THE 2017 NATIONAL ANTENATAL SENTINEL HIV SURVEY KEY FINDINGS, SOUTH AFRICA

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Executive summary

Introduction: South Africa has been implementing the national antenatal sentinel HIV prevalence survey since 1990. The 2017 antenatal sentinel survey was the 27th such survey conducted in South Africa. Between 1990 and 2015, the survey primarily focused on estimating HIV prevalence trend over time, using anonymous unlinked testing of blood samples collected from pregnant women attending routine antenatal care (ANC). In 2017, for the first time the survey gathered additional data on HIV incidence, knowledge of HIV status (1st 90), antiretroviral treatment (ART) coverage (2nd 90), viral suppression (3rd 90), syphilis screening coverage, and agreement between point-of-care HIV rapid testing and laboratory-based HIV testing. The surveys prior to 2015 enrolled women attending first-ANC-visit, whereas in the 2015 and 2017 surveys, both first and follow-up ANC visit attendees were included, so as to facilitate other programmatic questions to be explored. This is the first instalment of the 2017 survey report. It presents data on: HIV prevalence trends, knowledge of HIV status (1st 90), ART coverage (2nd 90), and maternal syphilis screening coverage.

Methods: A nationally representative sample of 32,716 pregnant women from 1,595 public health facilities, selected from 52 districts of South Africa, was included in the 2017 survey conducted from 1 October to 15 November 2017. The data collection procedures included a brief interview, medical record review and blood specimen collection. Demographic and clinical information collected from interviews and medical record review included: age of the woman, gestational age, HIV testing history, latest HIV rapid test result, ART initiation, timing of ART initiation, ART uptake in the 3 days preceding the survey, and maternal syphilis screening coverage. A whole blood sample was collected from participants and samples were tested using the routine algorithm for HIV infection on enzyme-linked immunosorbent assay (EIA) 4th generation platform. HIV test results were returned to participants if they were unaware of their HIV status or if there was a discrepancy between the results of the survey-provided laboratory test and the routine clinic test. This report presents the completed descriptive analyses of the data collected, together with 95% confidence intervals (CI), and associated *P* values from chi-square and non-parametric trend tests. All analyses took into account the survey design (clustering within facilities and stratification by district) and were weighted at province level using the number of reproductive age women (15−49 years) from the mid-year population estimates. The HIV prevalence trend analyses were restricted to first-ANC-visit attendees as the surveys prior to 2015 did not include follow-up visit attendees.

Results: At the national level, 90.8% (32,716) of the planned sample size (36,015) was achieved. Three-fifths (60.8%) of participants were follow-up ANC visit attendees, 37.7% were first-ANC-visit attendees, and 1.5% had no documentation of visit type. The median age of participants was 26 years, with an inter-quartile range (IQR) of 21−31 years.

The overall HIV prevalence at national level was stable relative to previous antenatal survey data at 30.7% (95% CI: 30.1%−31.3%), a 0.1% decline from the prevalence in 2015. Consistent with the previous survey, conducted in 2015, the highest HIV prevalence was in KwaZulu-Natal

(41.1%, 95% CI: 39.9%−42.3%) followed by Mpumalanga (37.3%, 95% CI: 35.4%−39.2%). The lowest HIV prevalence was in Western Cape at 15.9% (95% CI: 14.2%–17.8%). HIV prevalence was significantly higher (by 3.8% points) among follow-up ANC visit attendees (32.2%, 95% CI: 31.5%−33.0%), compared with first-ANC-visit attendees (28.4%, 95% CI: 27.7%−29.2%).

In KwaZulu-Natal, HIV prevalence among first-ANC-visit attendees declined by 3.9% points, from 42.4% (95% CI: 40.8%–44.1%) in 2014 to 38.5% (95% CI: 36.8%–40.2%) in 2017, after a consistent increase in HIV prevalence over the period of 2011–2014. The survey also observed a consistent but moderate decline in HIV prevalence among first-ANC-visit attendees in the age groups 15−24 years (declined by 2% points) and 25−29 years (declined by 6% points) between 2011 and 2017.

HIV testing uptake was high (over 99%) in the routine prevention of mother-to-child HIV transmission (PMTCT) HIV testing programme. Knowledge of HIV-positive status (1st 90) among women attending follow-up ANC visits was 96.7%. Of these, the percentage who were on ART (2nd 90) was 98.2%. The ART adherence rate among follow-up ANC visit attendees receiving ART was 98.7%, as self-reported from 3-day recall.

Overall, knowledge of HIV-positive status prior to first-ANC-visit was low. In this survey, 39.2% of HIV-positive pregnant women nationally were unaware of their HIV-positive status prior to their first-ANC-visit, and this figure rises to 61.1% among adolescent women (15–19 years). Knowledge of HIV-positive status and ART initiation prior to first-ANC-visit was higher in the older age groups. Three-quarters (75.5%) of women in the age group 35–49 years were aware of their HIV-positive status prior to their first-ANC-visit, of whom 92.9% initiated treatment prior to the first-ANC-visit. In contrast, 38.9% of women in the age group 15–19 years were aware of their HIV-positive status, of whom 86.7% initiated treatment prior to first-ANC-visits.

Maternal syphilis screening coverage was 96.7% at national level among enrolled pregnant women, excluding 14.1% of participants, for whom this information was missing.

Conclusion: Nationally, HIV prevalence among pregnant women continued to be stable at around 30%. The consistent decline in HIV prevalence observed among young women (15–24 years) is encouraging, as this population has traditionally been at increased risk of HIV acquisition. Knowledge of HIV status prior to first-ANC-visit was low, especially among young women (15−24 years), highlighting the gap in access to youth-friendly reproductive health services. The 1st and 2nd 90 targets have been reached among pregnant women across all provinces. The achievement of these targets in the PMTCT programme, despite the high proportion who were unaware of their HIV status prior to their first-ANC-visit, indicates how effective the PMTCT programme is, in identifying HIV-positive pregnant women and enrolling them into treatment.

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Acronyms

AIDS	Acquired Immunodeficiency syndrome
ANC	Antenatal care
ART	Antiretroviral treatment
ARV	Antiretroviral
CDC	Centers for Disease Control and Prevention
CGH	Center for Global Health
CI	Confidence Interval
DHIS	District Health Information System
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored and Safe
EC	Eastern Cape province
EDTA	Ethylenediaminetetraacetic acid
EIA	Enzyme-linked immunosorbent assay
FS	Free State province
GP	Gauteng province
HISP	Health Information System Programme
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research Council
IQR	Interquartile range
KZN	KwaZulu-Natal province
LP	Limpopo province
MP	Mpumalanga province
MTCT	Mother-to-child transmission
NC	Northern Cape province
NDoH	National Department of Health
NHLS	National Health Laboratory Service
NICD	National Institute for Communicable Diseases
NW	North West province
PLHIV	People living with HIV
PMTCT	Prevention of mother-to-child transmission
PPS	Probability Proportional to Size
PSU	Primary Sampling Unit
SAMRC	South African Medical Research Council
SANAS	South African National Accreditation System
Stats SA	Statistics South Africa
UNAIDS	The Joint United Nations Programme on HIV/AIDS
US	United States
WC	Western Cape province
WHO	World Health Organization

Chapter 1: Introduction

1.1. Background

South Africa has achieved considerable success in reducing new HIV infections and AIDS-related deaths. Between 2010 and 2017, new HIV infections and AIDS-related deaths have been reduced by 31% and 43% respectively [1]. Steady increases in both domestic and international funding for HIV, and the adoption of a combination prevention strategy – including the rapid expansion of the antiretroviral treatment (ART) programme – have contributed to the decline. Nonetheless, the scale of the epidemic is still massive. Nearly eight million (7.9 million) people are living with HIV (PLHIV) in South Africa, representing more than 20% of PLHIV globally[1]. The decline in new HIV infection rates varies substantially by geographical area and population group. Women are disproportionately affected by HIV, with adolescent and young women experiencing the highest incidence rates [2]: this is attributable to biological, social, behavioural, cultural and economic factors [3-6].

As a member state of the United Nations, South Africa has made a commitment to ending the public health threat of HIV/AIDS by 2030[7]. One of the crucial steps to ending the HIV epidemic is to reach the 90–90–90 targets, where 90% of PLHIV know their HIV status, 90% of those who know their HIV-positive status receive ART, and viral suppression among 90% of those on ART[8]. In a generalized and well-established epidemic, it is a challenging task to achieve these targets with the limited resources available. The collection of granular data and use of these data to target resources to areas with highest burden is increasingly being recognized as a highly effective strategy to achieve the most impact with limited resources available [2, 9].

HIV surveillance among antenatal clinic attendees remains an important data source for monitoring national HIV prevalence trends and the geographical distribution of HIV. In line with the recommendation of the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS), South Africa has been conducting the antenatal survey regularly since 1990: annually until 2015, and biennially since then. The survey will continue to inform the planning of HIV programmes at national, provincial and district levels. The age-disaggregated data from the antenatal survey helps - to estimate HIV prevalence in the general population. Between 1990 and 2015, the survey focused on estimating the HIV prevalence trend over time, using anonymous unlinked testing of blood samples collected from pregnant women who received routine antenatal care (ANC) at public health facilities. In the 2017 survey, new indicators were introduced to monitor the impact of HIV prevention and treatment programmes in the "test and treat" era. The survey collected data on the following indicators:

- HIV prevalence
- HIV incidence
- uptake of prevention of mother-to-child transmission (PMTCT) services

- progress towards the 90–90–90 targets
- agreement between point-of-care HIV rapid testing and laboratory-based HIV testing
- maternal syphilis screening coverage.

This is the first instalment of the 2017 ANC survey report, which presents data available at the time of writing: HIV prevalence trend, knowledge of HIV status (1st 90), ART coverage (2nd 90), and maternal syphilis screening coverage. Data on viral load suppression rate, laboratory confirmed treatment adherence, incidence rate, and agreement between point-of-care HIV rapid testing and laboratory-based HIV testing will be included in the instalment to be released in the last quarter of 2019.

1.2. Aim

The aim of this survey was to present empirical data over time on HIV prevalence, HIV incidence, and the progress towards the 90–90–90 targets among pregnant women of age 15 to 49 years attending public antenatal clinics at national, provincial and district level. It also aimed to promote the use of this data for HIV epidemic monitoring, policy planning, strategic implementation of interventions, and evaluation of the impact of programmes and activities aimed at prevention and control of HIV and AIDS.

1.2.1. Primary objectives

- To determine the geographical distribution and pattern of HIV seroprevalence among pregnant women between the ages of 15 and 49 years who attend public ANC clinics in South Africa, at national, provincial and district level
- To monitor HIV prevalence trends over time among pregnant women attending public ANC clinics in the following two domains:

    (a) 15–49 years old, at national and provincial level
    (b) 15–24 years old, at national level.

1.2.2. Secondary objectives

- To determine what proportion of HIV-positive pregnant women 15–49 years old, attending ANC clinics, know their HIV status (1st 90: knowledge of HIV status).
- To determine what proportion of known HIV-positive pregnant women 15–49 years old are receiving antiretroviral (ARV) treatment (second 90: ART coverage).
- To determine maternal syphilis screening coverage among pregnant women attending ANC clinics.

Chapter 2: Methodology

2.1. Study design

The 2017 antenatal survey was cross-sectional and linked-anonymous. It involved HIV screening of eligible pregnant women aged between 15 and 49 years attending public health facilities. Between 1990 and 2014 the survey included first-ANC-visit attendees only, but in the 2015 and 2017 surveys, follow-up visit attendees were included, so as to facilitate other programmatic or evaluation questions relevant for public health policies to be explored, e.g. PMTCT cascade, and seroconversion during pregnancy.

2.2. Sample size

The sampling frame for the primary sampling unit (PSU) consisted of public facilities reportedly providing ANC services in the last three months of the preceding year, i.e. October–December 2016. It was envisaged 36,015 pregnant women from 1,595 public health facilities would be included. The number of sites selected per district ranged from 8 to 83.

In surveys prior to 2017, sample size was allocated based on the volume of ANC visits. In 2017, sample size was re-calculated to fulfil two main objectives of the survey: (1) to estimate HIV prevalence within an acceptable level of precision, and (2) to measure change in HIV prevalence over time. For the first objective, the calculation was performed to estimate HIV prevalence at district level with a precision level of 3–5%, with 95% confidence interval (CI), design effect of 1.5, and 10% error rate (for loss of specimens and data collection forms, incomplete reporting, etc.).

For the second objective, with the calculated sample size for the first objective, it was possible to detect the following prevalence trend changes over time at 5% significance level, 80% power on a two-sided test, design effect of 1.5, and 10% error rate:
(i) A 1.3% HIV prevalence trend change over time at national level
(ii) A minimum expected 3–5% change (decline or increase) in HIV prevalence over time at province level
(iii) A 1.6% HIV prevalence trend change over time among the 15–24-year age group at national level.

The design effect was based on estimates calculated at province level from the 2014 survey. HIV prevalence estimates from the 2013 survey were used to calculate sample size for both objectives. The sample size re-calculation in 2017 resulted in changes in the sample size allocation at province and district level (Table 1). Prior to 2017, Gauteng (GP), Limpopo (LP) and Western Cape (WC) collected a sample size large enough to measure prevalence within a precision of 1–3%, whereas

sample size collected from other provinces only allowed a precision of 5% and above (in some districts up to 9–10%). This was corrected in the 2017 survey by redistributing sample size from provinces that were collecting large sample size to provinces where the sample size was inadequate. The aim was to achieve 3–5% precision across all districts so that HIV prevalence would be measured in the same way in all districts.

Province	2015		2017	
	N	%	N	%
Eastern Cape	4,168	11.5	5,306	14.7
Free State	2,349	6.5	2,722	7.6
Gauteng	6,512	18.0	4,775	13.3
KwaZulu-Natal	6,819	18.9	8,761	24.3
Limpopo	3,482	9.6	3,187	8.8
Mpumalanga	2,162	6.0	2,954	8.2
North West	1,880	5.2	3,045	8.5
Northern Cape	1,238	3.4	1,650	4.6
Western Cape	7,517*	20.8	3,615	10.0
Total	**36,127**	**100.0**	**36,015**	**100.0**

* The planned sample size for WC in the 2015 survey was 3,500. The province added/collected an extra 4,017 sample to measure HIV prevalence with adequate precision at the sub-district level

Table 1: Change in sample size allocation in the 2015 and 2017 antenatal surveys, South Africa

2.3. Sampling of sites

The selection of sites was based on geographical distribution, taking into account all nine provinces and 52 districts. Facilities were stratified by location (urban, semi-urban and rural clinics) and size (small, medium and large facilities) – providing up to six strata per district. The rural, urban and semi-urban categories were determined by geo-coordinates and information on ward-level geographical type classification from the 2011 census conducted by Statistics South Africa (Stats SA). Facilities were classified as small, medium, and large by using quantile values of the district antenatal visit volume data (2016) as proxy measure for size. Sample size calculated at district level was allocated for each stratum proportionally. Eligible sentinel sites within each stratum were selected according to the Probability Proportional to Size (PPS) sampling method. Since the sampling period was the same for each facility, this produced a self-weighting sample for each district. A fixed (equal) sample size was allocated per stratum.

2.3.1. Inclusion and exclusion criteria for sites

Eligible facilities that took part in the 2015 survey were included in 2017. To be included as a sentinel surveillance site in the 2015 survey, the public clinic had to:

- provide pregnancy testing and ANC services;

- have a minimum of 20 first-ANC-visit attendees per month;
- Routinely draw blood from ANC-clients, with facilities to store sera at 4 degrees Celsius (°C);
- be ready to transport biological specimens to the nearest regional laboratory within 24 hours.

In addition, the facility staff had to be willing and able to conduct the survey. Only public facilities were included.

Forty-eight (48) additional sites were sampled in 2017 to replace 11 facilities that had closed in 2016 and to provide 37 new sites needed to achieve a minimum precision level of 5% in four districts.[1] These sites were sampled using the PPS method. A sampling frame that had more reasonable exclusion–inclusion criteria was used to sample the 48 new sites in order to improve the generalizability of the survey - ANC visit volume of <5 /month was considered a more reasonable exclusion criteria for small facilities to sample the 48 new sites. Newly sampled sites were reviewed and validated by provincial coordinators from the Department of Health before they were finalized, to ensure that these sites fulfilled the inclusion-exclusion criteria. No other criteria were applied when 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.

2.4. Sampling of women

During the designated enrolment period, each pregnant woman visiting an ANC clinic at a sentinel site was given the opportunity to enrol voluntarily into the survey.

Inclusion criteria

- Consenting pregnant women aged 15-49 years, attending the antenatal clinic either for the first time or for follow-up visits during their current pregnancy in the-survey period were eligible for inclusion, regardless of their HIV status or previous (or current) history of routine HIV test.

Exclusion criteria

- Pregnant women who previously visited the clinic during the survey period were excluded to avoid duplicate sampling. Survey attendance sticker were put on the medical record of survey participants to indicate their participation in the survey. This was used to identify and exclude woman who already participated in the survey from being sampled twice.
- Pregnant women aged ≤14 years or ≥50 years were excluded.

[1] These districts were Xhariep, G Sibande, Joe Gqabi and Sarah Baartman

2.5. Data collection

The survey was conducted from 1 October to 15 November 2017. In most provinces, a five-day extension was given to enable rejected samples to be replaced. The data collection procedures included: *written* informed consent, a brief interview, medical record review and blood specimen. Women were offered enrolment into the survey during ANC visit. The ANC nurse, after providing routine services, assessed the eligibility of subjects to participate in the survey. Baseline data on four demographic indicators was collected from each eligible woman, using the data collection form (Annexure 1): age, marital status, race, and type of antenatal visit – first or follow-up visit. Following this, the information sheet and consent form (Annexure 2), adapted with permission from the South African Medical Research Council's PMTCT survey consent form [10], was given to the participant to read; if necessary, the nurse would read the information sheet to the participant. Nurses were trained to explain the information sheet in the language used for communication during consultation.

After giving written consent, participants were interviewed briefly, and a blood specimen was taken. For first-ANC-visit attendees, the blood sample for the antenatal survey was collected at the same time as the routine blood specimen for syphilis testing. From follow-up ANC attendees, a blood sample was collected for the antenatal survey only.

2.5.1. Collection and transfer of demographic information

The attending health worker completed the form (Annexure 1) used to collect the demographic and clinical information listed in Table 2. Data were extracted from medical records where available and documented on the form (Table 2). The data collection form was printed in duplicate: the original was sent to the serology laboratory (with the specimen), while the carbon copy was sent to the central team for capturing on the antenatal survey web-based District Health Information System (DHIS) Patient module.

Data source	Variables
Medical record review	• province, district, health facility • name of coordinator at the clinic • date of specimen collection • age of the woman • visit type, and gestational age • routine HIV testing uptake, routine HIV test result • ARV initiation, timing of ART initiation (if available from medical record, otherwise self-reported) • maternal syphilis screening
Self-reported	• race of the woman, level of education, marital status • gravidity, parity, age of the father of the child • ARV uptake in the 3 days preceding the survey

Table 2: Data collected in the 2017 antenatal survey, South Africa

2.5.2. Collection and transport of blood

The clinic nurses collected 8.5 ml of whole blood into the Ethylenediaminetetraacetic acid (EDTA) tubes supplied. Each tube was labelled with a barcode, and stored at 4 °C. At the close of each day, the supervisors checked the forms against the blood samples for completeness and possible mismatches. The National Institute for Communicable diseases (NICD) and National Health Laboratory Service (NHLS) were responsible for coordinating and facilitating the transport of specimens by routine courier from the sentinel sites to the designated survey laboratories. Optimised routes were used to limit transport delays. The samples were transported in cooler boxes maintained at 4°–8 °C, with the temperature continuously monitored by trackers.

2.6. Laboratory methods

2.6.1. Specimen testing for HIV

Standardized HIV testing strategies, as outlined in the national HIV testing guideline (2016), were used [11]. Two fourth-generation HIV-1 enzyme immunoassays were used to test for HIV infection, following the manufacturer's instructions – including appropriate quality control specimens. All plasma samples were tested at the regional laboratories, using the first enzyme-linked immunosorbent assay (EIA 1). Specimens that tested negative on first EIA were classified as negative. All samples that tested reactive using EIA 1 were re-tested using a second and different EIA (EIA 2). If EIA 1 and EIA 2 were in agreement the result was classified "HIV-positive". If EIA 1 and EIA 2 were not in agreement the result was recorded as "discrepant". The specimen information, including EIA 1 and EIA 2 results, were captured in an electronic lab information system called TrakCare.

The final HIV test results were returned to participants if they were unaware of their HIV status or if there was a discrepancy between the results of the survey-provided laboratory test and the routine clinic test. During data collection, the name of the participant, cell phone number and the barcode was collected in a separate confidential register that stayed at the antenatal clinic. The antenatal nurse used the cell phone number of participants to contact and return result of participants with discordant result and those who missed routine HIV testing. The identifying information documented on the register was used to link HIV test results returned from laboratory with participants' files.

2.6.2. Laboratory quality assurance

The NICD was responsible for monitoring key laboratory performance indicators against specific targets. All participating testing laboratories were SANAS-accredited (South African National Accreditation System), based on ISO15189-2012, and/or had an NHLS compliance audit score of over 80%.

2.7. Training and survey monitoring

Before the scheduled commencement date of the survey, a one-day training session was held at national level, in all nine Provincial Health offices and at district level. The national training was organized by the NICD and was attended by provincial HIV and AIDS coordinators, laboratory personnel, and representatives from the district health administration. A training-the-trainers approach was adopted to cascade the training down to provincial, district and facility staff. Provincial and District Department of Health offices were responsible for coordinating the provincial and district level training sessions (including funding, logistics and training). Health care providers were responsible to undertake further orientation upon their return to their respective facilities for midwives, public health nurses and other staff who were directly involved in the survey. The training covered: criteria for selection of the sites; screening and recruitment of pregnant women; data administration; blood sample collection; labelling, coding and storage of samples; sample transportation; laboratory testing for HIV; return of results; handling of discordant results; confidentiality and ethical issues; supervision and quality assurance procedures; and standard laboratory operating procedures.

2.7.1. Technical support and quality control visits during survey execution

Provincial and District Department of Health offices organized and managed all survey monitoring activities. Personnel from the district health office conducted site visits. In some provinces provincial survey team joined site visits. Regular progress reports were submitted from the sites to monitor performance. In the WC, provincial coordinators also regularly received laboratory reports (from the provincial laboratory) for each facility, which were used to provide feedback to sites.

2.8. Data management

Data collected on paper (the data collection forms) was captured by clerks at the Health Information System Programme (HISP) office, using the antenatal HIV prevalence survey web-based DHIS Patient Module. This database was designed to exclude out-of-range data, as well as illegal values, such as barcodes not assigned to a province. Skip patterns were also enforced where necessary. Data entry was verified through a systematic double entry of data from every tenth data collection instrument. Inconsistent values were examined and data entry errors corrected.

All EIA and confirmatory test results were exported from TrakCare (the lab electronic information system) to Excel. The laboratory data exported to Excel were then merged with the interview data captured on DHIS, using STATA 14 (StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP) [12]. Queries such as missing laboratory data and missing data collection forms were sent to the staff responsible at NICD and National Department of Health (NDoH), i.e. laboratory managers and provincial coordinators respectively, and data were cleaned. The final database excluded observations for participants outside the age range of 15–49, those

with no interview data, rejected or lost specimens and those with equivocal or unconfirmed HIV test results. Anonymous data were shared with South African Medical Research Council (SAMRC) and Centers for Disease Control and Prevention (CDC) for parallel data analysis. Data will be stored for future use at NICD on a password-protected computer, with access restricted to those who analyse the data.

2.9. Data analysis

Data were analysed using STATA 14 software (StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP) [12] at the NICD office, in collaboration with statisticians from the SAMRC and CDC. To control for quality of results, SAMRC, CDC and NICD performed parallel data analysis, and the outputs were compared and verified. A working group composed of NICD, CDC, SAMRC, NDoH and WHO reviewed the technical aspects of the data analysis and outputs.

Analysis took into account the survey design (clustering within PSUs, and stratification by district) and was weighted using the number of women of reproductive age (15–49 years) from the Stats SA 2017 mid-year population estimates, at province level. Similarly, the surveys prior to 2017 (i.e. 1990-2015) were weighted for the mid-year population size of reproductive age (15–49 years) women in the respective years using Stats SA data. Given that sites were sampled using PPS, and that the sampling period was fixed, this provided a self-weighted sample at district level. A population finite correction factor was added, to adjust for the >5% of PSUs sampled without replacement from a finite population of about 4,000 public facilities.

Descriptive analyses included a summary of sample size realization and data distribution by district, province, nationally, and by age, gravidity, race group, and visit type (first or follow-up ANC visit). Median and interquartile ranges (IQR) were reported for continuous variables, while frequencies were reported for categorical variables. The primary outcome of the survey was HIV prevalence: defined as the proportion of eligible pregnant women who participated in the survey with positive HIV EIA test. Descriptive analysis provided HIV prevalence at national, provincial and district level, by age group (5-year age bands, and the 15–24 years category), and visit type (first or follow-up ANC visit). HIV prevalence was compared across provinces and districts, and by visit type, with *P* values from chi-square tests reported for statistically significant differences.

The HIV prevalence trend for 2011–2017 (excluding 2015) was analysed by 5-year age band and by province. This analysis was restricted to first-ANC-visit attendees, because the inclusion of follow-up visit attendees was expected to result in a slight increase in overall HIV prevalence, owing to new HIV infections acquired during pregnancy. The 2015 survey was excluded from this

trend analysis, as the data were not identified by visit type.[2] A separate analysis compared HIV prevalence among all pregnant women between 2015 and 2017 by province and district. A non-parametric trend test was computed to assess the significance of HIV prevalence trend changes over time by province and age group. For all prevalence estimates, 95% CIs are reported.

The PMTCT cascade analysis included: uptake of HIV testing, knowledge of HIV status (both HIV-positive and negative), and ART coverage (2nd 90) – this was estimated for overall data and by visit type (first or follow-up ANC visit attendees). Knowledge of HIV status and ART initiation prior to pregnancy was estimated, in order to assess the coverage of the "test and treat" programme among pregnant women. The denominator for HIV-positive status knowledge prior to pregnancy was the number of EIA positive individuals. Of those who knew their HIV-positive status prior to pregnancy the proportion who were initiated on ART prior to pregnancy was reported.

Each analysis was done using complete observations, excluding individuals with missing values for the relevant variables. The non-response rate was low (<2%) for most variables. Two variables had >5% missing values, which were participant age (8.2%) and maternal syphilis screening (14.1%). For maternal syphilis screening, sensitivity analysis was applied by treating all missing values as "syphilis screening not done", and including them in the denominator accordingly.

2.10. Ethical considerations

Participation in the survey was voluntary, requiring written informed consent. To protect the confidentiality of participants' information, the data collection form and the blood specimens were submitted without patient identification. Ethical approval was sought from the University of the Witwatersrand Human Research Ethics Committee (Medical), the nine provincial health research ethics committees and the Center for Global Health (CGH) Associate Director of Science of the United States (US) CDC.

[2] In the 2015 survey, although both first-ANC-visit attendees and follow-up attendees were included, the data were not identified by visit type (i.e. on which visit each participant was tested was not known). In the 2017 survey, the data were identified by visit type (as 1st, 2nd, 3rd and 4+ ANC visits).

Chapter 3: Results

3.1. Sample size realization

In all, 36,128 participants were interviewed. Sixty-five (0.2%) participants fell out of the age range (15–49 years) for inclusion in the study;1,687 participants were missing their HIV test results or interview data, and 1,595 (4.4%) had their blood specimens rejected (80.0% of specimen rejections were due to haemolysis).[3] Of the remaining 32,781 specimens processed, 65 (0.2%) were excluded for discrepant or equivocal results. 32,716 (90.6%) observations were finally included (Figure 1).

