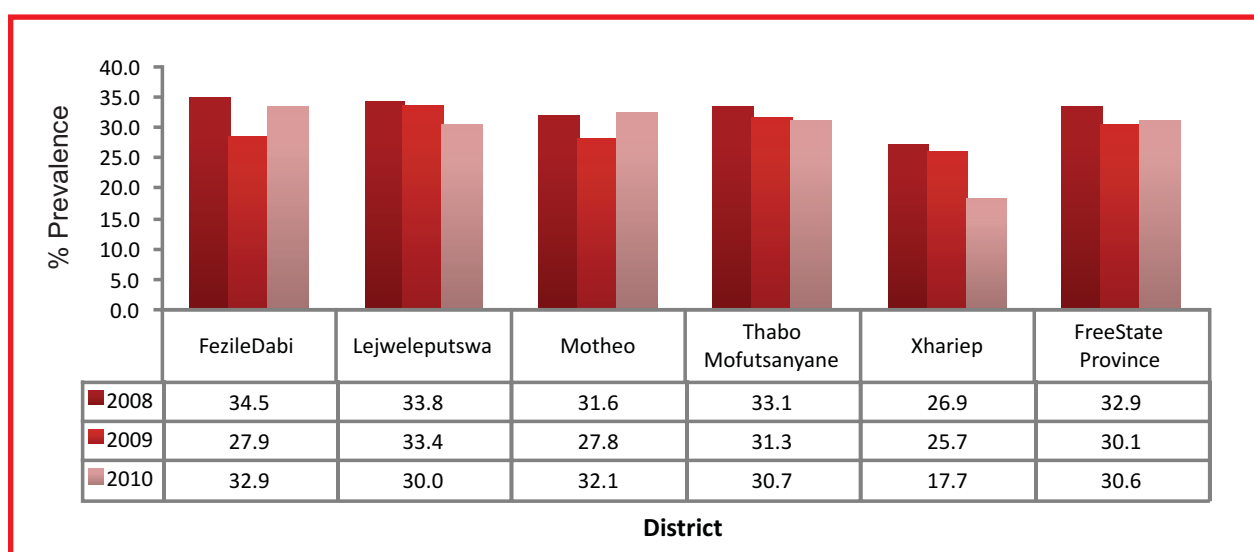


Figure 17: HIV prevalence trends among antenatal women by district, Free State, 2008 to 2010.

The Xhariep district's HIV prevalence decreased significantly by 9.9%, from 26.9% in 2008 to 17.0% in 2010. Four districts of the Free State in 2010, compared with two districts in 2009, recorded prevalence above 30%. The interpretation of HIV prevalence in districts with sample size less than 400, should be interpreted with caution.

However, Lejweleputswa and Thabo Mofutsanyane have shown slight decreases, from 33.4% in 2009 to 30.0% in 2010 and from 31.3% to 30.7% in 2010 respectively. Table 9 and Figure 17).

Fezile Dabi recorded an increase of 5.0% from 27.9% in 2009 to 32.9% in 2010, followed by Motheo with an increase of 4.3%, from 27.8% in 2009 to 32.1% in 2010.

Table 10: HIV prevalence among antenatal women by age group, Free State, 2008 to 2010.

Age group	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 - 24	1 038	22.0	1 144	21.8	1 118	21.0
10-14	8	28.0	16	0.0	14	0.0
15 -19	395	12.7	426	15.0	443	14.0
20 – 24	643	27.7	718	25.8	675	25.6
25 – 29	468	42.1	567	36.7	554	36.8
30 – 34	301	50.5	350	42.9	324	46.9
35 – 39	168	42.9	194	39.7	172	44.2
40 – 44	26	34.6	57	26.3	38	34.2
45 – 49	4	0.0	4	75.0	3	0.0
>49	**	**	**	**	**	**

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the MDG; N= Realised sample size.

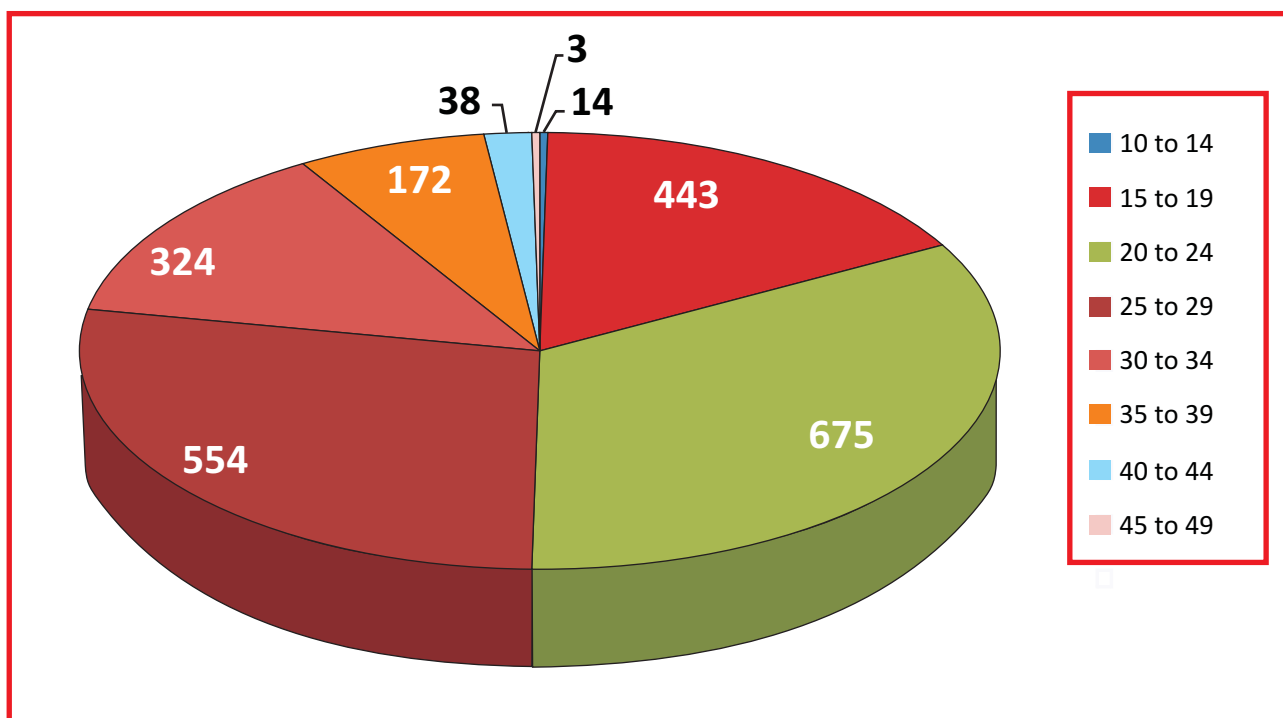


Figure 18: Sampled population distribution by age group, Free State, 2010

The age distribution of pregnant women who participated in the 2010 survey ranged from 10-14 years old to above 40 years of age. The majority of the participants in the Free State survey were women aged 20 – 24 years (Figure 18).

The HIV prevalence rates among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18) in this province was 22.0% in 2008, 21.8% in 2009 and 21.0% in 2010. This group constituted almost 55% of the survey population. There was a slight decrease in HIV prevalence among young women in the age group 15 - 19 years, from 15.0% in 2009 to 14.0% in 2010, a decline of 1.0% (Table 10).

The HIV prevalence among women in the age group 30 - 34 years remains the highest, with a 4.0% increase in prevalence, from 42.9% in 2009 to 46.9% in 2010. This age group constituted 14.0% of the sampled survey population. In 2008 the HIV prevalence among the 30-34 year old age group was 50.5% in the Free State province (Figure 17 and Table 9).

The HIV prevalence in the age group 35 - 39 years has increased by 5.0% from 39.7% in 2009 to 44.2% in 2010. When comparing the HIV prevalence in the different age categories with previous years, it has gone up slightly in all age groups.

The change in HIV infection and distribution in the Free State from 2008 to 2010 is shown in Figure 19.

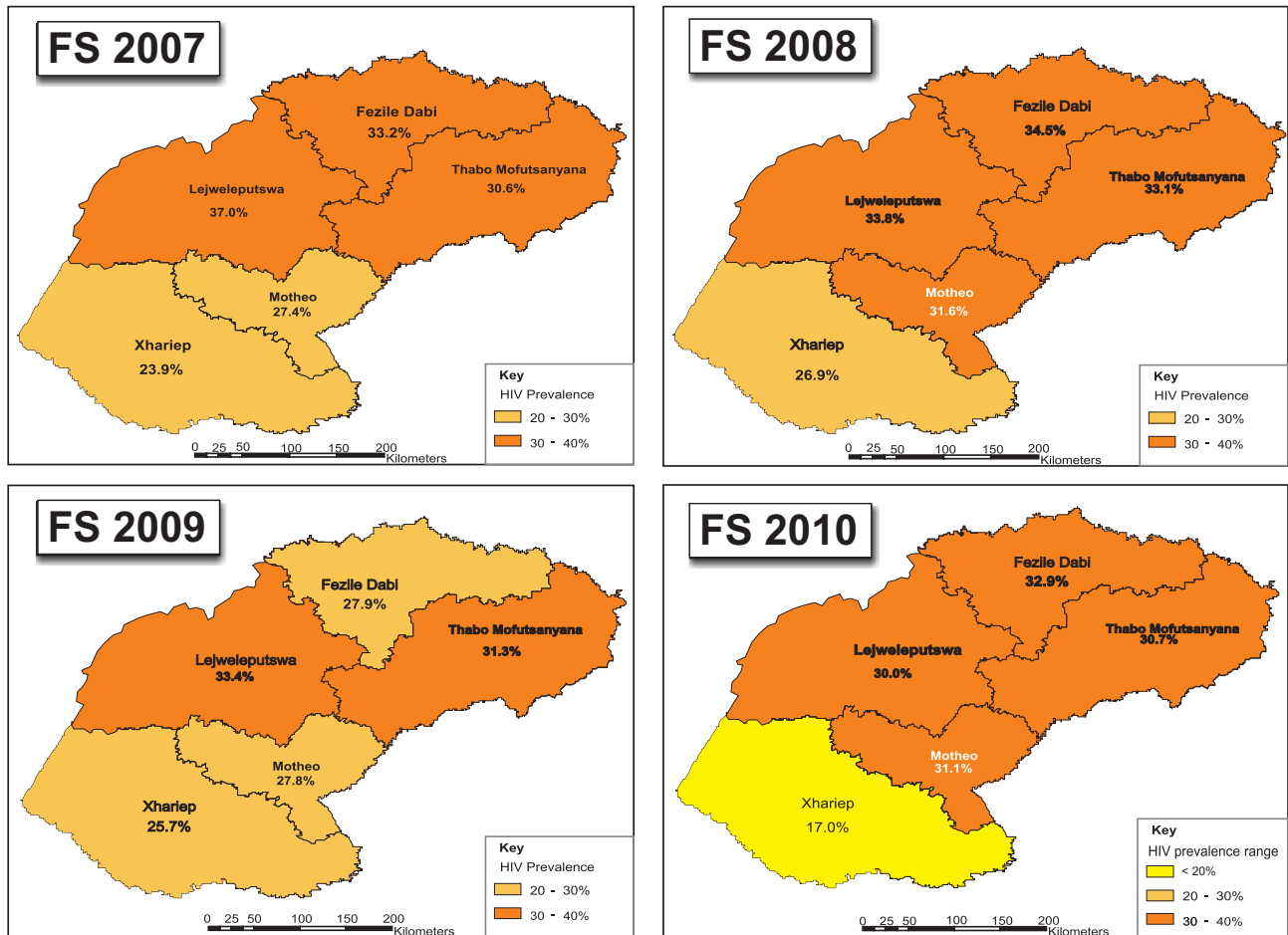


Figure 19: HIV prevalence distribution among antenatal women by district, Free State, 2007 - 2010.

3.6.3 GAUTENG PROVINCE

In 2010, the Gauteng provincial HIV prevalence amongst antenatal women was 30.4% (95% CI: 29.1 – 31.8). The overall prevalence in Gauteng has increased from 29.9% in 2008 to 30.4% in 2010 (Figure 20).

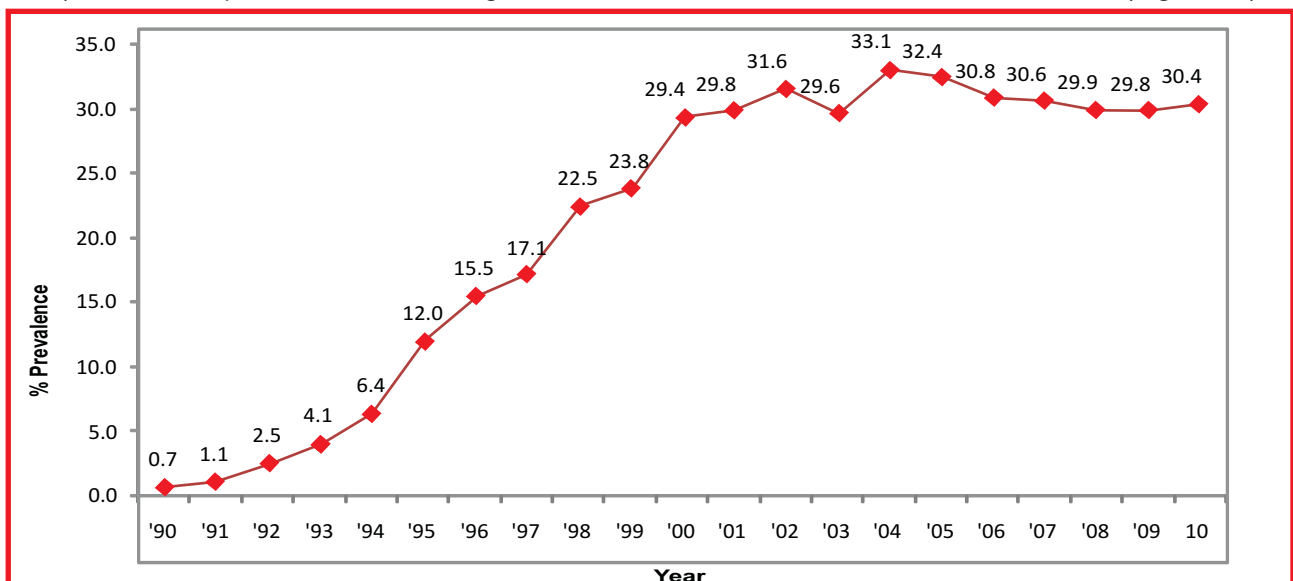


Figure 20: HIV prevalence epidemic curve among antenatal women, Gauteng, 1990 to 2010.

The results of this survey suggest that the overall HIV prevalence in the City of Johannesburg, Ekurhuleni and Tshwane has remained stable from 2007 to 2010. The highest HIV prevalence of 33.8% was again recorded in Ekurhuleni in 2010, followed by West Rand with a prevalence of 33.2%. Sedibeng and West Rand districts have shown an HIV prevalence increase of 2.0% and 3.1% respectively (Table 11 and Figure 21). All the health districts in Gauteng recorded HIV prevalences above 25.7% among 15-49 year old pregnant women.

Table 11: HIV prevalence among antenatal women by district in the Gauteng, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	95% CI	N	% HIV+	95% CI	N	% HIV+	95% CI
Provincial	7 497	29.9	28.5 – 31.2	7 187	29.8	28.6 – 31.1	6 714	30.4	29.1 – 31.8
City of JHB	2425	31.0	28.7 – 33.4	2 489	29.0	27.0 – 31.0	2 000	29.6	27.4 – 32.0
Ekurhuleni	2006	31.5	28.7 – 34.7	1 896	34.0	31.5 – 36.7	1 959	33.8	31.7 – 35.9
Metsweding	131	25.1	16.9 – 35.6	120	33.3	24.9 – 43.0	125	31.2	26.2 – 36.7
Sedibeng	740	31.8	28.7 – 35.1	667	28.9	25.9 – 32.2	499	30.9	26.5 – 35.6
Tshwane	1639	26.1	23.2 – 29.2	1 466	25.7	23.1 – 28.6	1 583	26.1	22.9 – 29.6
West Rand	556	27.8	23.7 – 32.4	549	30.1	26.2 – 34.3	584	33.2	29.7 – 37.0

Source: *Epidemiology & Surveillance National Department of Health*

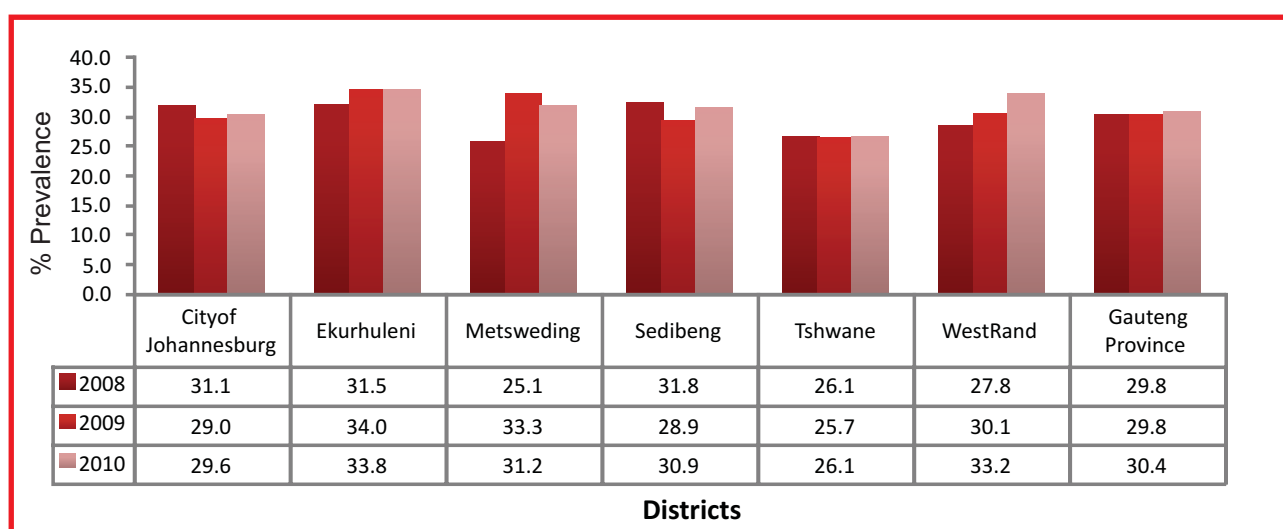


Figure 21: HIV prevalence trends among antenatal women by district, Gauteng, 2008, 2009 and 2010.

Table 12: HIV prevalence among antenatal women by age group, Gauteng, 2008 to 2010.

YEAR	2008		2009		2010	
Age group	N	%HIV+	N	% HIV+	N	% HIV+
*15 - 24	3 330	21.1	3 221	20.7	2 927	20.8
10-14	23	13.0	16	6.3	12	8.3
15 -19	1 038	14.4	943	12.1	887	12.6
20 – 24	2 292	24.2	2 278	24.2	2 040	24.4
25 – 29	2 046	36.7	1 956	35.1	1 928	36.3
30 – 34	1 262	40.6	1 154	43.6	1 068	40.5
35 – 39	696	34.6	575	38.3	545	42.2
40 – 44	157	25.5	157	23.6	138	31.2
45 – 49	15	33.3	14	42.9	8	25.0

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the Millennium Development Goals

** No participants in this age group

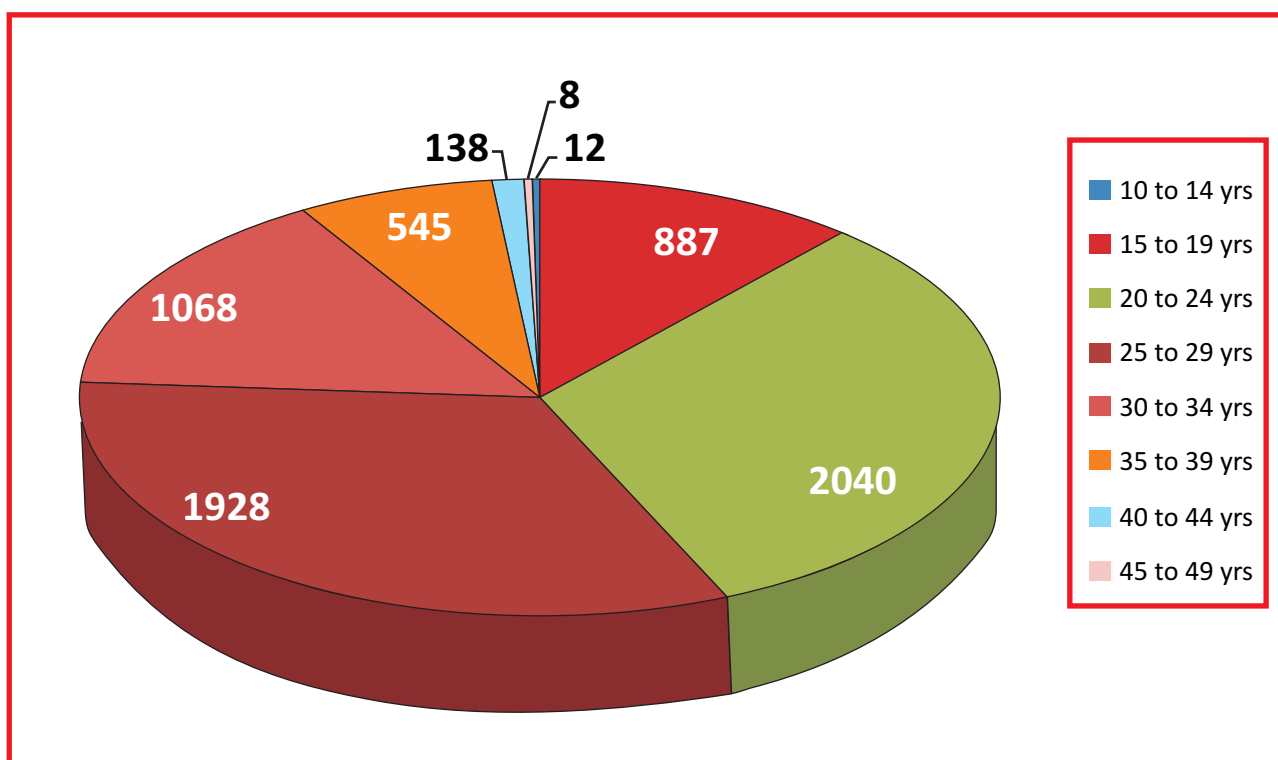


Figure 22: Sampled population distribution by age group, Gauteng, 2010.

In Gauteng province, the age distribution of pregnant women who participated ranged from 10 years to 49 years in the past 3 years. The majority of the survey participants were young women (20 - 24 years). Twelve women who participated in the survey were less than 14 years of age, of which 8.3% of them were HIV infected (Figure 22).

The trends in this age group in Gauteng require that additional efforts must be made to reduce HIV prevalence rate. In 2008 the 15 - 24 year old pregnant women's HIV prevalence was 21.1% compared with 20.7% in 2009, and 20.8% in 2010 which does not indicate a decline in HIV prevalence in this group (unless ART is factored in). This MDG group constituted almost 50% (N = 2 927) of the survey population.

There was a slight decrease in HIV prevalence among young women in the age group 15 - 19 years from 14.4% in 2008 to 12.6% in 2010, a decline of 2.0%. The HIV prevalence among women in the age group 30 - 34 years, remains high, with 40.6% in 2008 to 43.6% in 2009 and 40.5% in 2010. The HIV prevalence among the 30 – 39 years in Gauteng has been increasing from 34.6% in 2008 to 38.3% in 2009 and 42.2% in 2010, in each age group respectively.

The changes in HIV prevalence distribution by district from 2008 to 2010 of HIV prevalence by district in Gauteng province are shown in Figure 23.

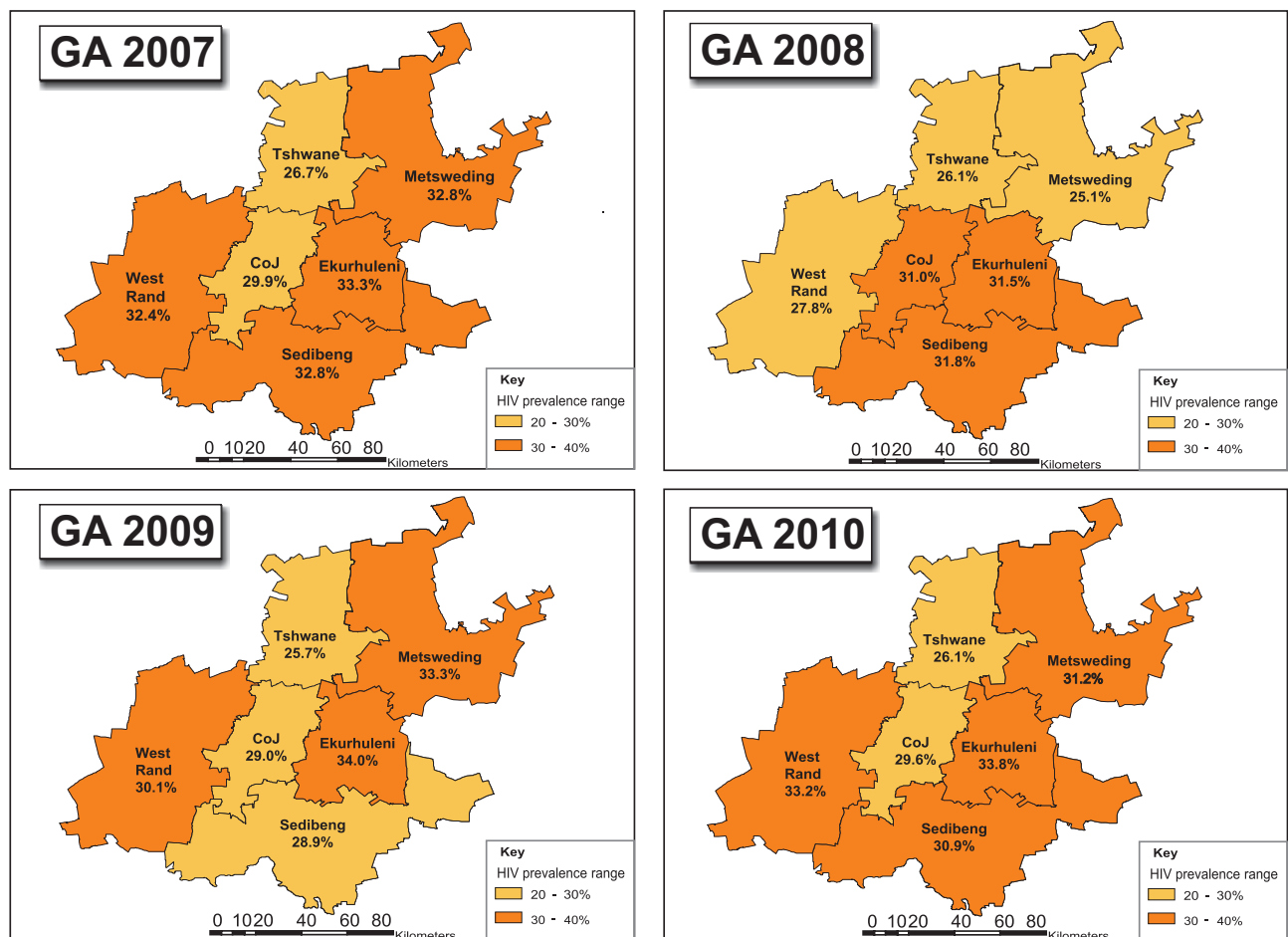


Figure 23: HIV prevalence distribution among antenatal women by district, Gauteng, 2007 – 2010.