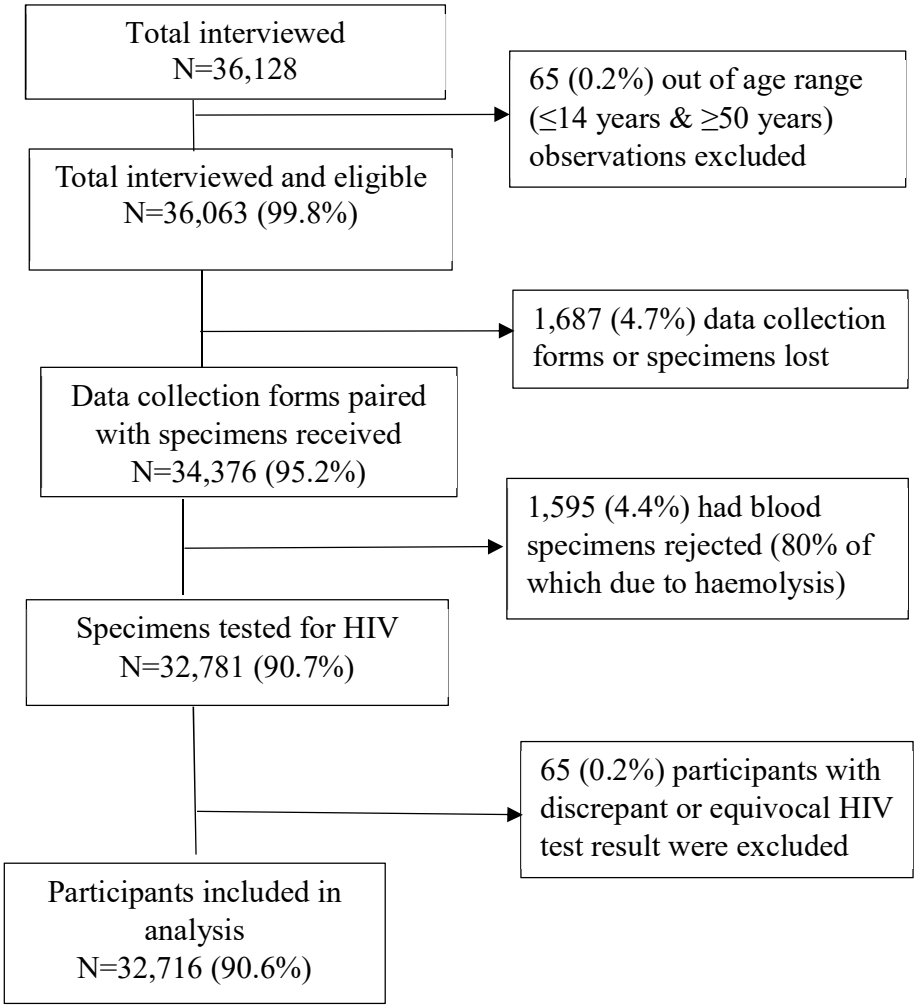


Figure 1: Flow chart of observations excluded from the analysis, in the 2017 antenatal survey, South Africa

[3] 67% of the haemolysed samples has occurred in laboratories in Limpopo and North West

3.1.1. Sample size realization at national and provincial levels

At national level, 90.8% (32,716) of the planned sample size (36,015) was achieved. The lowest sample size realization was in North West (NW) (74.1%), followed by Eastern Cape (EC) (76.1%) and LP (83.1%) (Table 3). Compared to the previous survey (2015), in 2017 sample size realization increased in five provinces – Free State (FS), KwaZulu-Natal (KZN), Mpumalanga (MP), Northern Cape (NC), and NW – and declined in four provinces – LP, EC, GP and WC. At the national level the overall sample size achievement declined by 9% (from 36,127 in 2015 to 32,716 in 2017) (Table 3). The sample size realization in three provinces (GP, WC, and LP) declined because sample size was purposely reduced for these three provinces in the 2017 survey (the previous sample size being deemed too large) and re-distributed to the other six provinces, which required greater sample size in order to measure prevalence within acceptable precision. Two of these six provinces (EC and NW) were unable to achieve the newly allocated sample size. Moreover, sample size realization in the LP and NW provinces was affected by haemolysed specimens and lost data collection forms.

Province	2014 sample size achieved		2015 sample size achieved		2017 Sample size achieved		2017 Planned sample size	2017 Sample size realization
	N	%	N	%	N	%	N	%
Eastern Cape	3,880	12.0	4,168	11.5	4,040	12.3	5,306	76.1
Free State	2,092	6.5	2,349	6.5	2,734	8.4	2,722	100.4
Gauteng	6,321	19.6	6,512	18.0	4,844	14.8	4,775	101.4
KwaZulu-Natal	6,855	21.3	6,819	18.9	8,242	25.2	8,761	94.1
Limpopo	3,587	11.1	3,482	9.6	2,647	8.1	3,187	83.1
Mpumalanga	2,259	7.0	2,162	6.0	2,870	8.8	2,954	97.2
North West	2,211	6.8	1,880	5.2	2,256	6.9	3,045	74.1
Northern Cape	1,092	3.4	1,238	3.4	1,512	4.6	1,650	91.6
Western Cape	4,036	12.5	7,517	20.8	3,571	10.9	3,615	98.8
Grand Total	**32,331**	**100.0**	**36,127**	**100.0**	**32,716**	**100.0**	**36,015**	**90.8**

Table 3: Sample size realization by province, in the 2017 antenatal survey, South Africa

3.1.2. Sample size realization at district and site level

Sample size realization at district level was variable. The median sample size realization was 94.2% (IQR: 83.8%−98.8%). Seven districts[4] had sample size realization between 59% and 69%.

[4] Namely, nw Ngaka Modiri Molema(59.0%), nw Dr Kenneth Kaunda(66.0%), ec Amathole (69%), ec ChrisHani (69%), ec Nelson Mandela (69%), ec Sarah Baartman (69%), and lp Waterberg(69%).

Ninety-nine percent (1,574 of the 1,595 selected sentinel sites) of selected sentinel sites participated in the survey; of the 21 sites that did not participate, 5 were closed (their sample size was collected from other sentinel sites), and the remaining 16, although open and functional during the study period, did not submit complete data.

3.2. Characteristics of survey participants

The majority of participants were Black African (86.6%), single, i.e. never married and not cohabiting (72.8%), and had attended at least secondary school (89.1%). The median gestational age of first-ANC-visit attendees and follow-up visit attendees was 16.0 weeks (IQR: 12.0 - 22.0 weeks) and 30.0 weeks (IQR: 23.0 - 34.0 weeks) respectively. One-third of participants (33.3%) reported that the current pregnancy was their first. At provincial level, more than 85.0% of participants were Black African in seven of the nine provinces. In two provinces – NC and WC – 50.3% and 40.0% respectively were Black African and 48.0% and 57.0% of participants respectively were Coloured. Distribution of other characteristics such as marital status, education, age, gestational age and gravidity did not vary substantially by province, nor did demographic characteristics vary substantially by visit type.

The median age of participants was 26 years (IQR: 21–31 years). There was a consistent decline in the proportion of younger women (15–19 years) participating in the survey (Table 4), who constituted 19.4% of participants (95% CI: 19.0%–19.8%) in the 2012 survey, declining to 14.3% (95% CI: 13.9%–14.7%) in 2017.

Age group (years)	2012		2013		2014		2015		2017*	
	N	%	N	%	N	%	N	%	N	%
15–19	6,578	19.4	5,735	17.5	5,400	16.8	5,587	15.5	4,301	14.3
20–24	10,000	29.5	9,901	30.2	9,548	29.6	10,518	29.1	8,666	28.9
25–29	8,360	24.7	8,289	25.3	8,125	25.2	9,416	26.1	8,012	26.7
30–34	5,263	15.5	5,396	16.4	5,469	17.0	6,455	17.9	5,598	18.6
35–39	2,805	8.3	2,662	8.1	2,788	8.7	3,218	8.9	2,750	9.2
40–44	791	2.3	768	2.3	830	2.6	871	2.4	672	2.2
45–49	68	0.2	62	0.2	55	0.2	62	0.2	32	0.1
Total	**33,865**	**100**	**32,813**	**100**	**32,215**	**100**	**36,127**	**100**	**30,031**	**100**

**Total excludes missing age data (in 2017, age data were missing for 8.2% of participants)*

Table 4: Distribution of survey participants by five-year age group, 2012–2017, South Africa

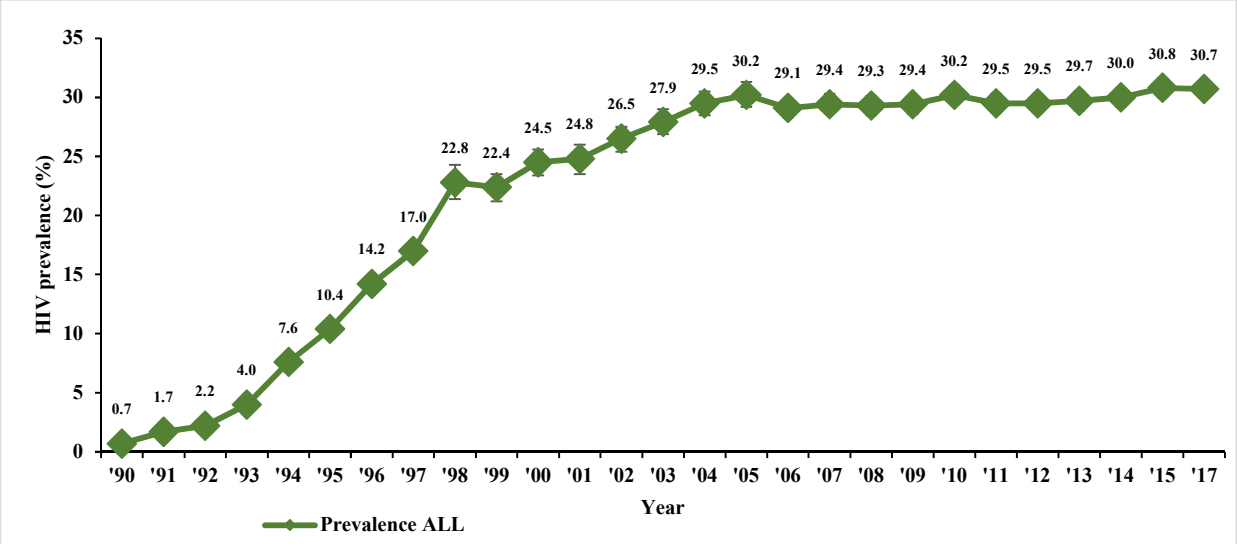
The majority (60.8%) of survey participants were follow-up ANC visit attendees and 37.7% were first-ANC-visit attendees (Table 5). The visit type was not documented in 1.5% of participants. At provincial level, GP had the highest proportion of first-ANC-visit attendees (almost half of the participants) while KZN had the lowest (30.7%).

Province	1st ANC visit		Follow-up ANC visit		Visit type not documented		Total	
	N	%	N	%	N	%	N	%
Eastern Cape	1,638	40.5	2,372	58.7	30	0.7	4,040	100.0
Free State	929	34.0	1,786	65.3	19	0.7	2,734	100.0
Gauteng	2,372	49.0	2,427	50.1	45	0.9	4,844	100.0
Kwa-Zulu Natal	2,535	30.7	5,642	68.5	65	0.8	8,242	100.0
Limpopo	1,012	38.2	1,517	57.3	118	4.5	2,647	100.0
Mpumalanga	1,038	36.2	1,817	63.3	15	0.5	2,870	100.0
North West	760	33.7	1,312	58.1	184	8.2	2,256	100.0
Northern Cape	557	36.8	950	62.8	5	0.3	1,512	100.0
Western Cape	1,481	41.5	2,075	58.1	15	0.4	3,571	100.0
Total	**12,322**	**37.7**	**19,898**	**60.8**	**496**	**1.5**	**32,716**	**100.0**

Table 5: National sample size distribution by visit type, in the 2017 antenatal survey, South Africa

3.3. National HIV prevalence

The overall HIV prevalence at national level was stable at 30.7% (95% CI: 30.1%–31.3%) – a 0.1% point decline from 2015 (Figure 2). HIV prevalence was significantly higher (by 3.8% points) among follow-up ANC visit attendees (32.2%, 95% CI: 31.5%–33.0%), compared with first-ANC-visit attendees (28.4%, 95% CI: 27.7%–29.2%) ($P < 0.01$) (Figure 3). The latter figure represented a decline from 30.0% (29.2%–30.8%) in 2014, but this was not statistically significant, as sample size was not adequate to detect significant prevalence trend changes over time in this category.



Note: the prevalence reported in 2015 & 2017 is for both first and follow-up ANC visit attendees.

Figure 2: The HIV epidemic curve among antenatal women, South Africa, 1990–2017

3.3.1. HIV prevalence by province

Consistent with the previous survey, conducted in 2015, the highest overall HIV prevalence was in KZN (41.1%, 95% CI: 39.9%–42.3%) followed by MP (37.3%, 95% CI: 35.4%–39.2%) (Figure 3). The lowest overall HIV prevalence was in WC at 15.9% (95% CI: 14.2%–17.8%).

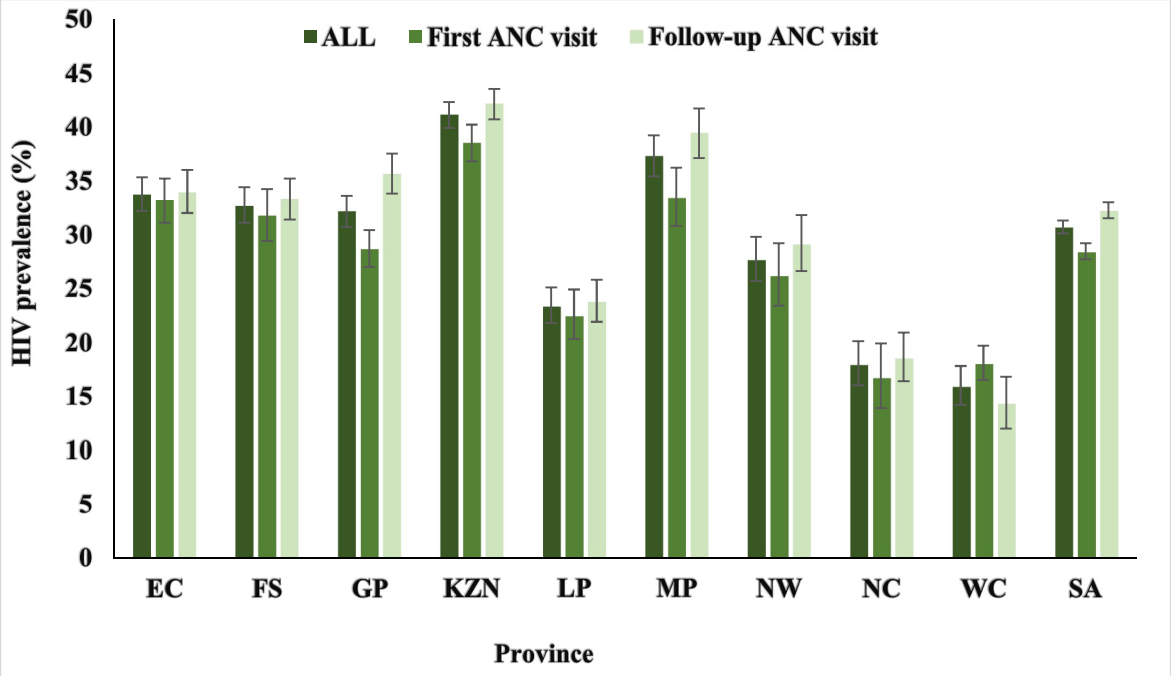


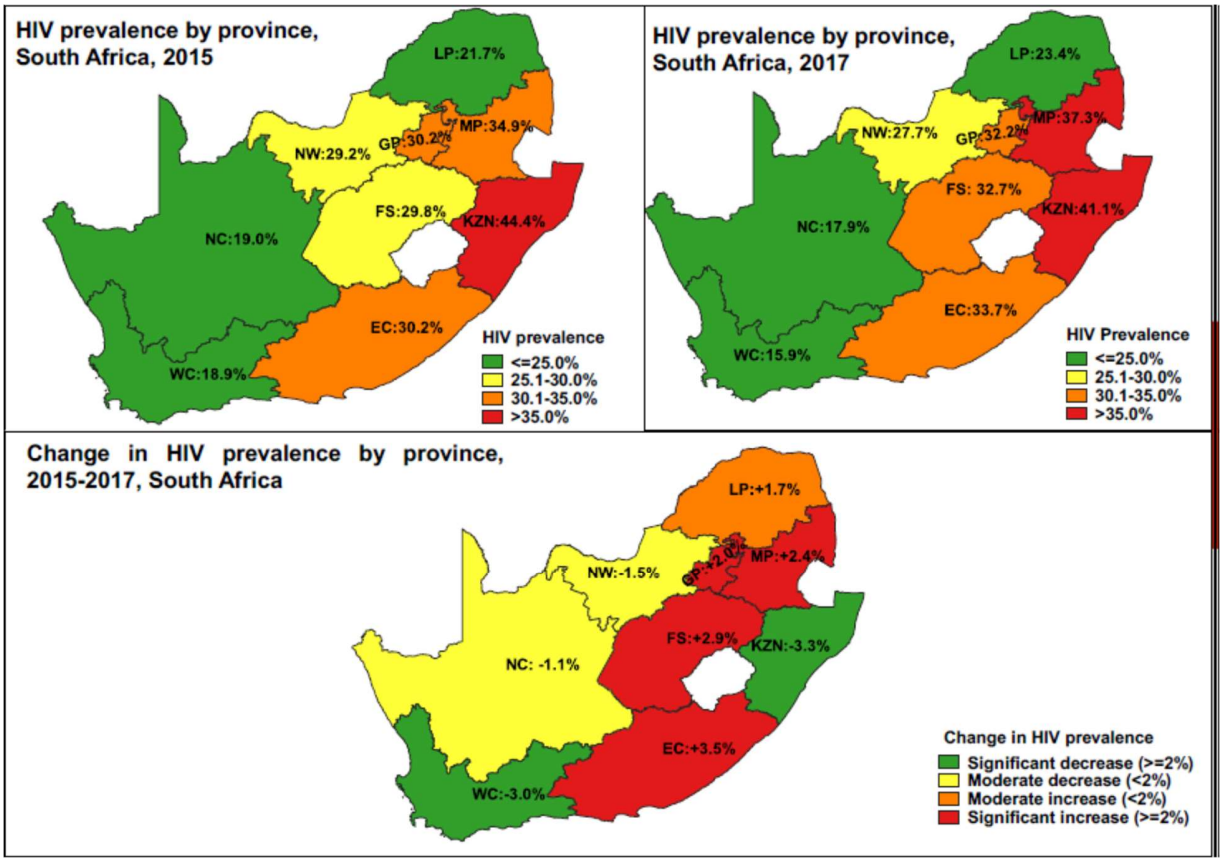
Figure 3: HIV prevalence among first-ANC and follow-up ANC visit attendees by province, in the 2017 antenatal survey, South Africa

In all provinces except WC, HIV prevalence was higher among follow-up ANC visit attendees, compared with first-ANC-visit attendees. This difference was statistically significant in three of the eight provinces: GP, KZN and MP. In GP, there was a 6.9% difference in HIV prevalence between first-ANC-visit attendees (28.7%, 95% CI: 27.0%–30.4%) and follow-up ANC visit attendees (35.6%, 95% CI: 33.8%–37.5%) ($P < 0.01$). In MP, there was a 6.0% HIV prevalence difference between first-ANC-visit attendees (33.4%, 95% CI: 30.8%–36.2%) and follow-up ANC visit attendees (39.4%, 95% CI: 37.1%–41.7%) ($P < 0.01$). In KZN, a 3.6% HIV prevalence difference was observed between first-ANC-visit attendees (38.5%, 95% CI: 36.8%–40.2%) and follow-up ANC visit attendees (42.1%, 95% CI: 40.7%–43.5%) ($P < 0.01$) (Figure 3). In the WC, HIV prevalence was higher among first-ANC-visit attendees (18.0%; 95% CI: 16.5–19.7%) compared with follow-up ANC visit attendees (14.3%, 95% CI: 12.0–16.8%), but this difference was not statistically significant.

3.3.1.1. Change in HIV prevalence (2015-2017) by province among all pregnant women

The point estimates for overall prevalence (i.e. among both first and follow-up ANC visit attendees) increased in five provinces (EC, FS, GP, LP, MP) between 2015 and 2017, and

decreased in four provinces (KZN, NC, NW, WC) (Figure 4). This change was statistically significant only in KZN, where prevalence declined by 3.3% points between 2015 (44.4%, 95% CI: 42.5%–46.3%) and 2017 (41.1%, 95% CI: 39.9%–42.3%).

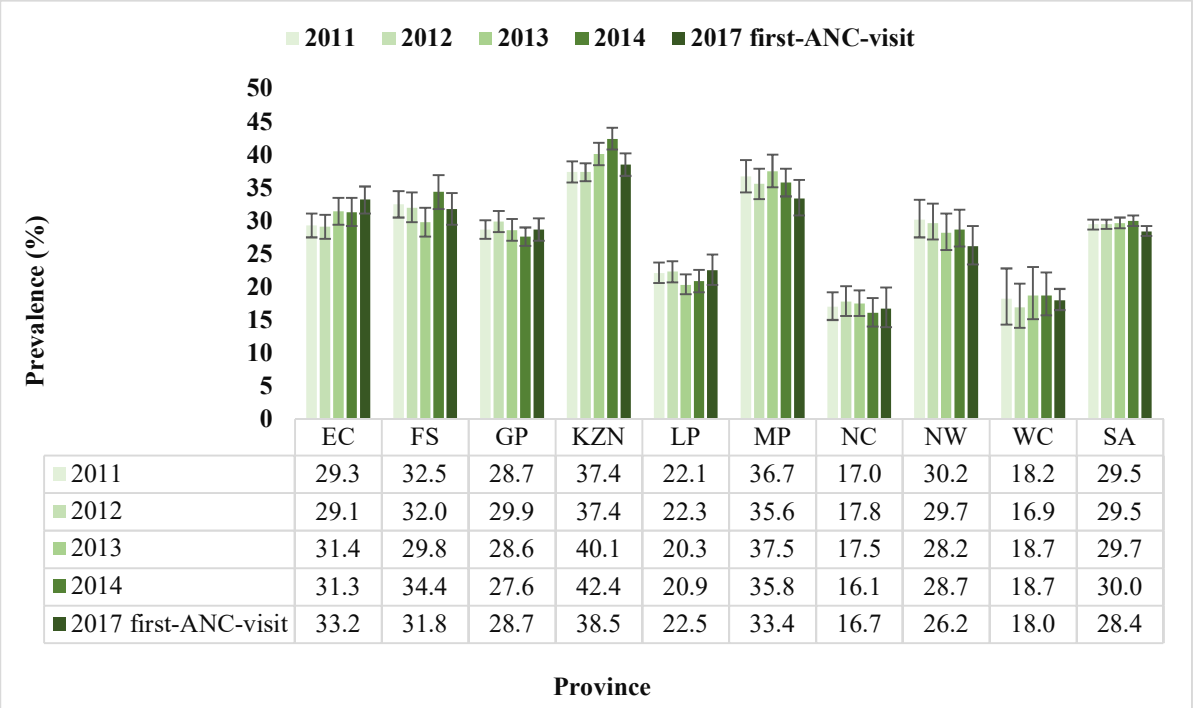


HIV prevalence decline (or increase) of >=2%/<2% refers to a drop (or increase) of HIV prevalence by 2% points e.g. for KZN, a 3.3% point drop of HIV prevalence was observed between 2015 (44.4%) and 2017 (41.1%).

Figure 4: Change in provincial HIV prevalence estimates, 2015–2017, antenatal survey, South Africa

3.3.1.2. HIV prevalence trend (2011-2017) among first antenatal care visit attendees (by province)

In none of the nine provinces was there a statistically significant upward or downward trend in HIV prevalence between 2011 and 2017. EC showed a consistent increase in HIV prevalence among first-ANC-visit attendees, but the magnitude of the increase was moderate. In KZN, a consistent increase in HIV prevalence between 2012 and 2015 was followed in 2017 by a significant decline: from a rate of 42.4% (95% CI: 40.8%–44.1%) in 2014 to 38.5% (95% CI: 36.8%–40.2%) in 2017 (*P* value from chi^2 test < 0.01; *P* value from trend analysis for 2012–2017 = 0.3) (Figure 5).

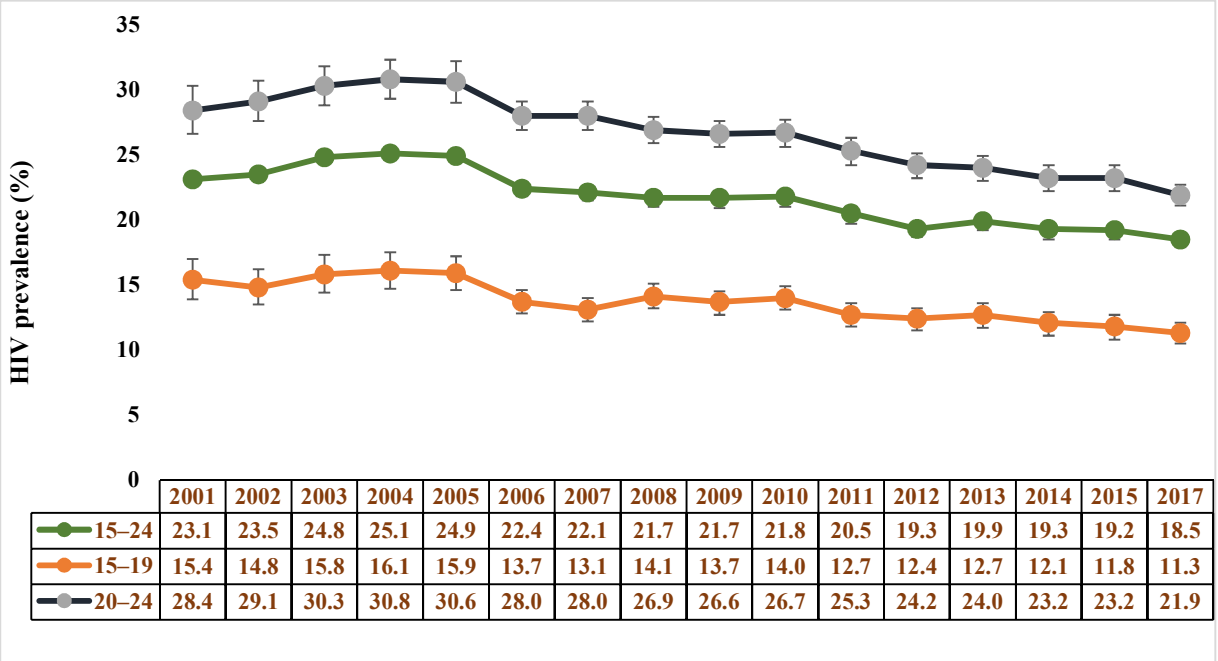


	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA
2011	29.3	32.5	28.7	37.4	22.1	36.7	17.0	30.2	18.2	29.5
2012	29.1	32.0	29.9	37.4	22.3	35.6	17.8	29.7	16.9	29.5
2013	31.4	29.8	28.6	40.1	20.3	37.5	17.5	28.2	18.7	29.7
2014	31.3	34.4	27.6	42.4	20.9	35.8	16.1	28.7	18.7	30.0
2017 first-ANC-visit	33.2	31.8	28.7	38.5	22.5	33.4	16.7	26.2	18.0	28.4

Figure 5: HIV prevalence trend among first-ANC-visit attendees (2011–2017), antenatal survey, South Africa

3.3.2. HIV prevalence trend by age (among both first and follow-up visit attendees)

HIV prevalence among 15-24 years age group continued to decline among both 15-19 years and 20-24 years age group. In the 15-24 years age group HIV prevalence significantly declined from 21.8% (95% CI: 18.5–20.0%) in 2010 to 18.5% (95% CI: 16.3–18.2%) in 2017 (*P* value from trend analysis < 0.01) (Figure 6).



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2017
15–24	23.1	23.5	24.8	25.1	24.9	22.4	22.1	21.7	21.7	21.8	20.5	19.3	19.9	19.3	19.2	18.5
15–19	15.4	14.8	15.8	16.1	15.9	13.7	13.1	14.1	13.7	14.0	12.7	12.4	12.7	12.1	11.8	11.3
20–24	28.4	29.1	30.3	30.8	30.6	28.0	28.0	26.9	26.6	26.7	25.3	24.2	24.0	23.2	23.2	21.9

Note: the prevalence reported in 2015 & 2017 is for both first and follow-up ANC visit attendees.

Figure 6: HIV prevalence trend by age group at national level, 2001–2017, antenatal survey, South Africa

HIV prevalence among first-ANC-visit attendees also declined steadily from 2011 to 2017, by 4.8%, 2.0% and 6.0% points in the age groups 20–24 years, 15–24 years and 25–29 years respectively (*P* value from trend test < 0.01) (Figure 7).