3.6.4 KWAZULU-NATAL PROVINCE

In 2010, KwaZulu-Natal provincial HIV prevalence amongst antenatal women has remained the highest in the country at 39.5% (95%CI: 38.0 – 41.0). KwaZulu-Natal has consistently recorded the highest prevalence since 1990 (Figure 24).

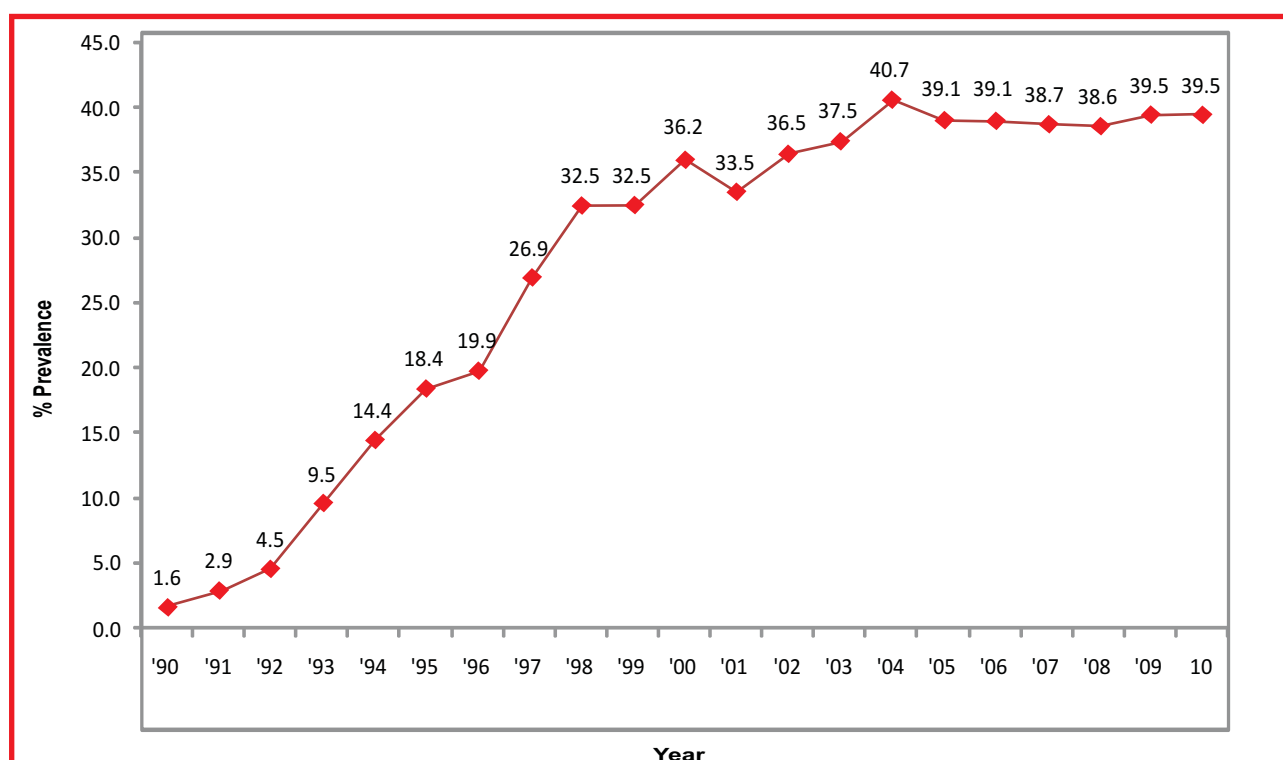


Figure 24: HIV prevalence epidemic curve among antenatal women, KwaZulu-Natal, 1990 to 2010.

One district, uThukela, has shown a decrease of almost 10%, from 46.4% in 2009 to 36.7% in 2010! UMzinyathi still has the lowest prevalence, but has increased from 28.2% in 2009 to 31.1% in 2010 (Table 13 and Figure 25).

In 2009, five districts in KwaZulu-Natal viz: Ugu, UMkhanyakude, eThekwini, iLembe and uMgungundlovu recorded HIV prevalence estimates above 40%. The 2010 survey has again recorded the same 5 districts with prevalence rates over 40%: iLembe and uMgungundlovu (42.3% each), eThekwini and Ugu (41.1% each) and uMkhanyakude (41.9%).

Table 13: HIV prevalence among antenatal women by district, in KwaZulu-Natal, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV +	95% CI	N	% HIV +	95% CI	N	% HIV +	95% CI
KZN Province	6 963	38.7	37.2 – 40.1	6 744	39.5	38.1 – 41.0	6 887	39.5	38.0 – 41.0
Amajuba	420	34.7	29.2 – 40.7	410	37.3	33.3 – 41.6	407	39.5	30.5 – 41.6
Sisonke	343	35.8	31.6 – 40.3	324	35.2	29.3 – 41.6	325	37.2	31.6 – 43.2
Ugu	507	40.6	36.9 – 44.3	435	40.2	36.0 – 44.6	453	41.1	35.5 – 46.9
UMkhanyakude	413	39.9	34.8 – 45.3	396	39.7	33.1 – 46.6	389	41.9	35.6 – 48.5
UMzinyathi	339	29.2	23.7 – 35.2	340	28.2	22.2 – 35.1	334	31.1	24.9 – 38.1
UThukela	450	38.6	32.6 – 45.0	444	46.4	41.1 – 51.8	450	36.7	30.6 – 43.2
Uthungulu	641	36.1	31.4 – 41.2	597	37.7	33.0 – 42.6	712	36.9	32.8 – 41.3
Zululand	587	36.1	31.8 – 40.5	586	36.7	30.4 – 43.5	583	39.8	34.2 – 45.6
eThekwini	2 153	40.3	37.6 – 43.0	2 140	41.5	38.9 – 44.0	2 144	41.1	38.3 – 43.9
iLembe	424	35.8	30.7 – 41.3	421	40.6	36.5 – 44.9	416	42.3	37.5 – 47.3
uMgungundlovu	686	45.7	42.1 – 49.4	651	40.9	36.2 – 45.7	674	42.3	39.0 – 45.7

Source: ANC sentinel survey, NDoH

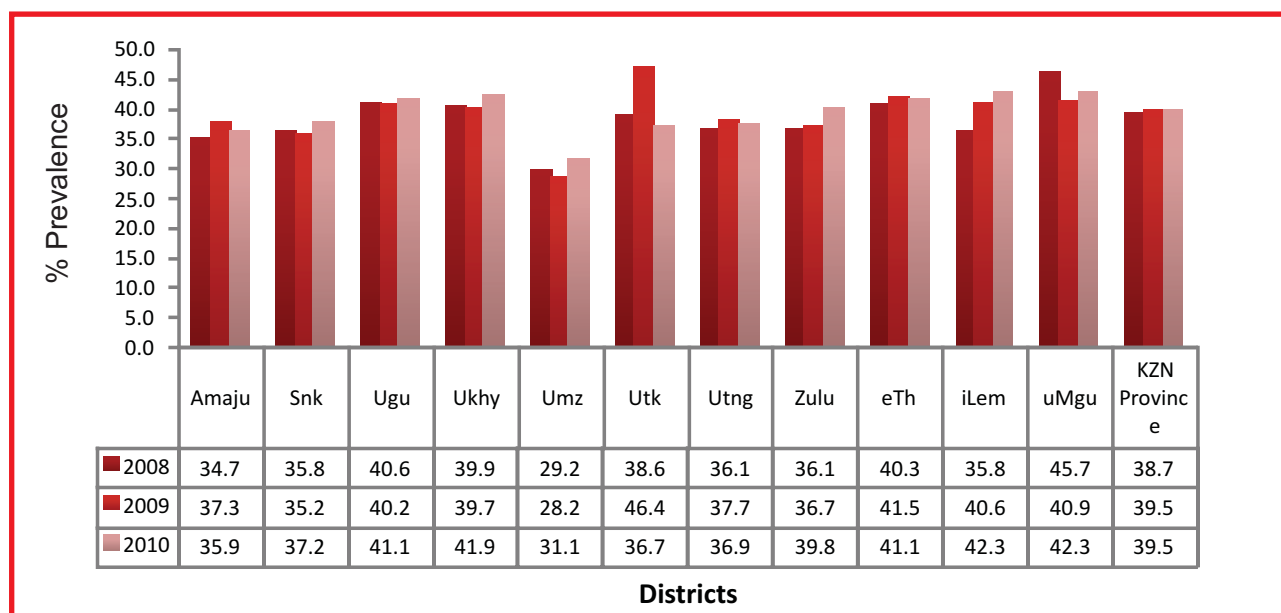


Figure 25: HIV prevalence trends among antenatal women by district, KwaZulu-Natal, 2008 to 2010.

Amaj = Amajuba; Snk = Sisonke; Umkh = Umkhanyakude; Umzny = Umzinyathi; Utgl = Uthungulu; Utkl = Uthukela; Zulu = Zululand; eThkn = eThekwini; iLem = iLembe; uMg = uMgungundlovu

The province's overall HIV prevalence remains at 39.5%, which is 9.5% above the national prevalence. Eight (8) out of 11 health districts viz., Sisonke, Ugu, uMkhanyakude, uMzinyathi, Zululand, iLembe and uMgungundlovu have recorded an increase of between 0.4% in Ugu and 2.9% in uMzinyathi between 2009 to 2010. EThekwini and uThungulu are showing stabilization since 2008 (Figure 25 and Table 13).

Table 14: HIV prevalence among antenatal women by age group, KwaZulu-Natal, 2008 to 2010.

YEAR Age group	2008		2009		2010	
	N	% HIV +	N	% HIV +	N	% HIV +
*15 - 24	3 940	29.0	3 831	31.0	3 849	29.2
10-14	23	13.0	15	20.0	26	19.2
15 -19	1 649	19.2	1 547	22.0	1 570	20.5
20 – 24	2 291	36.1	2 284	37.2	2 275	35.2
25 – 29	1 551	52.0	1 487	50.4	1 583	50.9
30 – 34	848	53.9	842	56.1	862	57.8
35 – 39	466	50.0	433	46.2	433	52.7
40 – 44	113	35.4	116	37.9	114	46.5
45 – 49	11	18.2	12	25.0	13	38.5
>49	1	0.0	2	100	4	50.0

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the Millennium Development Goals

N= Realised sample size.

In KwaZulu-Natal, the age distribution of pregnant women who participated ranged from the highest number of 10-14years old, i.e. 26, to four pregnant women older than 50 years. HIV prevalences in these two age groups were 19.2% and 50% respectively. The majority of the survey participants were young adults, 20- 24 years, (N = 2 275) (Figure 26).

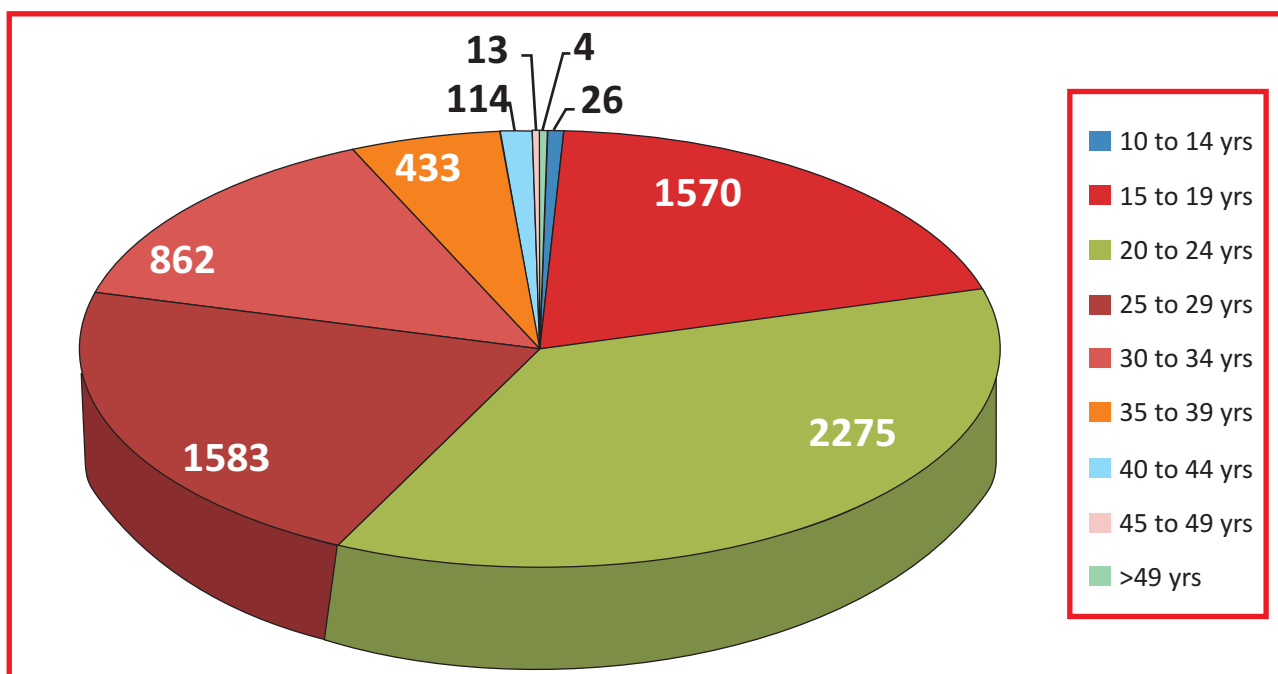


Figure 26: Sampled population distribution by age group, KwaZulu-Natal, 2010.

In 2010, the HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) remained unchanged from the 2008 estimate of 29.0%, to 31.0% in 2009 and back down to 29.2% in 2010. This MDG group constituted almost 3 849 of the survey population. There was a slight decrease in HIV prevalence among teenagers in the age group 15 - 19 years from 19.2% in 2008 to 22.0% in 2009. HIV prevalence trends in the 2 oldest age groups (40-44 & 45-49) in this province in the past three years shows a disturbing and significant increase in a high risk pregnancy group (DoBE, 2009).

In 2010 the HIV prevalence among women under 30 years has stabilized in the four age-specific intervals since 2006, while the prevalence in women above 30 years remains high (Table 14).

The HIV prevalence distribution pattern and intensity of HIV infection by district in KwaZulu-Natal from 2008 to 2010 is shown in Figure 27.

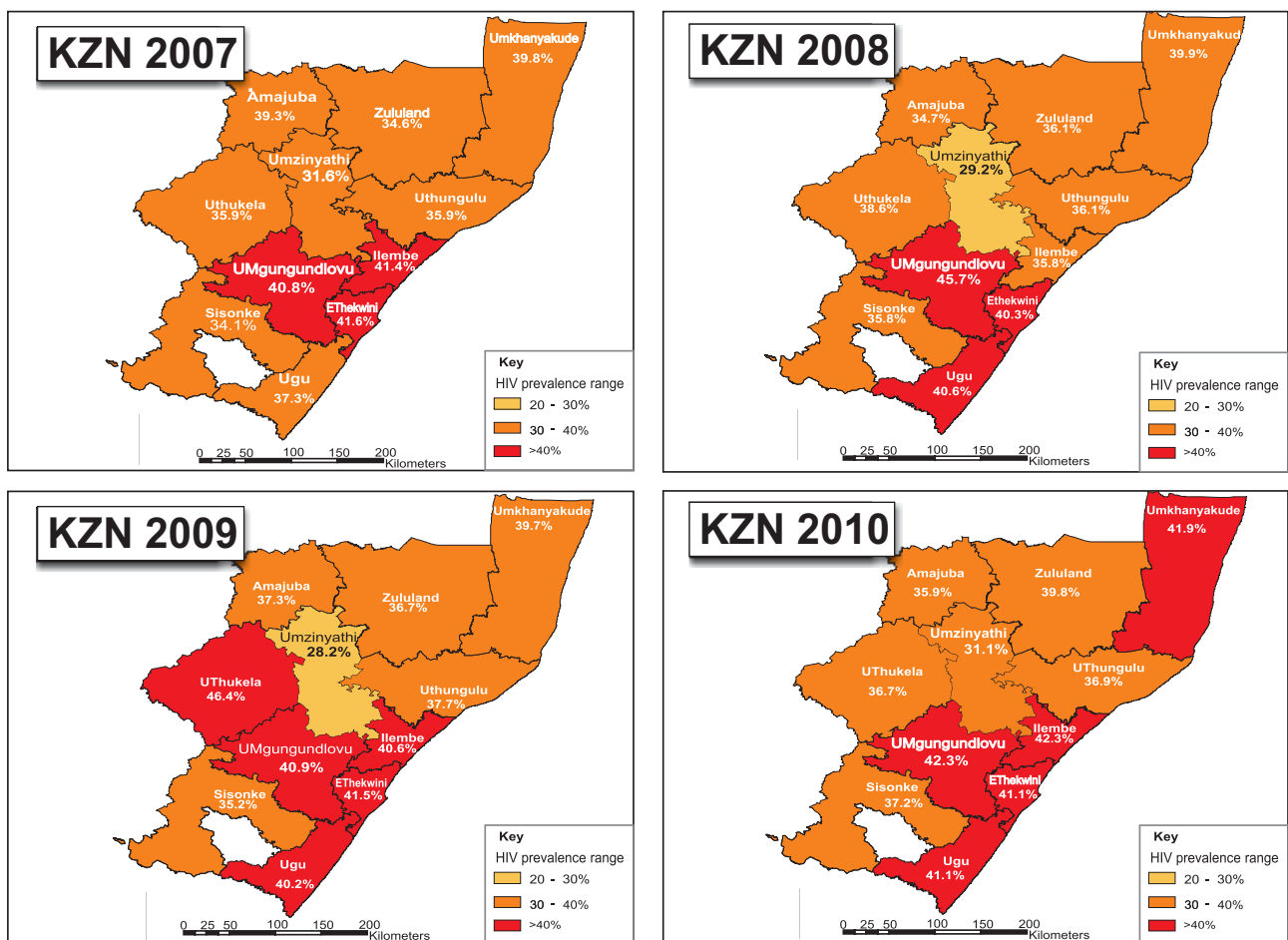


Figure 27: HIV prevalence distribution among antenatal women by district, KwaZulu-Natal, 2007 - 2010.

3.6.5 LIMPOPO PROVINCE

In 2010, the Limpopo provincial HIV prevalence amongst antenatal women was 21.9% (95%CI: 20.3 – 23.6). The overall provincial HIV prevalence in Limpopo increased slightly, by 0.5%, between 2009 and 2010 (Figure 28).

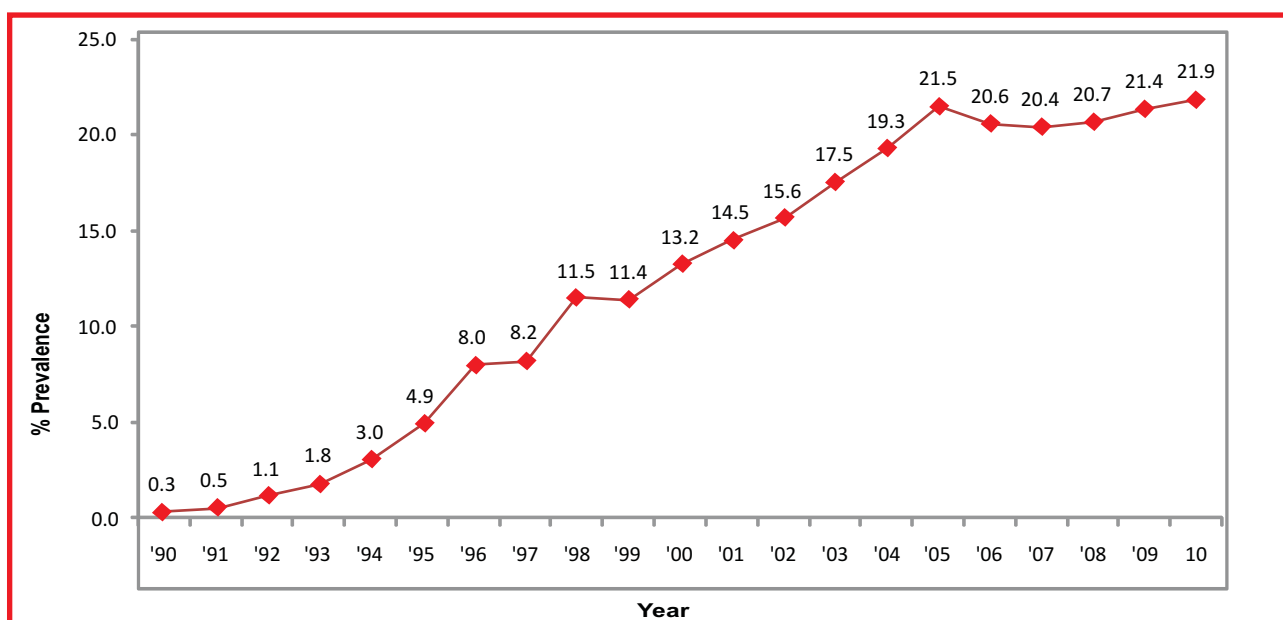


Figure 28: HIV prevalence epidemic curve among antenatal women, Limpopo, 1990 to 2010.

Table 15: HIV prevalence among antenatal women by district, Limpopo, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV +	95% CI	N	% HIV +	95% CI	N	% HIV +	95% CI
Limpopo Province	3 833	20.7	19.1 – 22.5	3 412	21.4	19.7 – 23.1	3	21.9	20.3 – 23.6
Capricorn	885	21.0	18.4 – 23.8	887	23.8	20.8 – 27.1	786	23.7	20.3 – 27.5
Mopani	710	25.2	21.2 – 29.6	698	26.2	21.8 – 31.2	555	24.9	21.9 – 28.1
Sekhukhune	788	21.8	18.4 – 25.6	493	16.6	13.5 – 20.3	589	20.2	16.8 – 24.1
Vhembe	951	14.7	12.5 – 17.2	903	14.3	11.4 – 17.8	65	17.0	14.3 – 20.1
Waterberg	499	23.6	18.2 – 30.1	431	28.8	23.4 – 34.8	422	26.1	22.8 – 29.7

Source: National Department of Health, ANC HIV & Syphilis Survey.

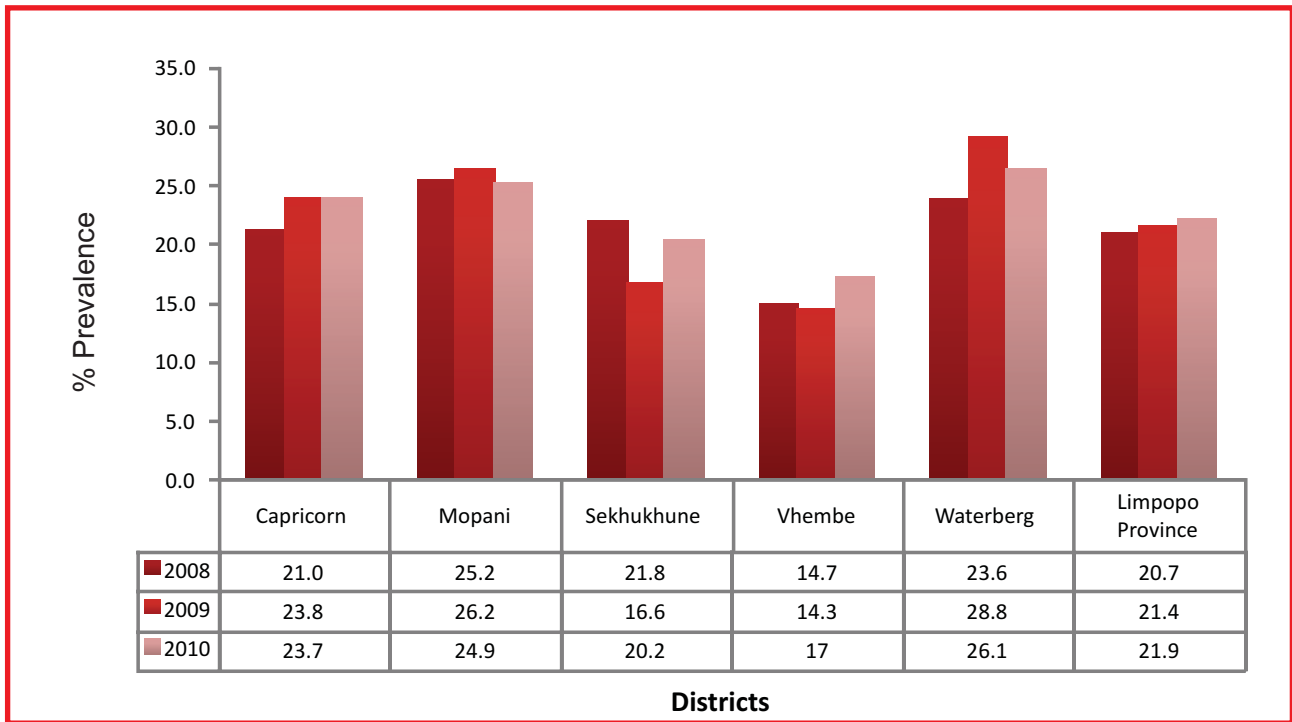


Figure 29: HIV prevalence trends among antenatal women by district, Limpopo, 2008 to 2010.

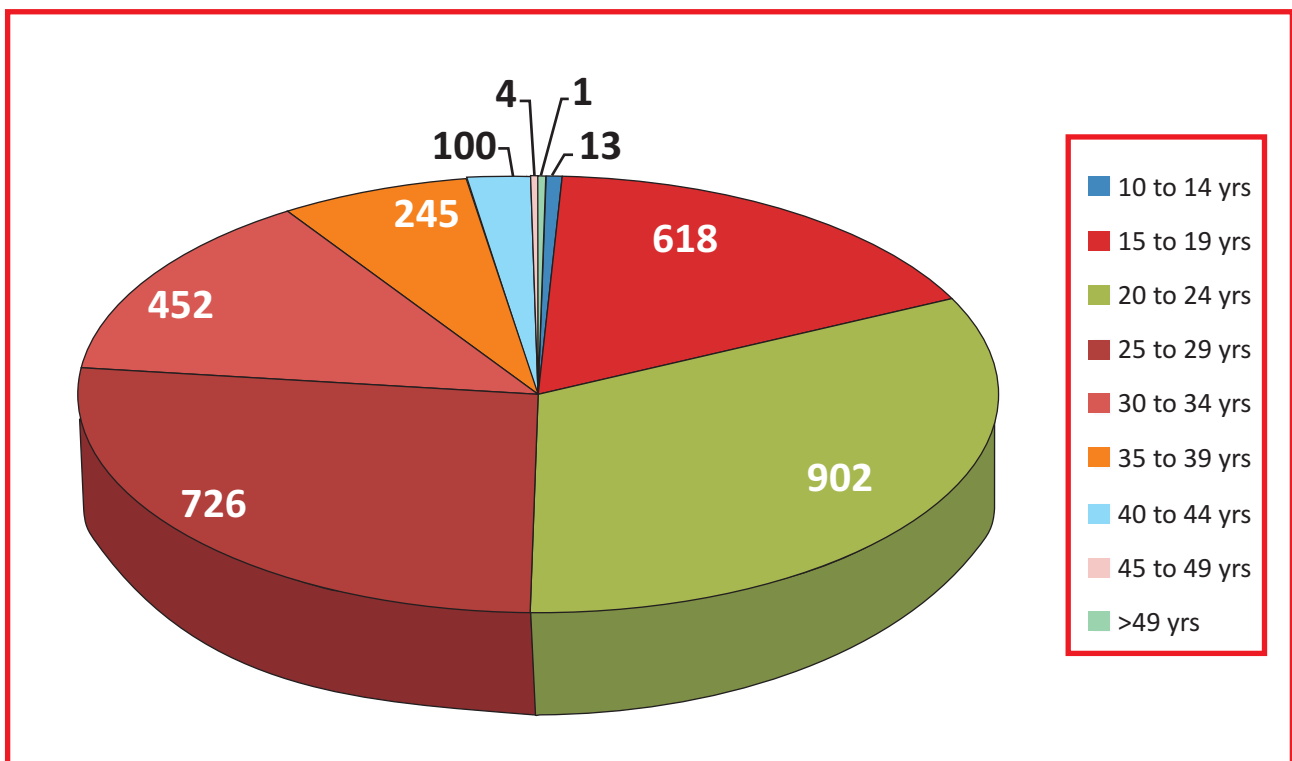


Figure 30: Sampled population distribution by age group, Limpopo, 2010.

Table 16: HIV prevalence among antenatal women by age group, Limpopo, 2008 to 2010.

YEAR Age group	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 - 24	1 902	13.6	1 661	13.7	1 520	14.2
10 – 14	24	4.2	18	0.0	13	7.7
15 – 19	809	7.7	665	7.7	618	7.1
20 – 24	1 093	17.9	996	17.8	902	19.1
25 – 29	778	28.7	750	31.5	726	28.7
30 – 34	568	34.9	524	29.8	452	31.9
35 – 39	310	21.9	306	26.8	245	29.4
40 – 44	110	13.6	87	18.4	100	24.0
45 – 49	18	11.1	23	8.7	4	25.0
>49	1	100	**	**	1	100

* The age group 15 – 24 years is an indicator for gal 6 of the Millennium Development Goals (MDG)

N = Realised sample size. ** No participants in this age group

The Capricorn and Mopani districts have shown a slight decrease in HIV prevalence between 2009 and 2010. The Waterberg district's HIV prevalence increased significantly by 5.2%, from 23.6% in 2008 to 28.8% in 2009, but decreased to 26.1% in 2010. Sekhukhune has shown erratic changes in prevalence from 21.8% in 2008, to 16.6% in 2009 and up to 20.2% in 2010 (Table 15 and Figure 29). However, this could be attributed to the variable sample sizes, viz. 788 in 2008, 493 in 2009 and 589 in 2010. There is a gradual increase in HIV prevalence from 15.2% in 2007 to 17.0% in 2010 in Vhembe as shown by the HIV prevalence distribution pattern in Figure 29. In Limpopo, the age distribution of pregnant women who participated ranged from under 15 year olds (n = 13), who were not found to be HIV infected to >49 year old (n=1) in 2010. The majority of the survey participants were young women, (15-24 years, N = 1 520) (Table 16).

The HIV prevalence trends in Limpopo among the 15 - 19 year old group has been fairly stable at approximately 7% over the last 3 years. The HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) was 13.6% in 2008. There was a slight increase in HIV prevalence among young women in the age group 15 - 24 year olds to 13.7% in 2009 and 14.2% in 2010. The highest HIV prevalence among women is in the 30 - 34 age group but remained the highest at 31.9% in 2010. This age group constituted 14.6% of the sampled survey population.

The changes in HIV prevalence distribution by district in Limpopo from 2008 to 2010 are shown in Figure 31.

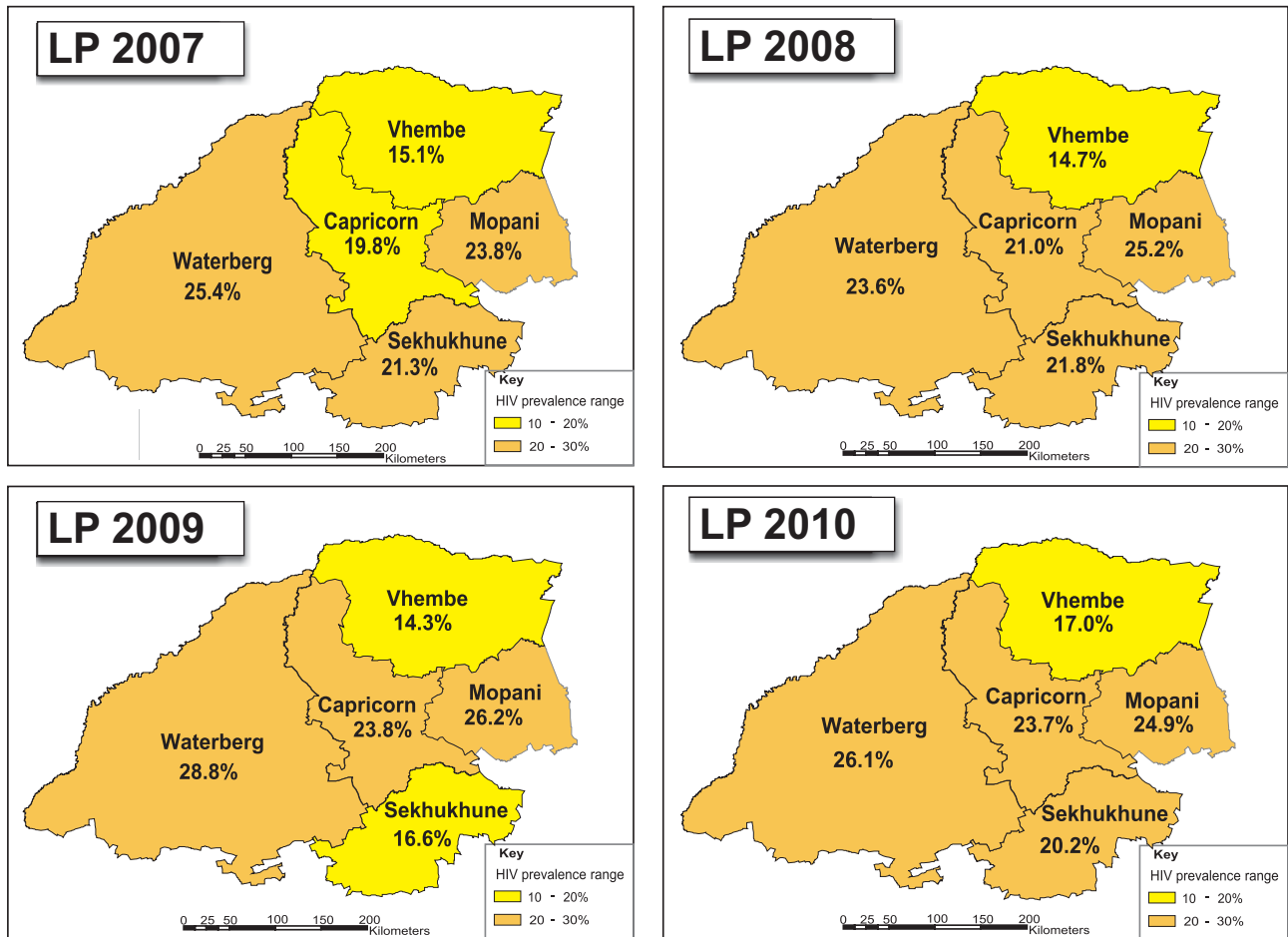


Figure 31: HIV prevalence distribution among antenatal women by district, Limpopo, 2007 - 2010.

3.6.6 MPUMALANGA PROVINCE

In 2010, the Mpumalanga provincial HIV prevalence amongst antenatal women was 35.1% (95%CI: 32.6 - 37.7). This is a slight increase from 34.7% in 2009. The Mpumalanga HIV epidemic curve from 1990 to 2010 is shown in Figure 32.

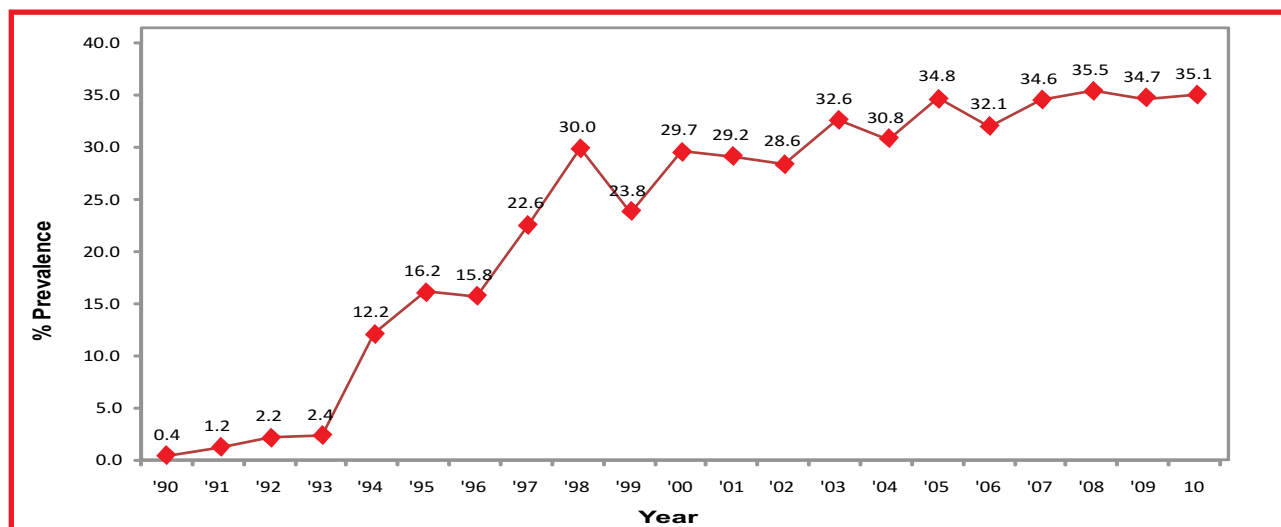


Figure 32: HIV prevalence epidemic curve among antenatal women, Mpumalanga, 1990 to 2010.

Two districts in Mpumalanga, viz., Ehlanzeni and Gert Sibande recorded the 6th and 7th highest HIV prevalence among the 52 health districts in the country. Nkangala antenatal HIV prevalence has declined from 32.6% in 2009 to 27.2% in 2010, a decrease by 5.4% as presented in (Table 17 and Figures 33 & 35).

Table 17: HIV prevalence among antenatal women by district, Mpumalanga, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	985% CI	N	% HIV+	985% CI	N	% HIV+	985% CI
Provincial	2 224	35.5	33.1 – 37.8	2 049	34.7	32.5 – 36.9	2 202	35.1	32.6 – 37.7
Ehlanzeni	1 027	34.9	31.4 – 38.6	921	33.8	30.1 – 37.6	1 074	37.7	34.1 – 41.4
Gert Sibande	560	40.5	36.4 – 44.8	560	38.2	34.7 – 41.9	528	38.8	33.7 – 44.2
Nkangala	637	31.8	27.7 – 36.2	568	32.6	29.1 – 36.3	600	27.2	22.8 – 32.1

Source: Epidemiology & Surveillance National Department of Health

The HIV prevalence estimates in all three districts of Mpumalanga are above 26%. This is reflected in Figure 33.

Figure 33: HIV prevalence trends among antenatal women by district, Mpumalanga, 2008 to 2010.

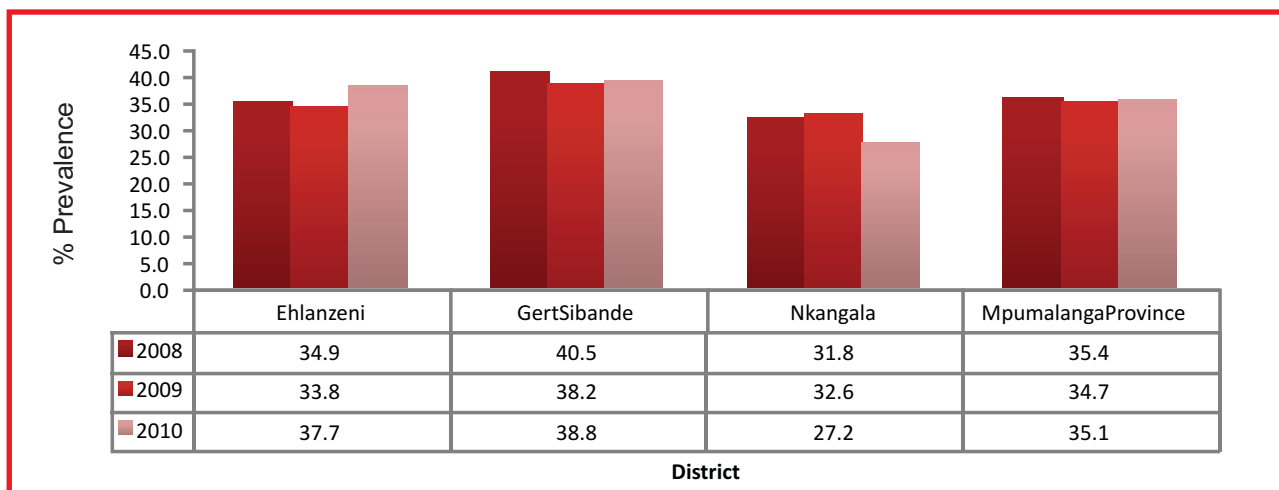


Table 18: HIV prevalence among antenatal women by age group, Mpumalanga, 2008 to 2010.

YEAR Age group	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 – 24	1 180	26.7	1 127	25.0	1 163	25.6
10 – 14	10	0.0	8	0.0	9	22.2
15 – 19	499	15.2	456	12.9	507	17.4
20 – 24	681	35.1	671	33.2	656	32.0
25 – 29	502	48.4	426	47.2	495	46.1
30 – 34	295	49.8	281	49.8	302	53.6
35 – 39	182	36.8	146	48.6	142	38.7
40 – 44	44	31.8	36	27.8	55	30.9
45 – 49	10	20.0	1	0.0	8	37.5
>49	**	**	1	0.0	**	**

N = Realised sample size. ** No participants in this age group

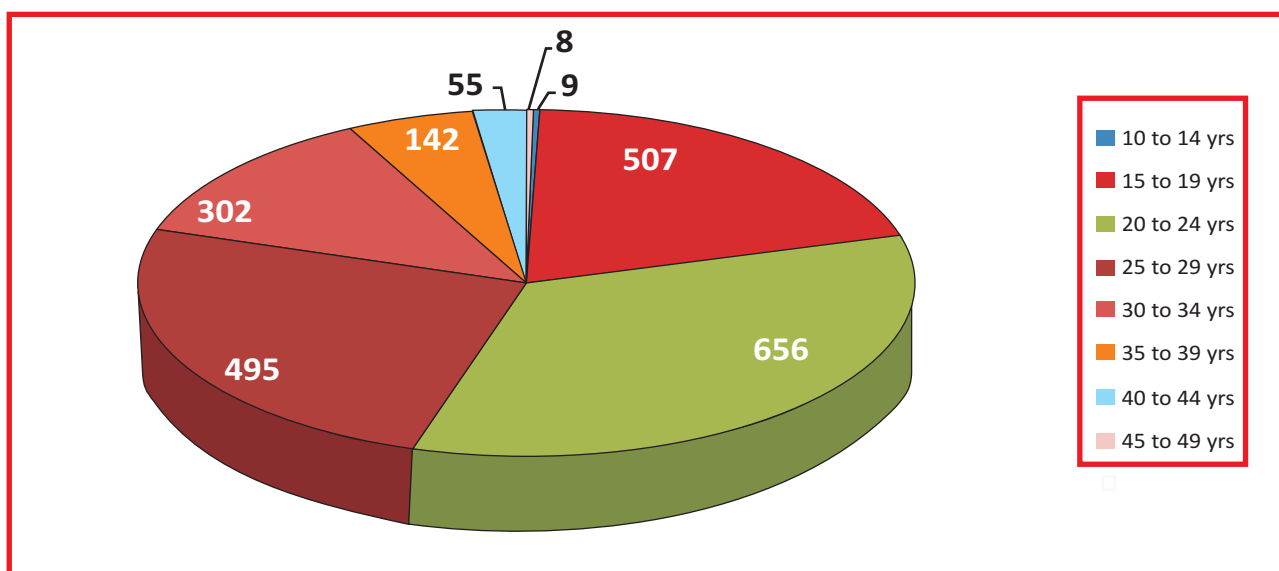


Figure 34: Sampled population distribution by age group, Mpumalanga, 2010

In Mpumalanga the age distribution of pregnant women who participated ranged from 10 to 49 years old. The majority of the survey participants were teenagers and young women (15-24 year olds).

In 2010, the HIV prevalence among 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) remained the second highest following KZN in this age group, from 26.7% in 2008 to 25.0% in 2009 to 25.6% in 2010. There was an increase in HIV prevalence among young women in the age group 15 - 19 years, from 12.9 % in 2009 to 17.4% in 2010.

The variation in HIV prevalence distribution in Mpumalanga from 2008 to 2010 is shown in Figure 35 below.

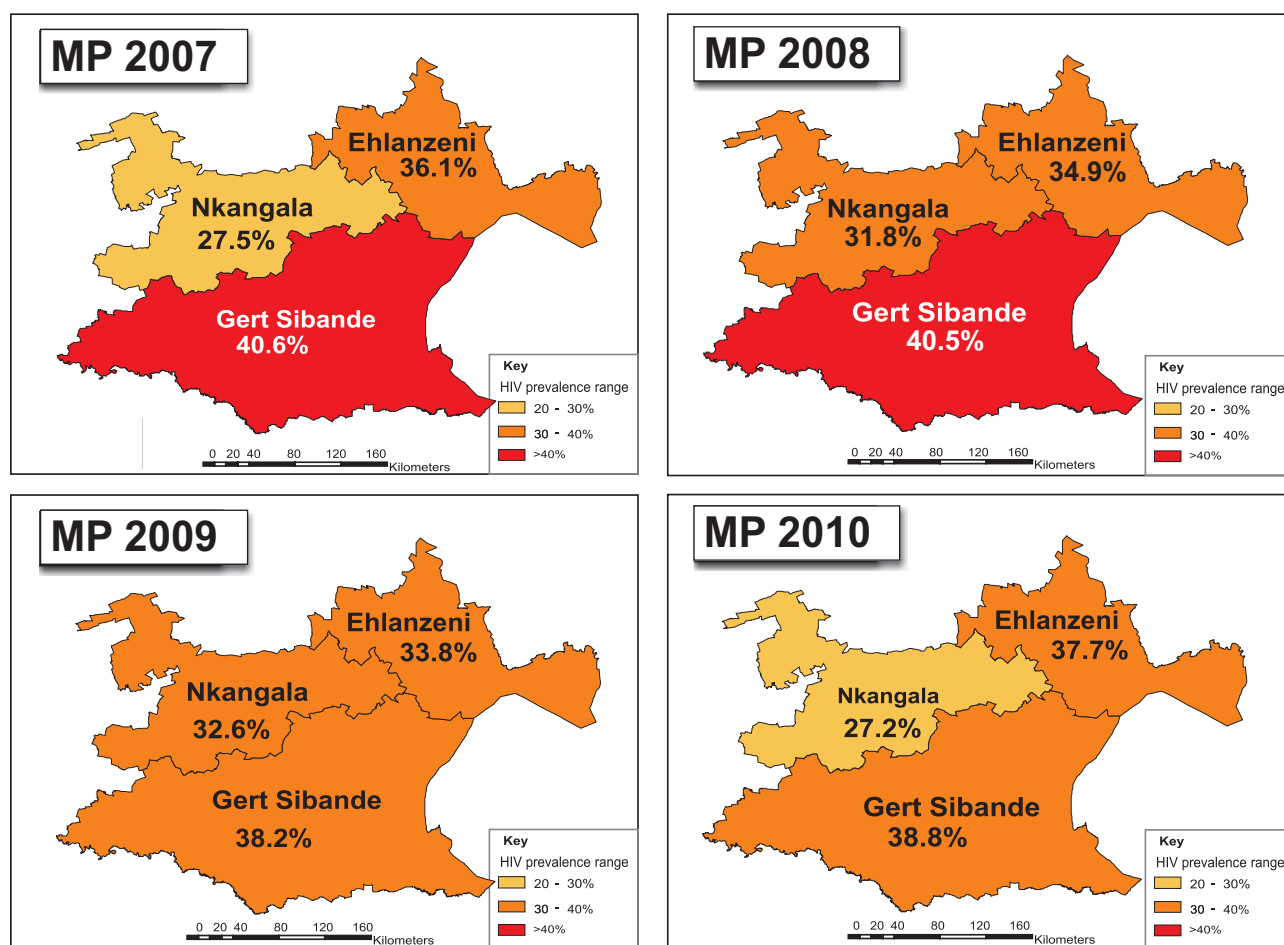


Figure 35: HIV prevalence distribution among antenatal women by district, Mpumalanga, 2007 – 2010

3.6.7 NORTH-WEST PROVINCE

In 2010, the North-West provincial HIV prevalence amongst antenatal women was 29.6% (95% CI: 27.3 – 31.9). The HIV prevalence in this province has declined slightly by 1.4% from 31.0% in 2008 (Figure 36).

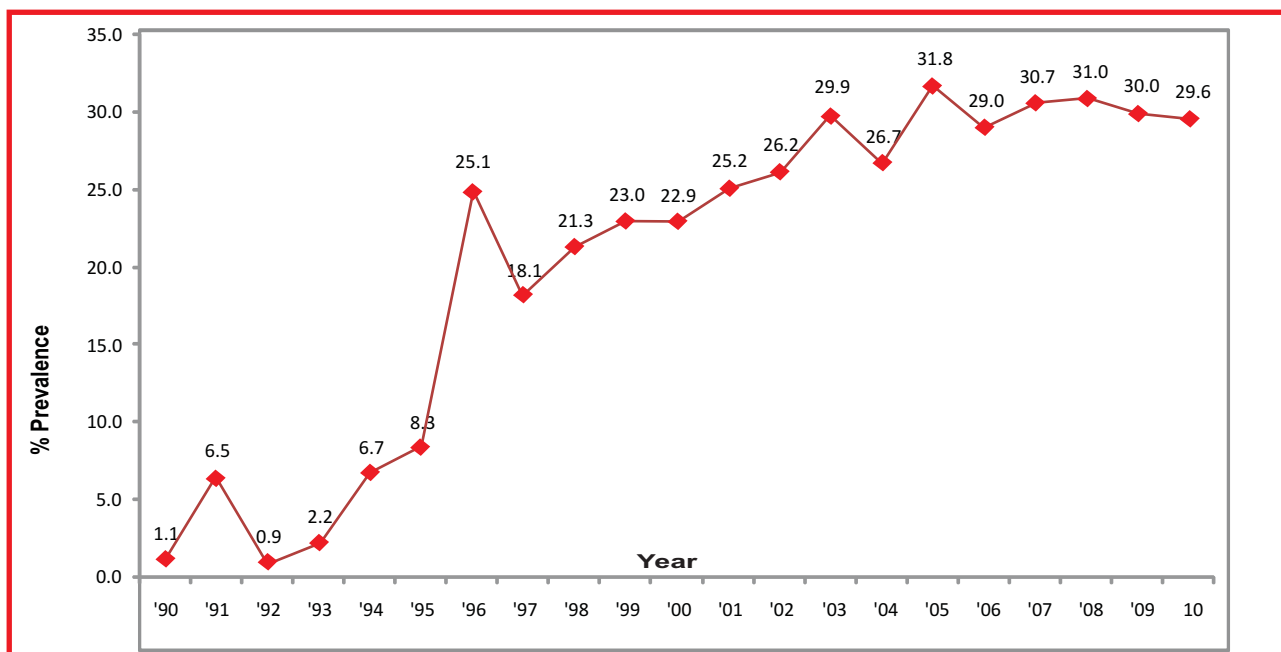


Figure 36: HIV prevalence epidemic curve among antenatal women, North West, 1990 to 2010.