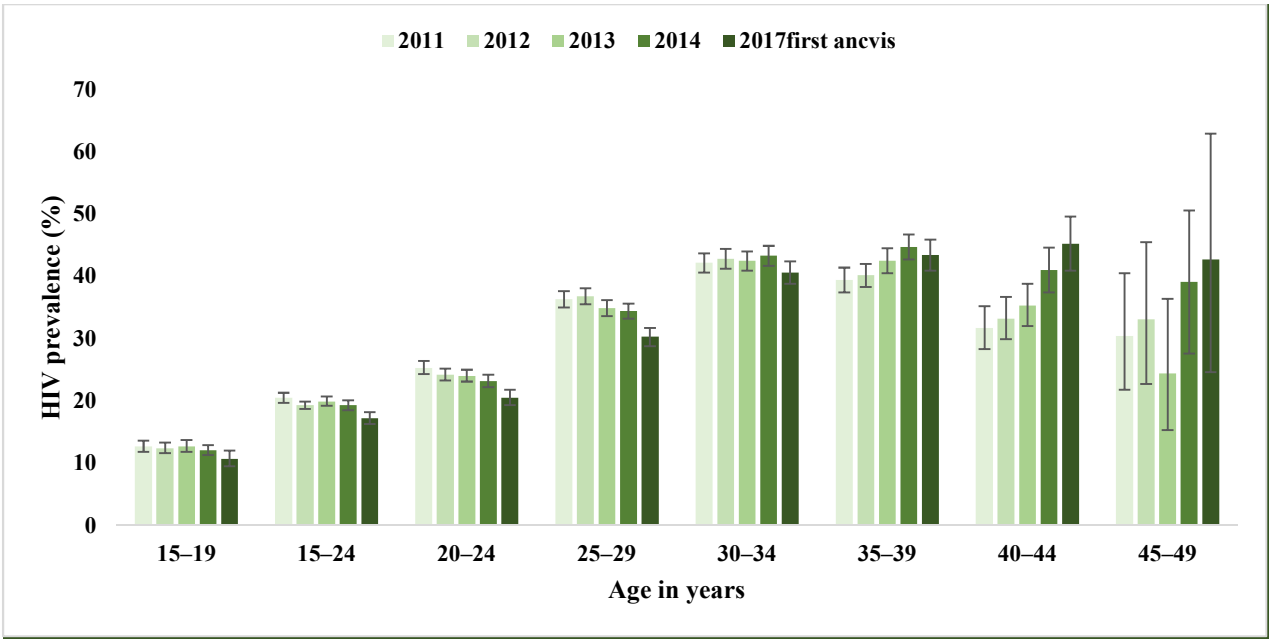
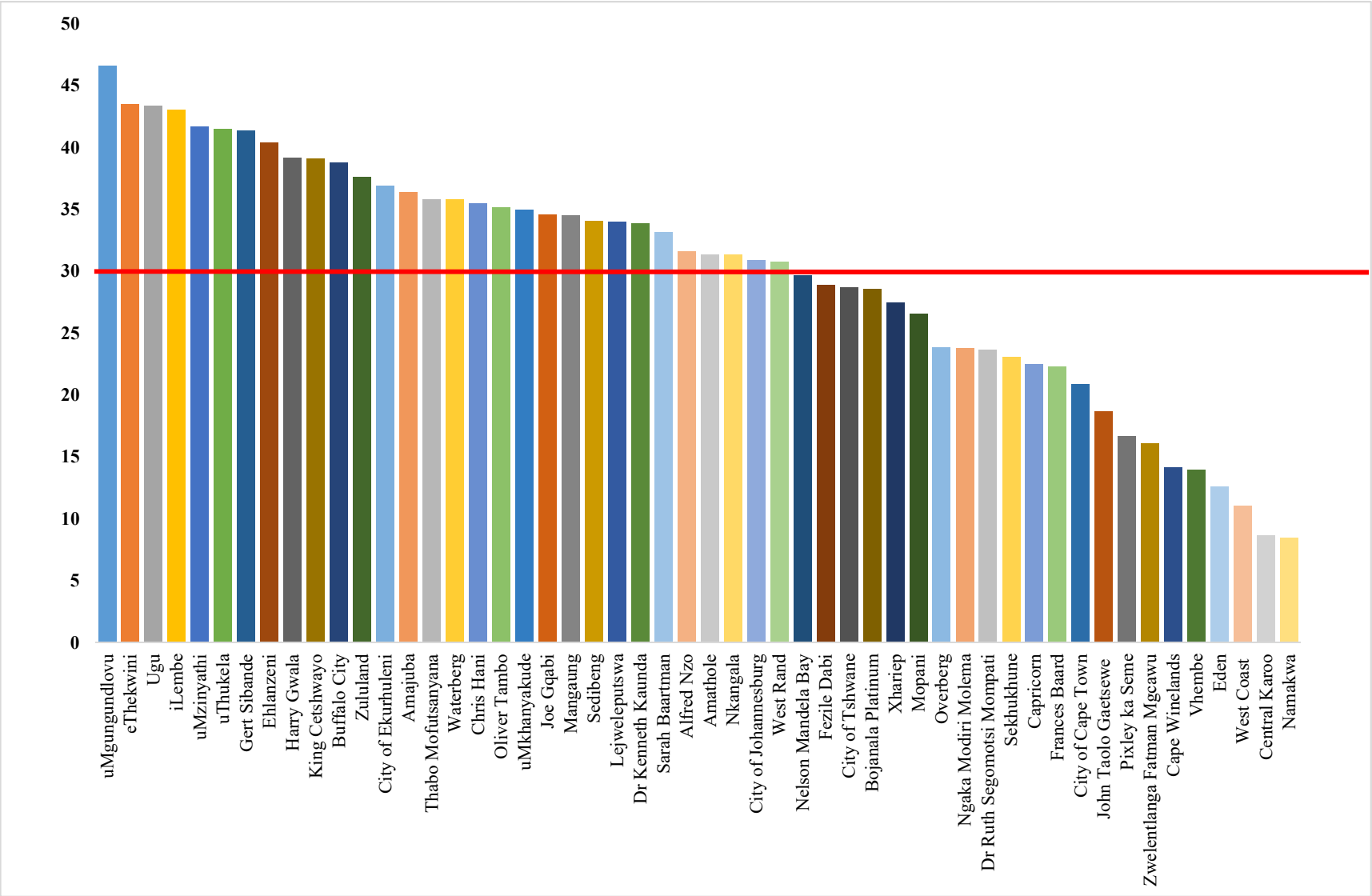


Figure 7: National HIV prevalence trend by age group among first-ANC-visit attendees, 2011–2017, antenatal survey, South Africa

3.3.3. HIV prevalence by district

As was the case in the previous survey (2015), 8 of the 10 high-prevalence districts were in KZN and the other 2 were in MP (Gert Sebande and Ehlanzeni) (Figures 8 and 9). However, comparison of HIV prevalence in 2015 and 2017 reveals that 4 out of the 10 highest declines in HIV prevalence were in KZN (uMkhanyakude, Zululand, King Cetshwayo, and Amajuba), with the highest in uMkhanyakude (11.3%) followed by Zululand (10.8%). Although HIV prevalence has declined in most districts in KZN, it continued to increase in two districts, namely uThukela (an increase of 5.2% between 2015 and 2017) and uMzinyathi (an increase of 5.0%). More detailed analysis of the district data is presented in Annexure 3.



Red line indicate national prevalence

Figure 8: HIV prevalence among pregnant women by district, 2017, antenatal survey, South Africa

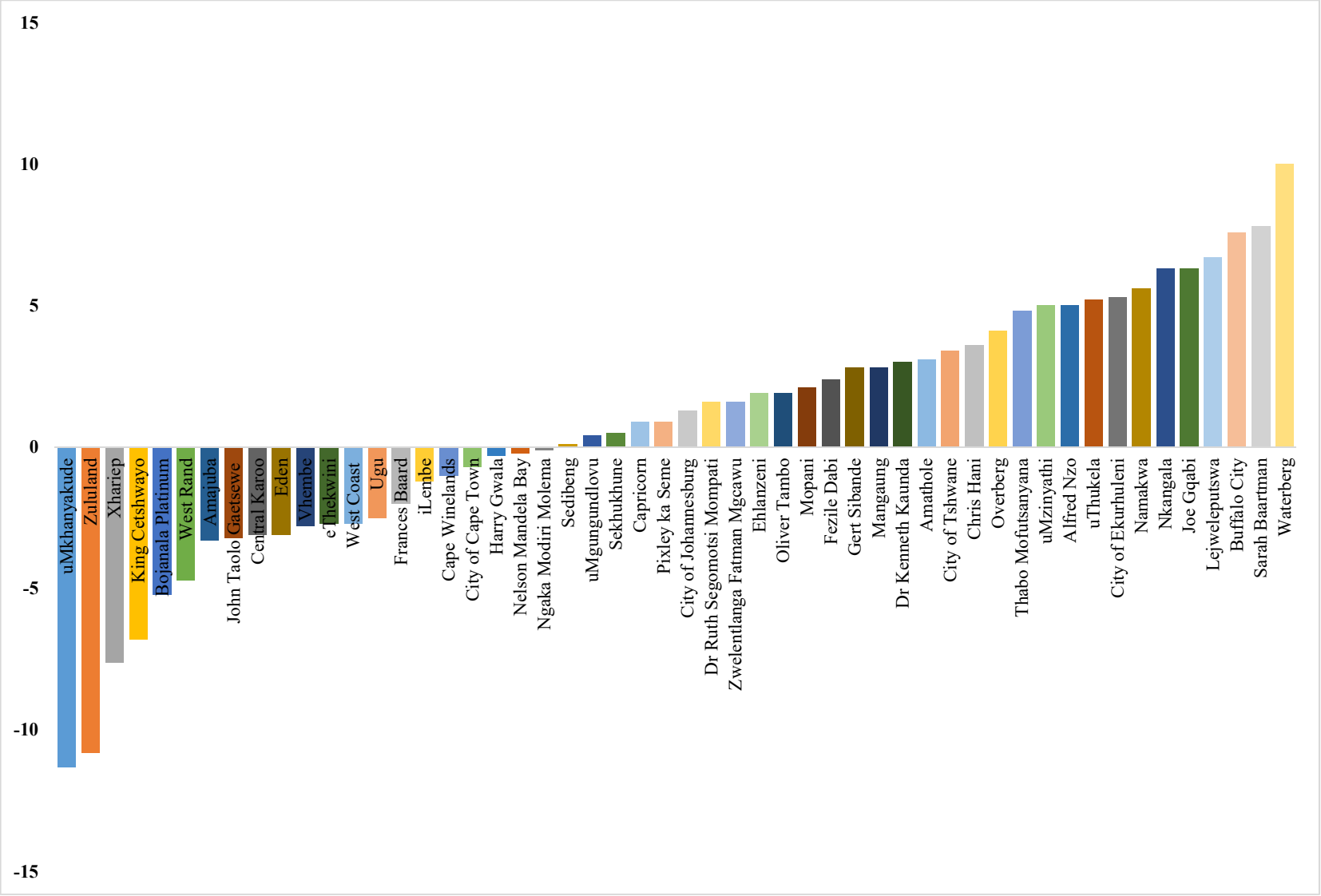
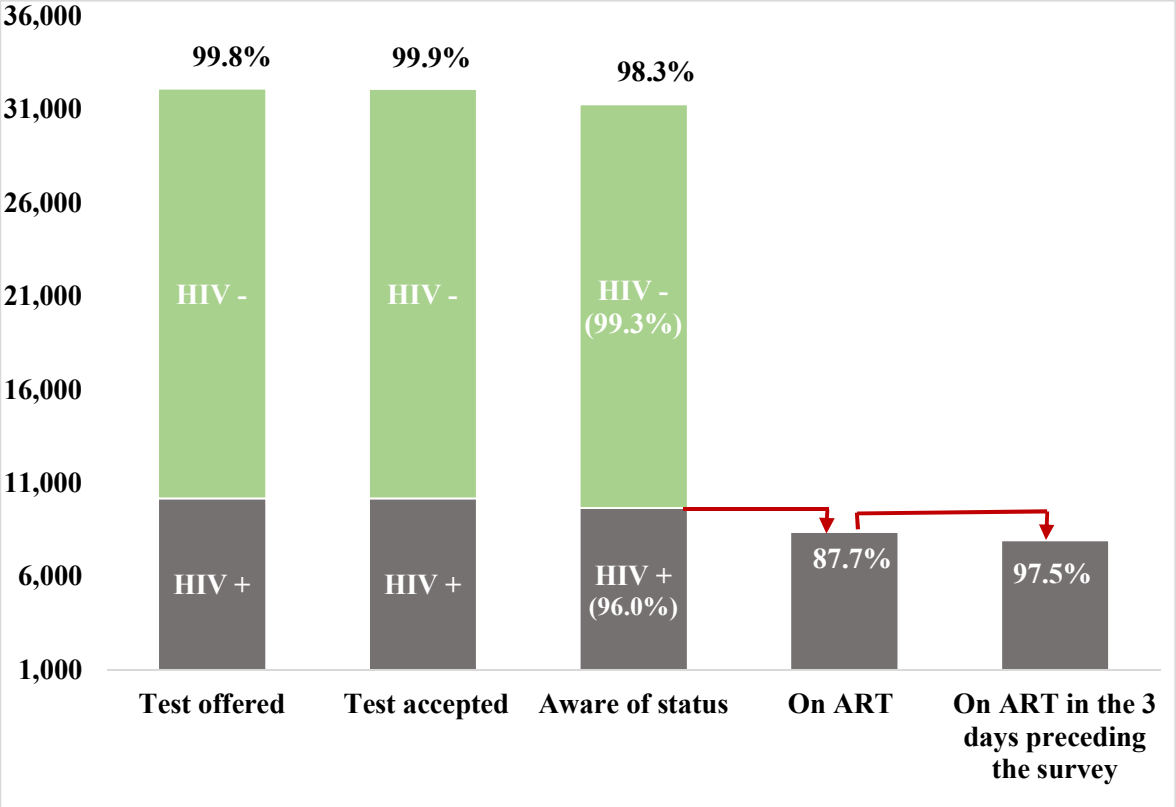


Figure 9: Change in HIV prevalence from 2015 to 2017 by district, antenatal survey, South Africa

3.4. HIV testing and treatment uptake

3.4.1. HIV testing uptake

HIV testing uptake was high in the routine PMTCT HIV testing programme. HIV testing was offered to 99.8% (32,125) of antenatal care attendees and almost all (99.9%, 32,116) either accepted the offer or already knew their HIV-positive status. 98.3% (31,294) of participants were aware of their HIV status. Almost all (99.3%) HIV-negative participants knew their HIV-negative status from tests done during the routine ANC service (Figure 10).



HIV testing uptake and HIV status information was not documented in 2% of participants and these were excluded from all cascade analysis. Percentages are weighted.

Figure 10: HIV treatment cascade among all pregnant women, in the 2017 antenatal survey, South Africa

3.4.2. HIV treatment cascade

Of those found to be HIV-positive by EIA test, 96.0% knew they were positive before the test (1st 90) (Figure 10). The greatest unawareness of HIV-positive status was found among first-ANC-visit attendees with five percent (5.0%) of first-ANC-visit attendees being unaware of their HIV-positive status as compared to 3.3% of follow-up attendees.

3.4.3. Overall ART coverage

ART coverage among all EIA positive pregnant women was 84.1% (Table 6). ART coverage was low (65.2%) among first-ANC-visit attendees and high among follow-up ANC visit attendees (94.9%). The low ART coverage among first-ANC-visit attendees may be explained by the fact that a significant number of HIV-positive first-ANC-visit attendees were newly diagnosed on the day of the survey. The survey forms for these participants were completed at the ANC service point before patients were referred to the ART clinic for ART initiation. Even though treatment is normally initiated on the same day, ART information may not have been captured on the survey forms of these participants.

	All HIV-positive pregnant women		**First-ANC-visit attendees**		**Follow-up ANC attendees**	
ART coverage	**Number (%)**	**95% CI**	**Number (%)**	**95% CI**	**Number (%)**	**95% CI**
HIV-positive pregnant women on ART	8,399 (84.1%)	83.4% – 84.9%	2,270 (65.2%)	63.8%– 66.7%	6,056 (94.9%)	94.4%– 95.4%
HIV-positive pregnant women not on ART	1,453 (15.9%)	15.1%– 16.6%	1,135 (34.8%)	33.3%– 36.3%	314 (5.1%)	4.6%–5.6%
Total	9,852 (100%)		3,405 (100%)		6,370 (100%)	

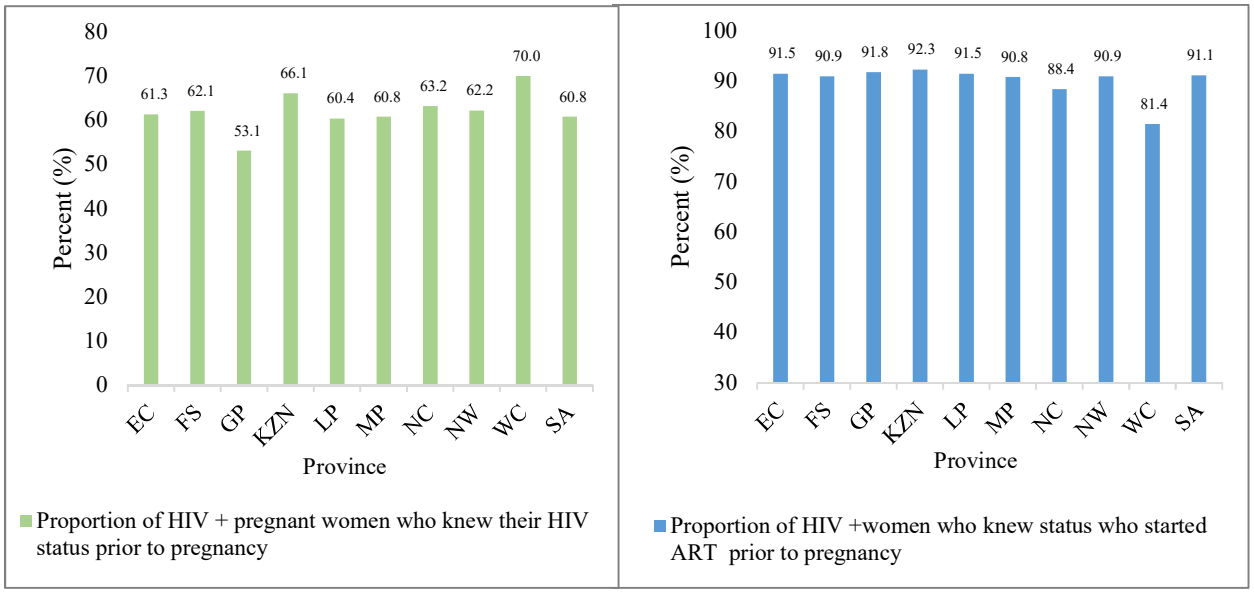
Denominator EIA positive; Missing response excluded; Percentages are weighted.

Table 6: Overall coverage of ART by visit type, in the 2017 antenatal survey, South Africa

3.4.3.1. Knowledge of HIV-positive status and ART initiation prior to pregnancy

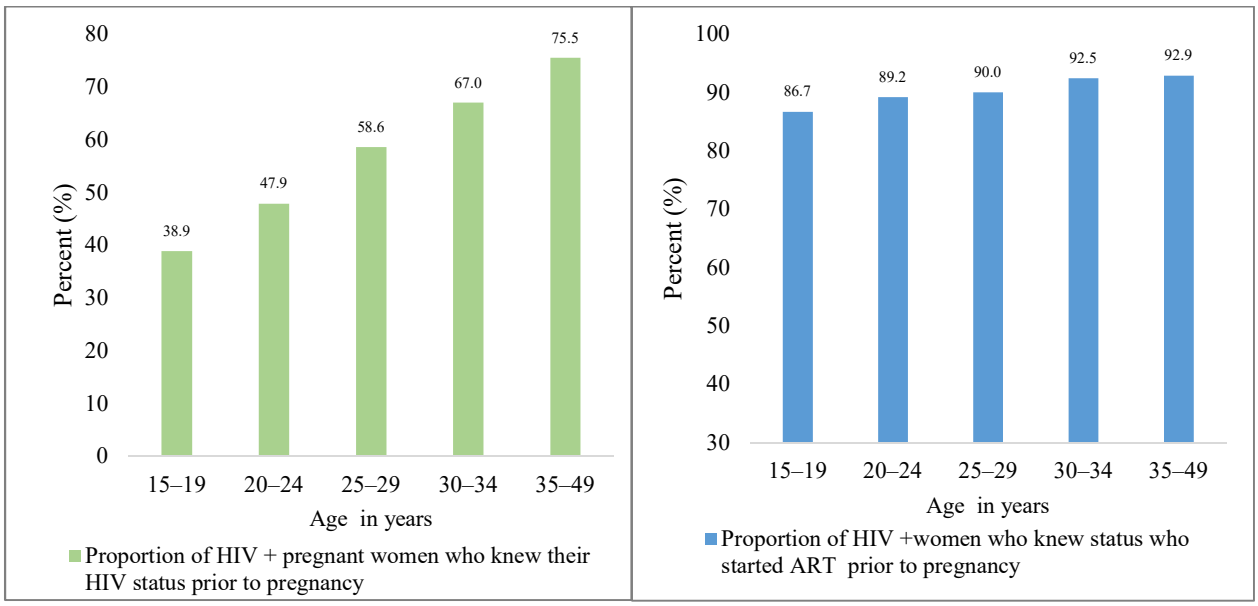
About sixty-one percent (60.8%, 95% CI: 59.9% - 61.7%) of HIV-positive pregnant women were aware of their HIV-positive status before falling pregnant. Of these, 91.1% (95% CI: 90.4%-91.7%) reported starting ART before pregnancy (Figure 11). The highest knowledge of HIV status prior to pregnancy was in WC (70.0%) and KZN (66.1%), while GP had the lowest (53.1%). At district level, the highest overall ART coverage prior to pregnancy was in the uMkhanyakude district in KZN (76.0% were aware of their HIV-positive status, of whom 94.6% initiated ART prior to pregnancy) and the Pixley ka Seme district in NC (74.5% were aware of their HIV-positive status, of whom 94.7% initiated ART prior to pregnancy).

Knowledge of HIV-positive status and ART initiation prior to pregnancy was higher in the older age group: 75.5% of women in the age group 35–49 years were aware of their HIV-positive status, of whom 92.9% initiated treatment prior to pregnancy; in contrast, only 38.9% and 47.9% of women in the age groups 15–19 years and 20–24 years respectively were aware of their HIV-positive status prior to their first-ANC-visit. Of these, 86.7% and 89.2% initiated ART prior to pregnancy (Figure 12).



SA stands for South Africa
Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 11: Knowledge of HIV-positive status and ART initiation prior to pregnancy by province, in the 2017 antenatal survey, South Africa



Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV -positive women who were aware of their HIV-positive status prior to pregnancy

Figure 12: Knowledge of HIV status and ART initiation prior to pregnancy by age group, in the 2017 antenatal survey, South Africa

3.4.4. PMTCT cascade among follow-up visit attendees

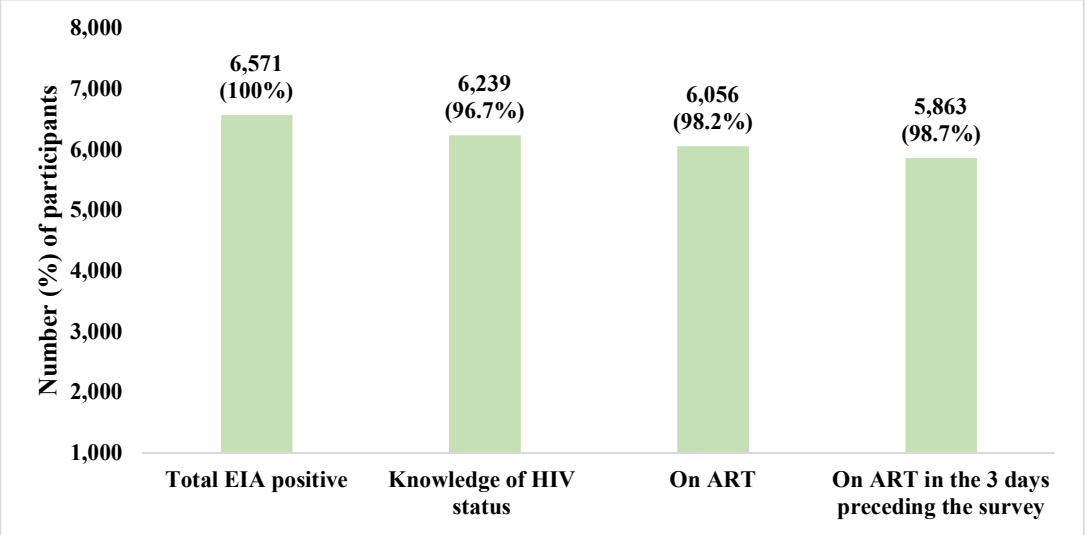
In this section, we measure the treatment cascade coverage among follow-up ANC attendees, to assess the progress of PMTCT programmes towards the first and the second 90 targets. First-ANC-visit attendees were not included in this analysis because ART initiation data were not available for those participants who were newly diagnosed at their first-ANC-visit.

HIV status knowledge (1st 90)

Knowledge of HIV status (1st 90) among follow-up ANC visit attendees was 96.7% (Figure 13). Participants who did not know their HIV-positive status either had a negative previous test result (from a test done in a previous ANC visit) or a negative or discrepant test result on the day of the survey. This suggests that the reason for the gap in knowledge of HIV-positive status among the 3.3% follow-up ANC attendees who were unaware of their status could be seroconversion during pregnancy or misdiagnosis (false negative result).

ART coverage (2nd 90) and adherence to ART

ART coverage was high (98.2%) among follow-up ANC visit attendees (Figure 13). Among those receiving ART, Self-reported ART adherence from 3-day recall was 98.7%.



Missing response excluded; weighted percentages

Figure 13: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, in the 2017 antenatal survey, South Africa

3.4.5. PMTCT cascade at province level

Knowledge of HIV status was greater than 90% in all nine provinces (Figure 14). The lowest achievement was in NC (at 93.6%) and the highest in KZN (at 98.6%). ART coverage among follow-up visit attendees was above 95% across provinces. Self-reported ART adherence (from 3-

day recall) was over 95% across provinces. The lowest reported ART adherence rate was in WC and the highest in NC. More detailed provincial and district level results are presented in Annexure 3.