Table 19: HIV prevalence among antenatal women by district, North West, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	985% CI	N	% HIV+	985% CI	N	% HIV+	985% CI
Provincial	2112	31.0	28.8 – 33.3	2 227	30.0	27.5 – 32.6	1 963	29.6	27.3 – 31.9
Bojanala	810	31.8	28.2 – 35.6	892	34.9	31.1 – 38.8	755	29.3	26.2 – 32.6
Dr. R.S. Mompati	337	28.1	23.5 – 33.3	346	25.7	20.5 – 31.8	272	24.3	20.4 – 28.6
Ngaka M. Molema	539	28.2	24.0– 32.8	527	25.1	20.6 – 30.1	479	25.9	21.5 – 30.9
Dr. K. Kaunda	426	35.2	3 – 40.4	462	29.2	22.4 – 37.1	457	37.0	32.8 – 41.4

Source: Epidemiology & Surveillance National Department of Health

Dr. Kenneth Kaunda has recorded the 9th highest HIV prevalence among the 52 district in the country. Findings of the 2010 survey showed that in Dr. Kenneth Kaunda district, there was a significant increase of 7.8% in the antenatal HIV prevalence, from 29.2% in 2009 to 37.0% in 2010. Bojanala district recorded a decrease from 34.9% in 2009 to 29.3% in 2010 (Table 19 and Figures 37).

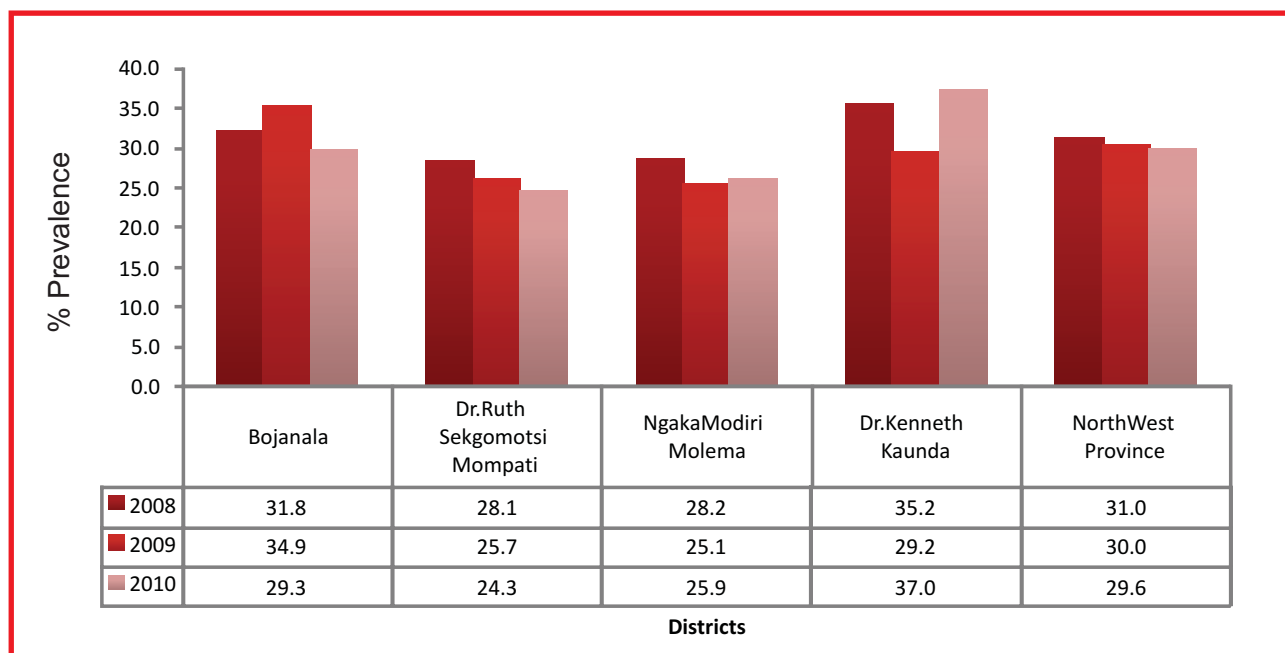


Figure 37: HIV prevalence trends among antenatal women by district, North West, 2008 to 2010

Table 20: HIV prevalence among antenatal women by age group, North West, 2008 to 2010.

YEAR Age group	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 - 24	1 003	27.2	1 061	19.3	917	22.2
10-14	3	0.0	5	20.0	4	0.0
15 -19	381	23.4	401	10.7	334	14.1
20 -24	622	29.6	660	24.5	583	26.9
25 – 29	492	35.4	548	37.0	452	31.9
30 – 34	308	36.0	317	45.4	344	41.9
35 – 39	182	29.7	210	41.9	187	36.9
40 – 44	55	23.6	67	28.4	42	33.3
45 – 49	7	42.9	8	37.5	5	40.0
>49	1	0.0	**	**	**	**

N= Realised sample size.

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the Millennium Development Goals

In the North West the age distribution of pregnant women who participated ranged from 10 to 49 years over the past 3 years. The survey participants were mostly teenagers and young women aged 15 – 29 years. The four under 14 year old pregnant women who participated in the 2010 survey were not HIV infected (Figure 38).

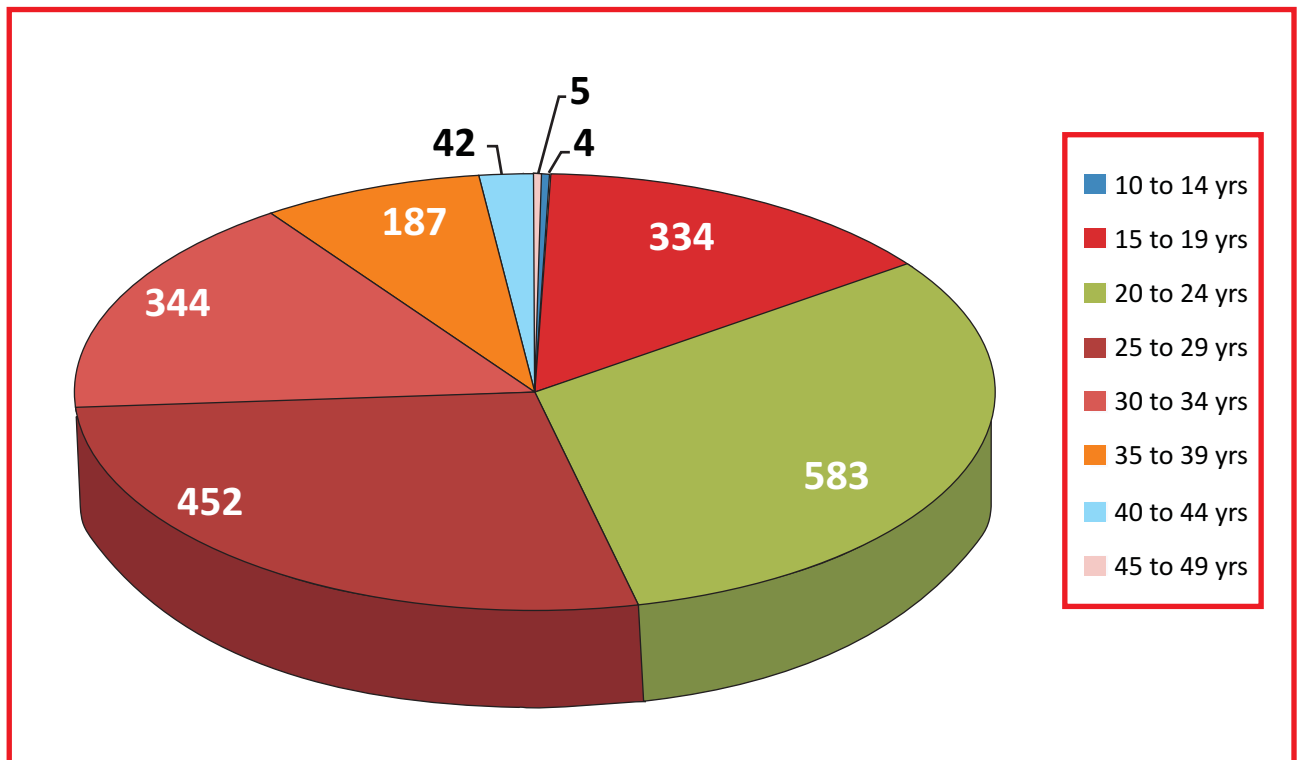


Figure 38: Sampled population distribution by age group, North West, 2010.

The HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) was 27.2% in 2008, 19.3% in 2009 and 22.2% in 2010. There was an increase of 3.4% in HIV prevalence among young women in the age group 15 - 19 years from 10.7% in 2009 to 14.1% in 2010. The HIV prevalence among women in the age groups 25 -29 years has decreased from 37.0% in 2009 to 31.9% in 2010. The HIV prevalence in the 30 - 34 years has decreased from 45.4% in 2009 to 41.9% in 2010 and in the 35-39 years age group has decreased from 41.9% in 2009 to 36.9% in 2010 (Table 20).

The change in the prevalence of HIV infection and distribution in the North West province from 2008 to 2010 is shown in Figure 39.

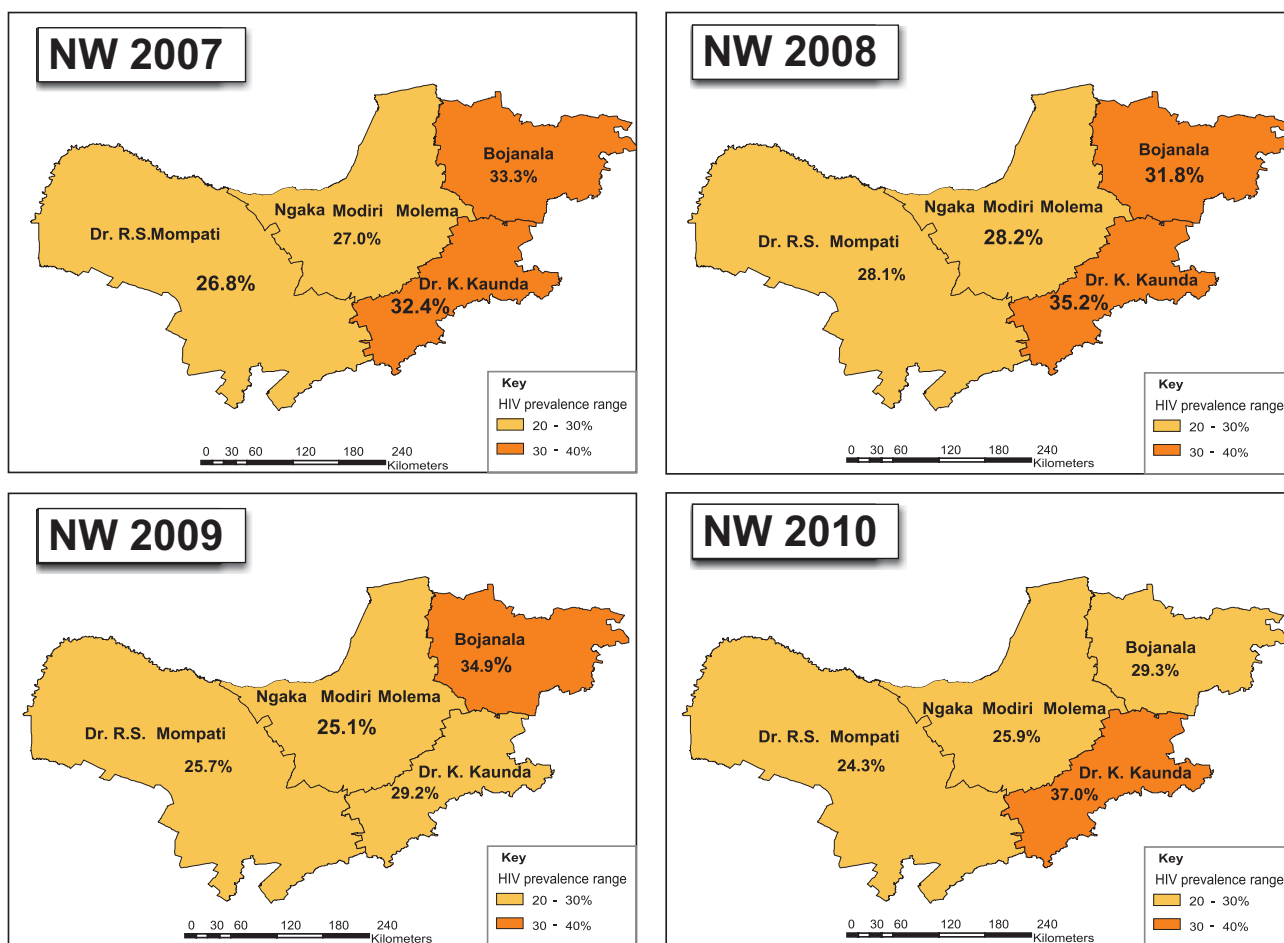


Figure 39: HIV prevalence distribution among antenatal women by district, North West, 2007 – 2010.

3.6.8 THE NORTHERN CAPE PROVINCE

The Northern Cape provincial HIV prevalence amongst antenatal women has increased from 17.2% in 2009 to 18.4% in 2010. The overall provincial HIV prevalence estimate has slightly increased by 1% from 2008 to 2009 (Figure 40). Interestingly, this province recorded the highest syphilis prevalence among all the other provinces in the past 5 years (see section on syphilis results). This situation requires further epidemiological investigation to determine the cause of this inversely proportional relationship.

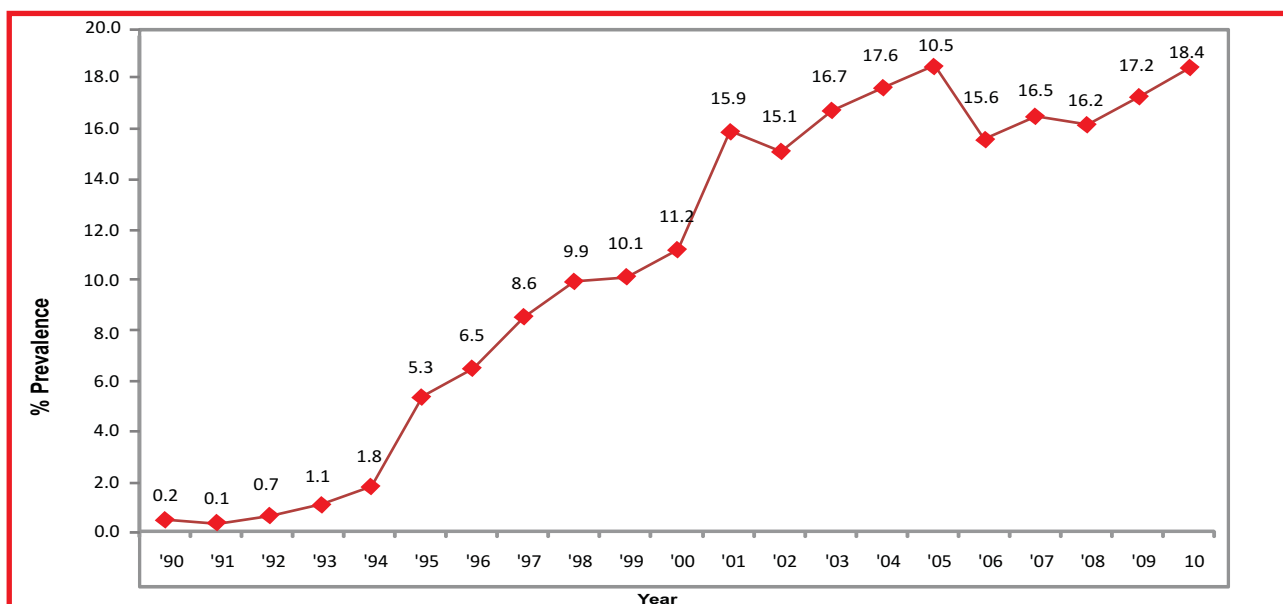


Figure 40: HIV prevalence epidemic curve among antenatal women, Northern Cape, 1990 to 2010.

Table 21: HIV prevalence among antenatal women by district, Northern Cape, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	985% CI	N	% HIV+	985% CI	N	% HIV+	985% CI
Provincial	1 111	16.2	13.8 – 18.9	1 002	17.2	14.3 – 20.4	1 144	18.4	16.1 – 21.1
F. Baard	389	21.8	18.2 – 26.0	385	25.2	20.1 – 31.1	432	20.1	17.3 – 23.3
J. T. Gaetsewe	171	18.7	14.5 – 23.8	157	17.2	12.3 – 23.6	182	27.5	22.2 – 33.5
Namaqua	89	2.2	0.5 – 8.8	68	0.0	0.0 – 7.1	76	11.8	6.6 – 20.3
Pixley ka Seme	255	13.3	8.2 – 20.8	206	12.1	7.2 – 19.7	247	12.6	8.6 – 17.9
Siyanda	207	13.0	8.4 – 19.5	186	12.4	8.9 – 17.0	207	16.4	11.0 – 23.9

Source: *Epidemiology & Surveillance* National Department of Health

In 2009, the antenatal HIV prevalence in Namaqua was 0.0%, and because the sample size in this district was small, it becomes difficult to discern any trends. Hence a great variation is observed. Namaqua district has recorded the 3rd lowest antenatal HIV prevalence among the 52 health districts. However, there was a significant increase from 2.2% in 2008 to 11.8% in 2010.

Francis Baard District has recorded a prevalence above 20 % since 2008 (Figure 41). J.T. Gaetsewe has recorded the highest HIV prevalence estimate of 27.5% in the Northern Cape for 2010. This district also showed a 10.3% increase since 2009.

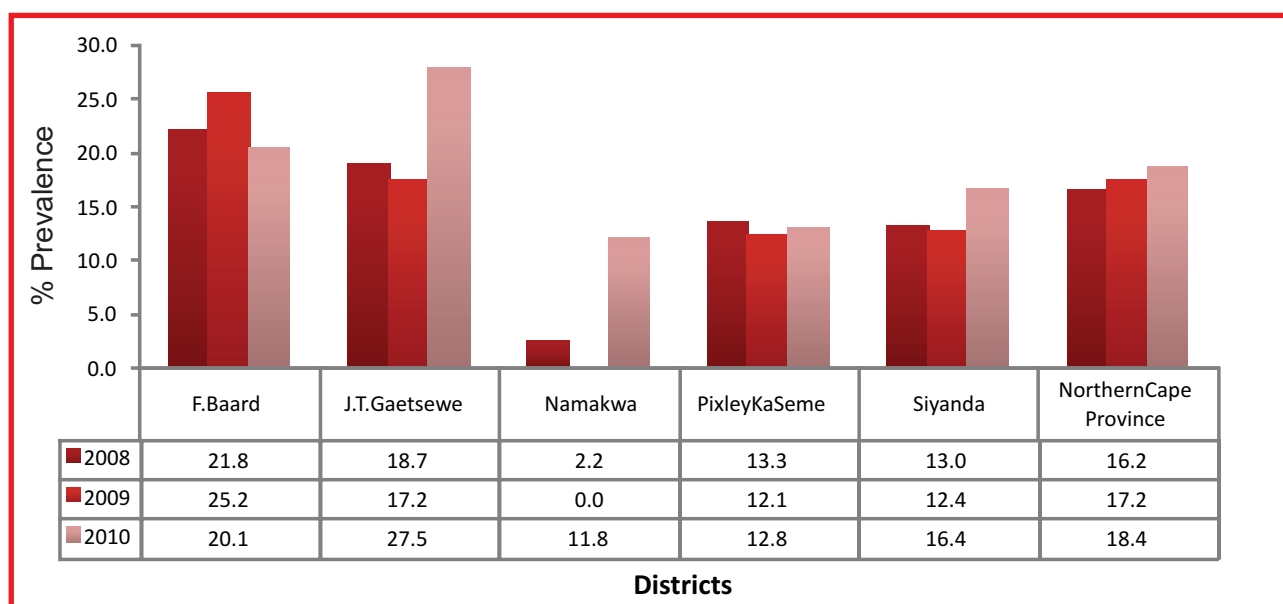


Figure 41: HIV prevalence trends among antenatal women by district, Northern Cape, 2008 to 2010

Table 22 : HIV prevalence among antenatal women by age group, Northern Cape, 2008 to 2010.

Age group	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 - 24	569	10.9	487	12.5	571	12.4
10-14	9	0.0	5	0.0	6	16.7
15 -19	226	4.0	206	7.8	265	8.7
20 – 24	343	15.5	281	16.0	306	15.7
25 – 29	250	23.6	229	21.4	250	24.0
30 – 34	161	27.3	136	27.9	173	22.5
35 – 39	91	14.3	102	15.7	101	30.7
40 – 44	23	4.3	30	13.3	30	23.3
45 – 49	4	0.0	2	0.0	2	0.0
>49	**	**	**	**	1	0.0

* Prevalence among the age group 15 – 24 years used as is an Indicator for goal 6 of the Millennium Development Goals

N = Realised sample size ** No participants in this age group

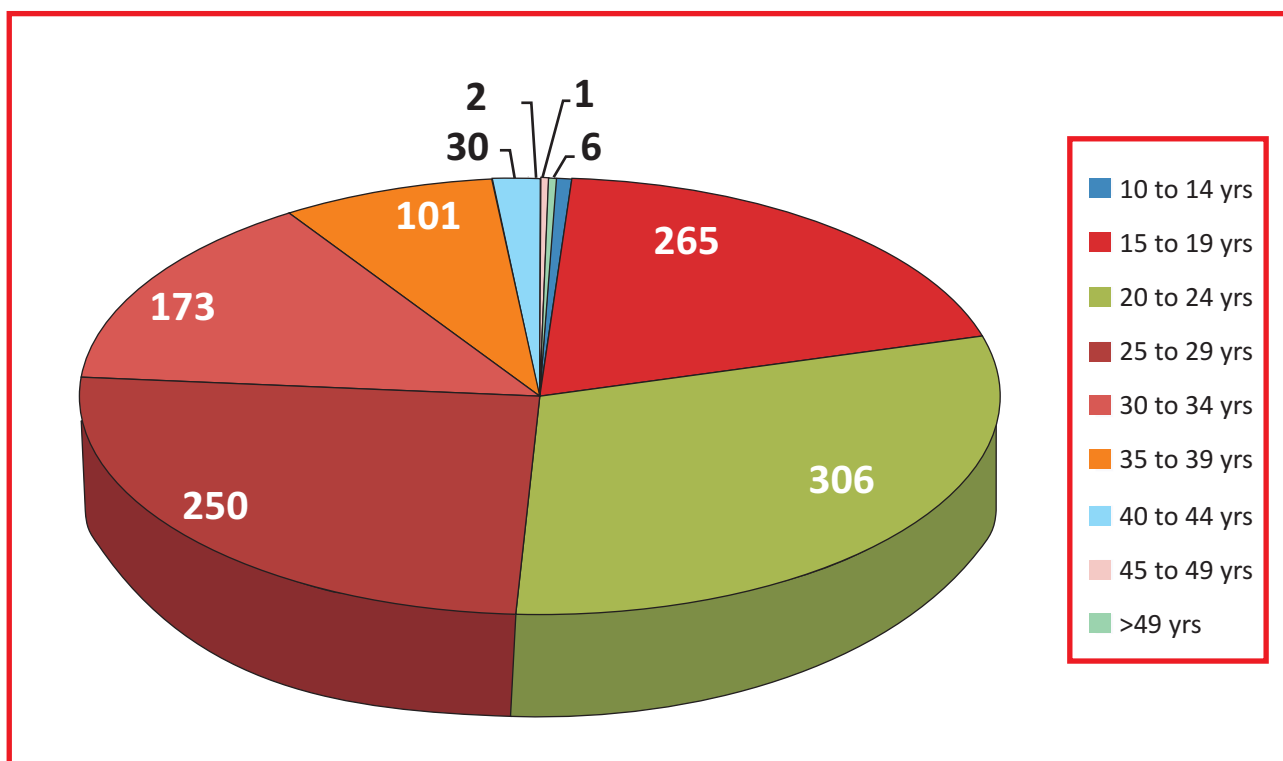


Figure 42: Sampled population distribution by age group, Northern Cape, 2010.

In the Northern Cape the age distribution of pregnant women who participated ranged from 10-14 years old (n=6) and one 49 year old participant. The majority of the survey participants were teenagers and young women (15-24 year olds) (Figure 42).

In 2010, the HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) remained unchanged at approximately 12% in 2009 and 2010. This MDG group constituted almost 49% (N = 571) of the survey population. There was an increase in HIV prevalence among young women in the age group 15 - 19 years, from 4.0% in 2008 to 8.7% in 2010.

The findings of monitoring age HIV prevalence trends in the Northern Cape showed that in the age group 35-39 years the prevalence has more than doubled from 14.3% in 2008 to 30.7% in 2010. There was also a significant increase of 10% among the 40-44 year old group from 13.3% in 2009 to 23.3% in 2010 and from 4.3 to 23.3% when comparing prevalence between 2008 to 2010.

The variation HIV prevalence distribution in the Northern Cape province from 2008 to 2010 is shown in Figure 43.

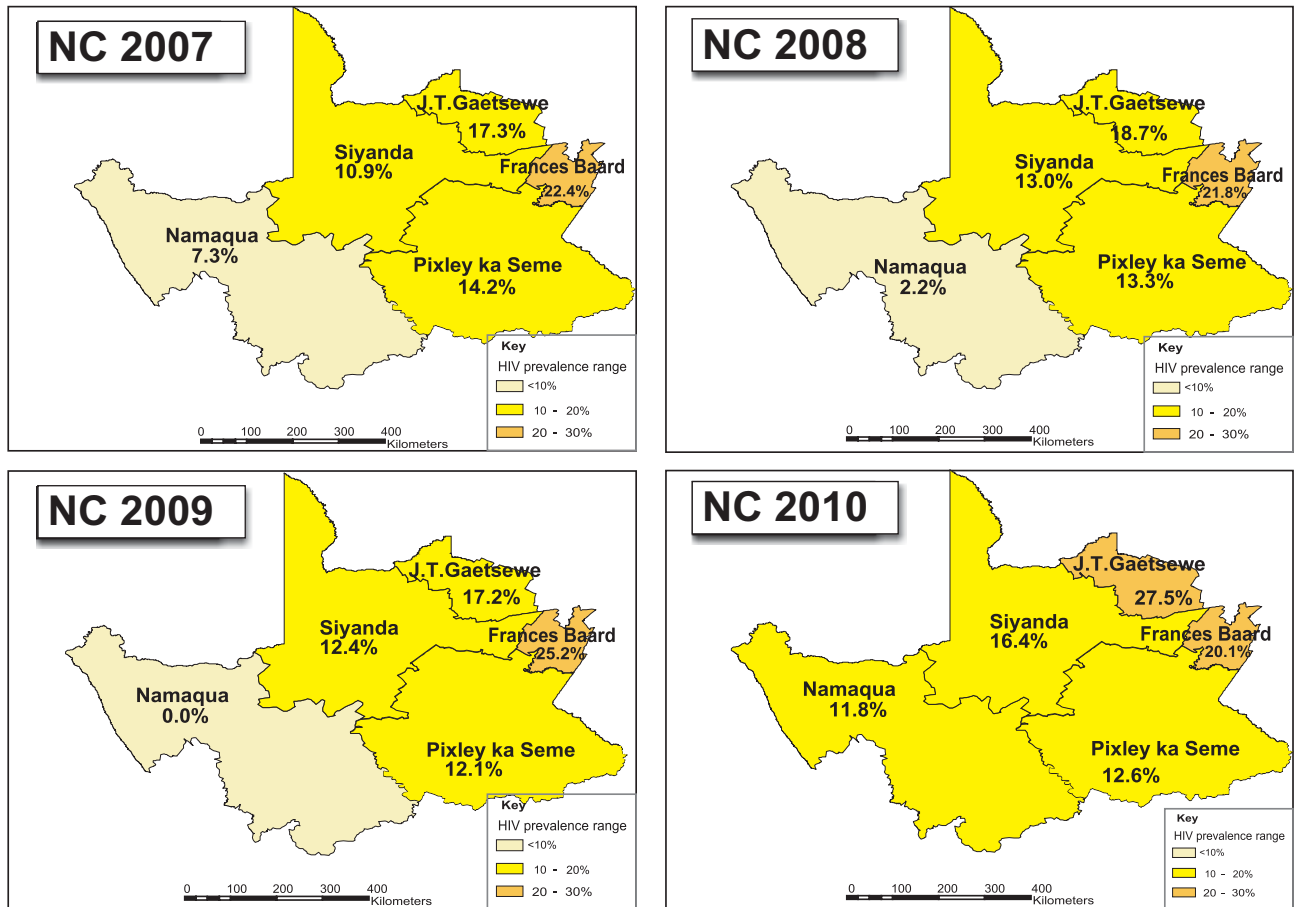


Figure 43: HIV prevalence distribution among antenatal women by district, Northern Cape, 2007 - 2010.

3.6.9 WESTERN CAPE PROVINCE

In 2010, the Western Cape provincial HIV prevalence amongst antenatal women was 18.5% (95% CI: 15.1 – 22.5) living in this metro. The overall HIV prevalence increased from 15.3% in 2007 to 18.5% in 2010, an increase of 3.2% (Figure 44).

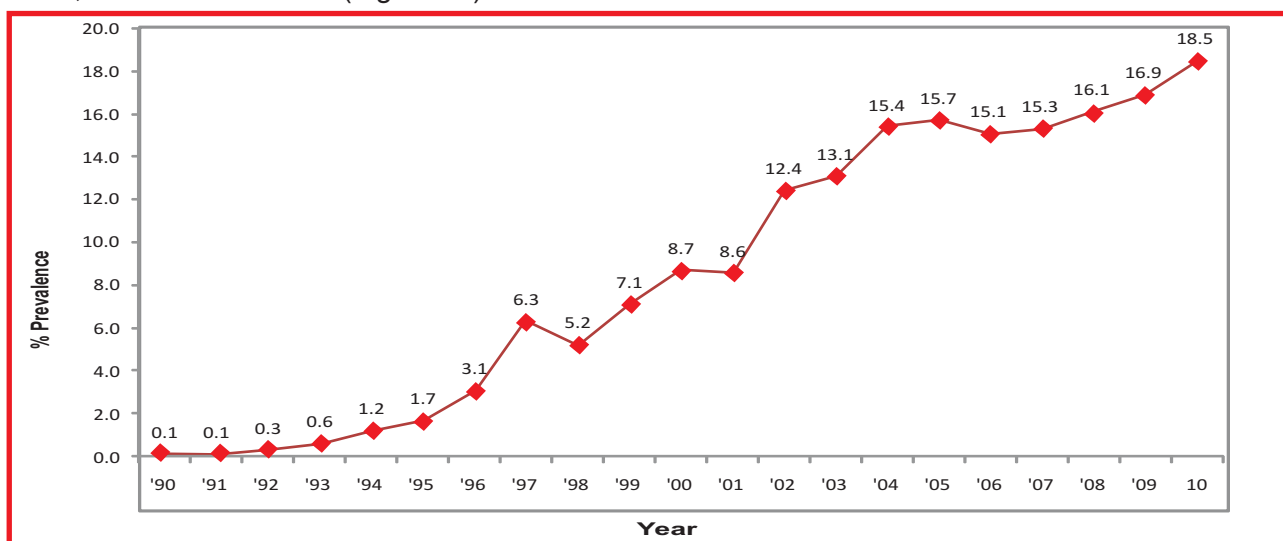


Figure 44: HIV prevalence epidemic curve among antenatal women, Western Cape, 1990 to 2010.

The Cape Metropole carries the heaviest burden of HIV in the Western Cape, with more than 70% of the HIV infected pregnant women in the province. The Cape Metro has recorded an increase by 2.2% from 18.0% in 2009 to 20.2% in 2010. Overberg and Central Karoo have recorded decreases in antenatal HIV prevalences from 2009 to 2010, by 3.5% and 3.3% respectively.

Table 23: HIV prevalence among antenatal women by district, Western Cape, 2008 to 2010.

YEAR	2008			2009			2010		
	N	% HIV+	95% CI	N	% HIV+	95% CI	N	% HIV+	95% CI
Provincial	3 828	16.1	12.6 – 20.3	3 679	16.9	13.8 – 20.5	3 981	18.5	15.1 – 22.5
C. Winelands	539	12.0	8.2 – 17.3	499	13.2	9.0 – 19.1	557	14.9	10.4 – 20.9
Central Karoo	54	14.8	7.5 – 27.1	51	11.8	6.8 – 19.6	59	8.5	3.1 – 20.9
Eden	338	13.0	8.8 – 18.8	319	18.2	12.9 – 25.0	353	18.7	13.6 – 25.2
Cape Metropole	2 536	17.9	13.2 – 23.9	2 481	18.0	13.8 – 23.1	2 656	20.2	15.7 – 25.6
Overberg	157	15.9	10.3 – 23.8	130	20.8	14.1 – 29.5	156	17.3	11.9 – 24.5
West Coast	204	9.3	6.2 – 13.6	199	9.5	6.1 – 14.6	200	10.0	6.6 – 14.9

Source: Epidemiology & Surveillance National Department of Health

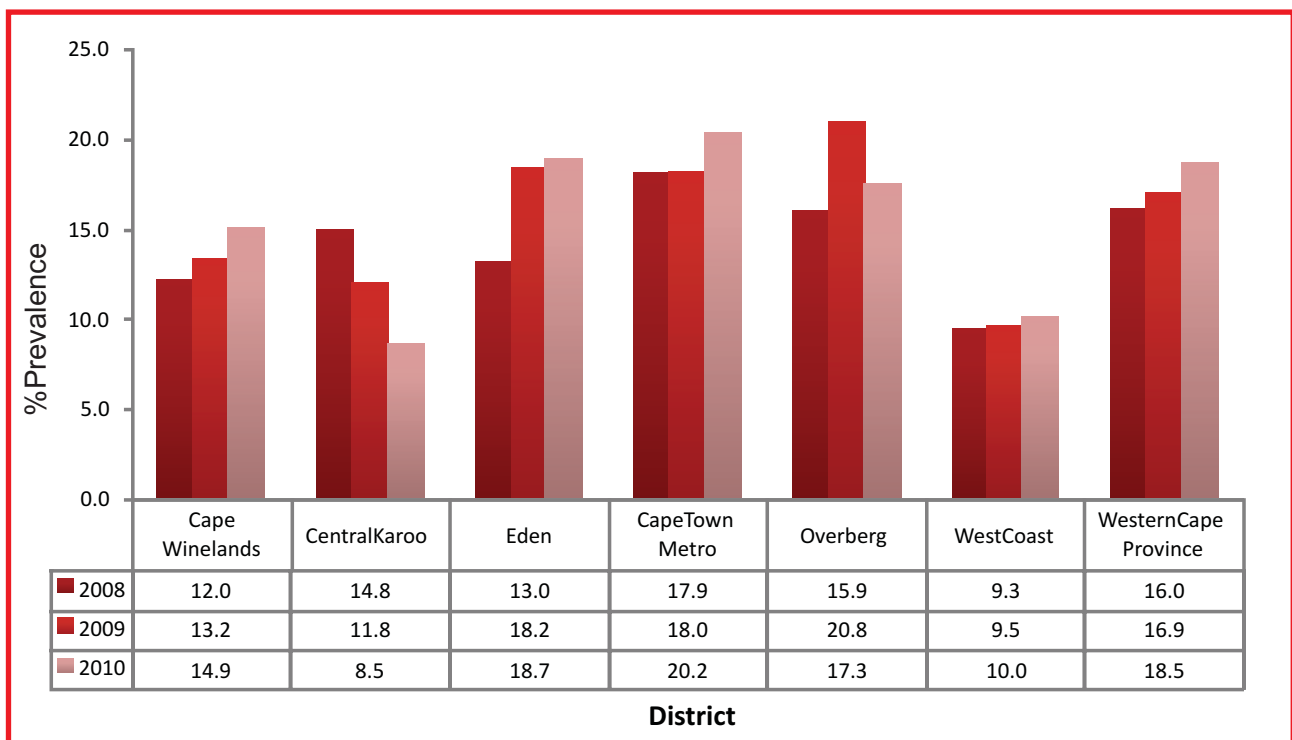


Figure 45: HIV prevalence trends among antenatal women by district, Western Cape, 2008 to 2010.

Prevalence in the West Coast has remained at or below 10% for the past three years. The Central Karoo district has shown a decrease of 3.0% from 14.8% in 2008 to 11.8% in 2009 and a further decrease to 8.5% in 2010 (Table 23 and Figure 45). Overberg has recorded a decrease from 20.8% in 2009 to 17.3% in 2010.

In the Western Cape the age distribution of pregnant women who participated ranged from (n=18) 10 - 14 year olds to 45 - 49 year old group (n=1). The majority of the survey participants were between 20 and 34 years. Among the under 14 year olds (n=18) that participated in the survey, 5.6% were HIV infected.

The findings of HIV prevalence trends in this province among the 15 - 19 year old pregnant women was 5.6% in 2008, 6.4% in 2009 and 7.7% in 2010, a steady annual increase. In 2010, the HIV prevalence among the 15 - 24 year olds (which is the Millennium Development Goal 6, Target 7 indicator 18 group) in the Western Cape remained at around 12.0% (from 12.2% in 2009 to 12.5% in 2010) (Table 24).

The HIV prevalence among women in the age group 30 - 34 years remains the highest infected group, with 27.4 % in 2010; followed by 22.1% in the 35-39 year olds and 21.9% among the 25-29 year olds. These specific age groups carry the main HIV burden in the Western Cape Province.

The variation in the HIV prevalence distribution in the Western Cape province from 2008 to 2010 is shown in Figure 47.

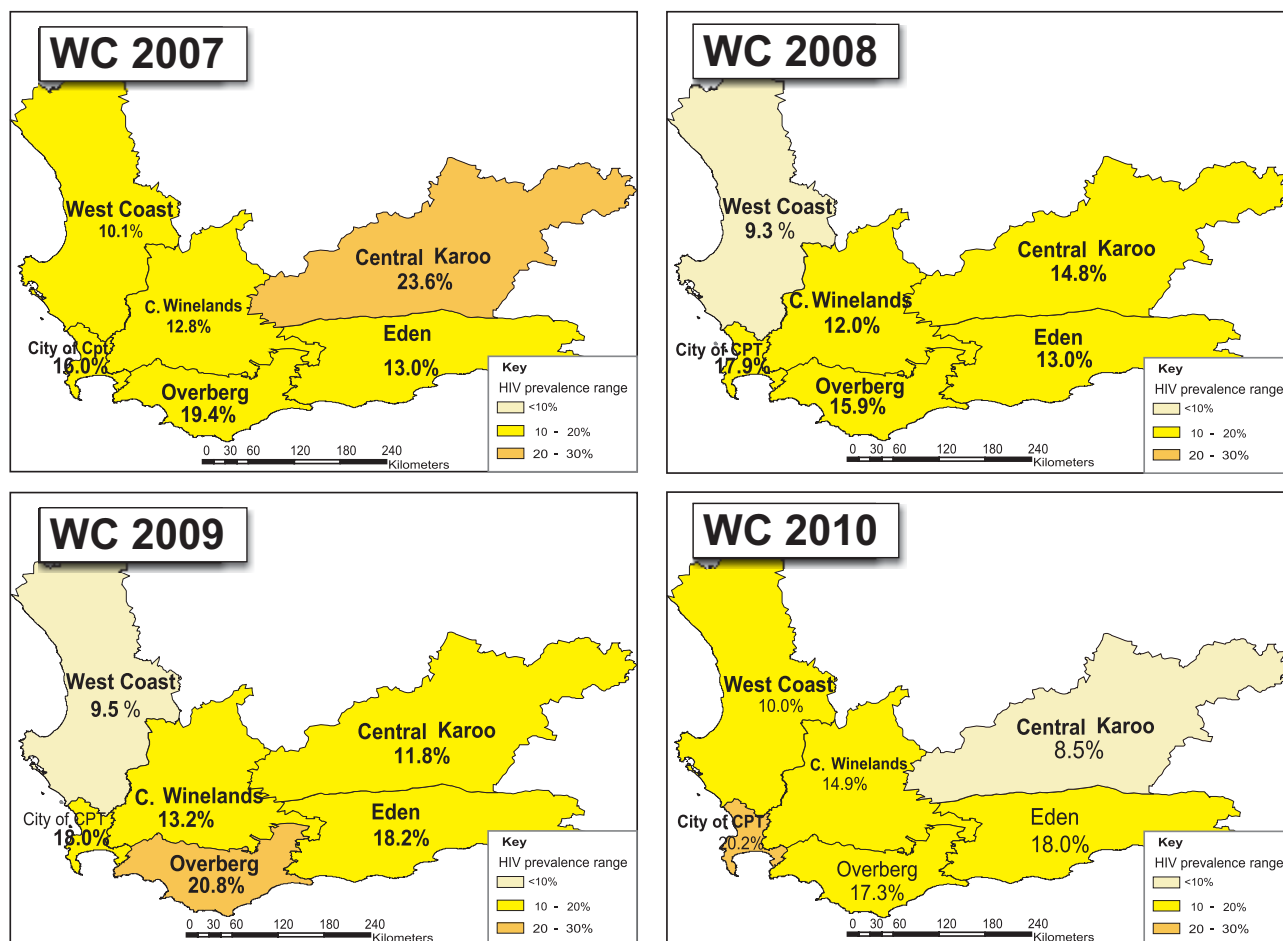


Figure 47: HIV prevalence distribution among antenatal women by district, Western Cape, 2007-2010.

Table 24: HIV prevalence among antenatal women by age group, Western Cape, 2008 to 2010.

YEAR	2008		2009		2010	
	N	% HIV+	N	% HIV+	N	% HIV+
*15 - 24	1 842	11.0	1 677	12.2	1 732	12.5
10-14	14	0.0	14	0.0	18	5.6
15 -19	608	5.6	535	6.4	636	7.7
20 – 24	1 234	13.6	1 142	14.9	1 096	15.2
25 – 29	1 013	22.2	993	21.0	1 083	21.9
30 – 34	581	23.9	548	24.5	661	27.4
35 – 39	279	12.5	343	17.2	349	22.1
40 – 44	64	12.7	73	17.8	74	17.6
45 – 49	3	0.0	3	0.0	1	0.0
>49	**	**	**	**	**	**

* Prevalence among the age group 15–24 years is an indicator for goal 6 of the Millennium Development Goals (MDG) **

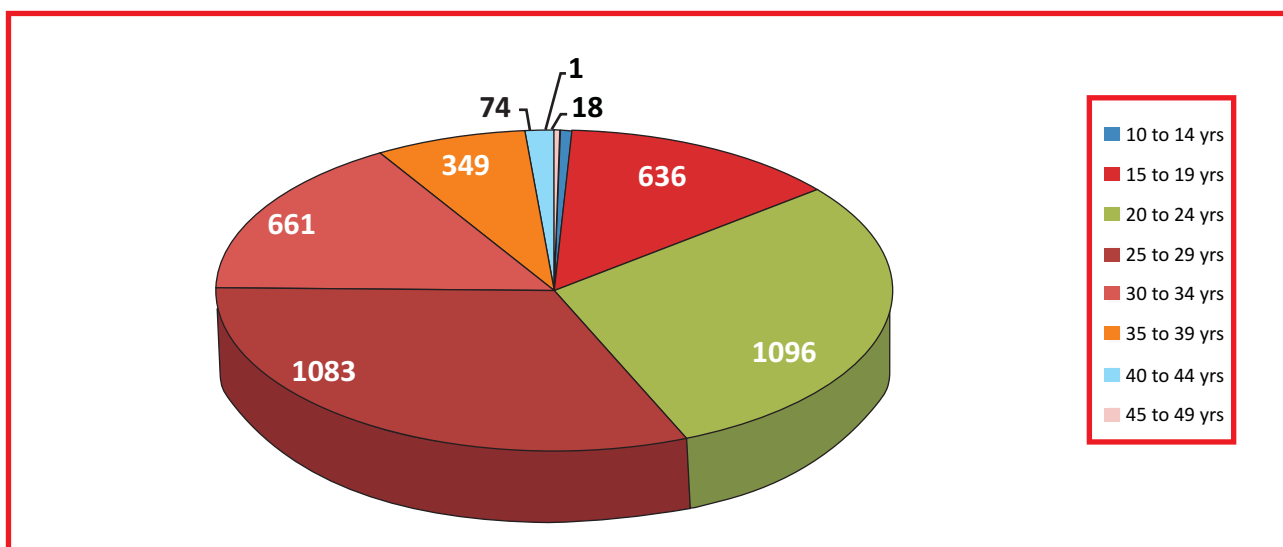


Figure 46: Sampled population distribution by age group, Western Cape, 2010.

3.7 Regression Analysis of Determinants of HIV infection

Potential HIV risk factors may act independently or concurrently to drive the HIV epidemic. Identification of independent factors related to a positive HIV infection status was determined through classification tree regression. The risk factor set of variables collected during the survey is limited to ensure the feasibility of the data collection and testing process. The analysis was limited to this set: age, age of the partner, population group, education level, marital status, participated in previous survey, aware of HIV status, gravid, parity and syphilis test result for 2010.

The model (presented on page 96) identified age, population group and marital status as the top three determinants in the 2010 survey. The first split was on age of the women younger than 22 years had a prevalence of 17.2% compared to 35.9% in the older women. None of the risk factors available were important enough to split the younger sub group further. The older subgroup was split on population group: non-African women had a prevalence of 7.8% compared with African women with a prevalence of 39%. No further splits were made in the non-African women. In the sub group of older African women marital status was the most important determinant: married women had a prevalence of 29.4% compared to 42.2% in unmarried women. In these single African women those older than 27 years constituted a total of 7 722 women (24% of the total survey). In this sub group the HIV prevalence was 48.7%. This sub group as identified by the tree regression had the highest HIV prevalence within the model (Annexure C).

The tree regression model was done on the unweighted data and strict splitting criteria was applied to ensure that only the important splits were identified. The model confirms known risk factors associated with HIV positive status in pregnant women and quantifies the prevalence differential across the significant sub groups for the 2010 survey.

2010 TREE MODEL

TARGET VARIABLE: HIV RESULT

PREDICTOR VARIABLES: POPULATION GROUPS, MARITAL STATUS, PARTICIPATED IN PREVIOUS SURVEYS, AWARE OF HIV STATUS, RPR RESULT, AGE GROUP OF THE PARTICIPANT, AGE OF THE PARTICIPANT, EDUCATION LEVEL, GRAVIDA, PARITY, AGE OF THE PARTNER

Data Sample
32 225 Records Total

Class	Learn	%	Total
0	22 602	70.14	22 602
1	9 623	29.86	9 623
Total:	32 225	100.00	32 225

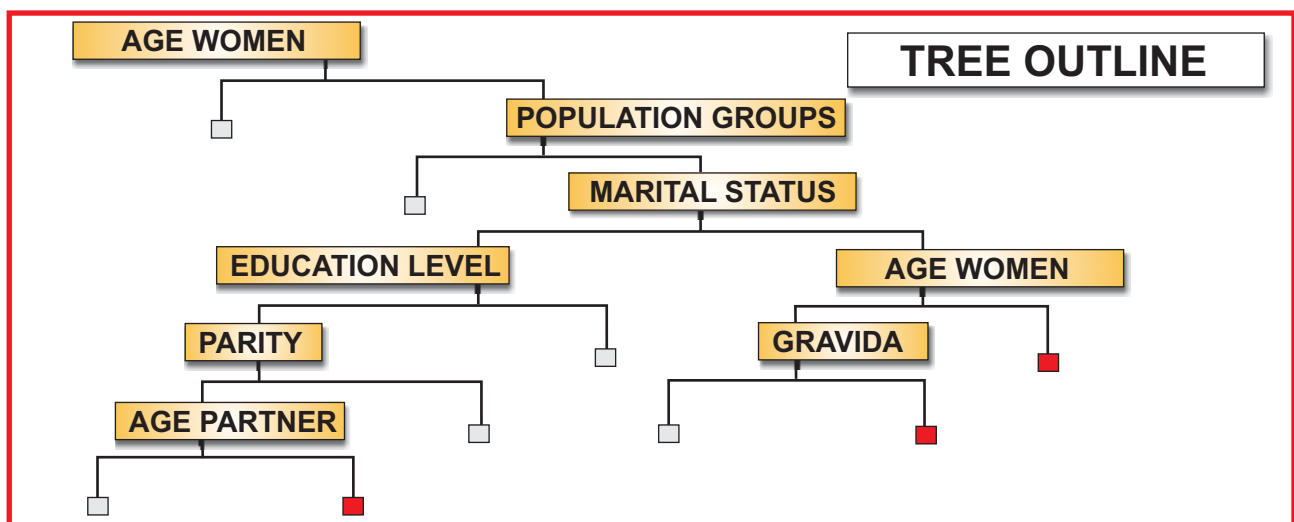
Variable Importance's

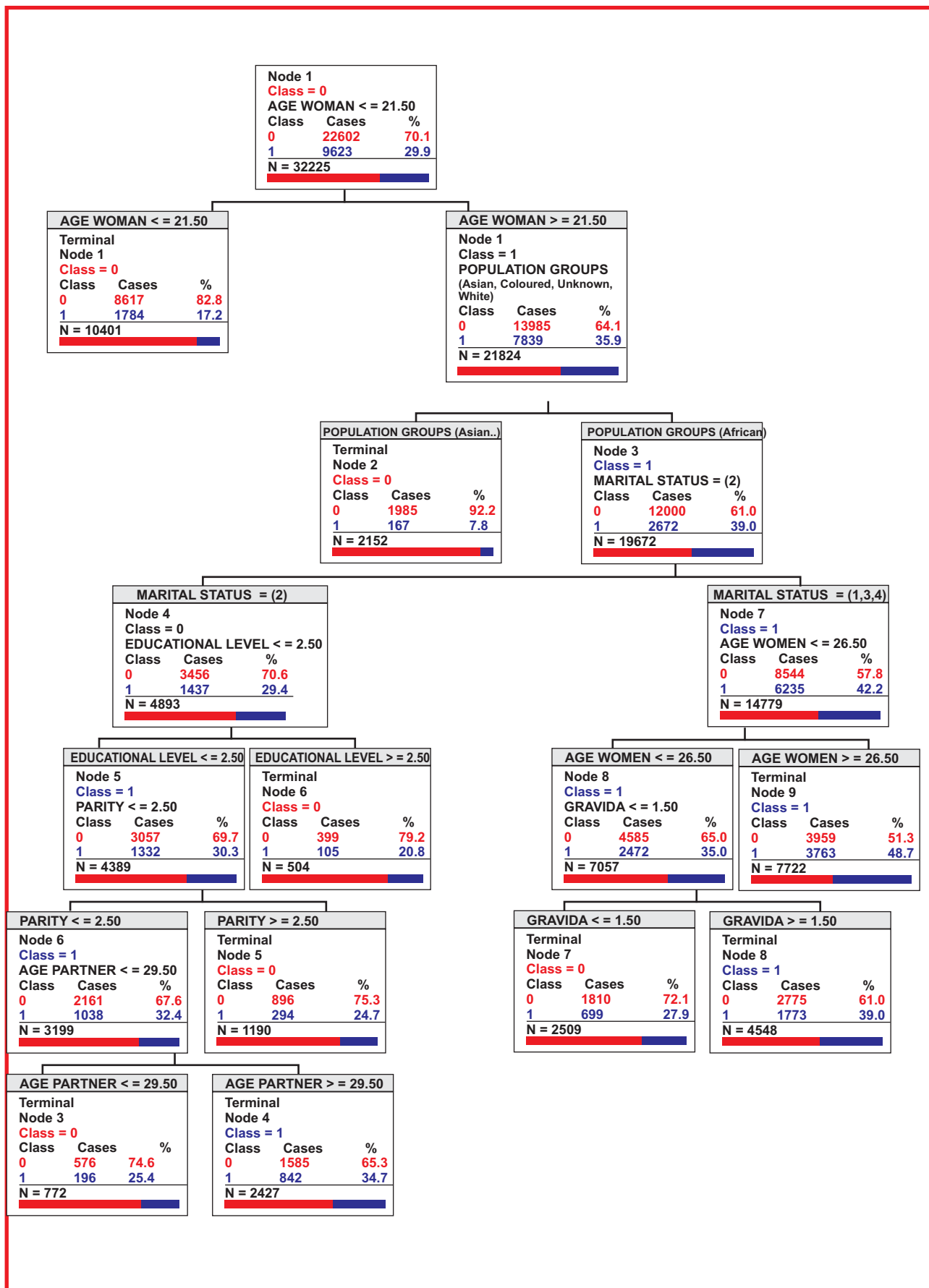
Variable	Score	
AGE WOMAN	100.00	
AGE PARTNER	89.73	
AGE GRP	88.02	
GRAVIDA	78.66	
PARITY	66.42	
POPULATION GROUPS	65.86	
MARITAL STATUS	16.66	
EDUCATION LEVEL	13.93	