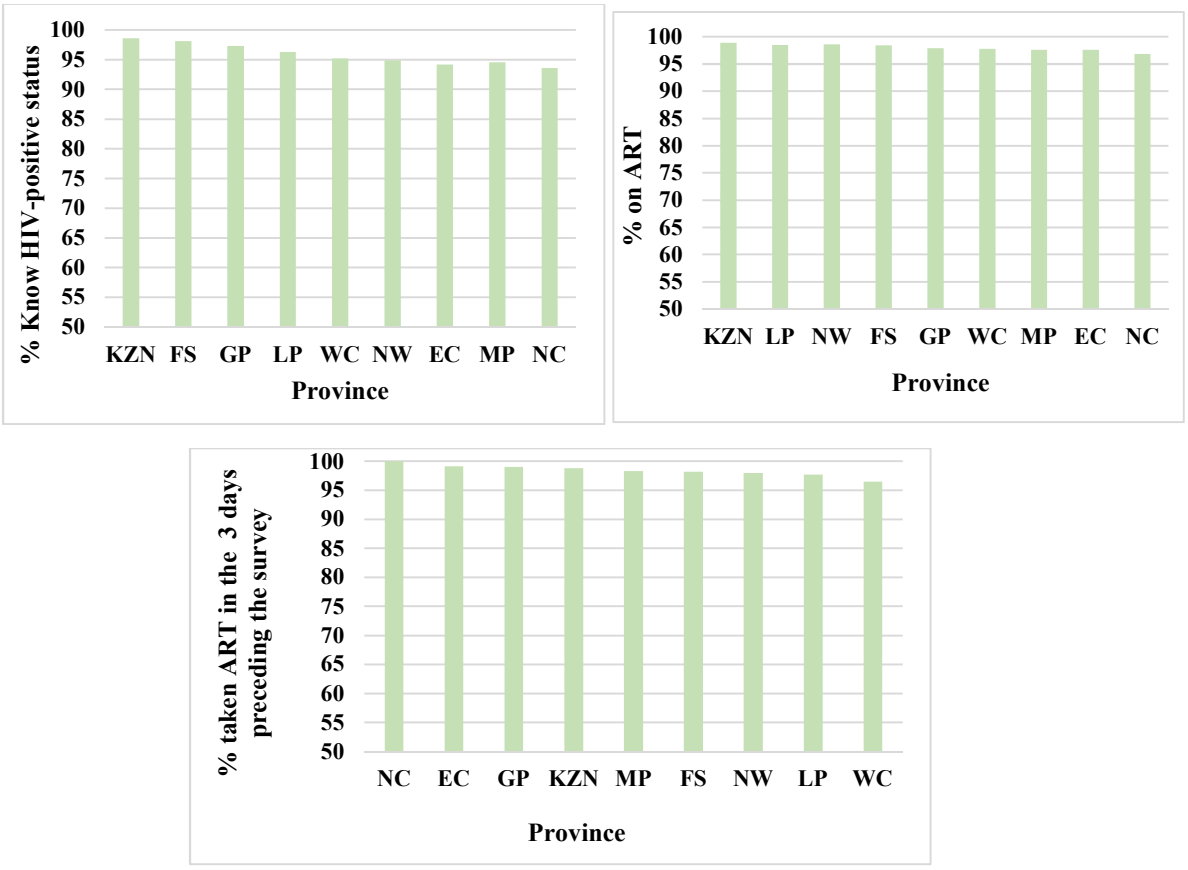


Figure 14: HIV status knowledge (1st 90), ART coverage and ART adherence in the three days preceding the survey among follow-up visit attendees by province, 2017 antenatal survey

3.5. Maternal syphilis screening service coverage

Maternal syphilis screening coverage was 96.7% at national level. All provinces had greater than 90% coverage (Figure 15). However, uptake was not documented in 14.1% of participants, so these were excluded from the syphilis screening coverage analysis. If we assume that all missing responses mean that the subjects did not receive the screening test, and include them as such in the denominator, the national coverage drops to 83%.

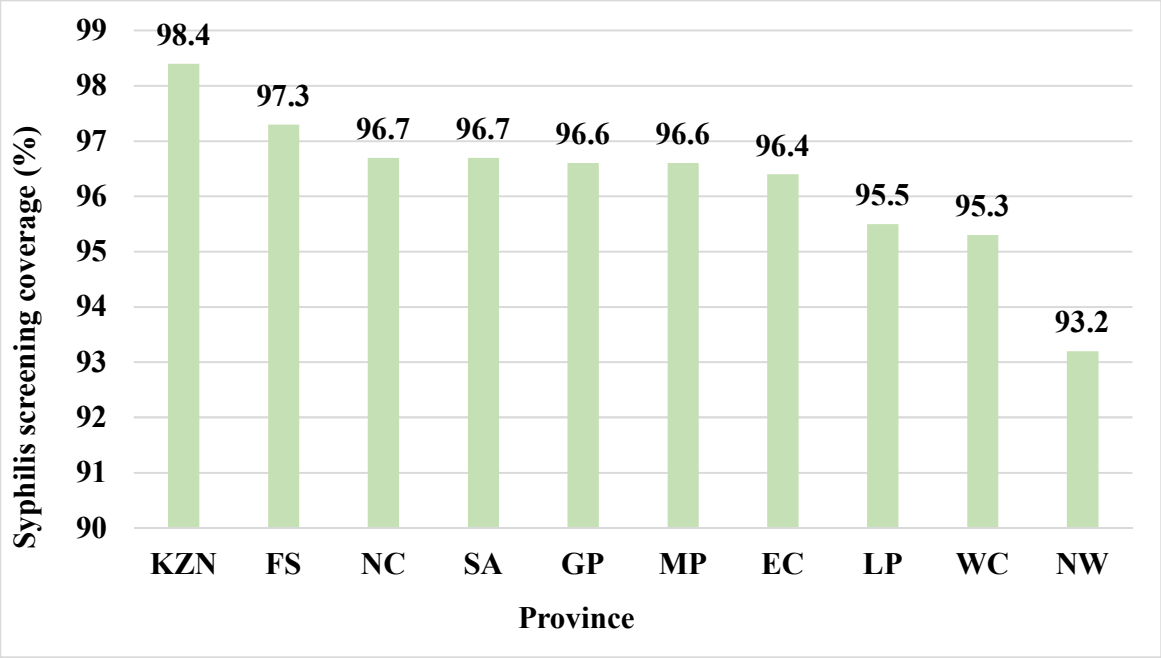


Figure 15: Maternal syphilis screening coverage among antenatal women at national level, in the 2017 antenatal survey, South Africa

Chapter 4: Conclusion and Recommendations

This report provided insight on HIV prevalence, PMTCT and syphilis screening services coverage among pregnant women attending public antenatal facilities in South Africa. In the 2017 survey, HIV prevalence among pregnant women remained stable at around 30%, as it has over the last decade. HIV prevalence varied across provinces. KZN (41.1%) and MP (37.3%) had the highest HIV prevalence. By contrast, prevalence in NC (17.9%) and WC (15.9%) was less than half of that in KZN and MP provinces. Studies suggest that this wide variation may be explained by such factors as: differences in medical male circumcision rate, differences in the fraction of high-risk population group, rate of concurrent and multiple partnerships, and socio-demographic factors [6, 13-15]. Other underlying psychosocial and structural causes of HIV in most high-burden provinces in South Africa are poverty, gender inequality, violence, stigma, and food insecurity, although these have not been reported as explanatory factors for the inter-provincial differences [6, 16-19].

The survey findings showed a declining HIV prevalence trend among young pregnant women in the age group 15–24 years. Other studies have reported similar declining HIV prevalence and incidence trends among young women (15–24 years) [20-22]. While direct evidence that link the declining prevalence trend with programme level efforts is not yet available, the "She Conquers" and "DREAMS" initiatives, implemented in South Africa since 2016, may have contributed to the recent HIV prevalence decline observed in this age group [23, 24].

In KZN, after a consistent increase in HIV prevalence over the previous four surveys (2012–2015), HIV prevalence dropped by 3.3% points in the 2017 survey. The decline appears modest at provincial level (3.3%), but at district level, achievements varied widely. The largest decline (11.3% decline) was observed in the uMkhanyakude district, where the Hlabisa HIV treatment and care programme, DREAMS, and other partner-supported and research-based interventions have been implemented [24-26]. The second highest decline was in the Zululand district (10.8%). In the other districts, declines achieved varied, ranging from 0.3% to 6.8%; and in two districts (uThukela and uMzinyathi districts), prevalence increased by ≥5%.

Prevalence data are influenced by both incidence and HIV-related mortality. HIV prevalence declines are observed when incidence rates drop below mortality rates (i.e. when the incidence-mortality ratio is below one) [27]. Following the roll-out of ART, several studies have reported substantial declines in HIV-related mortality in KZN [28, 29]. Declines in incidence have also been reported in certain population groups in KZN [30, 31]. A study of uMkhanyakude district between 2004 and 2015 reported declining trend in HIV incidence rate among men [31]. Other studies reported improved ART coverage in KZN [30, 32-35]. Consistent with these studies, the 2017 antenatal survey showed that KZN had the highest proportion of women initiated on ART prior to current pregnancy (61.8%), compared with other provinces. In the uMkhanyakude district in particular, ART initiation prior to pregnancy (72.5%) was 20% higher than the national average.

Declines in HIV prevalence among pregnant women may also be caused by factors such as declining fertility rate among HIV-positive women (as more women become aware of their HIV-positive status) and migration. While further analysis is needed to tease out these and other potential causes for the decline in HIV prevalence in KZN, the current survey highlights the need to distribute resources and support across all districts in the province equitably, as both ART coverage prior to pregnancy and declines in HIV prevalence were substantially different by district.

HIV prevalence among follow-up ANC visit attendees was higher (by 3.8% points at national level) than prevalence among first-ANC-visit attendees. At provincial level, this difference was large in GP (6.9%), MP (6.0%) and KZN (3.6%). The higher HIV prevalence rate observed could be due to incident infections during pregnancy. There may also be some bias in the estimating process, owing to the high frequency of ANC visits by HIV-positive pregnant women. According to the South African guideline and the WHO guideline, there should be no difference in frequency of ANC visits by HIV-positive women and HIV-negative women [36, 37], except that women who are not virally suppressed and those who experience viral rebound require more intense visits for viral load monitoring. But since ART adherence is reported to be high during pregnancy [38-40], frequent visits by women who are not virally suppressed are likely to have little effect statistically. In our survey, self-reported ART adherence was above 95% among follow-up visit attendees, and this rate has been confirmed by other studies [38-40]. On the other hand, new HIV infection and seroconversion during pregnancy has been reported to be the primary cause of mother-to-child transmission (MTCT). In a systematic review of PMTCT data in sub-Saharan countries, the pooled estimate of incidence rate during pregnancy in the Southern African countries was reported to be 4.8% [41]. In the national MTCT survey conducted between 2010 and 2012, seroconversion during pregnancy was reported at 3.3% [42]. Compared to these estimates the rate reported in this survey for incident infections during pregnancy is within range at national level (3.8%) but higher in GP (6.9%) and MP (6.0%). Further data analysis, especially on the proportion of newly infected follow-up visit attendees, will be done to verify this finding in the report that will be released in the last quarter of 2019.

The PMTCT programme has made significant progress in achieving the first two 90 targets. Across provinces, HIV testing uptake was above 99% and the coverage of both the first and the second 90 was greater than 95% among follow-up ANC visit attendees, showing the effectiveness of the PMTCT programme in identifying and enrolling HIV-positive pregnant women into treatment. Self-reported adherence rate to treatment was also high (98.7%); however, this figure needs to be validated against laboratory-based treatment adherence data.

HIV testing prior to first-ANC-visit was low. Well over a third of participants nationally (39.2%) and close to two-thirds of adolescent women aged 15–19 years (61.1%) were unaware of their HIV-positive status before their first-ANC-visit. Participants in WC (70.0%) and KZN (66.1%)

had the highest knowledge of HIV status prior to pregnancy. Similar high ART coverage was reported for WC and KZN in other studies [30, 32]. The high rate of unawareness of HIV-positive status prior to pregnancy among adolescent women (15–19 years) highlights the gap in access to youth-friendly reproductive health services. Accessible and youth-friendly HIV testing services need to be scaled-up nationally, combined with effective HIV prevention interventions, to ensure those who test HIV-negative maintain their HIV-negative status and those who are positive receive early treatment. In addition, factors that delay access to testing and treatment services – such as poor service utilization, psychosocial and structural factors, challenges associated with disclosure– should be addressed, to increase the coverage of early diagnosis and ART initiation [43, 44].

The maternal syphilis screening coverage (96.7%) exceeded the WHO target of screening over 95% of pregnant women to eliminate mother-to-child transmission of syphilis [45]. However, this result needs to be interpreted with caution, as syphilis-screening data were missing in 14.1% of participants. If we take this to mean that no screening took place in these cases, the syphilis screening coverage drops to 83.3%, well below the WHO target.

The survey had some limitations. The sample size of women attending first-ANC-visit was too small to detect significant prevalence trend changes over time in this group. Sample size achievement at district level was low in some districts (e.g. in nw Ngaka Modiri Molema district, and lp Waterberg district) (Annexure 4). For these districts, the estimates need to be interpreted with caution. Sensitivity analysis excluding the 48 sites newly sampled in the current survey showed, no significant change in national and provincial level HIV prevalence estimates with the inclusion of the newly sampled sites. The decline observed in the proportion of adolescent women (15–19 years) participating in the survey was consistent with data from the district health barometer, which reported a declining delivery rate among teenage women (under 18 years) between 2012/13 (7.7%) and 2016/17 (6.8%) [46]. The proportion of adolescent pregnant women who participated in our survey (14.3%) was comparable to the proportion of adolescent women (15% of 15–49 years old women) in the general population as reported by Stats SA [47]. This indicates that adolescent women were adequately represented in the current survey. Pregnant women younger than 15 years or older than 49 years were not included in the survey. The survey was restricted to public facilities, which may limit the generalizability of its findings to the overall population, since the number of White and Indian people, in particular, and others from high-income groups who attend public health facilities is typically small. In future surveys it may be appropriate to target the private sector specifically.

The cross-sectional design of the survey does not provide opportunity to follow-up on the ART status of pregnant women newly diagnosed as HIV-positive. For this reason, the PMTCT cascade was not measured among first-ANC-visit attendees. The self-reported data used to measure treatment adherence may be susceptible to social desirability bias. We aim to validate this data using laboratory-based measures of treatment adherence. The results from the laboratory data for

ARV treatment adherence and other data – on viral load suppression rate, incidence rate and agreement between routine rapid test result and laboratory-based EIA test result – will be presented in subsequent reports.

Some data quality gaps were observed in the survey. While overall percentages of lost data collection forms and specimen rejections were small (both under 5%), some provinces (LP and NW) experienced a larger proportion of haemolysed specimens and lost data collection forms than other provinces, indicating the need to strengthen training and logistical support in these provinces. These lost data collection forms and haemolysed specimens are less likely to introduce bias in estimating the outcomes of interest in this survey, as they reflect gaps in logistics and training rather than to be associated with certain characteristics of participants or the outcome of interest. However, the low sample size realization particularly in LP and NW provinces may have affected the precision of district level estimates in these provinces. Across provinces, some data were missing for the age of participants and the coverage of the syphilis screening service. Data for age of participant were originally missing in 25% of the observations, but some of these data were retrieved later from patients' files, reducing missing age data to 8.2%. The retrieved data were found to have the same distribution as the rest of the age data, captured from data collection forms, confirming that the exclusion of missing age data from this analysis does not introduce bias. The retrieved data also showed that participants with missing age data were less likely to be out of the age range (15-49years) for inclusion in the study, thus for national and provincial prevalence estimates, participants with missing age data were considered eligible and included in the analysis. The folder number of participants was collected with the purpose of using this data as a unique identifier to link the ANC survey data with other cohort data sources such as Tier.Net data, which would have enabled to follow-up and analyse future outcome of these participants. However, folder number was missing in >25% of the observations, making it difficult to link this data with other data sources.

In conclusion, HIV prevalence among pregnant women at national level is stable. Some progress has been made in reducing HIV prevalence among young women (15–24 years old). The prevalence declines observed in KZN need to be triangulated with incidence data. The first two 90 target has been reached among pregnant women across all provinces, despite the high unawareness rate of HIV status prior to first-ANC-visit, especially among young women (15–24 years old). This achievement shows the effectiveness of the PMTCT programme in identifying and enrolling HIV-positive pregnant women into treatment.

The following recommendations are given, based on the findings of the 2017 survey:

- The combination prevention package, including the HIV "test and treat" initiative, which became a national policy in South Africa in September 2016, should continue to be strengthened nationally. Resources and support should be distributed appropriately across all high-burden districts to increase the coverage of these interventions nationally.

- It will be useful to prioritize combination prevention programmes for youths at all levels (schools, community and facilities), including increased access to youth-friendly reproductive health services, to prevent both new HIV infections and unintended pregnancies among young women. The social and structural barriers that delay testing and treatment in this age group need to be addressed.
- It will be useful to take steps to address the root causes of HIV, such as poverty, inequality and gender-based violence. This includes strengthening AIDS councils (established at national, provincial and district levels to coordinate the implementation of multi-sectoral HIV/AIDS response) and recognizing the challenges they face such as: inadequate capacity at province and district level, lack of senior political leadership, un-enabling environment, and lack of resources [48, 49]. Solutions need to be found in all these areas.
- Given the high rate of MTCT among women who seroconvert during pregnancy, it will be useful to promote innovative interventions that strengthen partner (e.g. index) testing, linkage to ART, and condom use during pregnancy. Such interventions could include involving male partners in ANC, as well as distributing HIV self-test kits, health education materials, and condoms during ANC visits.
- The increased proportion of women initiating ART prior to pregnancy (in the "test and treat" era) should be taken into account when modelling or estimating the HIV prevalence in the general population.
- In future antenatal surveys, the unique identifiers of study participants (e.g. folder numbers) should be collected more rigorously. This information can be used to link the antenatal survey data with laboratory data so as to create a cohort follow-up data set that will enable us to monitor the perinatal and postnatal outcomes (e.g. viral load level) of HIV-positive pregnant women in the survey.
- Administrative shortcomings need to be eliminated to improve data quality (completeness) and sample size achievement.

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Annexure 1: Data collection form

Appendix B: Questionnaire

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

NATIONAL 2017 ANTENATAL SENTINEL HIV SURVEY, SOUTH AFRICA

0000001

PROVINCE INFORMATION

☐ Gauteng | ☐ Free State | ☐ Eastern Cape | ☐ KwaZulu-Natal | ☐ Western Cape | ☐ Limpopo | ☐ Mpumalanga | ☐ Northern Cape | ☐ North West

DISTRICT INFORMATION

NATIONAL HIV SURVEILLANCE FOCAL PERSON CONTACT NUMBER: 011 386 6328

Name of District:	
Name of Sub District:	
Name of Sentinel Clinic:	
DHIS Clinic Code:	

GA1700002

SPECIMEN INFORMATION

Collection Date: D D M M 2017	Client Folder Number:
Test Requested	HIV ELISA

ELIGIBILITY ASSESSMENT AND CONSENT

Is this the client's first ANC visit in this pregnancy? 1. ☐ Yes 2. ☐ No, second visit 3. ☐ No, third visit 4. ☐ No, >=fourth visit

Age of pregnant survey client (years)=

Race: 1. ☐ African 2. ☐ Asian 3. ☐ Coloured 4. ☐ White

Marital Status: 1. ☐ Single 2. ☐ Married 3. ☐ Widowed 4. ☐ Divorced 5. ☐ Separated 6. ☐ Living with Partner 7. ☐ Refused to answer

☐ 1. Client agrees to participate in the interview and blood specimen

☐ 1b. Client agrees to use of blood sample for future studies

☐ 2. Client refuses to participate (give reason for refusal by selecting option 2a-2e)

☐ 2a. Have already been tested at ANC and know I am HIV positive

☐ 2b. Tested at ANC and already know I am HIV negative.

☐ 2c. Tested before pregnancy and know I am HIV positive.

☐ 2d. In a hurry

☐ 2e. Other reasons (specify):

DEMOGRAPHIC AND CLINICAL INFORMATION

1 ☐ Education: None | 2 ☐ Education: Primary | 3 ☐ Education: Secondary | 4 ☐ Education: Tertiary

Gravidity: Number (No.) of pregnancies (include this one)	
Parity: No. of live born children	
Gestational age: this pregnancy (In weeks)	
How old is your partner (the father of the child)- in years	

Did the client receive routine HIV test either today or in previous ANC visits during this pregnancy (review ANC register / client file)?

1 ☐ Yes
2 ☐ No, although HIV test was offered
3 ☐ No, because HIV test was not offered
4 ☐ No, because already positive before ANC

What is the client's latest routine rapid HIV test result from previous or current ANC tests (review register/client file)?

1 ☐ Negative from test done today
2 ☐ Negative (from test done in previous ANC visit during this pregnancy)
3 ☐ Positive at ANC
4 ☐ Positive before ANC
5 ☐ Discrepant
6 ☐ Not offered
7 ☐ Not accepted

If reported HIV positive ask these two questions

Have you ever taken ARV? If yes when did you start:

1 ☐ Yes, before pregnancy
2 ☐ Yes, at 1st trimester
3 ☐ Yes, at 2nd trimester
4 ☐ Yes, at 3rd trimester
5 ☐ No

Have you taken ARV's in the last 3 days

1 ☐ Yes
2 ☐ No

Did the client receive routine Syphilis test during current pregnancy (review client file/ANC register) ☐ Yes ☐ No

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Annexure 2: Consent form

Information sheet and Consent Form for Women Attending Antenatal clinic

CONSENT TO PARTICIPATE IN SURVEY

Felsch-Kincaid Grade Level Score: 6.7

INTRODUCTION

Hello. I am Ms/Mr. ……, a nurse working in the antenatal care unit of this clinic. We request if you are willing to participate in a study called "the Antenatal HIV survey". This study is being sponsored by the National Institute for Communicable Diseases and the National Department of Health.

WHY AND HOW ARE WE DOING THIS STUDY?

We are asking 36, 015 pregnant women to take part in this study. They will come from all 9 provinces of South Africa. We are doing this study to find out how many pregnant women have HIV. In this way the government will know whether the money spent to prevent HIV is having an effect and what more needs to be done. We are also doing this study to find out what care pregnant women get from the clinic: Did the pregnant women get an HIV test during antenatal visit? Did they get treatment for HIV? They also need to know how much medicine is needed to treat pregnant women for HIV.

We will draw a sample of blood from you for an HIV test. We will interview you and collect information from your medical record. Your answers and information from the medical record will be written in a form. We will send the blood and the form to the laboratory for testing.

BEING PART OF THE STUDY AND STOPPING THE STUDY

If you agree to take part in this study, we will first ask you questions. You do not have to answer all the questions. We will then collect 8.5mls of blood from you for HIV testing. If this is your first antenatal visit, a separate blood sample in addition to the blood collected for routine testing will be collected for the study. At any time during the questions or before blood specimen collection you can refuse to participate or ask us to stop. We will then stop.

If you do not want to take part in this study you will still get the same care in the clinic that you would get if the study was not here. The questions and the blood test will be done today in a separate part of the clinic.

Returning of result

We will ask you to provide us your full name and mobile phone number to contact you to return to the clinic for your HIV test result. This information will be captured on a paper-based register and will be stored in a safe place. It will only be seen by the antenatal nurse in the clinic who will contact you to return your HIV test result. Your HIV results will not be given over the phone.

The nurse will contact you only if you did not test for HIV during your antenatal visit or the laboratory test result done as part of the survey has a different test result. You will receive two SMS reminders: the first reminder will be sent two weeks after testing and will ask you to come and collect your results. A second reminder will be sent if the results have not been collected after 8 weeks.

If the two tests have different result, we will ask you to repeat the test, and the final result will be confirmed 14 days after the second blood draw.

PRIVACY

Your answers to the questions will be marked on a form. Your name will not be written down when you answer the questions. Only a code will be linked to your answers. This code is called a barcode. So all your answers will be kept private. As the study sponsors, National Department of Health, National Institute for Communicable Diseases and other sponsors may monitor or audit survey activities in conjunction with the Wits research ethic committee. The reason for this would be to make sure that the survey is being done the way it is supposed to be done. It would also make sure that your rights and health are protected. Your personal medical information will be kept confidential.

The blood test results will be kept at the laboratory where they do the test as part of the everyday service. The HIV test results may be known to the nurse at the clinic who will give you the result but not to other nurses in other clinics.

POTENTIAL BENEFITS

You will know your HIV test result. If you are HIV-positive then you can get medicine to treat HIV through the routine health care system immediately. If you are HIV negative then you will get further counselling on HIV prevention methods.

Pregnant women are also routinely offered HIV testing at the clinic. You can test for HIV at the clinic any time you want. Participation in the study is not a requirement for HIV testing.

POTENTIAL HARM

The questions and the blood sample collection will take about 15 minutes of your time. If we ask questions that are a problem for you, you do not have to answer them.

The blood test can cause a little pain. The good thing about the blood test is that you can get to know your HIV result. This means that you can then get the right care for yourself.

As we said your name and answers are kept private. We do not share your individual information with anyone in the clinic. Please ask me if you have any problems with the questions, or with the study.

WILL YOU GET ANY PAYMENT FOR BEING IN THE STUDY?

You will not receive any money or food for being part of the study. You do not have to pay to be in the study.

To take part in this study, please tick the following boxes:

- □ if I refuse HIV testing given as part of my routine care that I can still get tested at the nearest clinic
- □ if I refuse HIV testing given as part of my routine care that I can take the option of receiving my blood test results from this study at the nearest clinic, two weeks from now
- □ if my HIV test results are different than what my HIV status is currently (from test performed in the clinic), I will receive a reminder to collect my results two weeks after testing. A second reminder will be sent if the results have not been collected after 8 weeks. If I refuse to collect my results, I cannot take part in the testing section of this study and can only take part in the questionnaire.
- □ if my HIV test results are positive, I will be linked to HIV care and treatment services

PEOPLE DOING THE STUDY
If you have any questions or problems about the research study please phone the person in charge of the study. His name and telephone numbers are:
Professor Adrian J Puren (overall investigator)
Head of Department
Centre for HIV and STI
National Institute for Communicable Disease (NICD)
1 Modderfontein Road, Sandringham
Gauteng, 2031
Tel: +2711386 6328 Mobile +27829088048

Or For *Ethical or Rights questions contact:*
The WITS Ethics Committee with the following address: name: Prof. P Cleaton-Jones. Tell: (011) 717 2301; e-mail: peter.cleaton-jones1@wits.ac.za

BARCODE

STICKER

Antenatal Sentinel HIV Survey
Consent form

Province:_____ Facility name: _____
(nurse name): _____*(please print as it appears on ID))*

Agree to Interview and blood specimen collection

_____ _____
Participant's signature *Date (dd_mm_yyyy)*

Nurse:
I declare that I have followed all informed consent procedures:

_____ _____
Nurse's signature *Date (dd_mm_yyyy)*

Thanking you for helping us with our survey

INFORMED CONSENT FORM FOR BLOOD SAMPLE STORAGE FOR POSSIBLE FUTURE STUDIES

INTRODUCTION
You have decided to be part of the study. There may be some remaining blood taken from you during the study that might be useful for future studies. You are being asked to agree to the storage of the left over blood for future study.

WHAT WILL THE SAMPLES BE USED FOR?
Your samples may be used for future studies. We would like permission to store remaining samples. We cannot give more details of what will be looked at, as this is not yet known. We assure you that no research will be done on the specimens without the approval of the Wits Human Research Ethics Committee.

CONFIDENTIALITY
We will not leave your name or contact information on the blood sample. However, the barcode and laboratory tracking number will be on the specimen.

WHERE WILL MY SAMPLES BE STORED?
Your samples will be stored in special facilities that are safe and secure at NICD and only approved researchers can have access to the samples. A research ethics board, which watches over the human safety and rights, must approve any future research study using the blood samples from you.

HOW LONG WILL YOU KEEP MY SAMPLES?
We store samples for a maximum period of five years but if new evidence is available will reapply to store for an additional five years.

DOES STORAGE OF MY SAMPLES BENEFIT ME?
There are no direct benefits to you if you allow to store the samples, but doing studies on the stored samples may benefit the society in the future and include learning more about HIV infection.

WHAT ARE THE RISKS?
We don't anticipate any risk as the samples are not linked with name. Your blood sample will not be sold.

WHAT ARE MY RIGHTS?
Allowing your samples to be stored is voluntary. You may decide not to have your samples stored other than what is needed for the main study. If you decide not to allow your blood samples to be stored, you will still participate in the main study and will also receive the same care in the clinic that you would get if the study was not here.

PEOPLE DOING THE STUDY
For any question on the storage of your samples you may contact the principle investigator. His name and telephone numbers are given in the information sheet of the main study.

Consent form for blood sample storage and future use

BARCODE

Province:_____ Facility name: _____

☐ Agree to use of the blood specimen for future studies

_____ _____

Participant's signature *Date (dd_mm_yyyy)*

(nurse name): _____*(please print as it appears on ID))*

Nurse:

I declare that I have followed all informed consent procedures:

_____ _____

Nurse's signature *Date (dd_mm_yyyy)*

Thanking you for helping us with our survey

Annexure 3: HIV prevalence trend by individual provinces

Table of contents

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Eastern Cape

Sample size realization and demographic characteristics

The sample size realization for Eastern Cape was 76.1% (4,040). At district level, sample size realization ranged from 68.9% (388) to 83.0% (949) for Amathole and Oliver Tambo districts respectively (Annexure 4). About forty-six percent (45.7%) of participants were 15-24 years old and only 11.0% were older than 35 years (Figure 1).