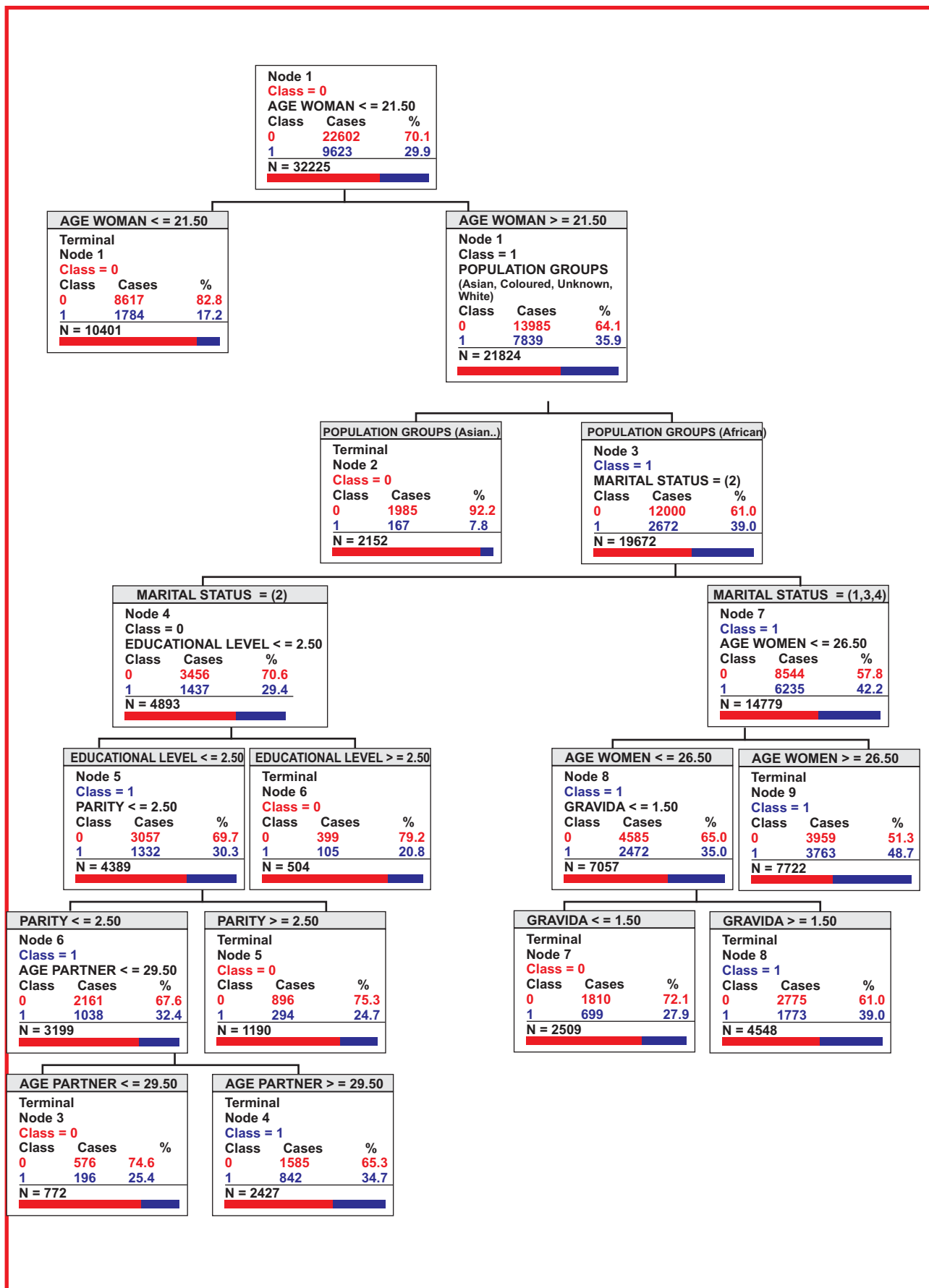
Variable Importance's

Class	N Cases	N Mis-Classed	Pct. Error	Cost
0	22 602	8 928	39.50	0.40
1	9 623	3 070	31.90	0.32

Overall correct 63%. 32% of positives misclassified and 4% of HIV negatives. Thus predictive ability very modest







3.8 Extrapolation of HIV infection to the general population

According to the UNAIDS EPP and Spectrum models the estimated **national** HIV prevalence has increased from 17.8 % in 2009 to 17.9% in 2010, projected in the 15 – 49 years old in the general population (Table 25a).

The HIV incidence among adults 15-49 was estimated at 1.47% (324 150) (Table 25b) . New infections for those aged 15 years and above was estimated at 352 000 in 2008 and 332 512 in 2010. New infections among children decreased from 49 800 in 2008 to an estimated 48 088 in 2010. An estimated 260 280 women were in need of PMTCT services in 2010.

Tables 25b and 25c indicate considerable variation in **provincial prevalence**, incidence and new infections in the UNAIDS estimates. For the country as a whole, incidence was estimated 1.47% in 2010. For 2010, incidence ranged from 0.44% in the Western Cape to 2.2% in KwaZulu-Natal. Northern Cape had an estimated 2 876 new infections for 2010 while KwaZulu-Natal had an estimated 95 896 new infections. KwaZulu-Natal also had the highest number of new infections among children below 15 years (14 226) followed by Gauteng (9 850).

In the past two decades (1990 - 2010), the National Department of Health has produced sentinel surveillance data that informs policy planning and scientific evidence in monitoring the HIV epidemic prevalence trends in the 15 - 49 years old pregnant female population. Using the 2008 ASSA model in 2010 the HIV prevalence in the adult population (aged 15-49) was estimated at 17.0%; or 5 470 000 adults and children were infected with HIV in South Africa. Of these, 4 030 000 are adults aged 15 years and older, 2 million were females and 438 000 were children below 15 years of age. For 2010, an estimated 194 000 South Africans died of AIDS; of which 173 000 were adults and this resulted in approximately 1.670 000 AIDS orphans. In 2010, it is estimated that 1 210 000 South Africans aged 15 and older were in need of antiretroviral therapy, approximately 102 000 children needed anti-retroviral therapy. It is estimated that in 2010 there were 281 000 new adult infections and 54 000 new infections among children under 14 years of age.

In 2010, ASSA estimated that the lowest incidence estimates were obtained for the Western Cape (0.5%) and highest in KwaZulu-Natal (1.8%). Most of the childhood new infections were estimated to take place in KwaZulu-Natal followed by Gauteng.

Table 25a: Selected HIV estimates for South Africa, calendar years 2009 and 2010

Indicator	UNAIDS ¹ 2008	UNAIDS ² 2009	UNAIDS 2010	ASSA* 2008	ASSA* 2009	ASSA* 2010
Total HIV population (Adults & children)	5 570 000	5 630 000	5 575 096	5 240 000	5 350 000	5 470 000
HIV + Adults(15+)	5 240 000	5 300 000	5 056 294	4 840 000	4 930 000	4 030 000
Adult (15-49) prevalence (%)	17.9	17.8	17.9	16.9	16.9	17.0
Adult HIV+female population(15+)	3 230 000	3 270 000	2 945 686	2 840 000	2 920 000	2 000 000
HIV population (children <15)	325 000	334 000	518 802	396 000	418 000	438 000
Total annual AIDS deaths	330 000	314 000	282 578	241 000	212 000	194 000
AIDS orphans	1 850 000	1 950 900	2 138 909	1 520 000 (maternal<18)	1 610 000 (maternal<18)	1 670 000 (mrt<18)
Adult AIDS deaths(15+)	297 000	284 000	252 348	212 000	1 90 000	173 000
Adult New HIV infections (15+)	352 000	344 000	332 512	310 000	294 000	281 000
New infections (children <15)	49 800	42 700	48 088	65 000	58 000	54 000
Need for ART among adults (15+)	1 475 000	1 584 000	1 407 026	880 000	1 030 000	1 210 000
Need for ART (children)	156 800	158 600	304 535	64 000	84 000	102 000
Infected mothers needing PMTCT	218 700	213 800	260 280	**	**	**

* Based on the 2006 WHO eligibility criteria of CD4<200 ** Not calculated

These estimates are based on data provided by the National Department of Health up to 2009. Spectrum version 3.48 was used to derive these estimates.

Table 25b: Provincial estimates of new infections, 2009 to 2010, UNAIDS (EPP & SPECTRUM) and ASSA, models

	YEAR	Estimated number of new infections (adults 15-49 years)		Estimated number of new infections (adults 15-49 years) % per annum		Estimated number of new infections (children birth - 14 years)	
		UNAIDS	ASSA ³	UNAIDS	ASSA	UNAIDS	ASSA ³
South Africa	2010	324 150	281 000	1.47	1.2	48 088	54 000
	2009	335 700	310 000	1.5	1.3	48 481	58 000
KwaZulu-Natal	2010	95 896	76 000	2.21	1.8	14 226	15 000
	2009	98 600	78 000	2.3	1.9	14 235	17 000
Mpumalanga	2010	26 535	25 000	1.85	1.5	3 937	5 000
	2009	28 200	26 000	1.9	1.6	4 069	6 000
Free State	2010	21 068	17 000	1.64	1.3	3 125	3 000
	2009	22 600	18 000	1.7	1.4	3 263	4 000
Gauteng	2010	66 399	48 000	1.36	1.0	9 850	10 000
	2009	67 100	52 000	1.4	1.0	9 692	11 000

	YEAR	Estimated number of new infections (adults 15-49 years)		Estimated number of new infections (adults 15-49 years) % per annum		Estimated number of new infections (children birth - 14 years)	
			ASSA ³	UNAIDS	ASSA	UNAIDS	ASSA ³
Northwest	2010	27 386	20 000	1.57	1.4	4 063	4 000
	2009	28 500	21 000	1.6	1.4	4 111	4 000
Eastern Cape	2010	44 308	43 000	1.51	1.5	6 573	8 000
	2009	46 400	44 000	1.6	1.6	6 704	9 000
Limpopo	2010	28 378	24 000	1.08	0.9	4 210	5 000
	2009	29 000	25 000	1.1	1.0	4 181	5 000
Northern Cape	2010	2 876	3 900	0.66	0.7	427	700
	2009	3 100	4 100	0.7	0.8	449	800
Western Cape	2010	11 306	12 000	0.44	0.5	1 677	2 000
	2009	12 300	13 000	0.5	0.5	1 778	2 000

Table 25c: Provincial HIV prevalence of adults 15-49 years, 2008 to 2010

	UNAIDS ³ 2008 - %	UNAIDS ⁴ 2009 - %	UNAIDS ⁵ 2010 - %	ASSA 2008 - %	ASSA 2009 - %	ASSA 2010 - %
SA	17.9	17.9	17.90	16.9	16.9	17.0
EC	18.6	18.5	18.45	16.6	16.7	16.8
FS	19.5	19.5	19.73	18.8	18.6	18.6
GA	16.7	16.6	16.91	17.1	17.0	17.0
KZN	25.1	25.0	24.85	23.4	23.3	23.1
LP	13.8	13.8	13.97	10.8	11.0	11.1
MP	21.8	21.8	21.71	19.6	19.6	19.6
NW	19.2	19.2	19.06	19.2	19.0	18.9
NC	9.3	9.3	8.93	10.0	10.2	10.3
WC	6.2	6.2	6.16	7.6	7.8	7.9

⁴ These estimates are based on data provided by the National Department of Health up to 2009. Spectrum version 3.48 was used to derive these estimates.

4. RESULTS - SYPHILIS PREVALENCE

In 2010, the overall syphilis prevalence when data was pooled, was 1.5% (CI 95% of 1.4% – 1.7%) of the pregnant women served at public antenatal care clinics. This has decreased by 0.4% from 2009. The trend in syphilis prevalence among attendees of antenatal clinics from 1997 to 2009 is shown in Figure 48 below. The overall syphilis prevalence of 1.5% is the lowest recorded since 1997.

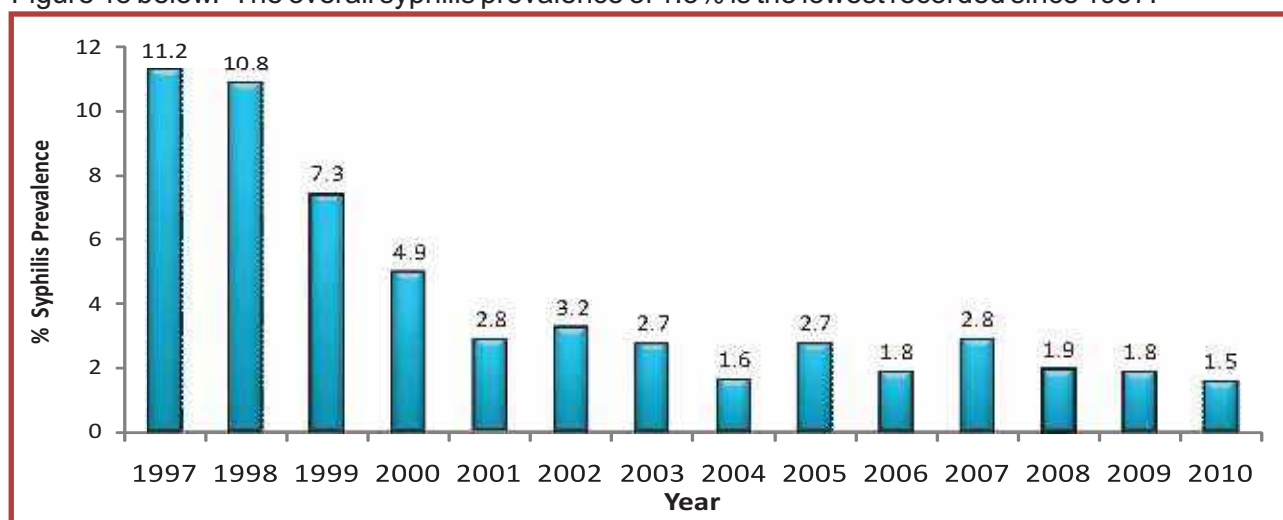


Figure 48: National syphilis prevalence trends among antenatal women, South Africa, 1997 to 2010.

4.1 Syphilis prevalence by province

The estimated highest prevalence of syphilis (3.6%) in 2010 was recorded in the Northern Cape, and was 2.0% lower than in 2009. Mpumalanga syphilis prevalence has more than doubled from 0.7% in 2008 to 2.1% in 2010. The lowest syphilis prevalence was 0.3% recorded in Kwa-Zulu Natal (Table 26)..

Table 26: Syphilis prevalence among antenatal women by province, 2008 to 2010

	2008			2009			2010		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
SA	33 800	1.9	1.7 – 2.0	32 260	1.9	1.7 – 2.1	32 225	1.5	1.4 – 1.7
EC	4 217	1.9	1.5 – 2.4	4 225	2.2	1.7 – 2.7	3 994	2.1	1.7 – 2.7
FS	2 015	2.3	1.7 – 3.1	2 331	2.1	1.5 – 2.8	2 223	1.2	0.8 – 1.8
GA	7 500	2.7	2.2 – 3.1	7 187	2.9	2.5 – 3.4	6 714	2.8	2.4 – 3.2
KZN	6 963	0.6	0.4 – 0.8	6 744	0.8	0.5 – 1.1	6 887	0.3	0.2 – 0.5
LP	3 830	0.4	0.3 – 0.7	3 145	0.3	0.2 – 0.5	3 117	0.5	0.3 – 0.8
MP	2 223	0.7	0.4 – 1.2	2 049	2.4	1.9 – 3.2	2 202	2.1	1.5 – 2.8
NW	2 112	1.5	1.1 – 2.2	1 898	1.7	1.1 – 2.7	1 963	1.3	0.9 – 1.9
NC	1 111	6.8	5.2 – 8.7	1 002	5.6	4.0 – 7.8	1 141	3.6	2.4 – 5.3
WC	3 829	3.8	3.1 – 4.6	3 679	2.0	1.5 – 2.6	3 979	1.2	0.9 – 1.7

KwaZulu-Natal, which has the highest HIV prevalence in the country, recorded the lowest syphilis prevalence in the country (Figure 49). There were slight decreases in syphilis prevalences in all the provinces except a slight increase in Limpopo from 0.3% in 2009 to 0.5% in 2010.

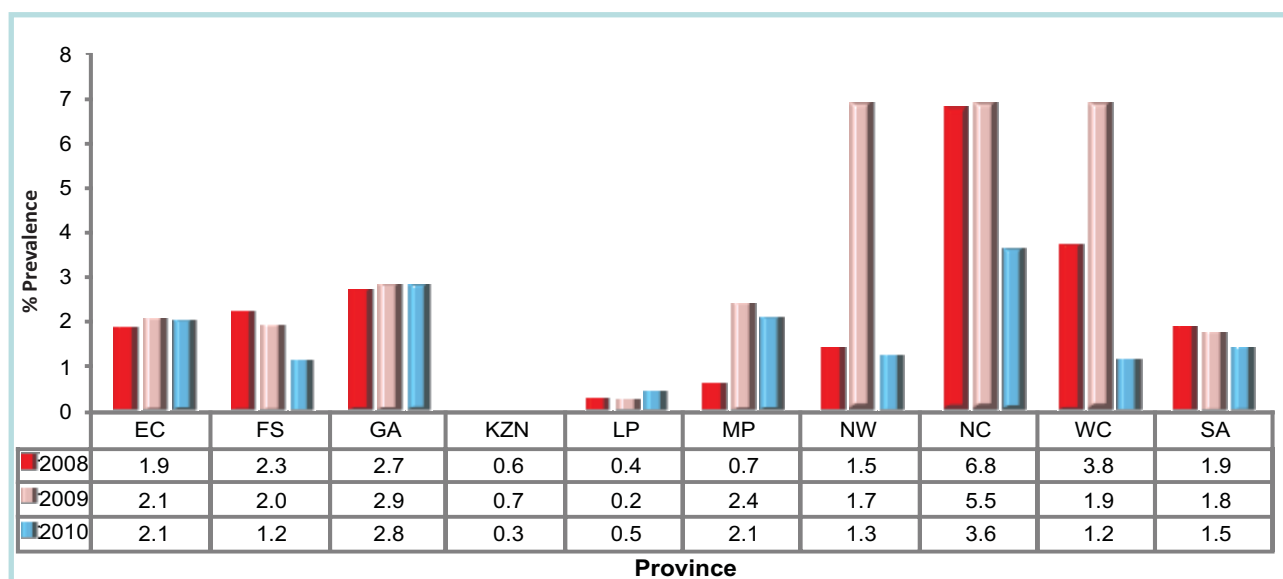


Figure 49: Syphilis prevalence trends among antenatal women by province, South Africa 2008 to 2010.

4.2 Syphilis prevalence by age

Unlike HIV, the prevalence of syphilis appears to be largely independent of age with the exception of the lower prevalence in the youngest age group. In 2010, the syphilis prevalence remained stable in the 15-19 and 35-39 year age group and slightly decreased among the 40-44 and 25-29 year old age groups, and there was only a 1.0% decrease in syphilis prevalence in the 30-34 year old age group (Table 27 and Figure 50).

Table 27 : Syphilis prevalence (%) among antenatal women by age group, 2008 to 2010.

Age group	2008			2009			2010		
	N	%	95% CI	N	%	95% CI	N	%	95% CI
15 -19	6 560	1.4	1.1 – 1.7	6 009	1.3	1.0 – 1.6	6 171	1.4	1.1 – 1.7
20 – 24	10 498	1.9	1.6 – 2.2	10 054	1.7	1.5 – 2.0	9 722	1.6	1.3 – 1.8
25 – 29	8 052	2.2	1.8 – 2.5	7 735	2.1	1.8 – 2.5	7 937	1.6	1.3 – 1.9
30 – 34	4 949	2.1	1.6 – 2.5	4 689	2.6	1 – 3.1	4 689	1.4	1.1 – 1.8
35 – 39	2 711	1.9	1.4 – 2.4	2 595	2.0	1.5 – 2.6	2 497	2.2	1.6 – 2.8
40 – 44	703	2.0	1.1 – 3.2	714	2.0	1.3 – 3.3	703	1.0	0.5 – 2.0
45 – 49	82	1.2	0.2 – 8.1	78	1.3	0.2 – 8.5	58	1.8	0.3 – 11.9

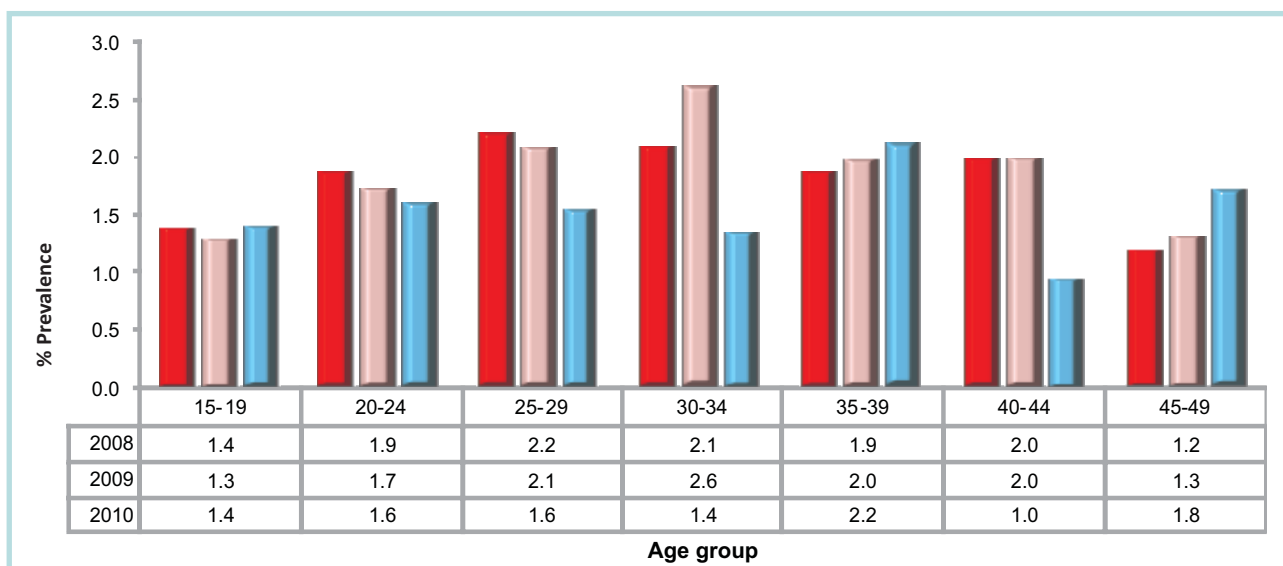


Figure 50: Syphilis prevalence trends among antenatal women by age group, South Africa, 2007 to 2010.

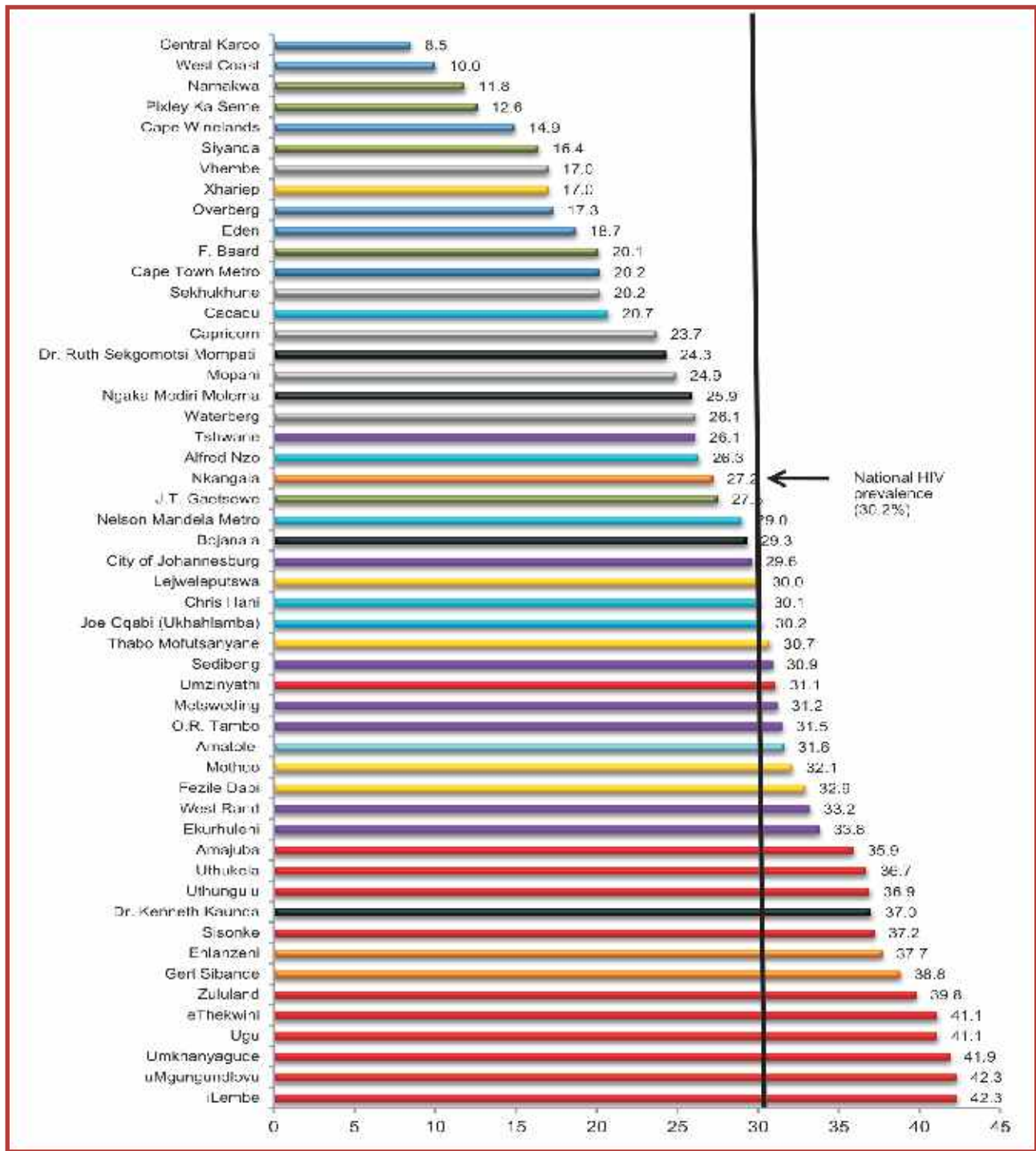
4.3 Syphilis vs. HIV by district prevalence

There was a marked inverse relationship between districts recording high HIV prevalences and ones recording high syphilis prevalences. Twenty three (23) of the 52 districts recorded HIV prevalences above the national average in 2010, which is almost half of all the districts. All 11 districts in KwaZulu-Natal recorded prevalences ranging from 31.1% in Umzinyathi to 42.3% in both iLembe and uMgungundlovu, followed by uMkhanyakude, Zululand and eThekweni both recording 41.1%. Only 2 of the 5 districts in Gauteng recorded prevalences below 30% (Figure 51 and Figure 52).

The lowest HIV prevalence was recorded in Central Karoo at 8.5%, this being the only district recording a prevalence below 10%. Four of the 5 districts in Northern Cape recorded HIV prevalences from 11.8% in Namaqua to 20.1% in Francis Baard. Only Xhariep in the Free State recorded an HIV prevalence below 20%, with the other 4 districts recording from 30.0% in Lejweleputswa to 32.9% in Fezile Dabi.

The above description showed the direct opposite with regards to syphilis prevalences. Five of the 11 districts in KwaZulu-Natal and Vhembe in Limpopo, recorded 0.0% syphilis prevalence, followed by lows of 0.1% in Uthungulu, 0.3% in Umzinyathi, 0.4% in eThekweni in KZN and 0.4% in Thabo Mofutsanyane district in Free State.

Twenty one of the 52 Health Districts recorded syphilis prevalences above the national average of 1.5%. The highest syphilis prevalence was recorded in Pixley Ka Seeme in the Northern Cape, followed by Central Karoo with 6.8%. In 2010, Siyanda and Sedibeng recorded 4.8% and Namaqua recorded 3.9%. Three of the 5 districts in Gauteng were among the top 10 highest, with Sedibeng at



Key: Eastern Cape (blue) Free State (yellow) Gauteng (purple) KwaZulu-Natal (red) Limpopo (dark red) Mpumalanga (grey) Northern Cape (orange) North West (green) Western Cape (black)

Figure 51: HIV prevalence among antenatal women by district, South Africa, 2010.

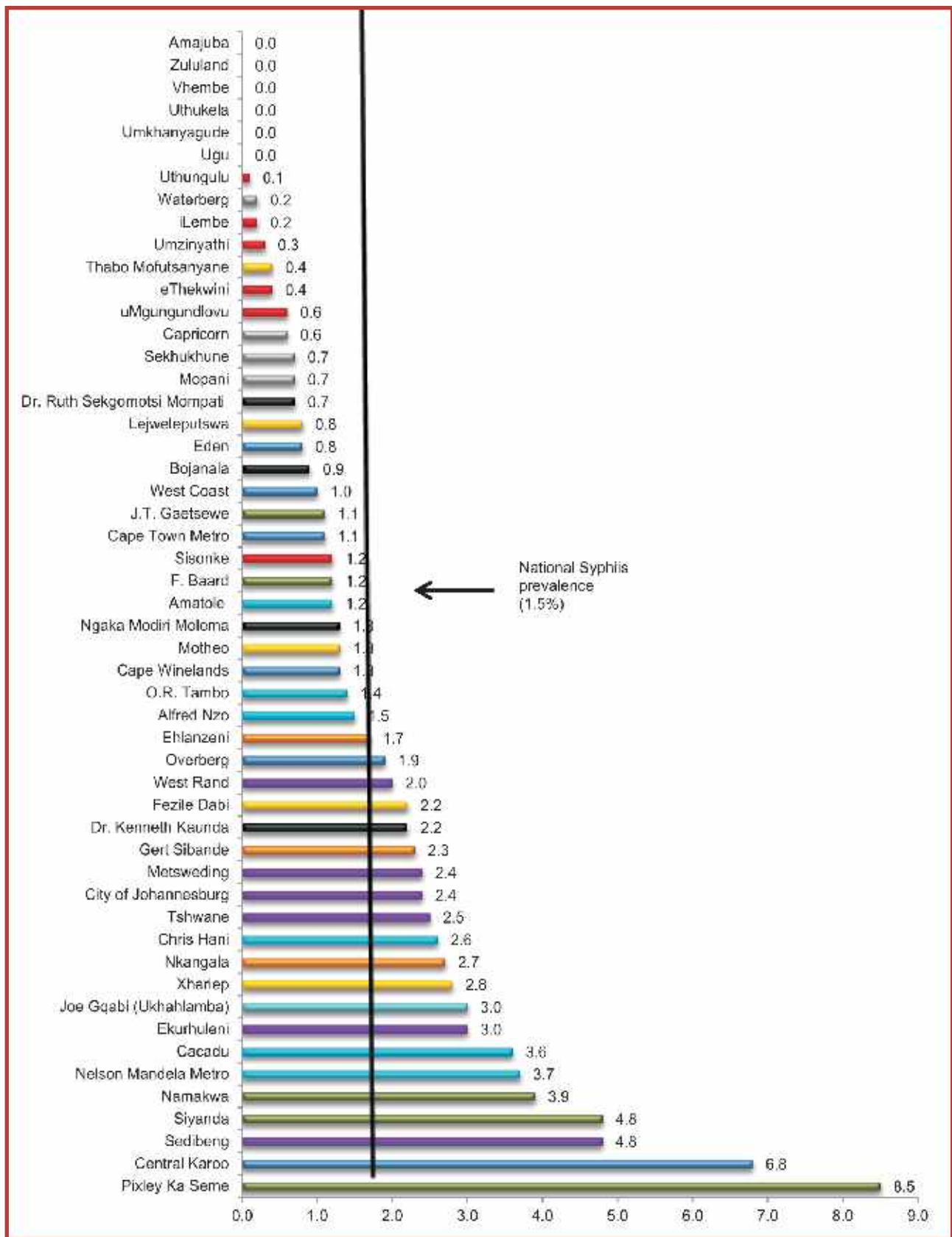


Figure 52: Syphilis prevalence among antenatal women by district, South Africa, 2010

4.8 % and Ekurhuleni at 3.0 %. There was a high number of districts that recorded syphilis prevalences ranging between 2.6% and 3.7%, e.g. Chris Hani (2.6%), Cacadu (3.6%) and Nelson Mandela Metro (3.7%), all in the Eastern Cape. Two districts from Free State and Mpumalanga and one in Northwest recorded syphilis prevalences above the overall average.

5. GENERAL DISCUSSION

The South African Antenatal Sentinel HIV and Syphilis Prevalence Survey remains the largest of its kind in the world, targeting a sample of 36 000 pregnant women who book for their first antenatal care visit in October month, every year since 2006. These data have helped to monitor HIV infection trends and the maps show the area of the HIV epidemic foci. The 2010 antenatal HIV and syphilis survey marks two decades of producing scientific evidence. The results from these surveys continue to be used as the primary source of data by mathematical modellers and scientists to estimate the rate of new HIV infections and HIV-associated deaths and to project prevalence in the general population.

The 2010 sentinel antenatal HIV prevalence was 30.2 %. This overall increase was the result of an increase in HIV prevalence among women 30 years and older attending antenatal clinics. Women age 30-34 years had a prevalence from 40.4% in 2008 and 42.6% in 2010, closely followed by an increase from 32.4% in 2008 to 38.4% in 2010 among the 35-39 year age group. The underlying driver of this increase in prevalence in older women could be attributed to their access to anti-retroviral treatment, which enables women to remain healthy and fall pregnant. From a PMTCT perspective, the high prevalence in all age groups and especially older women is a prevention challenge which has been met to a larger extent with an estimated transmission rate of less than 3.5% (Source: 2010 South African PMTCT survey).

The descriptive analysis of the association of the demographic and background characteristics of the survey participants and the HIV epidemic in this survey for the past 4 years, show that in 2010, there were 121 participants aged 10-14 years screened for HIV and 9.1% were HIV infected compared to 7.9% and 7.3% in 2009 and 2008 respectively. This indicates that more emphasis should be placed on strengthening HIV prevention strategies like targeting the “girl child”, because we are beginning to observe an increase in HIV prevalence among women less than 15 years old. This should be done inter-sectorally, with key government departments such as the Ministry of Women, Child and Persons with Disability, Department of Basic Education and Department of Social Development.

The country has started a collective effort to strengthen its HIV prevention strategy to bolster our efforts to meet the 15 - 24 year old pregnant women Millennium Development Goal 6 Target 7 Indicator 18. The findings of this survey indicate that the HIV prevalence among 15-24 year olds was 21.8%, not showing a decline. To reach a target level of 5.3% (expected to be achieved in 2015), will require **tripling** our efforts in this regard. The country has completed developing the national Strategic Plan for HIV and AIDS and TB for 2012 – 2016, and prevention is one of the pillars of the strategy.

The survey has shown that there is an inverse relationship between HIV prevalence and syphilis since 2003 and therefore syphilis is not a significant co-factor for HIV transmission. Rather, the role of

other sexually transmitted infections and their association with HIV should be investigated. The 2010 survey found that 1.5 % of pregnant women presenting at public antenatal care clinics were infected with syphilis. This is lower than the 1.9% prevalence recorded for 2008 and 2009 and is the lowest prevalence recorded since 1997. This is evidence that the screening for syphilis during pregnancy and the Syndromic management of syphilis available in the public sector has a great impact in controlling syphilis particularly.

5.1 Ecological associations between HIV outcomes of pregnant women, syphilis, social deprivation, population density and PTB burden in South Africa

The HIV epidemic curve stabilization could be caused by different HIV risk behaviours and epidemiological factors. It is only change in HIV incidence that will allow us to determine if the interventions are effective or not. At present we rely on modelling to estimate HIV incidence trends, which have high uncertainty and wide confidence intervals. Other confounding variables such as mortality, access to ART, migration patterns and saturation of the population at risk, may also account for such changes.

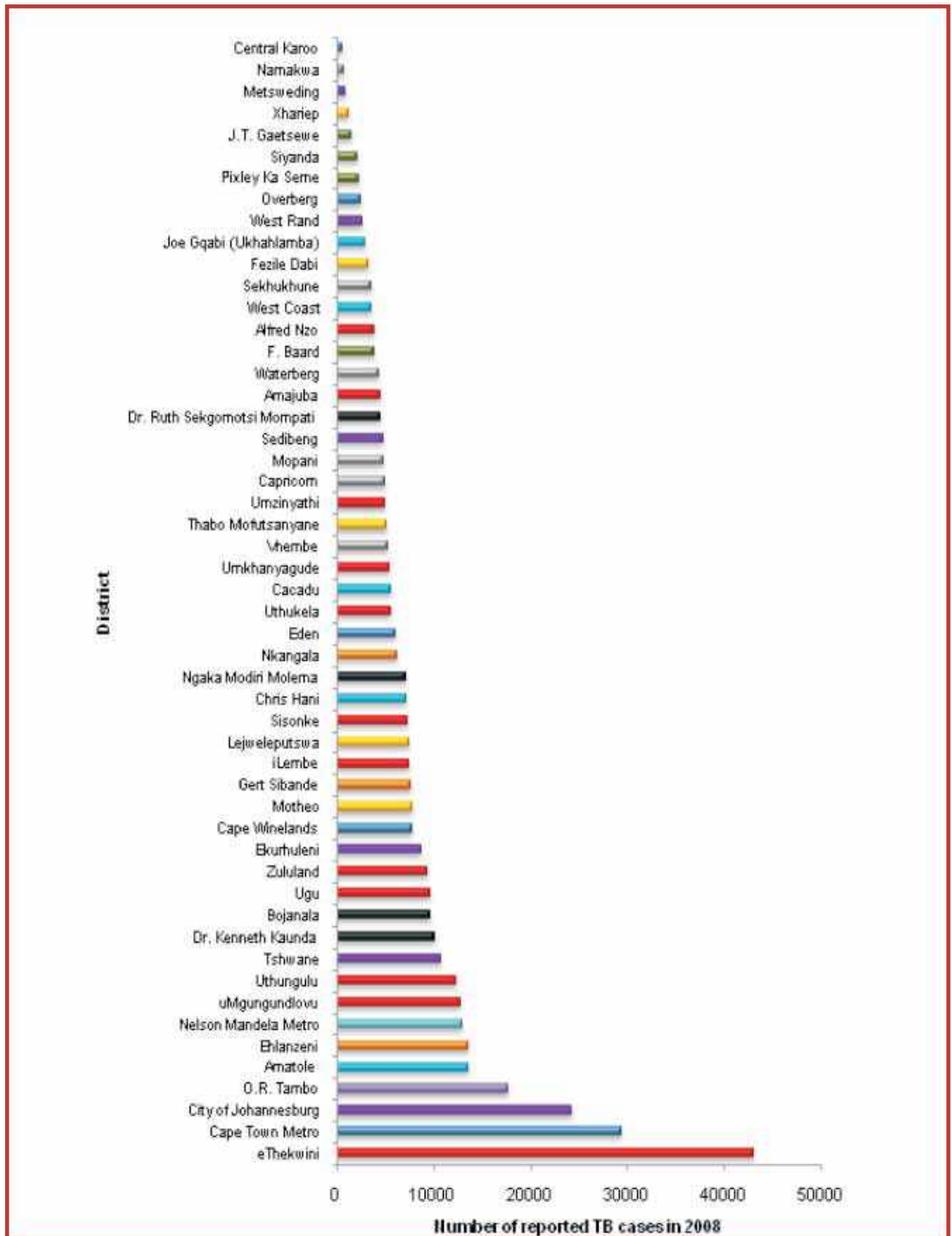
This section is a follow-up summary of the description and analysis of some of the conclusions and recommendations made for further epidemiological investigations proposed in the National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa 2008 report namely:

1. That the department does an in-depth analysis or epidemiological investigations on what could be causing the interjectory between the 52 Health Districts.
2. The department assess the ecological correlations between the trend in HIV prevalence and potential risk factors such as demographic, behavioral and socio-economic factors that could be driving the HIV epidemic.

In this report we provide a descriptive and analytical association between HIV and syphilis prevalence, TB burden and material and social deprivation in the 52 health districts. Further empirical research is needed to establish the strongest predictors for HIV status among the antenatal women per district in South Africa.

5.1.1 TB burden and HIV prevalence

There is enough scientific literature to provide sufficient scientific evidence which proves that within the pathways of poverty, HIV and Tuberculosis are interconnected. Reactivation of latent Mycobacterium Tuberculosis infection and rapidly progressive Tuberculosis, and Drug Resistance among people co-infected with HIV and the high co-morbidity of HIV and tuberculosis patients could be a proxy for the maturity of, and compromised immunity due to, the HIV epidemic. Co-morbidity may also indicate the effect of HIV epidemic on health-care services, especially in the HIV severely affected countries of eastern and southern Africa. The emergence of HIV epidemic has been associated with an increased incidence of Tuberculosis (Figure 53).



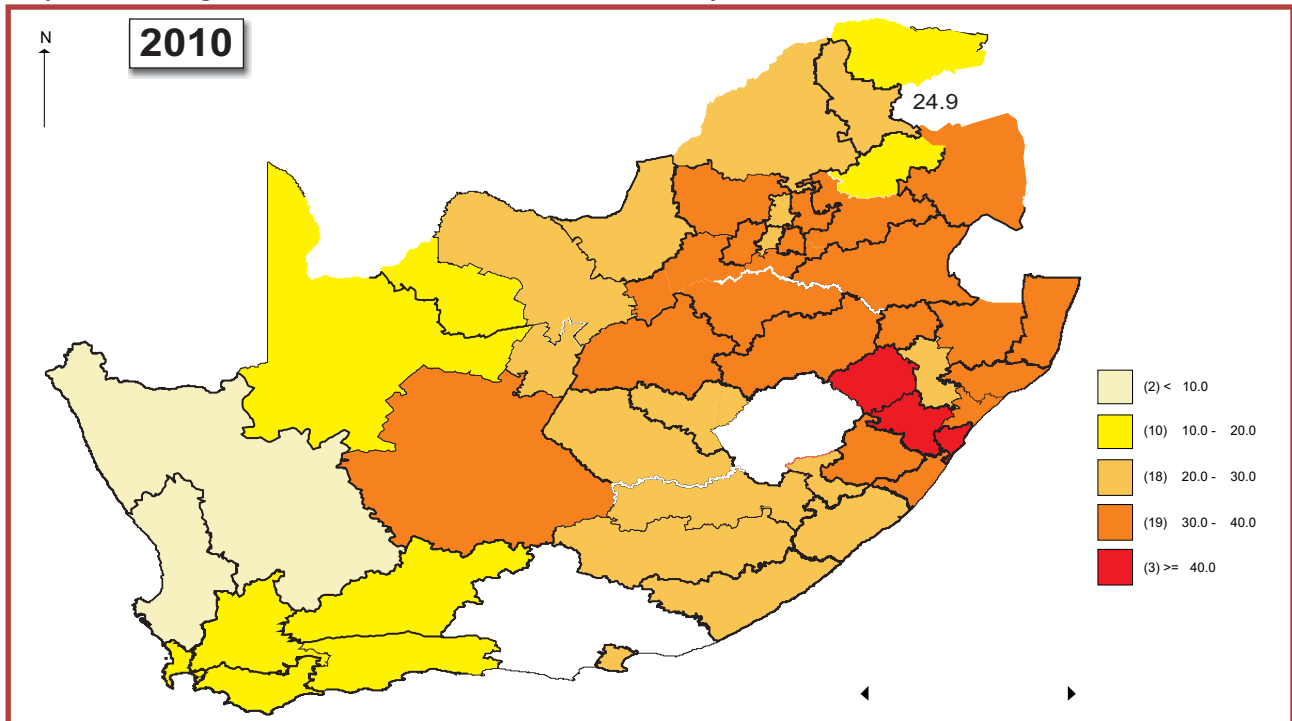
Key: Eastern Cape (light blue), Free State (yellow), Gauteng (orange), KwaZulu-Natal (purple), Limpopo (red), Mpumalanga (grey), Northern Cape (dark blue), North West (green), Western Cape (black)

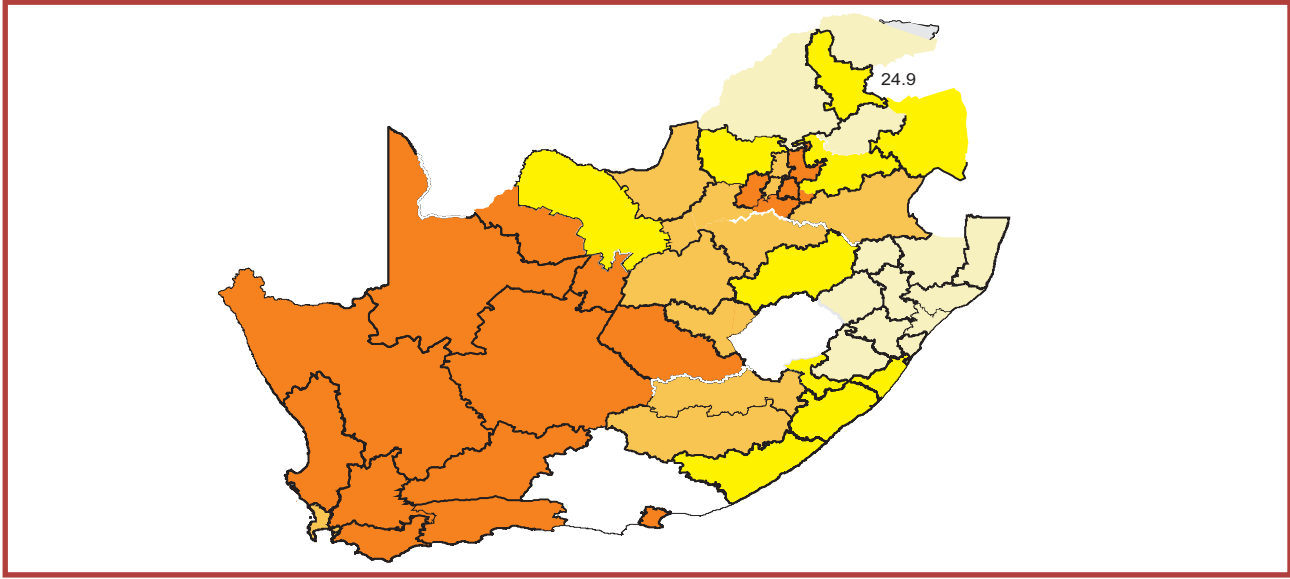
Figure 54: Total number of reported PTB cases, South Africa, 2008. Source: HST & NTP.

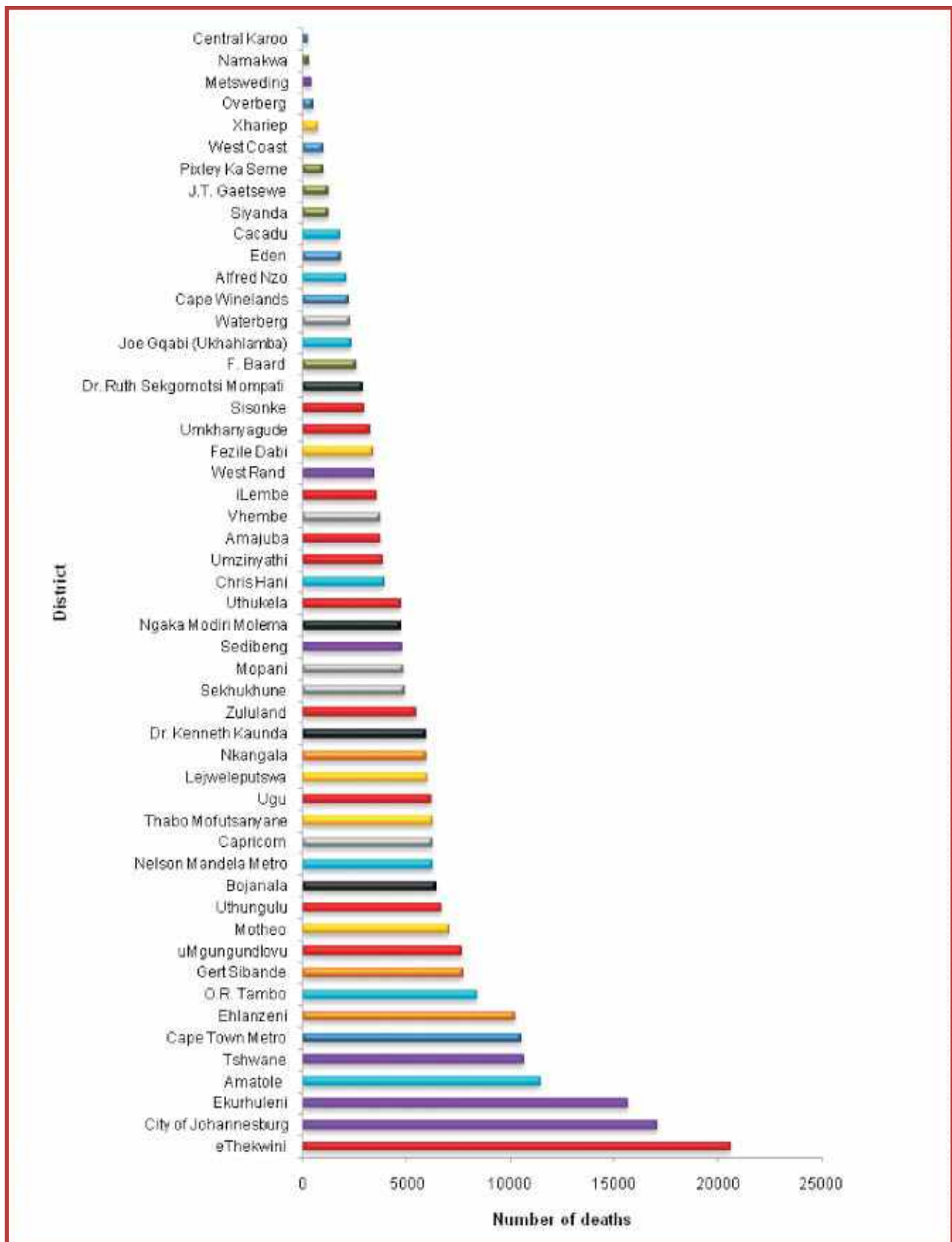
5.1.2 Possible Confounding Risk Factors

Data from the National Antenatal HIV and Syphilis prevalence surveys 2007, 2008 and 2009 and Health Systems Trust (TB incidence, Material and Social Deprivation, Population Density at the district level) were combined in all of the 52 health districts in the country. Combined HIV prevalence from the three antenatal surveys was used as an outcome. We modelled the association between antenatal HIV prevalence with the incidence of Pulmonary Tuberculosis over the total population using a Binomial Regression Model, controlling for three important confounders. The first was syphilis prevalence data which was used as a proxy for high risk sexual behaviour and successes of public health initiatives (or the impact of the Syndromic Management of Syphilis by our Health Care System); the second was the Deprivation Index which is a composite measure of variables indicative of material and social deprivation; and the third predictor was Population Density; which was used as a measure of social network and interactions, and there is evidence that more densely populated areas like urban informal settlements have a higher HIV and STI prevalence (HSRC Household National HIV and Behavioural Survey 2008).