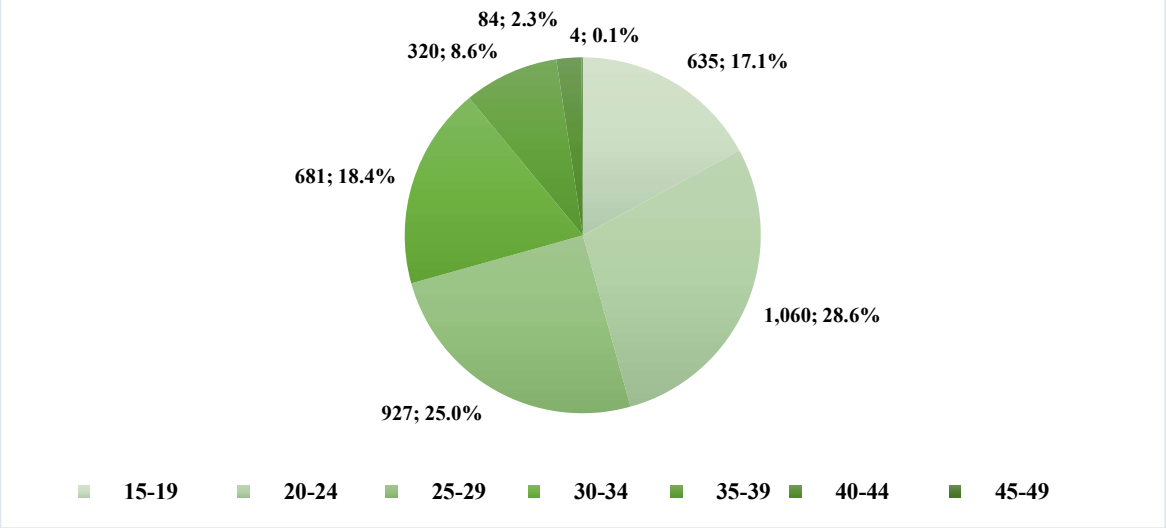
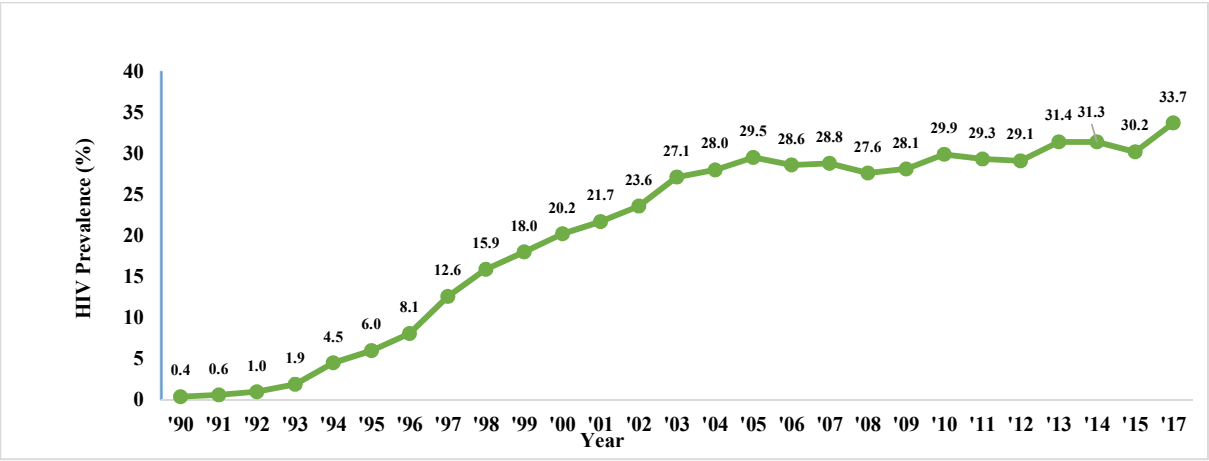


Figure 1: Distribution of survey participants by five-year age group – Eastern Cape, 2017

HIV prevalence

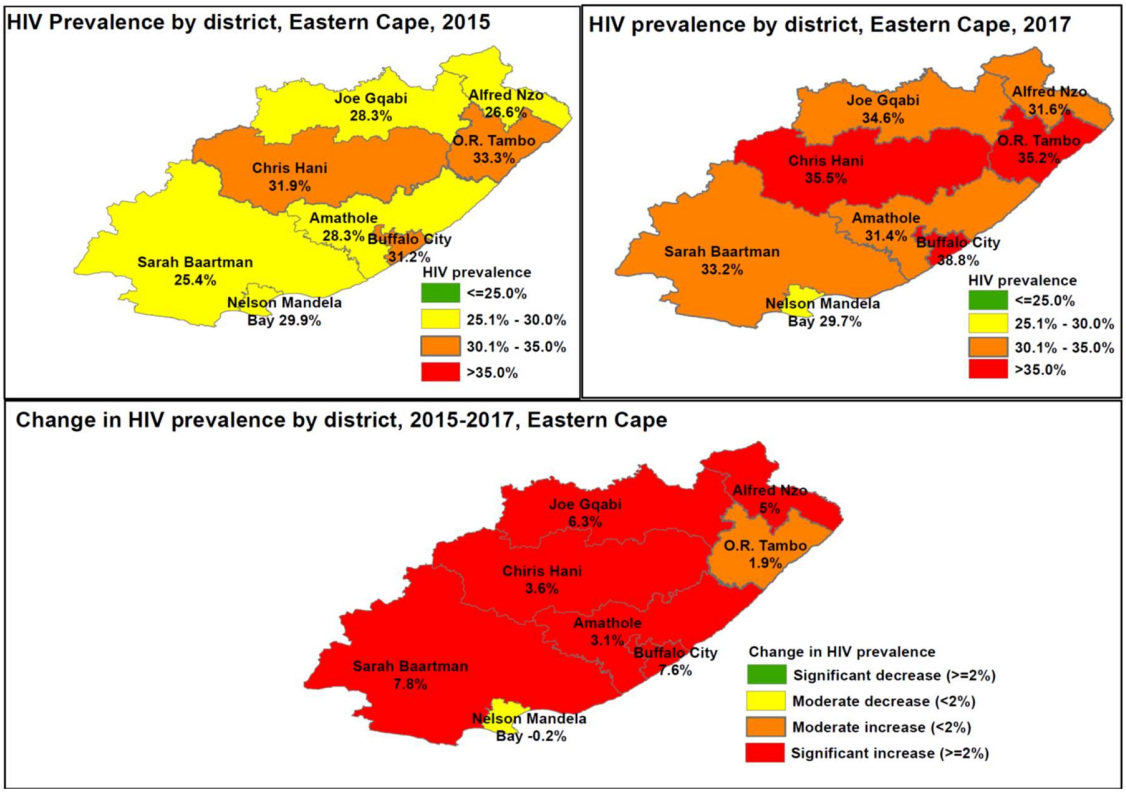
HIV prevalence increased consistently in Eastern Cape over the years with a small deep from 31.4% in 2013 to 30.2% in 2015. In 2017, it increased to 33.7% (Figure 2).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 2: The HIV epidemic curve among antenatal women, Eastern Cape, 1990-2017

Chris Hani, O.R Tambo and Buffalo City districts had the highest prevalence in 2015 (30% - 35%) and 2017 (>35%) as shown in Figure 3. Most districts had a significant increase (3.1% - 7.8%) except O.R Tambo that had a moderate increase of 1.9% and Nelson Mandela Metro (NMM) with a moderate decrease of 0.2%.



The prevalence reported is for both first and follow-up visit attendees

Figure 3: Change in district HIV prevalence estimates - 2015-2017, Eastern Cape

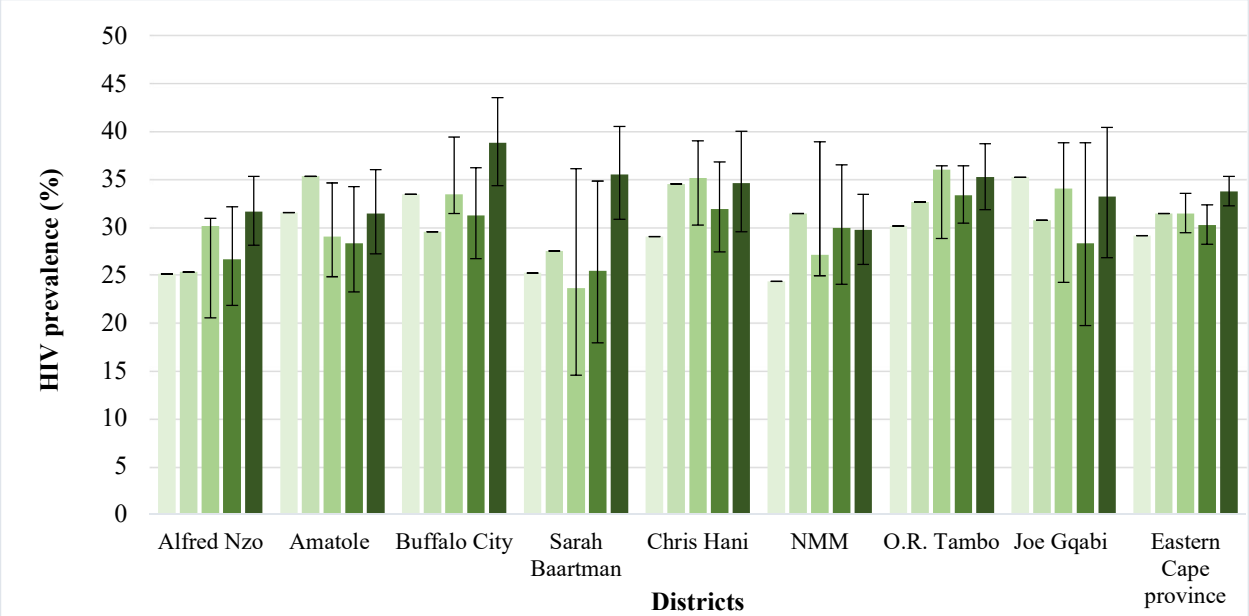
Table 1 and Figure 4 show the prevalence trend from 2012 to 2017. District prevalence ranged from 29.7% in NMM to 38.8% in Buffalo City in 2017. Even though there appeared to be no trend in prevalence from 2012, there was a remarkable increase in prevalence in 2017 in most districts except NMM that saw a slight decline from 29.9% to 29.7%.

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Alfred Nzo	25.1	20.8 - 30.0	25.3	20.5 - 30.9	30.1	20.5 - 30.9	26.6	21.8 - 32.1	31.6	28.1-35.3
Amatole	31.5	28.5 - 34.6	35.3	31.4 - 39.4	29.0	24.8 - 34.6	28.3	23.2 - 34.2	31.4	27.2-36.0
Buffalo City	33.4	28.5 - 38.8	29.5	24.8 - 34.6	33.4	31.4 - 39.4	31.2	26.7 - 36.2	38.8	34.3-43.5
Chris Hani	29.0	24.4 - 34.1	34.5	30.2 - 39.0	35.1	30.2 - 39.0	31.9	27.4 - 36.8	35.5	30.8-40.5
Joe Gqabi	35.2	28.4 - 42.7	30.7	24.2 - 38.0	34.0	24.2 - 38.8	28.3	19.7 - 38.8	34.6	29.5-40.0

NMM	24.3	19.2 - 30.2	31.4	24.9 - 38.9	27.1	24.9 - 38.9	29.9	24.0 - 36.5	29.7	26.1-33.4
O.R. Tambo	30.1	27.1 - 33.3	32.6	29.0 - 36.4	36.0	28.8 - 36.4	33.3	30.4 - 36.4	35.2	31.8-38.7
Sarah Baartman	25.2	17.9 - 34.3	27.5	20.4 - 35.9	23.6	14.5 - 36.1	25.4	17.9 - 34.8	33.2	26.8-40.4
Eastern Cape province	**29.1**	**27.3 - 30.9**	**31.4**	**29.4 -33.5**	**31.3**	**29.4 - 33.5**	**30.2**	**28.2 - 32.3**	**33.7**	**32.2-35.3**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 1: HIV prevalence by district in the Eastern Cape province, 2012 to 2017

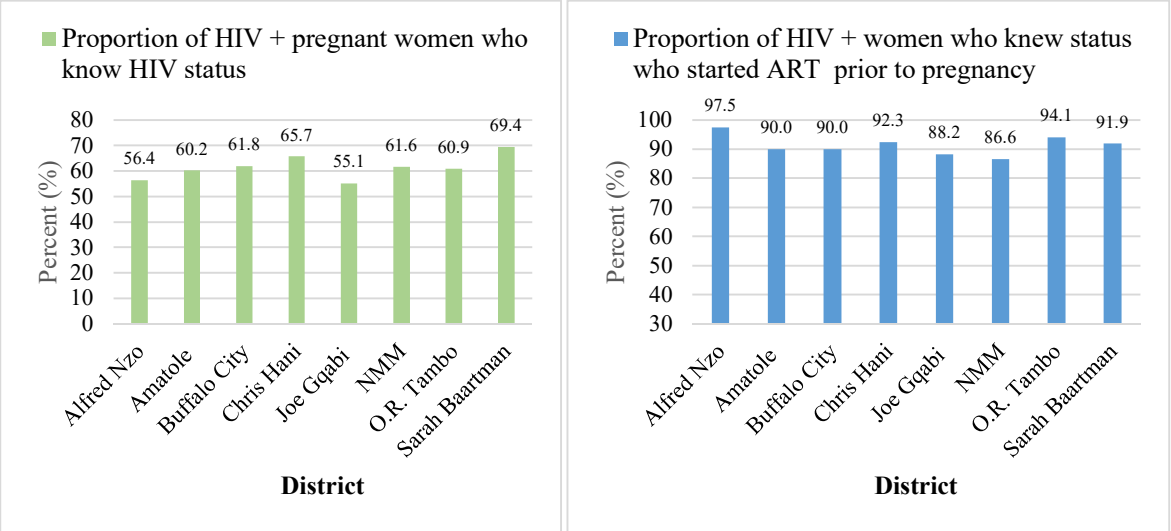


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 4: HIV prevalence trend by district, 2012-2017, Eastern Cape

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy in the Eastern Cape was a little above the national average (61.3% compared to 60.8%). Among those who knew their HIV-positive status prior to pregnancy, 91.5% started ART prior to pregnancy. By district, knowledge of HIV status prior to pregnancy ranged from 55.1% in Joe Gqabi to 69.4% in Sarah Baartman. NMM had the lowest ART initiation prior to pregnancy (86.6%) (Figure 5).

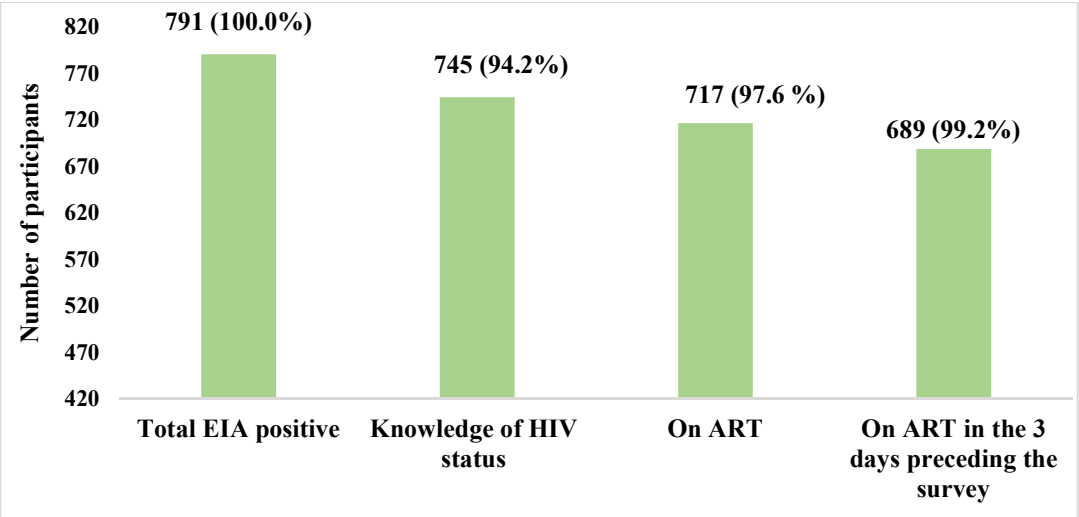


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 5: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Eastern Cape, 2017

PMTCT cascade

In the Eastern Cape, 791 women were positive among follow-up ANC visit attendees (Figure 6). Of these, 94.2% were aware of their HIV status; 97.6% of those who knew their status were on ART and 99.2% of those on ART had taken ART in the 3 days preceding the survey.



Weighted percentages

Figure 6: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Eastern Cape, 2017

Free State

Sample size realization and demographic characteristics

The sample size realization in Free State was 100.4%. All districts achieved sample size of at least 97.0% with 2 districts exceeding the planned sample size: Fezile Dabi (102.0%) and Mangaung Metropolitan (103.2%) (Annexure 4). Just below half of the participants (41.8%) were 15-24 years old and only 12.2% were older than 35 years (Figure 7).

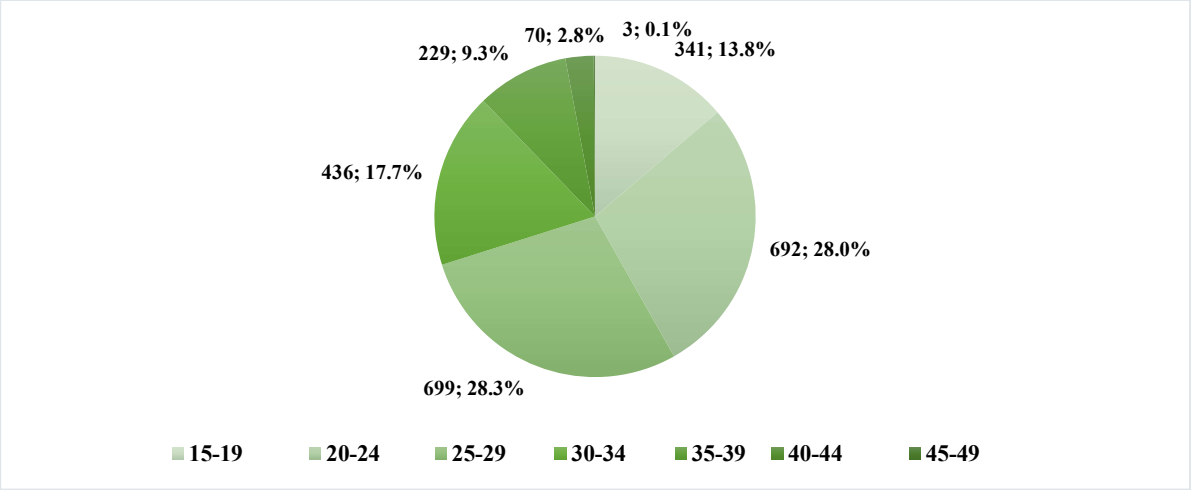
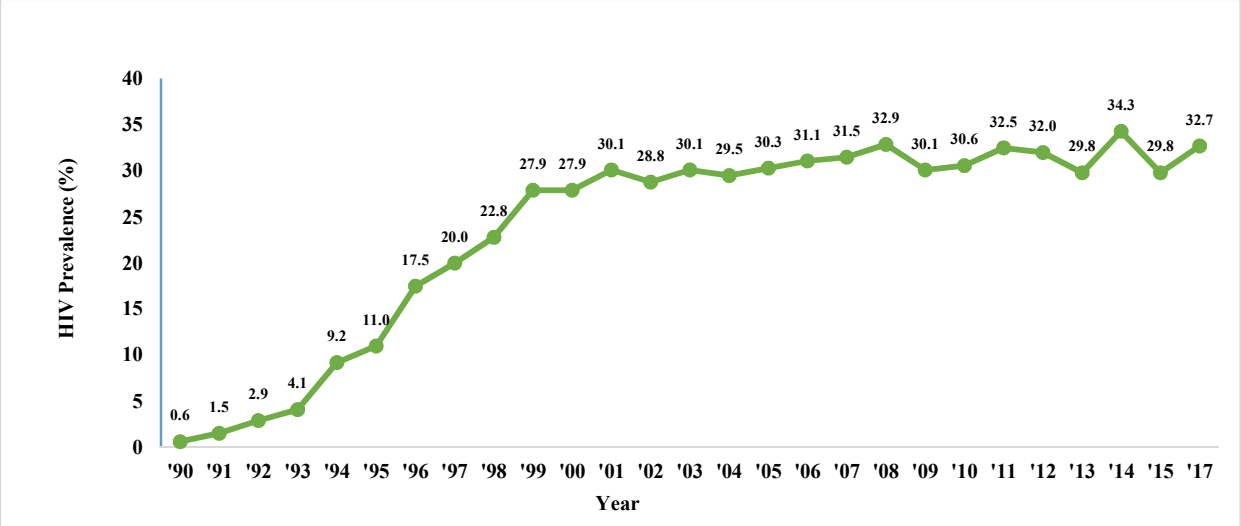


Figure 7: Distribution of survey participants by five-year age group– Free State, 2017

HIV prevalence

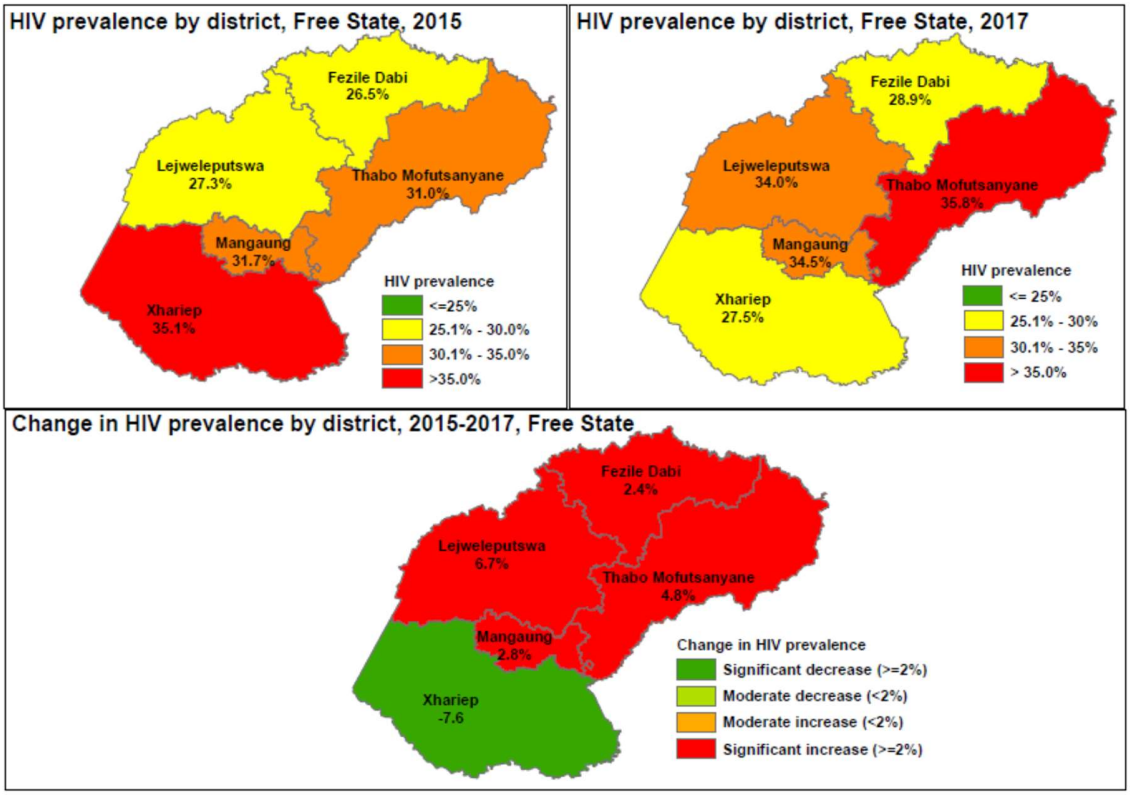
HIV prevalence increased over the years to 32.9% in 2008; then fluctuated until 2017 with a 32.7% prevalence, representing a 2.9% increase from 2015 (Figure 8).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 8: The HIV epidemic curve among antenatal women, Free State, 1990-2017

In 2017, there were significant increases in prevalence in all but one district with differences ranging from 2.4% for Fezile Dabi to 6.7% in Lejweleputswa. There was a 7.6% decline in prevalence in Xhariep (Figure 9).



The *prevalence reported is for both first and follow-up visit attendees*

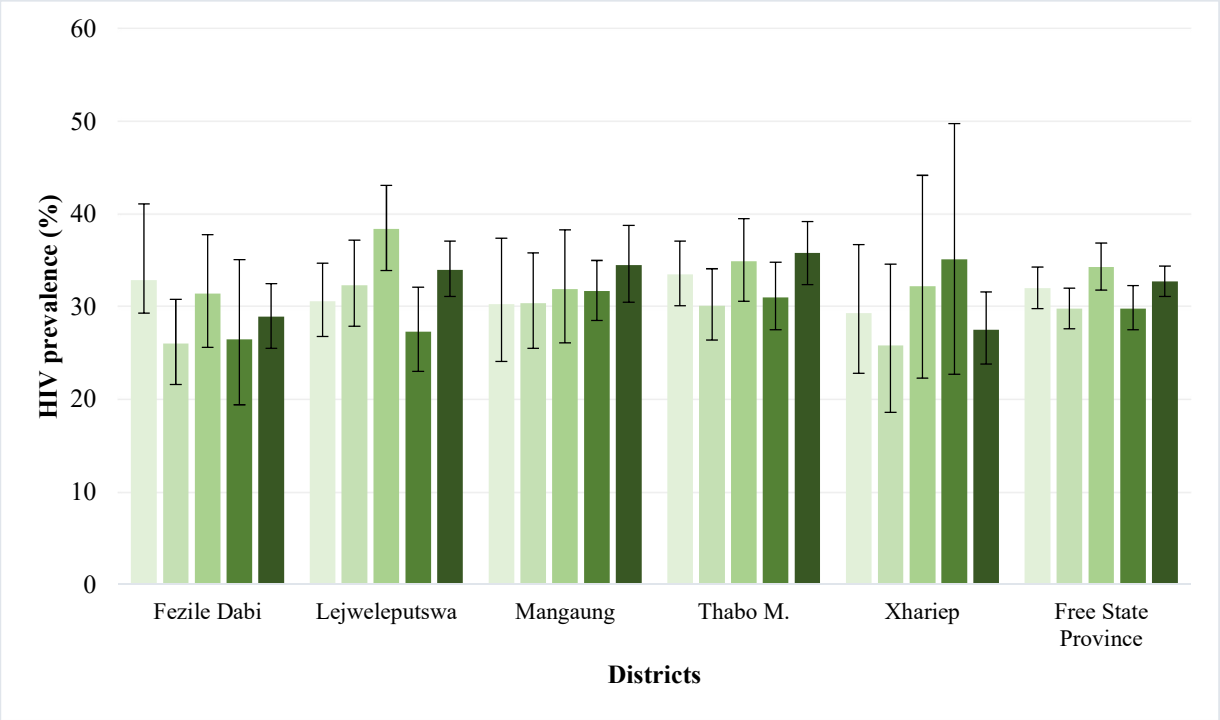
Figure 9: Change in district HIV prevalence estimates - 2015-2017, Free State

From 2012 to 2017, Mangaung had a consistent increase in prevalence from 30.3% to 34.5%, while other districts had fluctuations in prevalence (Table 2 and Figure 10).

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Fezile Dabi	32.9	29.3 - 41.1	26.0	21.6 - 30.8	31.4	25.6 - 37.8	26.5	19.4 - 35.1	28.9	25.5-32.5
Lejweleputswa	30.6	26.8 - 34.7	32.3	27.9 - 37.2	38.4	33.9 - 43.1	27.3	23.0 - 32.1	34.0	31.1-37.1
Mangaung	30.3	24.1 - 37.4	30.4	25.5 - 35.8	31.9	26.1 - 38.3	31.7	28.5 - 35.0	34.5	30.5-38.8
Thabo M.	33.5	30.1 - 37.1	30.1	26.4 - 34.1	34.9	30.6 - 39.5	31.0	27.5 - 34.8	35.8	32.4-39.2
Xhariep	29.3	22.8 - 36.7	25.8	18.6 - 34.6	32.2	22.3 - 44.2	35.1	22.7 - 49.8	27.5	23.8-31.6
Free State province	**32.0**	**29.8 -34.3**	**29.8**	**27.6 -32.0**	**34.3**	**31.8 -36.9**	**29.8**	**27.5 -32.3**	**32.7**	**31.1-34.4**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 2: HIV prevalence by district in the Free State province, 2012 to 2017

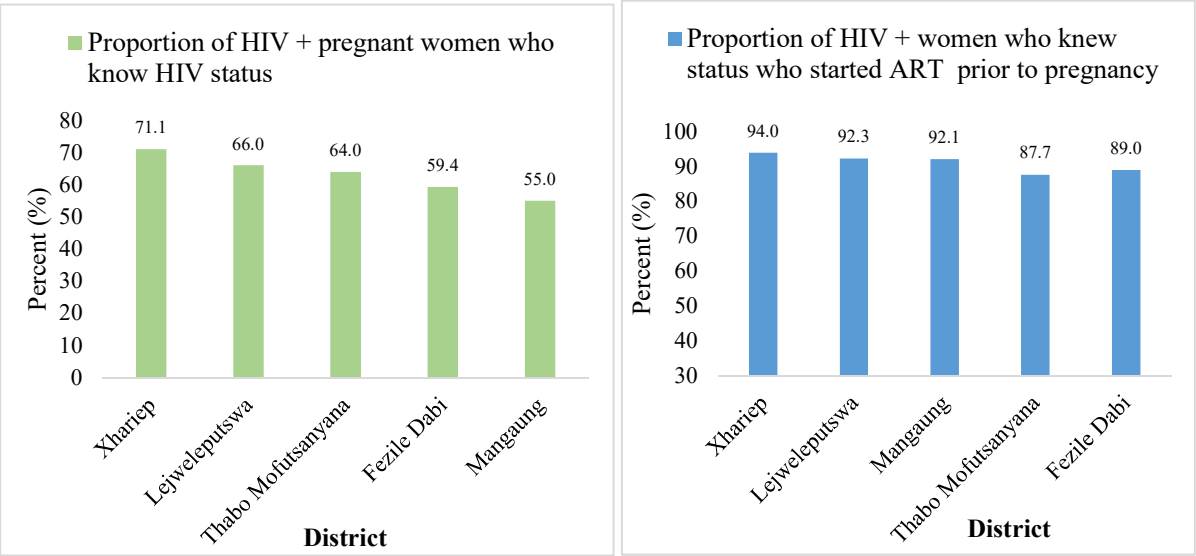


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 10: HIV prevalence trend by district, 2012-2017, Free State

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy in the Free State was slightly higher than the national average (62.1% compared to 60.8%). Of those who knew their HIV-positive status prior to pregnancy, 90.9% were initiated on ART prior to pregnancy. By district, knowledge of status prior to pregnancy ranged from 55.0% in Mangaung to 71.1% in Xhariep. Thabo M had the lowest ART initiation prior to pregnancy (87.7%) (Figure 11).

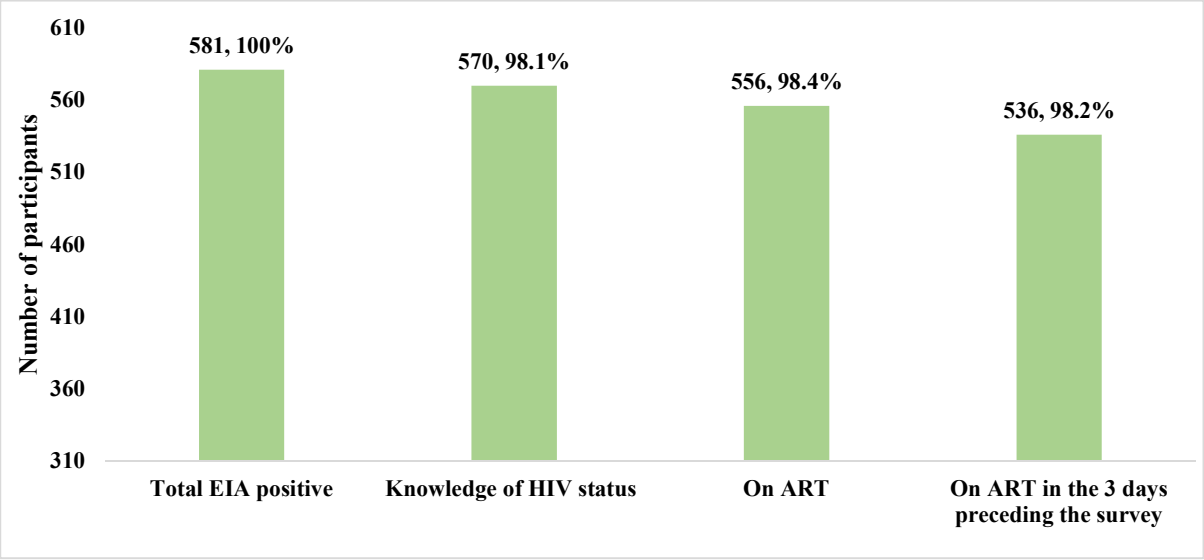


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 11: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Free State, 2017

PMTCT cascade

In the Free State, 581 women were positive among follow-up ANC visit attendees (Figure 12). Of these, 98.1% were aware of their HIV status. 98.4% of those who knew their status were on ART and 98.2% of those on ART had taken ART in the 3 days preceding the survey.



Weighted percentages

Figure 12: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Free State, 2017

Gauteng

Sample size realization and demographic characteristics

Sample size realization was 101.4% in Gauteng province. At district level, it ranged from 97.5% in Sedibeng to over 100% in City of Tshwane, City of Johannesburg and West Rand districts (Annexure 4). About thirty-five percent (35.3%) of participants were 15-24 years old and only 13.0% were older than 35 years (Figure 13). The proportion of 15-24 years participants in Gauteng province was lower compared to the national average (43.2%).

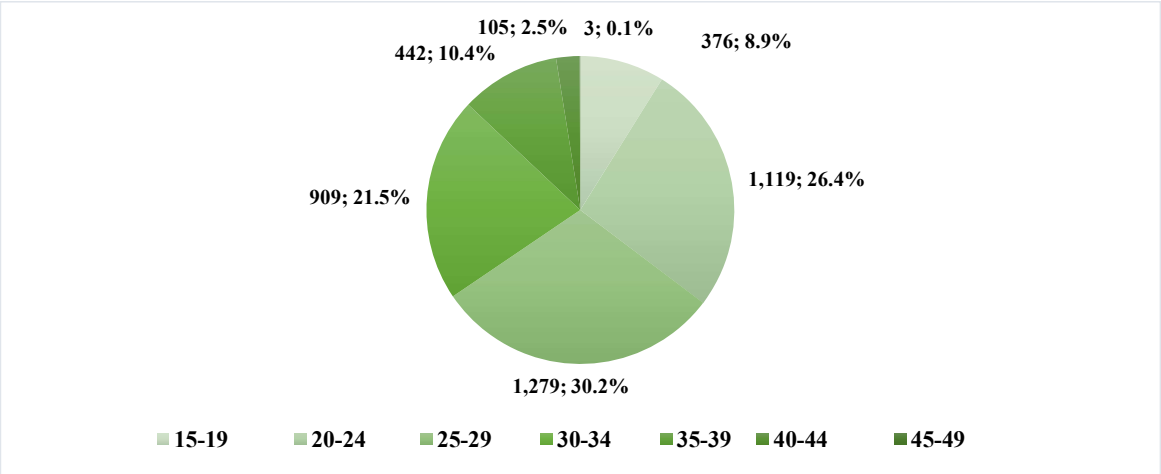
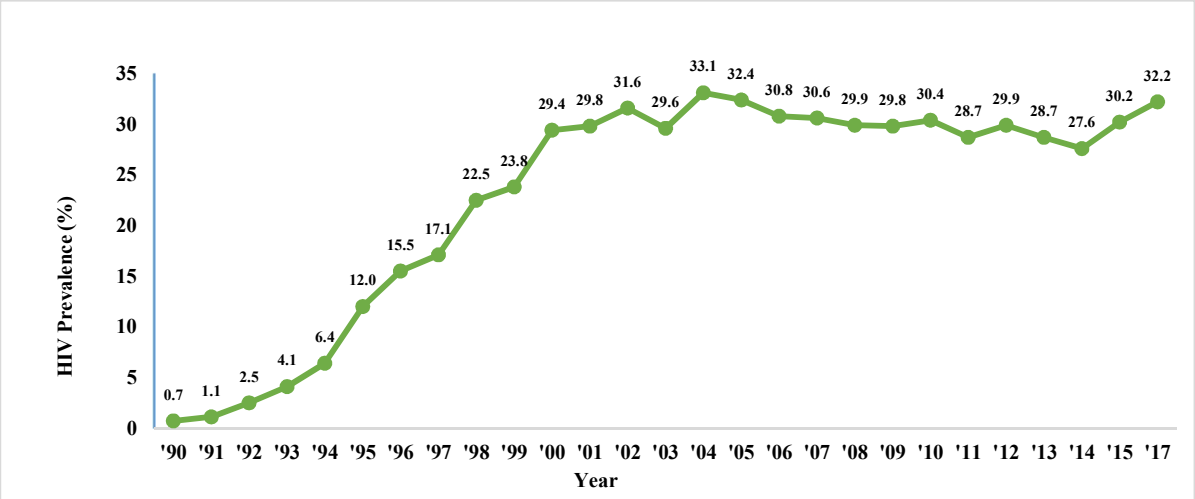


Figure 13: Distribution of survey participants by five-year age group – Gauteng, 2017

HIV prevalence

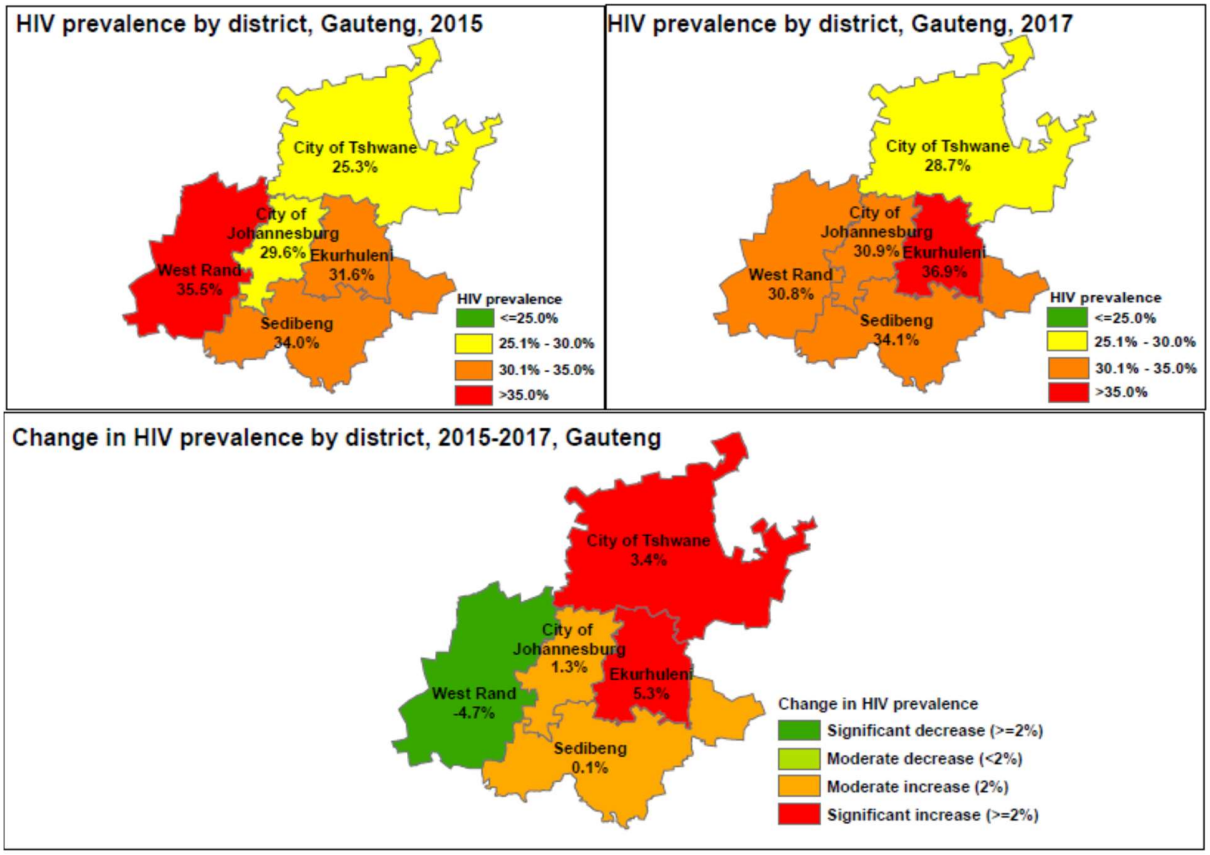
HIV prevalence increased over the years to 31.6% in 2002, then declined to 27.6% in 2014; and increased to 32.2% in 2017; representing a 2% increase from 2015 (Figure 14).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 14: The HIV epidemic curve among antenatal women, Gauteng, 1990-2017

In 2017, there were 3.4% and 5.3% increases in prevalence for City of Tshwane and Ekurhuleni respectively (Figure 15). In the West Rand, there was a 4.7% decline in prevalence.



The prevalence reported is for both first and follow-up visit attendees

Figure 15: Change in district HIV prevalence estimates - 2015-2017, Gauteng

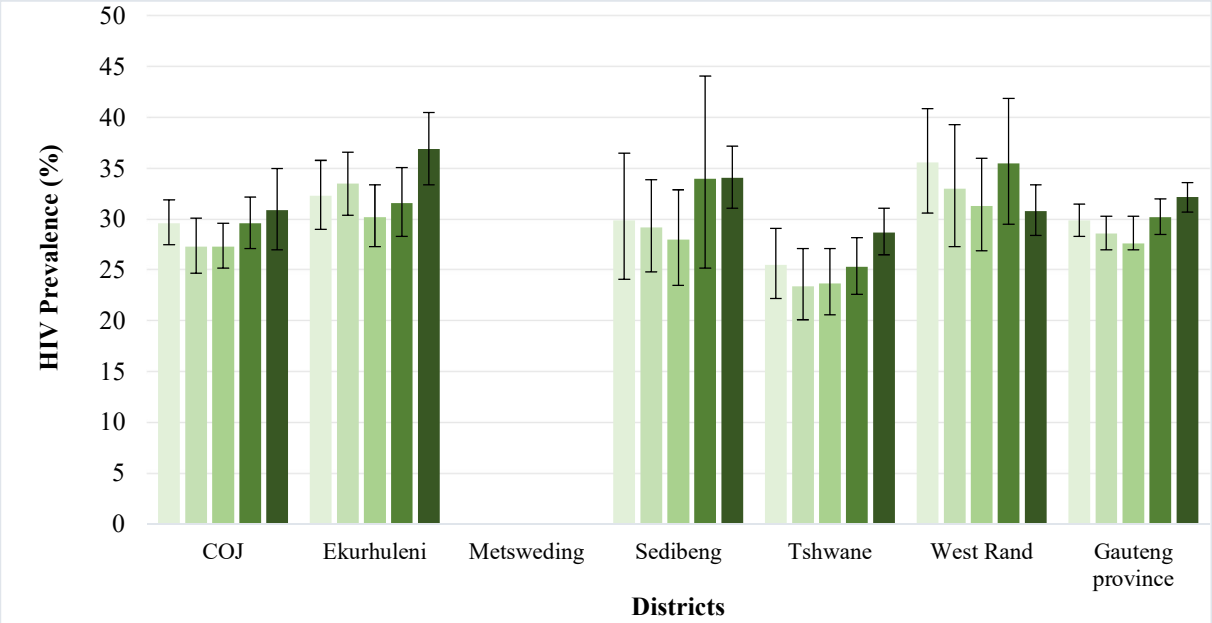
Table 3 and Figure 16 show the prevalence trend from 2012 to 2017. District prevalence ranged from 28.7% in City of Tshwane to 36.9% in Ekurhuleni in 2017. Even though there appeared to be no trend in prevalence from 2012, there was a remarkable increase in prevalence in 2017 in Ekurhuleni, and the West Rand recorded a decline from 2015 (35.5%) to 2017(30.8%).

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
COJ	29.6	27.5 - 31.9	27.3	24.7 - 30.1	27.3	25.2 - 29.6	29.6	27.1 - 32.2	30.9	27.0-35.0
Ekurhuleni	32.3	29.0 - 35.8	33.5	30.4 - 36.6	30.2	27.3 - 33.4	31.6	28.3 - 35.1	36.9	33.4-40.5
Sedibeng	29.9	24.1 - 36.5	29.2	24.8 - 33.9	28	23.5 - 32.9	34.0	25.2 - 44.1	34.1	31.1-37.2
Tshwane	25.5	22.2 - 29.1	23.4	20.1 - 27.1	23.7	20.6 - 27.1	25.3	22.6 - 28.2	28.7	26.5-31.1

West Rand	35.6	30.6 - 40.9	33	27.3 - 39.3	31.3	26.9 - 36.0	35.5	29.5 - 41.9	30.8	28.4-33.4
Gauteng province	**29.9**	**28.3 - 31.5**	**28.6**	**27.0 - 30.3**	**27.6**	**27.0 - 30.3**	**30.2**	**28.5 - 32.0**	**32.2**	**30.7-33.6**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 3: HIV prevalence by district in the Gauteng province, 2012 to 2017

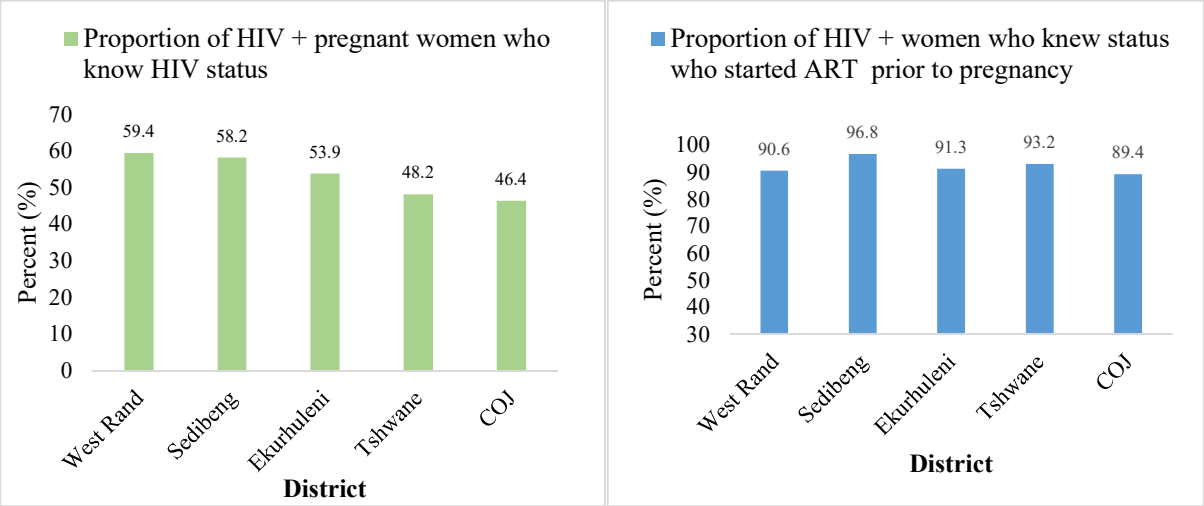


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 16: HIV prevalence trend by district, 2012-2017, Gauteng

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy in Gauteng was lower than the national average (53.1% compared to 60.8%). Of those who knew their HIV-positive status prior to pregnancy, 91.8% were initiated on ART prior to pregnancy. By district, knowledge of status prior to pregnancy ranged from 46.4% in City of Johannesburg to 59.4% in the West Rand district. City of Johannesburg had the lowest ART initiation prior to pregnancy (89.4%) (Figure 17).

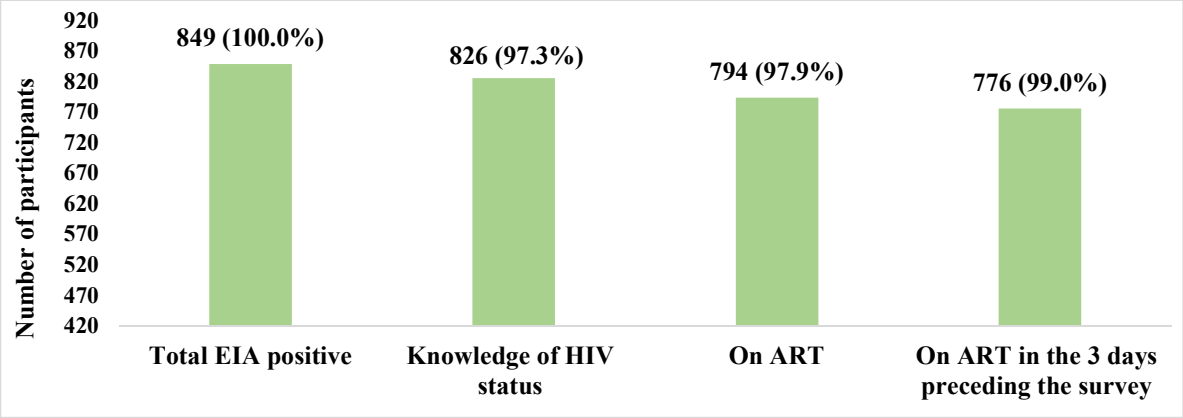


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives. Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 17: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Gauteng, 2017

PMTCT cascade

In Gauteng, 849 women were positive among follow-up ANC attendees (Figure 18). Of these, 97.3% were aware of their HIV status, 97.9% of those who knew their status were on ART and 99.0% of those on ART had taken ART in the 3 days preceding the survey.



Weighted percentages

Figure 18: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Gauteng, 2017

KwaZulu-Natal

Sample size realization and demographic characteristics

The total planned sample size for the KwaZulu-Natal province was 8,761. Sample size realization was >90% at provincial level (94.1%, 8,242). The lowest sample size realization was in iLembe and Ugu district (86%) and the highest sample size realization was in uMzinyathi district, where planned sample size was exceeded by 5% (105%) (Annexure 4). The proportion of participants in the age group 15-24 years (46.9%) was higher than the national average (43.2%) (Figure 19). The proportion of participants in the age group 35 and above were 9.7%.

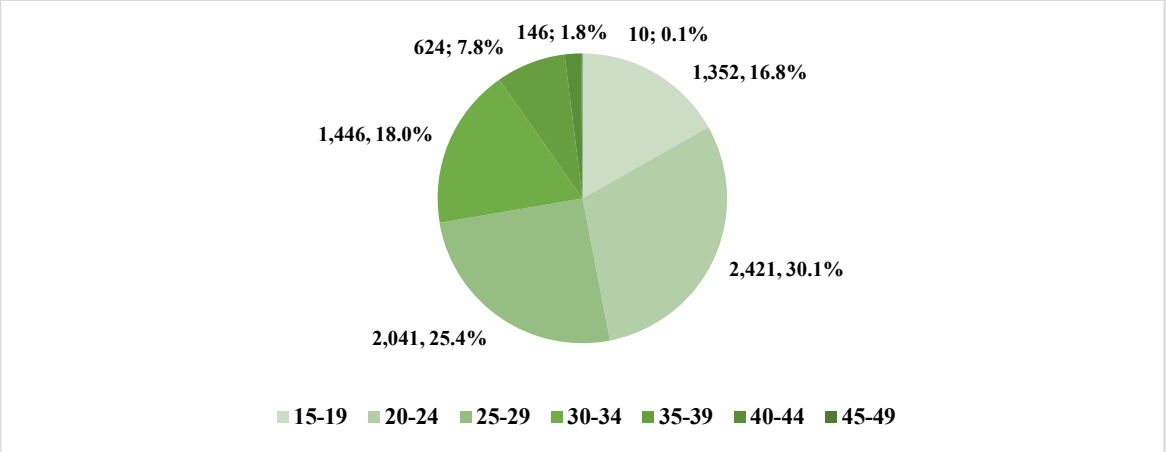
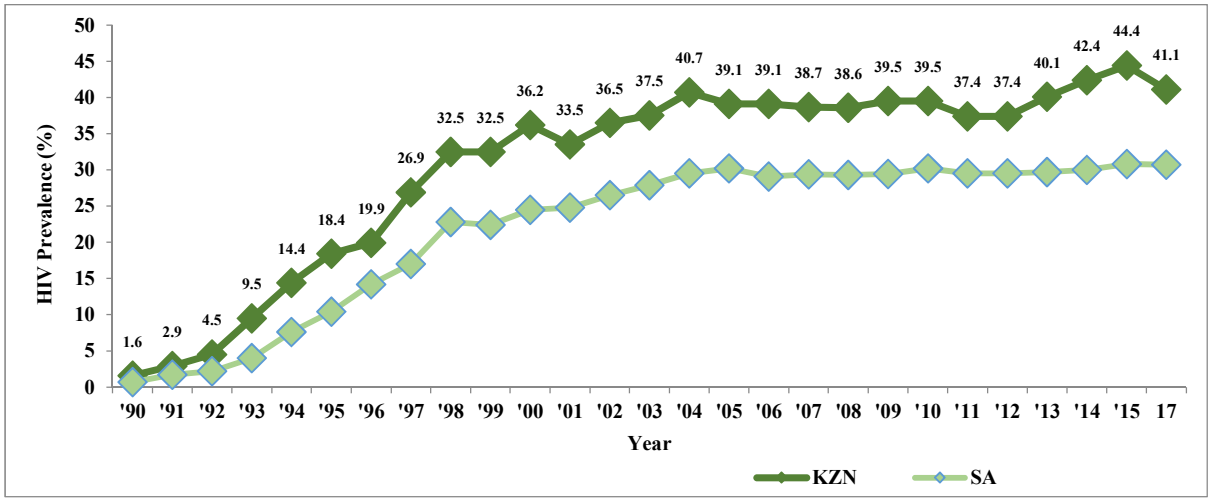


Figure 19: Distribution of survey participants by five-year age group – KwaZulu-Natal, 2017

HIV prevalence

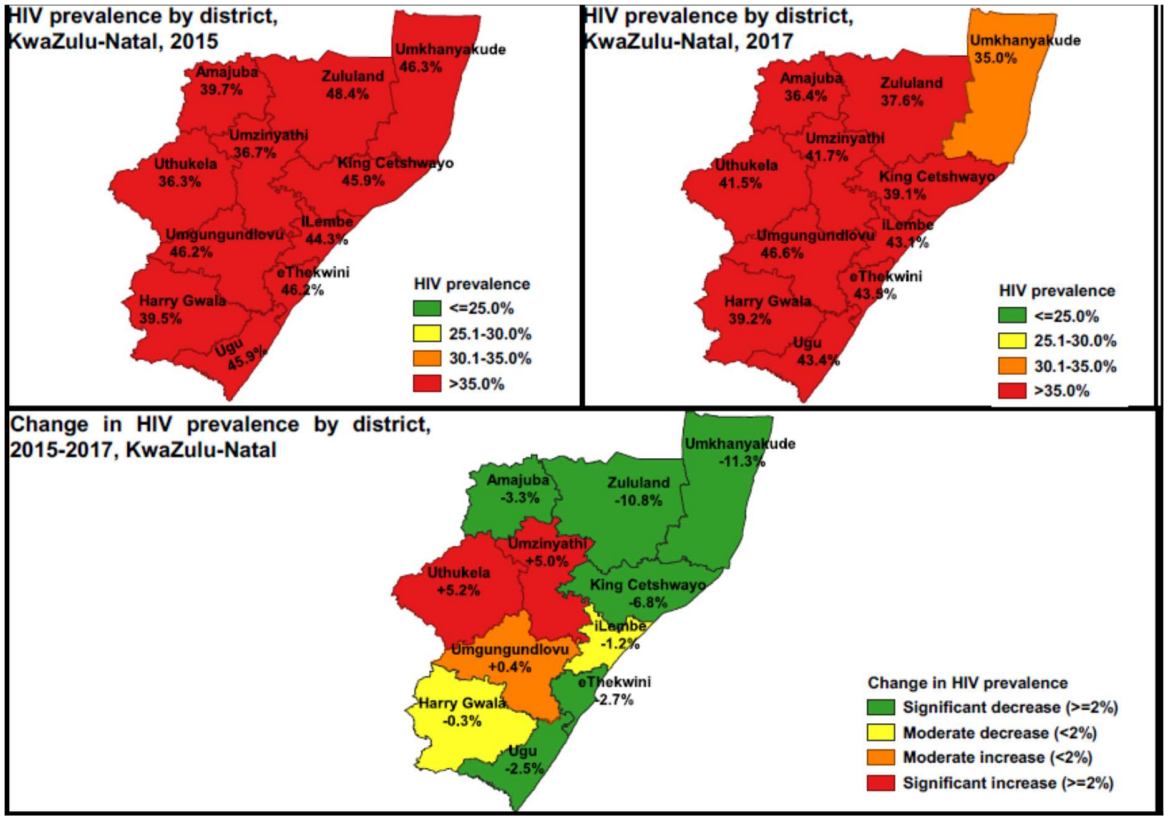
In KwaZulu-Natal, HIV prevalence had increasing trend between 2012 and 2015. In the 2017 survey, HIV prevalence dropped from 44.4% in 2015 to 41.1% in 2017. Overall, HIV prevalence in KwaZulu-Natal was higher by more than 10% from the national average (Figure 20).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees. SA= South Africa

Figure 20: The HIV epidemic curve among antenatal women, KwaZulu-Natal, 1990-2017

The highest prevalence declines were in uMkhanyakude (11.3%) and Zululand (10.8%) districts (Figure 21). In 2015, these two districts had the highest HIV prevalence nationally. In the 2017 survey, the lowest prevalence in KwaZulu-Natal was in uMkhanyakude (35.0%), Amajuba (36.4%) and Zululand districts (37.6%). In Six other districts in KwaZulu-Natal, HIV prevalence declined by 0.3%-6.8% between 2015 and 2017.