Map of the Average Antenatal HIV Prevalence in South Africa by Health Districts; 2007-2009







Key: Eastern Cape (blue) Free State (yellow) Gauteng (purple) KwaZulu-Natal (red) Limpopo (orange) Mpumalanga (grey) Northern Cape (brown) North West (green) Western Cape (black)

Figure 54: Total Number of reported 15-49 HIV deaths by district, SA 2008, Source: StataSA, 2008.

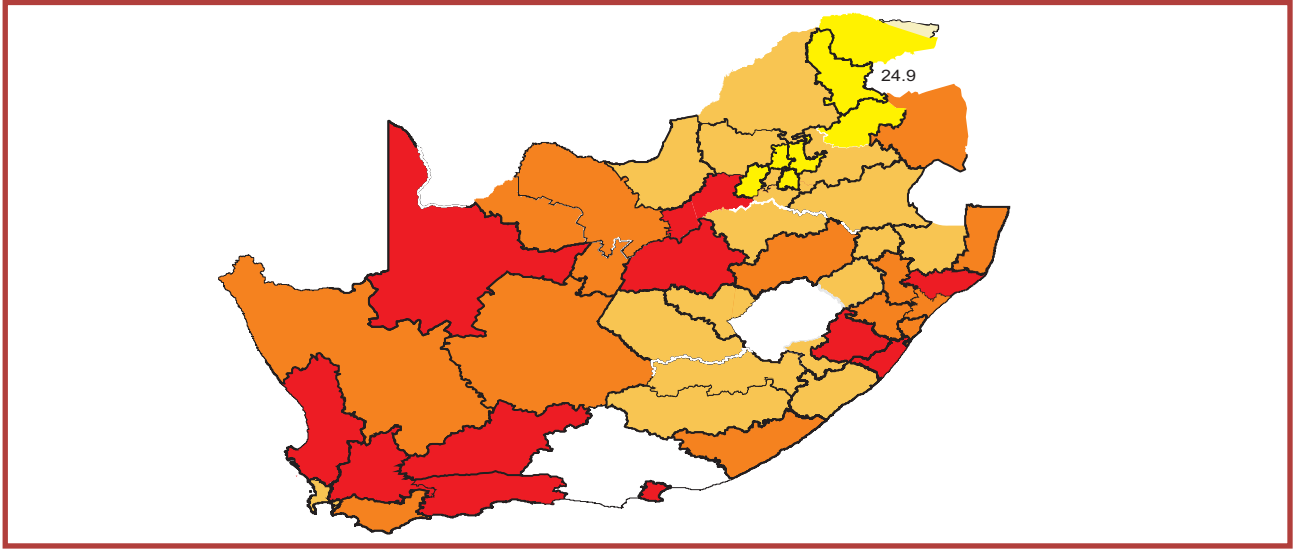


Table 28 shows the unadjusted and adjusted Odds Ratios (OR) for HIV prevalence. The results show that HIV is positively and significantly associated to social deprivation, TB incidence rate and population density. However, the association with syphilis prevalence was negative and significantly not correlated.

The effect of various important predictors of HIV Prevalence show a point estimate in terms of the odds of HIV prevalence for difference levels of factors compares to the odds of acquiring HIV infection in the reference category (Lowest). A value higher than 1, indicates that the odds of HIV Prevalence increases compared to the reference category. Thus, deprivation, population density, incidence of TB, higher levels are have increasing HIV Prevalence since high .

Table: 28 Median (95% CI) Odds Ratios estimates for sentinel antenatal HIV Survey, South Africa, 2007-2009

Covariate effects		HIV Unadjusted Prevalence Model	HIV Adjusted Prevalence Model
Yearly Prevalence (%)	2007	26.55 (22.61 - 31.71)	15.66 (9.09 - 20.99)
	2008	26.52 (22.57 - 31.65)	15.62 (9.08 - 20.97)
	2009	26.57 (22.64 - 31.66)	15.67 (9.09 - 21.00)
Deprivation	I (Lowest)		1.00
	II		1.30 (1.02 - 1.71)
	III		2.04 (1.57 - 2.69)
	IV		1.40 (1.03 - 1.92)
	V (Highest)		1.67 (1.20 - 2.31)
Population Density	I (Lowest)		1.00
	II		1.33 (1.10 - 1.68)
	III		1.27 (1.01 - 1.66)
	IV		1.33 (1.01 - 1.78)
	V (Highest)		1.73 (1.23 - 2.67)
Incidence of PTB	I (Lowest)		1.00
	II		1.17 (0.91 - 1.53)
	III		1.22 (0.90 - 1.68)
	IV		1.57 (1.17 - 2.21)
	V (Highest)		1.68 (1.22 - 2.39)
Syphilis Prevalence	I (Lowest)		1.00
	II		0.82 (0.64 - 1.03)
	III		0.94 (0.70 - 1.28)
	IV		0.88 (0.59 - 1.23)
	V (Highest)		0.59 (0.38 - 0.89)

6. CONCLUSION & RECOMMENDATIONS

South Africa has gone through different phases of national HIV and AIDS responses from widespread denial in the late 1980's to mid 1990's, adoption of a multi-sectoral policy in 1997, and strong government leadership and political commitment since 2005, when Cabinet approved the rollout of anti-retroviral treatment (ART) to those who need it. Linking various interventions such as behaviour change communication (BCC) and HIV Counselling and Testing (HCT) with prevention of mother-to-child transmission (PMTCT) and antiretroviral therapy (ART), has created a continuum of prevention and care services.

The government, knowing that the war against the HIV and AIDS pandemic has yet to be won, will continue to lead the fight. One goal is to reduce new infections by 50% by 2011 and increase the PMTCT coverage using dual therapy to 100%. Other key programmes include blood safety, early diagnosis through the “know your status campaign”, HCT campaign, prompt Syndromic treatment of sexually transmitted infections (STIs), home-based care and support for the infected and affected, developing a strong link between TB and HIV programmes, and effective management of opportunistic diseases.

One of the important observations of the 2010 findings is that the higher prevalence in older age groups could be partly explained by increased access to ART; however in the younger women (15-24 years old), the MDG target group, there is no decline in the number of HIV positives and this age group should not be much affected by access to ART. The ANC survey does not collect information on ART coverage and hence the contribution of ART to the increase in HIV prevalence cannot be directly determined. However, it is recommended that data on ART be collected and triangulated with in all future ANC surveys.

The significant higher national overall HIV prevalence observed in the 2010 findings could be a result of the impact of ART, and as mentioned before, it is becoming very important to start collecting age specific information on patients receiving ART for those women who attend ANC clinics. We observed that the HIV prevalence is higher in older women but this cannot be explained with certainty due to the limitation of the design of this survey. If HIV prevalence were to increase in the context of a large ART programme, then it would mean that life expectancy has increased for those who got infected in earlier years. In addition, trends in incidence and mortality need to be investigated.

The negative association between HIV and syphilis prevalence re-affirms the empirical evidence that syphilis prevalence is not a useful factor to positively correlate with HIV. Hence, an appropriate STI needs to be identified for the co-infection.

The ecological analysis resulting from the recommendations outlined in the 2008 antenatal sentinel survey report, shows that social Deprivation and Population density are positively associated with HIV; *However*, these ecological predictors do not explain all the variations in HIV across districts. There was considerable excess variation in risk of HIV as evidenced from the map of the smoothed HIV prevalence. This might indicate that other variables may also play important roles regarding HIV prevalence across the 52 Health districts in South Africa. The country need to move rapidly to zero new infections and increase the number of HIV infected person on treatment

LIST OF REFERENCES

1. Anderson and May, 1999. Infectious diseases of Humans Dynamics and Control. Oxford University Press. New York.
2. Chin J, Mann J, Global Surveillance and Forecasting of AIDS (1989). Bull World Health Organ, 67
3. Death Notification Report. StatsSA, 2008
4. Department of Basic Education, Teenage pregnancy among school going learners, 2009 report.
5. Department of Health South Africa (2007). National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2006. Pretoria.
6. Department of Health, 2007. HIV & AIDS and STI Strategic Plan for South Africa 2007-2011. Pretoria.
7. Department of Health, 2005. Report: National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2009. Pretoria.
8. Department of Health, 2006. Report: National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2009. Pretoria.
9. Department of Health, 2007. Report: National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2009. Pretoria.
10. Department of Health South Africa (2008). National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2008. Pretoria.
11. Department of Health South Africa (2009). National HIV and Syphilis Antenatal Prevalence Survey, South Africa, 2008. Pretoria.
12. Department of Health. Comprehensive HIV and AIDS Care, Management and Treatment Plan. South Africa, 2003. Pretoria.
13. Jackson, H. AIDS in Africa Continent in crisis. SAfAIDS. ISBN 0-7974-2428-8.
14. UNAIDS (2007). Comparing adult antenatal-clinic based HIV prevalence with prevalence from national population based surveys in sub-Saharan Africa. UNAIDS presentation.
15. UNAIDS (2009). AIDS Epidemic Update 2008: Special Report on HIV/AIDS: December 2006.
16. UNAIDS (2001). Declaration of Commitment on HIV/AIDS: UN General Assembly Special Session on HIV/AIDS, 25-27 June 2001.
17. UNAIDS Reference Group on Estimates, Modeling, and Projections (2006). Improving parameter estimation, projection methods, uncertainty estimation, and epidemic classification. Report of a meeting of the UNAIDS Reference Group on Estimates,
18. Modeling, and Projections, Prague, Czech Republic, 29 Nov—1 Dec. http://data.unaids.org/pub/Report/2007/2006prague_report_en.pdf.
19. UNAIDS Reference Group on Estimates, Modelling and Projections (2002). Improved methods and assumptions for the estimation of the HIV/AIDS epidemic and its impact: recommendations of the UNAIDS Reference Group on Estimates, Modelling and Projections. AIDS, 16: W1–W16.
20. WHO, UNAIDS, UNICEF (2007). Towards universal access: scaling up priority HIV/AIDS interventions in the health sector: progress report. April. Geneva. ISBN 978 92 4 159539 1.
21. UNAIDS & WHO (2007). AIDS epidemic update: December 2007. UNAIDS, Geneva 2007. UNAIDS/07.27E/JC1322E. ISBN 978 92 9 173621 8.
22. UNAIDS & WHO (2006). Guidelines for measuring national HIV prevalence in population – based surveys. UNAIDS, Geneva. ISBN 92 4 159370 9.
23. UNAIDS & WHO (2006). AIDS epidemic update: December 2006. UNAIDS, Geneva 2006. UNAIDS/06.29E. ISBN 92 9 173542 6.
24. UNAIDS & WHO (2005). AIDS Epidemic Update 2009.
25. UNAIDS & WHO (2003). Working group on HIV/AIDS & STI surveillance. Guidelines for 2nd Generation HIV surveillance.
26. UNAIDS & WHO (2000). Working group on HIV/AIDS & STI surveillance. Guidelines for 2nd Generation HIV surveillance.
27. UNAIDS & WHO Global Programme on AIDS (1989). Unlinked anonymous screening for the public health surveillance of HIV infections. International Guidelines.
28. WHO (2003). World health report: 2003: shaping the future. Geneva. ISBN 92 4 156243 9.

29. Shisana O, Rehle T, Simbayi L, Zuma K, Jooste S, et al. (2009) South African National Prevalence, Incidence, Behaviour and Communication Survey, 2008. A Turning Tide Among Teenagers? Cape Town, South Africa: HSRC Press
30. Crainiceanu, CM, Diggle PJ, Rowlingson B. (2006). Bivariate Binomial Spatial Modelling of LOA loa Prevalence in Tropical Africa. Johns Hopkins University; Dept. of Biostatistics Working Papers: Paper 103
31. Kleinschmidt I, Pettifor A, Morris N, MacPhail C, Rees H. (2007). Geographic Distribution of Human Immunodeficiency Virus in South Africa. *American Journal of Tropical Medicine and Hygiene.* 77(6), 1163–1169.
32. Kleinschmidt I, Ramkissoon A, Morris N, Mabude Z, Curtis B, Bekinska M. (2006). Mapping indicators of sexually transmitted infection services in the South Africa public health sector. *Tropical Medicine and International Health.* 11(7), 1047–1057
33. Corbett EL, Watt CJ, Walker N, et al. (2003). The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Arch Intern Med,* 163: 1009-21
34. Browne, W. J., Goldstein, H., and Rasbash, J. (2001). Multiple membership multiple classification (MMMC). *Statistical Modelling,* 1, 103--124.
35. Cantwell MF and Binkin NJ (1996) Tuberculosis in sub-Saharan Africa: a regional assessment of the impact of the human immunodeficiency virus and National Tuberculosis Control quality. *Tuber Lung Dis,* 77: 220-225.
36. Carey V, Zeger SL, Diggle P. (1993). Modelling multivariate binary data with alternating logistic regressions. *Biometrika;* 80: 517-526.
37. Corbett EL, Watt CJ, Walker N, et al. (2003). The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Arch Intern Med,* 163: 1009-21
38. Feltbower RG, Manda SOM, Gilthorpe MS, Greaves MF, Parslow RC, Kinsey SE, Bodansky HJ, Patricia A McKinney PA. (2005). Detecting small area similarities in the epidemiology of childhood acute lymphoblastic leukaemia and type 1 diabetes: a Bayesian approach. *American Journal of Epidemiology,* 161; 1168-1180.
39. John-arne R, Cameron W, Garnett GP (2001). A systematic review of epidemiologic interactions between classic sexually transmitted diseases and HIV: how much really is known? *Sexually Transmitted Diseases;* 28: 579-597.
40. UNAIDS/WHO (20003). Guidelines for conducting HIV sentinel serosurveys among pregnant women and other groups / UNAIDS/WHO Working Group on Global HIV/AIDS and STI Surveillance. WHO Library Cataloguing-in-Publication Data. Geneva.
41. Johnson LF, Coetzee DJ, Dorrington RE (2005). Sentinel surveillance of sexually transmitted infections in South Africa: a review. *Sexually Transmitted Diseases;* 81: 287-293.
42. Leyland AH, Langford IH, Rasbash J, Goldstein H. (2000). Multivariate spatial models for event data. *Statistics in Medicine;* 19: 2469--2478.
43. Manda SOM and Leyland A. (2005) Maximum likelihood and Bayesian estimation methods for multivariate disease outcomes in spatial epidemiology. (Submitted to *Statistics in Medicine*)
44. Monteiro EF, Lacey CJN and Merrick D. (2005). The interrelation of demographic and geospatial risk factors between four common sexually transmitted diseases. *Sexually Transmitted Infections;* 81: 41-46.
45. Over M and Piot P. (1993). HIV infection and sexually transmitted diseases. In *Disease Control Priorities in Developing Countries* (eds. D.T. Jameson, W.H. Mosely, A.R. Measham and J.L. Badailla), pp. 445-529. New York: University Press.
46. Department of Health (2009). National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa 2008 Report. South Africa: Department of Health.
47. Shisana O, Rehle T, Simabiyi LC, Parker W, Zuma K, Bhana A, Conolly C, Jooste S, Pillay-van-Wyk V, et al. (2005). South African National HIV Prevalence, HIV incidence, Behaviour and Communication Survey 2005. Cape Town: HSRC Press.
48. Shisana O, Rehle T, Simabiyi LC, Parker W, Zuma K, Bhana A, Conolly C, Jooste S, Pillay-van-Wyk V, Mbelle N, Van Zyl J, Parker W, Zungu NP, Pezi S & the SABSSM III Implementation Team (2009). South African National HIV Prevalence, HIV incidence, Behaviour and Communication Survey 2008: A turning tide among teenagers? Cape Town: HSRC Press.
49. Sandøy IF, Gunnar Kvale G, Michelo C, Fylkesnes (2006). Antenatal clinic-based HIV prevalence in Zambia: Declining trends but sharp local contrasts in young women. *Tropical Medicine and International Health,* 11 (6) pp 917–928.
50. UNAIDS (2009). 2008 Report on the global AIDS epidemic. Available at <http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/>.
51. UNAIDS (2008). Status of the global HIV epidemic http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp29_62_en.pdf
52. Day C, Monticelli F, Barron P, Haynes R, Smith J, Sello E, editors. The District Health Barometer 2008/09. Durban: Health

Systems Trust; May 2010.

53. Meidany F, Horikoshi Y, Rohde J (2000). HIV prevalence rate and population density: Eastern Cape experience, South Africa International Conference on AIDS.
54. Spiegelhalter D, Thomas A, Best N. and Lunn D (2004). BUGS: Bayesian Inference Using Gibbs Sampling, Version 1.4}. MRC Biostatistics Unit: Cambridge.
55. Pettifor AE, Kleinschmidt I, Levin J, Rees HV, MacPhail C, Madikizela-Hlongwa L, Vermaak K, Napier G, Stevens W and Padian NS. (2005). A community-based study to examine the effect of a youth HIV prevention intervention on young people aged 15–24 in South Africa: results of the baseline survey. *Tropical Medicine and International Health*, 10 (10) pp 971–980.
56. William B, and Dye C (2003). Antiretroviral Drugs for Tuberculosis Control in the Era of HIV/AIDS. Communicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland
57. Cohen, D (1998). Socio-economic causes and consequences of the HIV epidemic in Southern Africa: The case of Namibia, UNDP Issues Paper No. 31, 1998.
58. Zierler S, Krieger N, Tang Y, Coady W, Siegfried E, DeMaria A, Auerbach J. (2000). Economic Deprivation and AIDS Incidence in Massachusetts. *American Journal of Public Health*. 90; 1064–1073
59. Montana L, Neuman M, Mishra V and Hong R. (2005). Spatial Modeling of HIV Prevalence in Cameroon, Kenya, and Tanzania. Population Association of America Annual Conference, 2005.
60. Montana L, Neuman M, and Mishra V. (2007). Spatial Modelling of HIV Prevalence in Kenya
61. DHS Working Papers. No 27, Calverton.
62. Browne WJ, Goldstein H, Rasbash J. Multiple membership multiple classification (MMMC). *Statistical Modelling* 2001; 1, 103–124.
63. Hargrove J. (2008). Migration, mines and mores: the HIV epidemic in Southern Africa. *South African Journal of Science* 104, January/February 2008
64. Yahya-Malima KI, Evjen-Olsen B, Matee MI, Fylkesnes K, Haarr L. (2008). HIV-1, HSV-2 and syphilis among pregnant women in a rural area of Tanzania: Prevalence and risk factors. *BMC Infectious Diseases* 2008, 8:75.
65. Mullick S, Beksinksa M, Msomi S. (2005). Treatment for syphilis in antenatal care: compliance with the three dose standard treatment regimen. *Sexually Transmitted Infections*. 81: 220-222.
66. Ramkisson et al (2004). National Baseline Assessment of Sexual Transmitted Infection and HIV services in South African public sector health facilities. Summary report 2004.
67. Lurie, M.N., Williams, B.G., Zuma, K., Mkaya-Mwamburi, D., Garnett, G. P., Sturm, A. W., Sweat, M. D., Gi ttelsohn, J. & Abdool Karim, S.S. (2003) The impact of migration on HIV-1 transmission in South Africa: a study of migrant and nonmigrant men and their partners. *Sexually transmitted diseases*. 30 (2):149-156
68. Montana, LS, Mishra V, Hong R (2008). Comparison of HIV prevalence estimates from antenatal
69. *Sex Transm Infect* 2008 84: i78-i84

ANNEXURE 1

Sampled population distribution by district from 2008 to 2010.

District	2008		2009		2010	
	N	%	N	%	N	%
ANzoDM	201	0.6	186	0.6	133	0.4
AmajubaDM	420	1.2	410	1.2	407	1.3
AmatoleDM	1128	3.3	1116	3.4	1029	3.2
BojanalaPlatinumDM	811	2.4	892	2.7	755	2.3
CHaniDM	529	1.6	491	1.5	548	1.7
CacaduDM	281	0.8	255	0.8	275	0.9
CapeTownMM	2538	7.5	2481	7.5	2656	8.2
CapeWinelandsDM	550	1.6	499	1.5	557	1.7
CapricornDM	902	2.7	887	2.7	786	2.4
CentralKaroo DM	54	0.2	51	0.2	59	0.2
DrKkaundaDM	426	1.3	462	1.4	457	1.4
EdenDM	342	1	319	1	353	1.1
EhlanzeniDM	1027	3	921	2.8	1074	3.3
EkurhuleniMM	2007	5.9	1896	5.8	1959	6.1
eThekwiniMM	2158	6.4	2140	6.5	2 144	6.7
FezileDabiDM	336	1	416	1.3	413	1.3
FrancesBaardDM	389	1.1	385	1.2	432	1.3
GertSibandeDM	560	1.7	560	1.7	528	1.6
Gr.SekhukhuneDM	793	2.3	493	1.5	589	1.8
iLembeDM	424	1.2	421	1.3	416	1.3
JTGaetseweDM	171	0.5	157	0.5	182	0.6
JoeGqabiDM	219	0.6	200	0.6	235	0.7
JohannesburgMM	2426	7.2	2489	7.6	2000	6.2
LejweleputswaDM	571	1.7	611	1.9	601	1.9
MetswedingDM	131	0.4	120	0.4	125	0.4
MopaniDM	724	2.1	698	2.1	555	1.7
MotheoDM	486	1.4	601	1.8	545	1.7
NMandelaMM	795	2.3	785	2.4	677	2.1
Namaqua DM	89	0.3	68	0.2	76	0.2
NgakaModiriMolema DM	539	1.6	527	1.6	479	1.5
NkangalaDM	637	1.9	568	1.7	600	1.9
OTamboDM	1067	3.1	1192	3.6	1097	3.4
OverbergDM	157	0.5	130	0.4	156	0.5
PixleykaSemeDM	257	0.8	206	0.6	247	0.8
RuthSegomotsi MompotiDM	337	1	346	1.1	272	0.8
SedibengDM	740	2.2	667	2	499	1.5
SisonkeDM	343	1	324	1	325	1.0
SiyandaDM	207	0.6	186	0.6	207	0.6
TMofutsanyaneDM	519	1.5	603	1.8	558	1.7
TshwaneMM	1640	4.8	1466	4.5	1583	4.9
UguDM	508	1.5	435	1.3	453	1.4
uMgungundlovuDM	688	2	651	2	674	2.1
UMkhanyakudeDM	416	1.2	396	1.2	389	1.2
UMzinyathiDM	341	1	340	1	334	1.0
UTHukelaDM	452	1.3	444	1.4	450	1.4
UTHunguluDM	641	1.9	597	1.8	712	2.2
VhembeDM	963	2.8	903	2.7	765	2.4
WaterbergDM	524	1.5	431	1.3	422	1.3
WestCoastDM	207	0.6	199	0.6	200	0.6
WestRandDM	556	1.6	549	1.6	548	1.7
XhariepDM	105	0.3	105	0.3	106	0.3
ZululandDM	595	1.8	586	1.8	583	1.8
Total	33927	100	32861	100	32225	100

NATIONAL ANTENATAL SENTINEL HIV & SYPHILIS PREVALENCE SURVEY 2010

CHECKLIST FOR THE MONITORING OF SENTINEL SITES DURING THE NATIONAL HIV AND SYPHILIS SURVEY

Facility Name:

Name of survey coordinator:

District:

Province:

Date survey started:

1. Did you or a representative of your clinic /sentinel site attend the survey preparation workshop?
If not, what was the reason for not attending?
2. Were you provided with a copy of the Standard Operation Procedures or a manual explaining the procedures for the survey?
Is everything clear for you to feel comfortable with running the survey?
3. Did you receive all necessary equipment (vacutainers, data capture forms, etc) in time?
4. How many 1st ANC clients/patients do you normally see in a month?
5. On which day/s of the week do you see 1st time antenatal care patients/clients?
6. Actual number of specimens collected to date by the facility?
Target
7. Are the blood samples stored in a fridge? Fridge temperature
8. How many refusals have you had since the beginning of the survey?
9. How do you inform and request clients to participate in the survey?
10. Do you know which laboratory you are supposed to send the specimen to?
Name
11. Are transport arrangements for the specimens to the laboratory adequate?
12. How often are the specimens collected?
13. Does this facility have VCT/PMTCT programmes?
14. Any other problems encountered?
15. Any recommendations for the survey?

Interviewer: Today's date