The prevalence reported is for both first and follow-up visit attendees

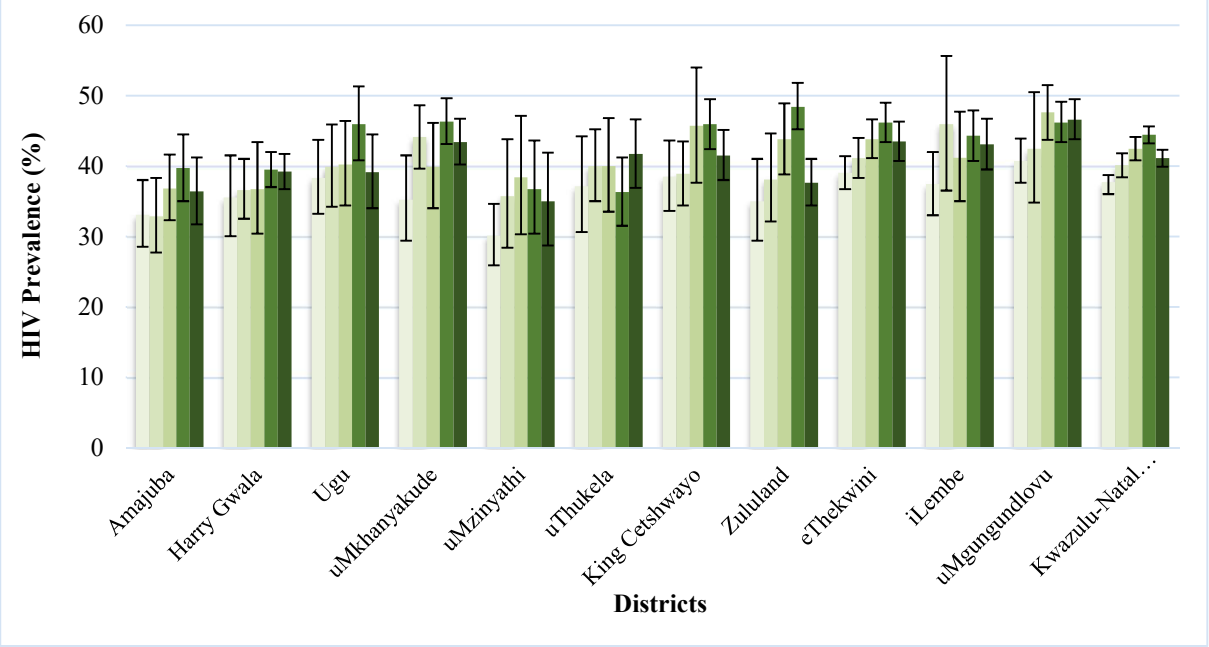
Figure 21: Change in district HIV prevalence estimates, 2015-2017, KwaZulu-Natal

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Amajuba	33.1	28.5 - 38.0	32.8	27.7 - 38.3	36.8	32.3 - 41.6	39.7	34.9 - 44.8	36.4	31.7-41.2
Harry Gwala	35.5	30.0 - 41.5	36.6	32.5 - 41.0	36.7	30.4 - 43.4	39.5	35.8 - 43.4	39.2	36.7-41.7
King Cetshwayo	38.5	33.6 - 43.6	38.9	34.4 - 43.5	45.7	37.6 - 54.0	45.9	37.0 - 55.1	39.1	34.0-44.5
Ugu	38.3	33.2 - 43.7	39.9	34.2 - 45.9	40.2	34.4 - 46.4	45.9	39.9 - 52.1	43.4	40.2-46.7
uMkhanyakude	35.2	29.4 - 41.5	44.1	39.6 - 48.6	39.9	34.0 - 46.1	46.3	40.4 - 52.3	35.0	28.7-41.9
uMzinyathi	30.1	25.9 - 34.6	35.7	28.4 - 43.8	38.4	30.3 - 47.1	36.7	28.5 - 45.8	41.7	36.9-46.6
uThukela	37.1	30.6 - 44.2	40.0	35.0 - 45.2	40.0	33.5 - 46.8	36.3	31.3 - 41.7	41.5	38.0-45.1
Zululand	35.0	29.4 - 41.0	38.1	32.1 - 44.6	43.8	38.8 - 48.9	48.4	40.2 - 56.8	37.6	34.4-41.0
eThekwini	39.0	36.7 - 41.4	41.1	38.3 - 44.0	43.8	41.1 - 46.6	46.2	43.0 - 49.5	43.5	40.7-46.3
iLembe	37.4	33.0 - 42.0	45.9	36.5 - 55.6	41.2	35.0 - 47.7	44.3	38.3 - 50.5	43.1	39.5-46.7
uMgungundlovu	40.7	37.6 - 43.9	42.4	34.8 - 50.5	47.6	43.7 - 51.5	46.2	39.3 - 53.1	46.6	43.8-49.5
KwaZulu-Natal province	**37.7**	**36.0 - 38.7**	**40.1**	**38.4 - 41.8**	**42.4**	**40.8 - 44.1**	**44.4**	**42.5 - 46.3**	**41.1**	**39.9-42.3**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 4: HIV prevalence by district in the KwaZulu-Natal province, 2012 to 2017

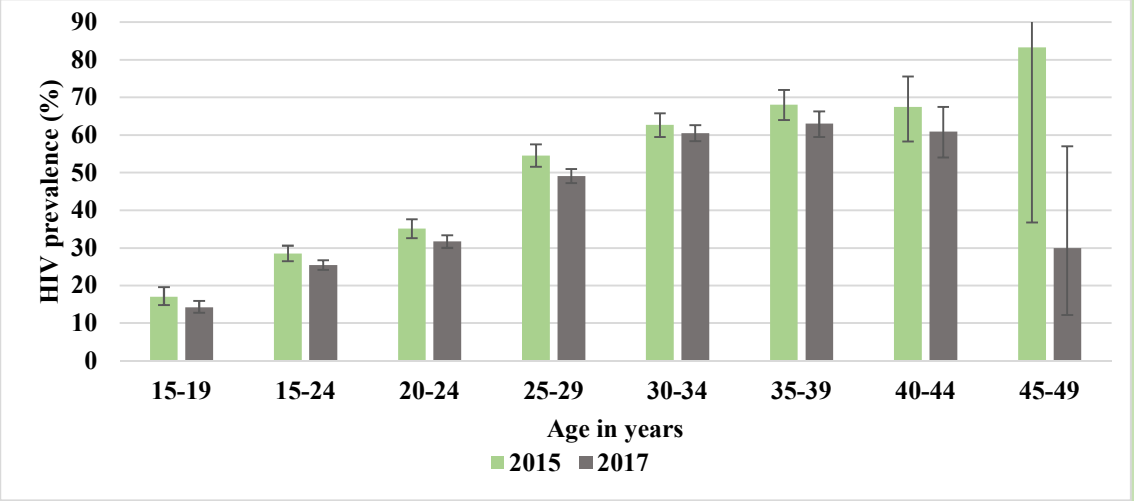
Although HIV prevalence has declined in most districts in KwaZulu-Natal, in two districts prevalence has continued to sharply increase. These two districts are: uThukela district, where prevalence increased by 5.2% in 2017 and uMzinyathi district where prevalence increased by 5.0% (Table 4 and Figure 22).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 22: HIV prevalence trend by district, 2012-2017, KwaZulu-Natal

Figure 23 shows, change in HIV prevalence between 2015 and 2017 by age group. The result shows HIV prevalence decline across all age groups in the KwaZulu-Natal province. The decline in the age groups 15-24 years and 25-29years was statistically significant.

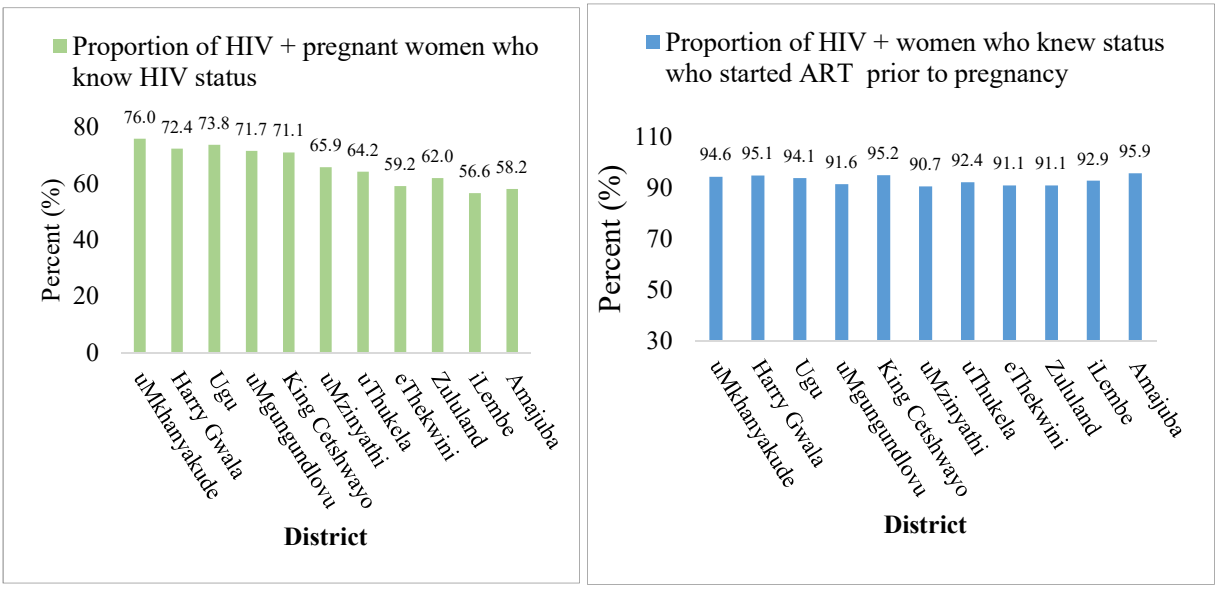


The prevalence reported is for both first and follow-up visit attendees

Figure 23: Change in HIV prevalence (2015-2017) by five-year age group, KwaZulu-Natal

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV-positive status prior to pregnancy and ART initiation was high in KwaZulu-Natal compared to the national average.



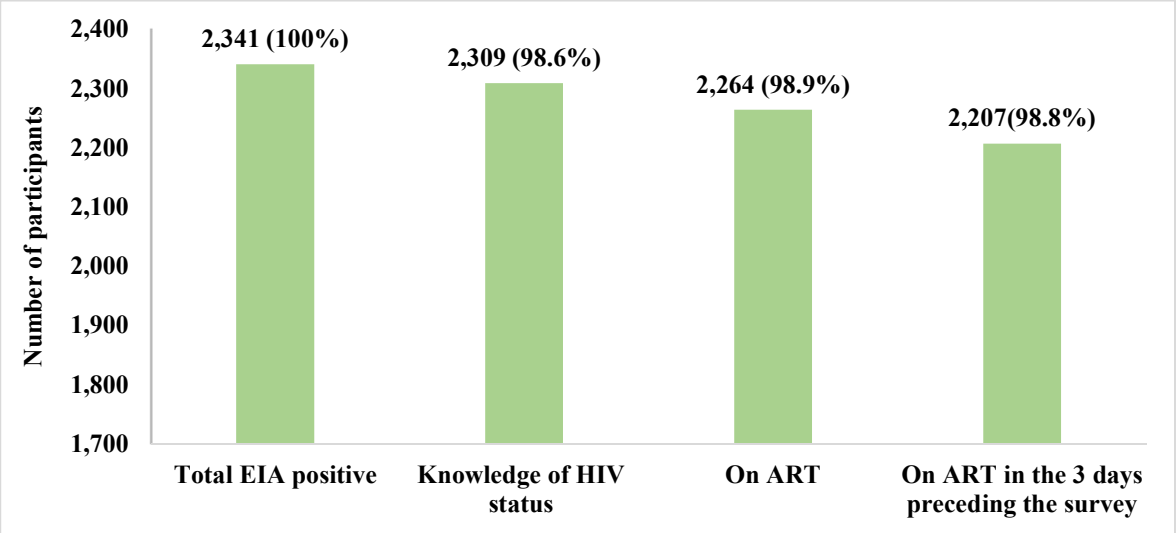
Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 24: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, KwaZulu-Natal, 2017

Knowledge of HIV status prior to pregnancy among HIV-positive pregnant women was above the national average (60.8%) in nine of the eleven provinces (except iLembe, and Amajuba districts) (Figure 24). The highest reported knowledge of HIV status prior to pregnancy was in uMkhanyakude (76.0%) and Harry Gwala (72.4%).

PMTCT cascade

Knowledge of HIV status (1st 90) was high (98.6%) among HIV-positive pregnant women attending follow-up visit in KwaZulu-Natal. Of those who were aware of their HIV-positive status, 98.9% were on ART, and 98.8% of those on ART reported taking ART in the 3 days preceding the survey (Figure 25).



Weighted percentages

Figure 25: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, KwaZulu-Natal, 2017

Limpopo

Sample size realization and demographic characteristics

The sample size realization in Limpopo was 83.1% (2,647). At district level, the lowest sample size realization was in Waterberg district (69.2%) and the highest was in Vhembe district (95.6%) (Annexure 4). More than two-fifths (42.4%) of participants were women in the age group 15-24years (Figure 26).

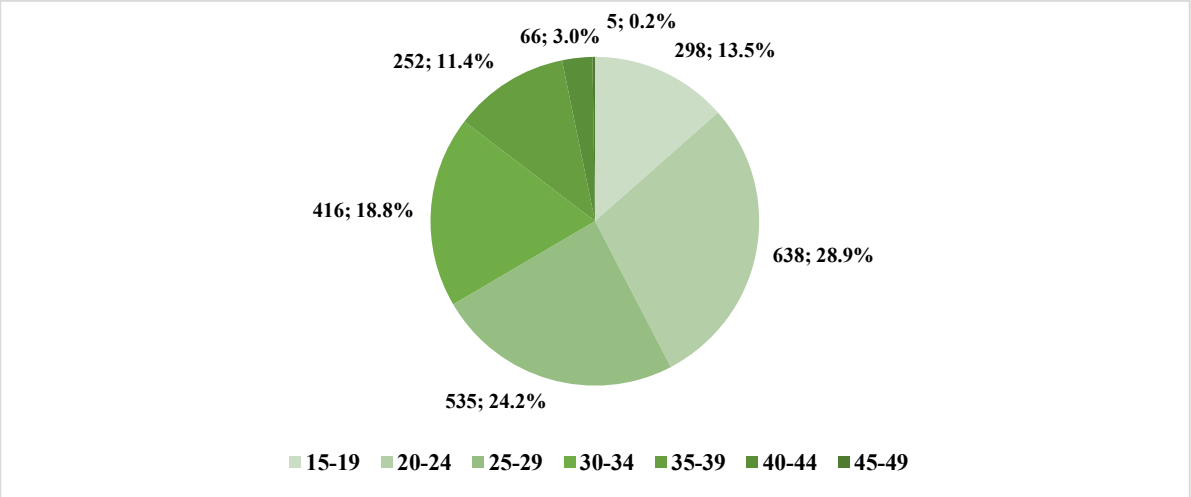
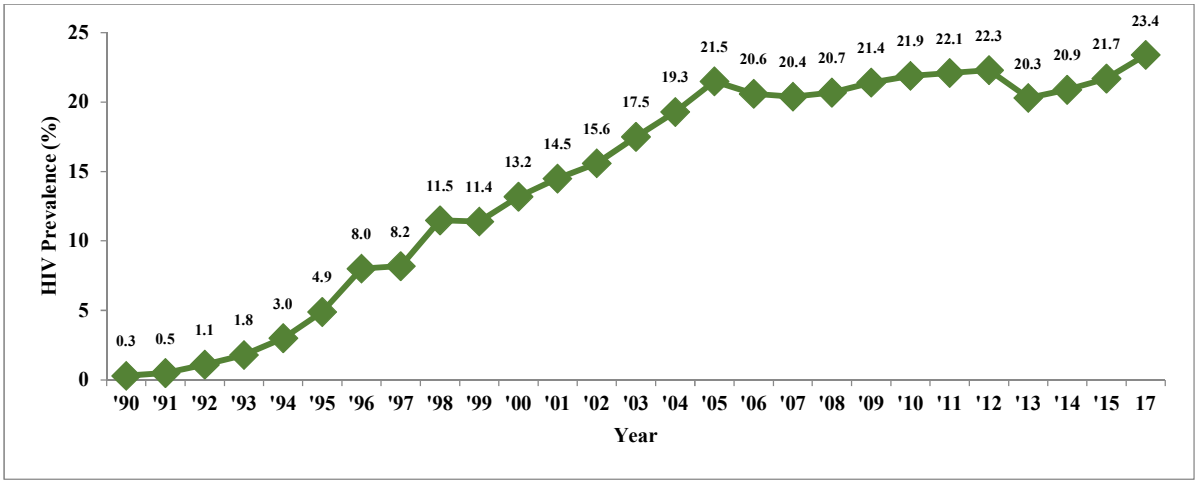


Figure 26: Distribution of survey participants by five-year age group – Limpopo, 2017

HIV Prevalence

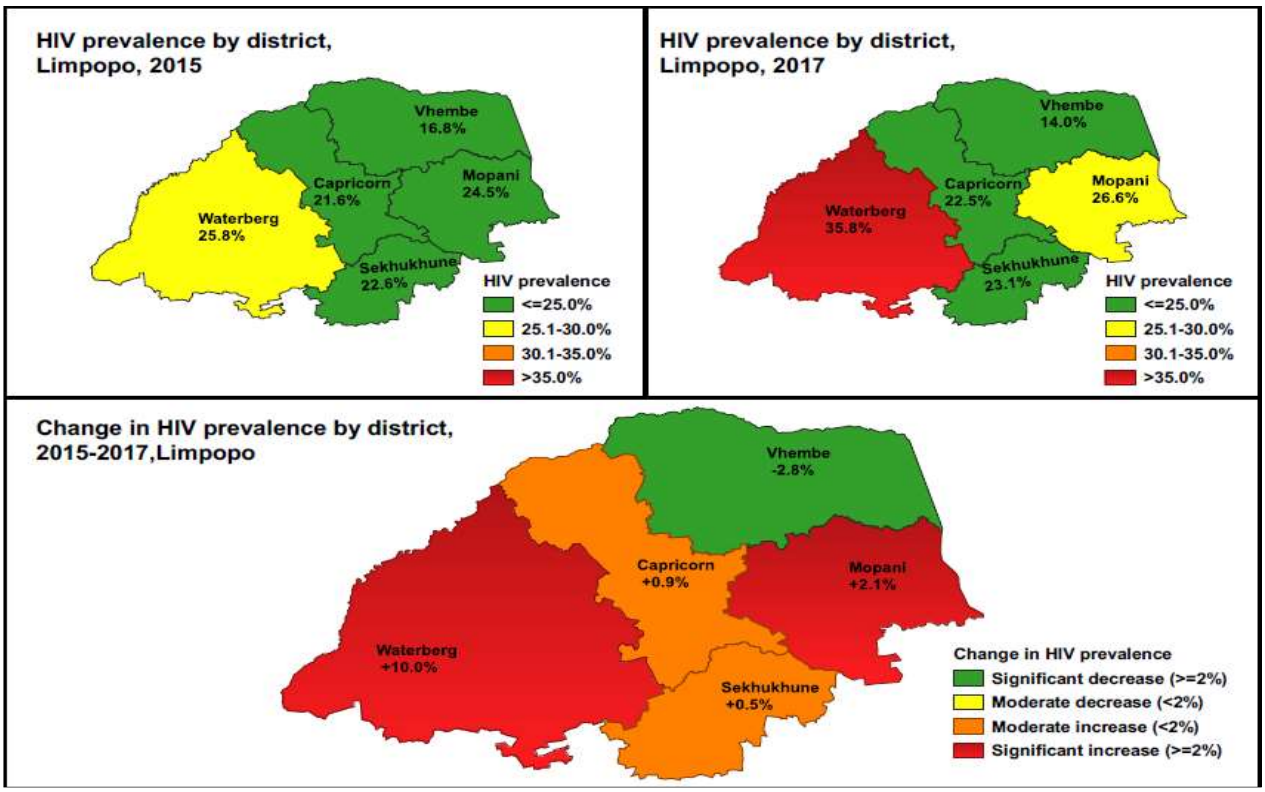
The epidemic curve below (Figure 27) demonstrates an increasing HIV prevalence trend in the Limpopo province since 2013. Prevalence increased by 3.1% between 2013 and 2017.



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 27: The HIV epidemic curve among antenatal women, Limpopo, 1990-2017

Prevalence between 2015 and 2017 increased in 4 of the 5 districts in Limpopo. The highest increase was in Waterberg district. Prevalence increased by 10.0% in Waterberg district between 2015 and 2017 (Figure 28). This increase should be interpreted with caution, as the sample size realization in Waterberg district was low (69.2%). The only district in Limpopo that showed declining prevalence trend was Vhembe, where prevalence declined by 2.8%. The prevalence in Vhembe district is the fifth lowest prevalence (14.0%) nationally, next to Namakwa (8.5%), Central Karoo (8.7%), West coast (11.1%) and Eden (12.6%) districts.



The prevalence reported is for both first and follow-up visit attendees

Figure 28: Change in district HIV prevalence estimates - 2015-2017, Limpopo

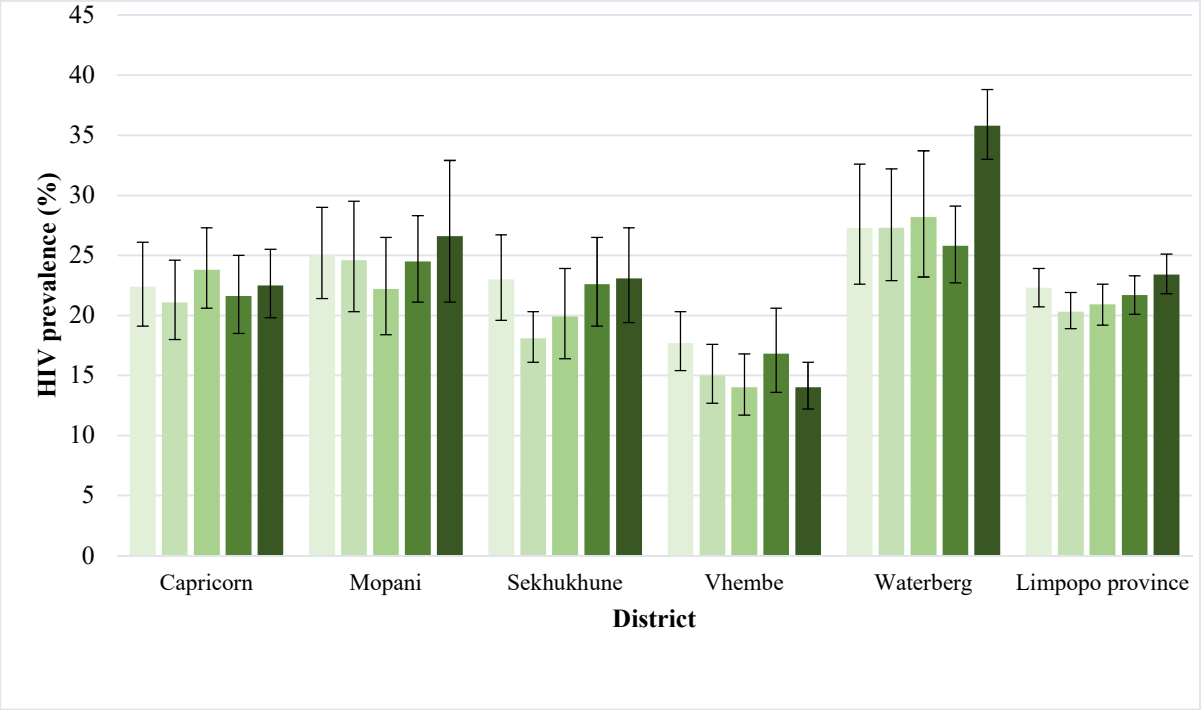
Over the last five surveys, prevalence at district level was fluctuating in Limpopo by ±2% in four of the five districts (except Waterberg districts) (Table 5 and Figure 29).

District	2012		2013		2014		2015		2017 ALL	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Capricorn	22.4	19.1 - 26.1	21.1	18.0 - 24.6	23.8	20.6 - 27.3	21.6	18.5 - 25.0	22.5	19.8- 25.5
Mopani	25.0	21.4 - 29.0	24.6	20.3 - 29.5	22.2	18.4 - 26.5	24.5	21.1 - 28.3	26.6	21.1- 32.9
Sekhukhune	23.0	19.6 - 26.7	18.1	16.1 - 20.3	19.9	16.4 - 23.9	22.6	19.1 - 26.5	23.1	19.4- 27.3
Vhembe	17.7	15.4 - 20.3	15.0	12.7 - 17.6	14.0	11.7 - 16.8	16.8	13.6 - 20.6	14.0	12.2- 16.1

Waterberg	27.3	22.6 - 32.6	27.3	22.9 - 32.2	28.2	23.2 - 33.7	25.8	22.7 - 29.1	35.8	33.0-38.8
Limpopo province	**22.3**	**20.7 - 23.9**	**20.3**	**18.9 - 21.9**	**20.9**	**19.2 - 22.6**	**21.7**	**20.1 - 23.3**	**23.4**	**21.8-25.1**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 5: HIV prevalence by district, in the Limpopo province, 2012-2017

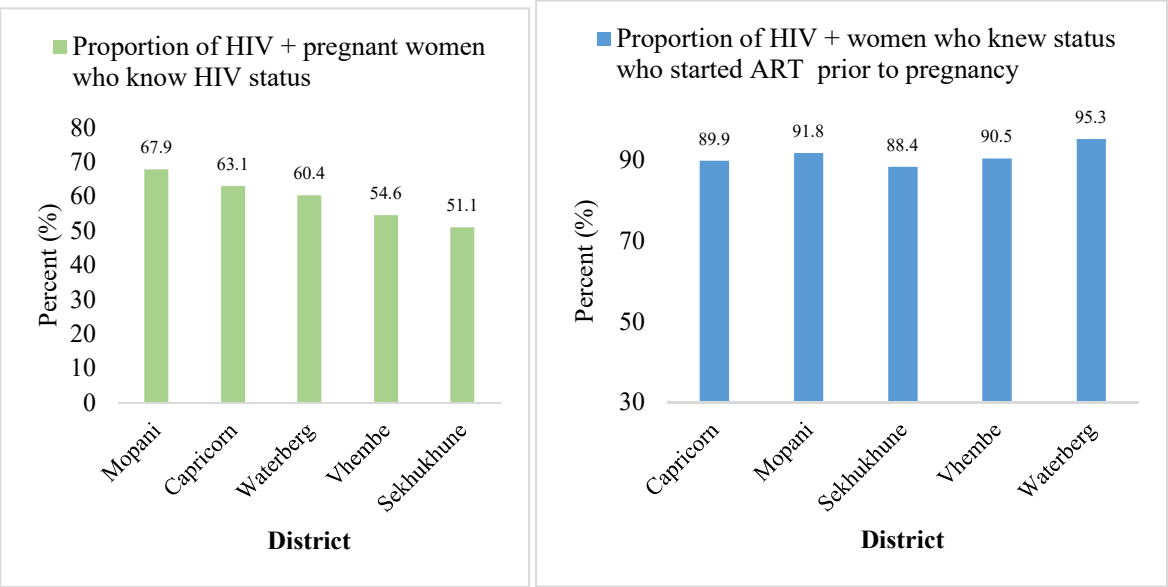


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 29: HIV prevalence trend by district, 2012-2017, Limpopo

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy among pregnant women was 60.4% in Limpopo. This was slightly lower than the national average (60.8%). At district level, awareness of HIV-positive status prior to pregnancy was high in Mopani district: 67.9% of HIV-positive women were aware of their HIV status prior to pregnancy (Figure 30). The lowest awareness of HIV-positive status (51.1%) and ART initiation (88.4%) prior to pregnancy was in Sekhukhune district.

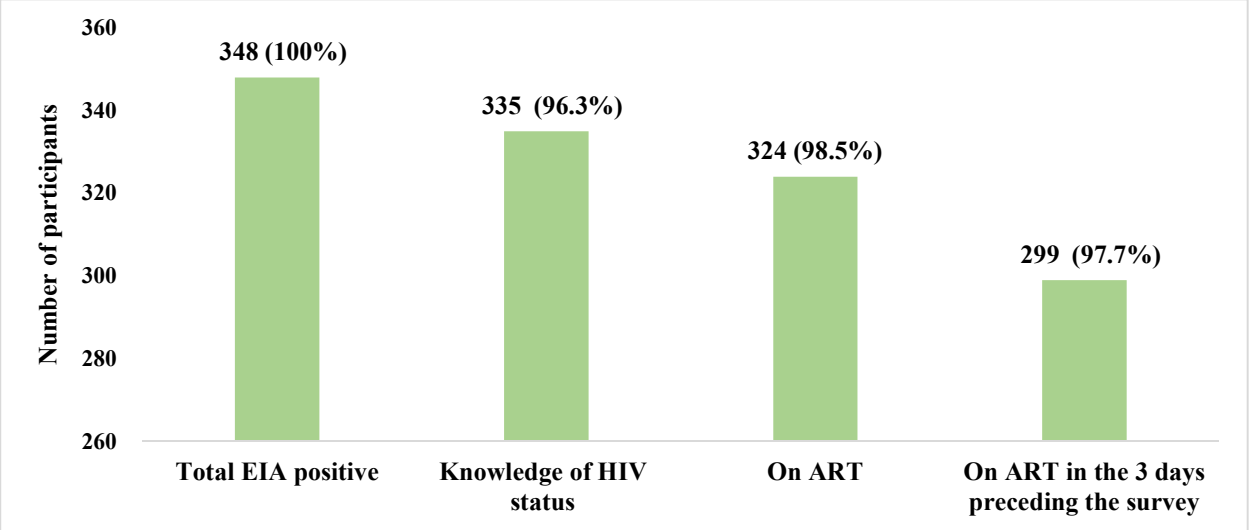


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 30: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Limpopo, 2017

PMTCT cascade

The PMTCT cascade coverage was >95% in Limpopo. Knowledge of HIV status (1st 90) was 96.3% among HIV-positive pregnant women attending follow-up visit in Limpopo. Of those who were aware of their HIV-positive status, 98.5% were on ART, and 97.7% of those on ART reported taking ART in the 3 days preceding the survey (Figure 31).



Weighted percentages

Figure 31: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Limpopo, 2017

Mpumalanga

Sample size realization and demographic characteristics

In Mpumalanga, 97.2% (2,870) of the planned sample size was achieved. The lowest sample size realization was in Nkangala district (90.7%) and the highest was in Gert Sibande district (102.6%) (Annexure 4). The distribution of participants by age had similar distribution as the national level age distribution (Figure 32).

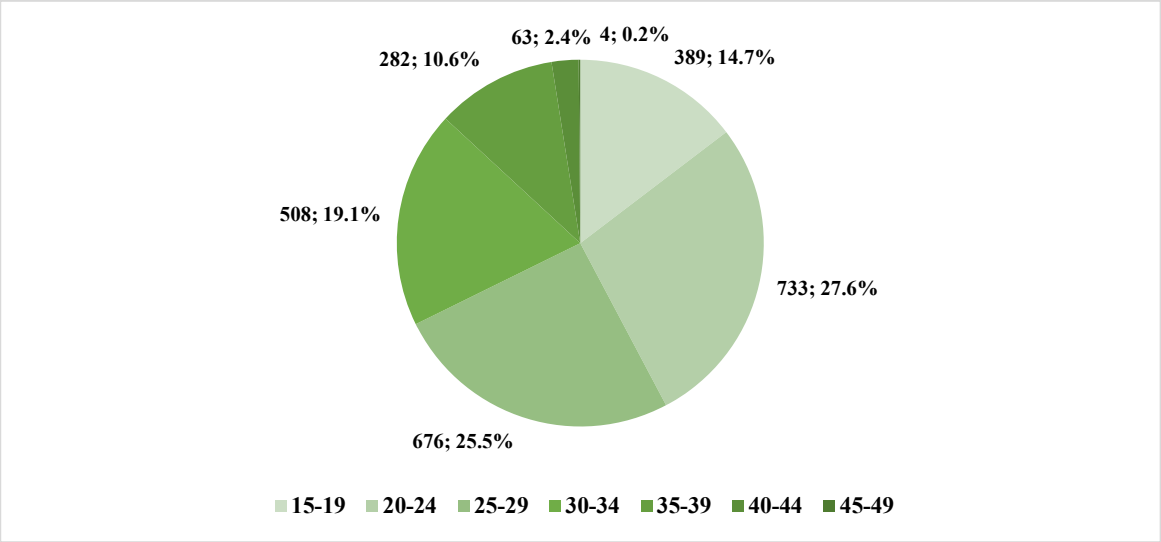
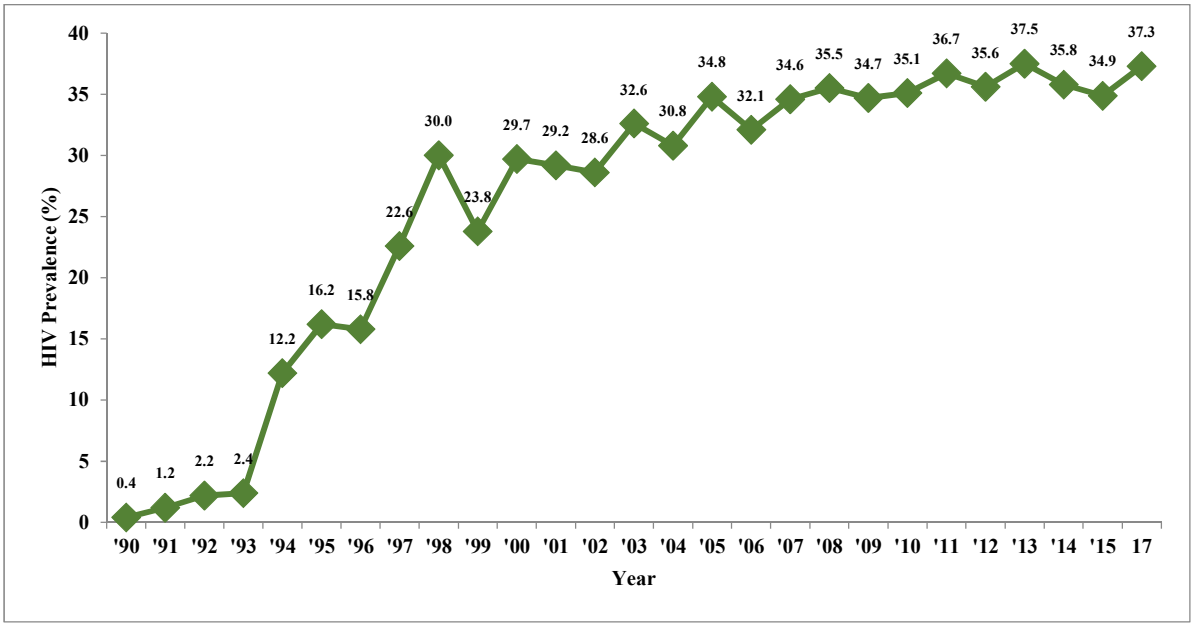


Figure 32: Distribution of survey participants by five-year age group – Mpumalanga, 2017

HIV prevalence

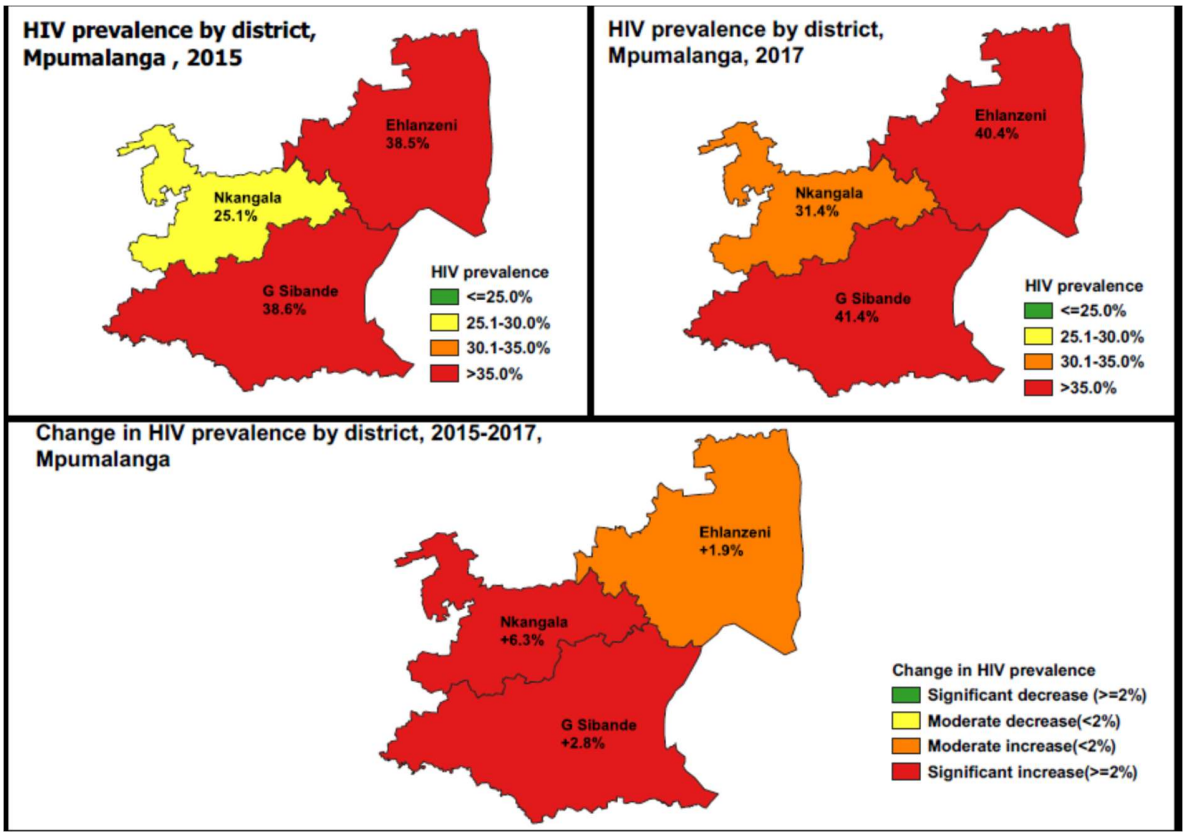
HIV prevalence in Mpumalanga was starting to show declining trend between 2013 and 2015. In the 2017 survey, HIV prevalence increased by 2.4% (Figure 33). A stratified analysis of HIV prevalence by visit type shows, HIV prevalence increased in 2017, mainly due to the high prevalence of HIV among follow-up visit attendees (refer to main report for detail discussion on this).



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 33: The HIV epidemic curve among antenatal women, Mpumalanga, 1990-2017

Figure 34 shows HIV prevalence increased in all districts in Mpumalanga between 2015 and 2017.



The prevalence reported is for both first and follow-up visit attendees

Figure 34: Change in district HIV prevalence estimates - 2015-2017, Mpumalanga

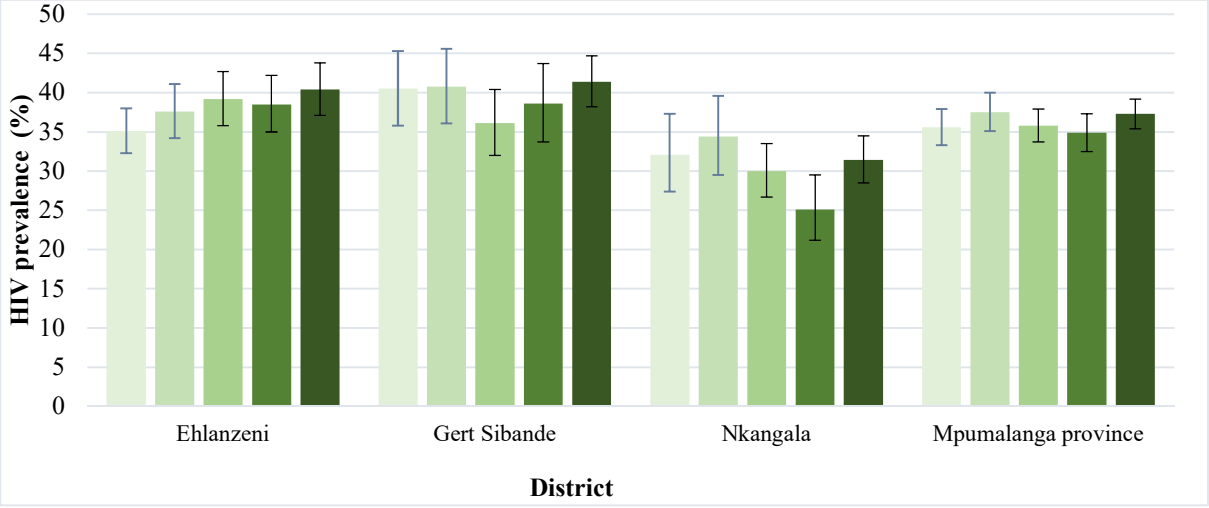
The highest increase was in Nkangala where prevalence increased by 6.3%. At provincial level, the increased HIV prevalence in Mpumalanga was due to the relatively higher prevalence rate among follow-up visit attendees. At district level, sample size was not adequate to stratify the trend analysis by visit type.

Between 2012 and 2015, HIV prevalence in the Ehlanzeni district had an overall increasing trend except the slight decline observed in 2015. HIV prevalence increased in Gert Sibande district in the last two surveys. In Nkangala district, there was a declining trend in HIV prevalence between 2013 and 2015, however HIV prevalence increased by 6.3% in 2017 (Table 6 and Figure 35).

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Ehlanzeni	35.1	32.3 - 38.0	37.6	34.2 - 41.1	39.2	35.8 - 42.7	38.5	35.0 - 42.2	40.4	37.1- 43.8
Gert Sibande	40.5	35.8 - 45.3	40.8	36.1 - 45.6	36.1	32.0 - 40.4	38.6	33.7 - 43.7	41.4	38.2- 44.7
Nkangala	32.1	27.4 - 37.3	34.4	29.5 - 39.6	30.0	26.7 - 33.5	25.1	21.2 - 29.5	31.4	28.5- 34.5
Mpumalanga province	**35.6**	**33.3 - 37.9**	**37.5**	**35.1 - 40.0**	**35.8**	**33.7 - 37.9**	**34.9**	**32.5 - 37.3**	**37.3**	**35.4- 39.2**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 6: HIV prevalence by district, in the Mpumalanga province, 2012-2017



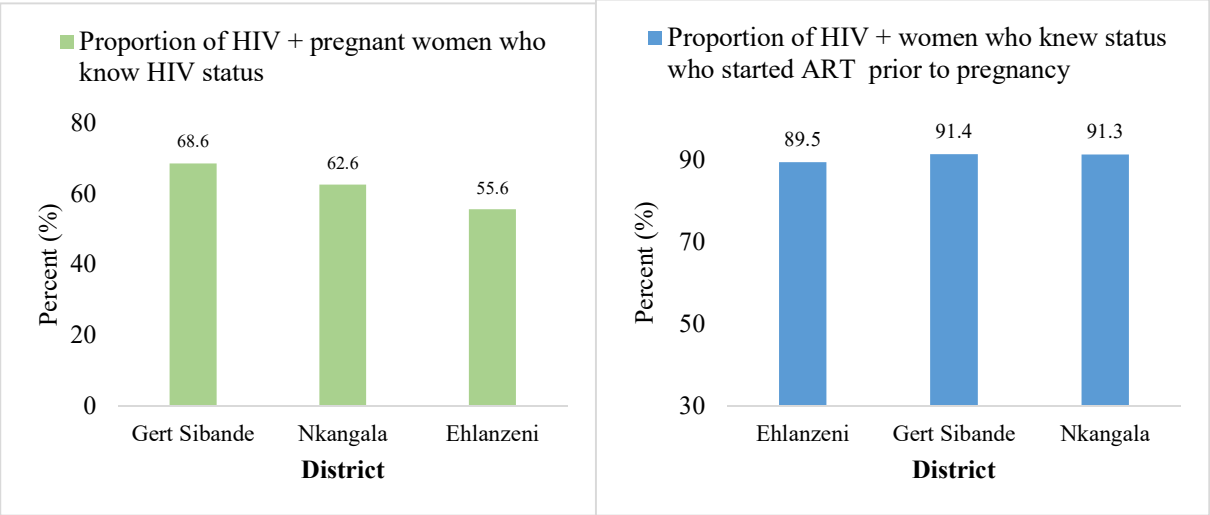
The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 35: HIV prevalence trend by district, 2012-2017, Mpumalanga

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy in the Mpumalanga province was 60.8% equal to the national average (Figure 36). Awareness of HIV-positive status prior to pregnancy was relatively higher in Gert Sibande district (68.6%). Knowledge of HIV status prior to pregnancy was lower

than the national average in Ehlanzeni district (at 55.6%). The lowest coverage of ART initiation prior to pregnancy among those who already know their HIV status was 89.5% in the Ehlanzeni district.

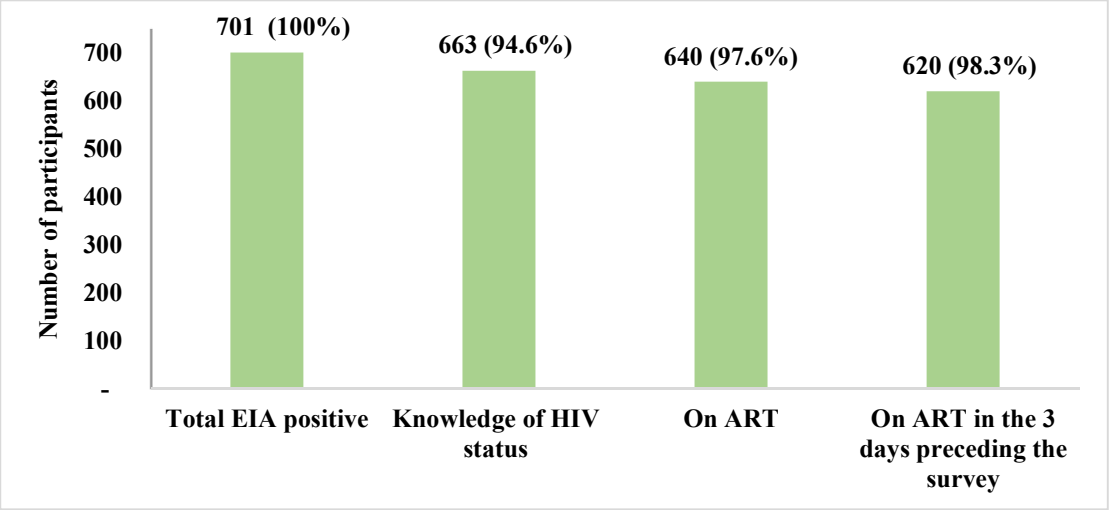


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives. Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 36: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Mpumalanga, 2017

PMTCT cascade

Knowledge of HIV status (1st 90) was 94.6% among HIV-positive pregnant women attending follow-up ANC visit in Mpumalanga. Of those who were aware of their HIV-positive status, 97.6% were on ART, and 98.3% of those on ART reported taking ART in the 3 days preceding the survey (Figure 37).



Weighted percentages

Figure 37: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Mpumalanga, 2017

Northern Cape

Sample size realization and demographic characteristics

The total sample size in the Northern Cape Province was 1,512 with a sample size realization of 91.6%. The district with the highest sample size realization (96.9%, 312) in the province was Pixley Ka Seme District and the district with the lowest sample size realization was John Taolo Gaetsewe district (84.6%, 395) (Annexure 4). Close to half (45.2%) of participants were 15-24 years old and only 12.7% were older than 35 years (Figure 38).

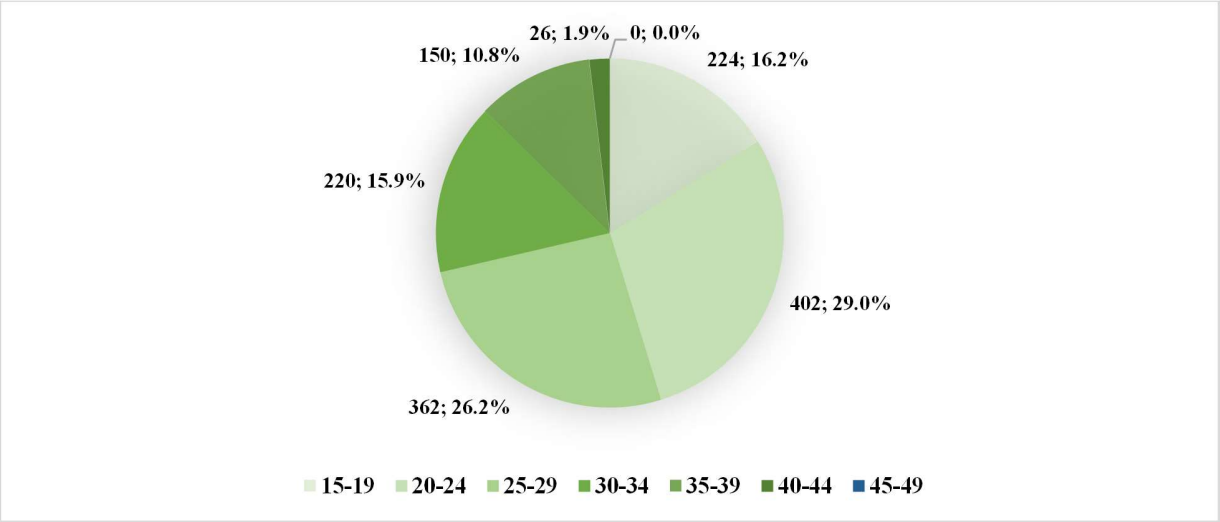
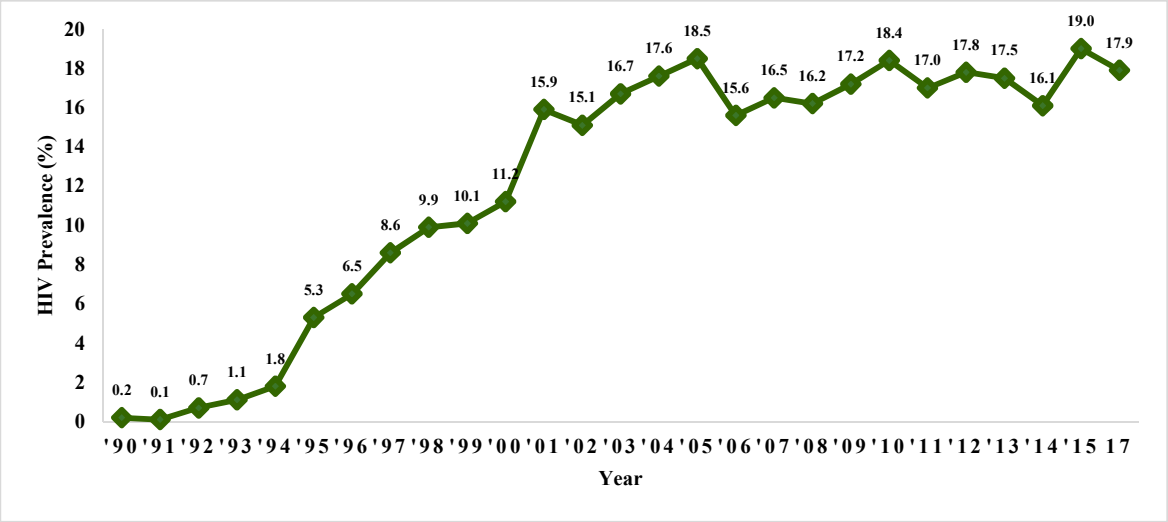


Figure 38: Distribution of survey participants by five-year age group - Northern Cape, 2017

HIV prevalence

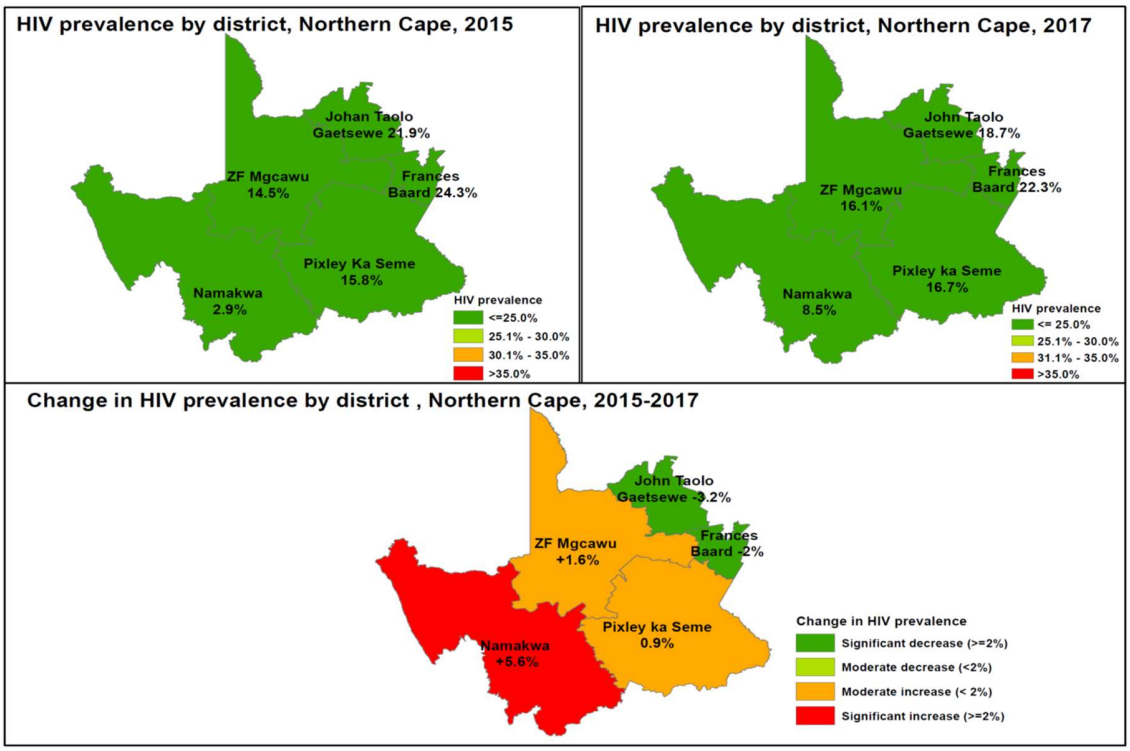
In the Northern Cape province, the HIV prevalence rate among pregnant women attending ANC clinics appeared to be increasing at a relatively high rate till 2005 in general; thereafter the prevalence dropped to a value of 15.6% in 2006 and started increasing consistently till 2010 as shown in Figure 39. HIV prevalence fluctuated within the range of 16-19% between 2011 and 2017. HIV prevalence in 2017 declined by 1.1% as compared to that of 2015.



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 39: The HIV epidemic curve among antenatal women, Northern Cape, 1990-2017

Figure 40 shows a map of HIV prevalence among antenatal women and a change in HIV prevalence by district in the Northern Cape province between 2015 and 2017. Between 2015 and 2017, HIV prevalence increased by 5.6% in Namakwa district. ZF Mgcawu and Pixley ka Seme districts also showed a moderate increase (<2%) in HIV prevalence between 2015 and 2017. HIV prevalence decreased by 3.2% and 2.0% in John Taolo Gaetsewe and Frances Baard districts respectively in the same period.



The prevalence reported is for both first and follow-up visit attendees

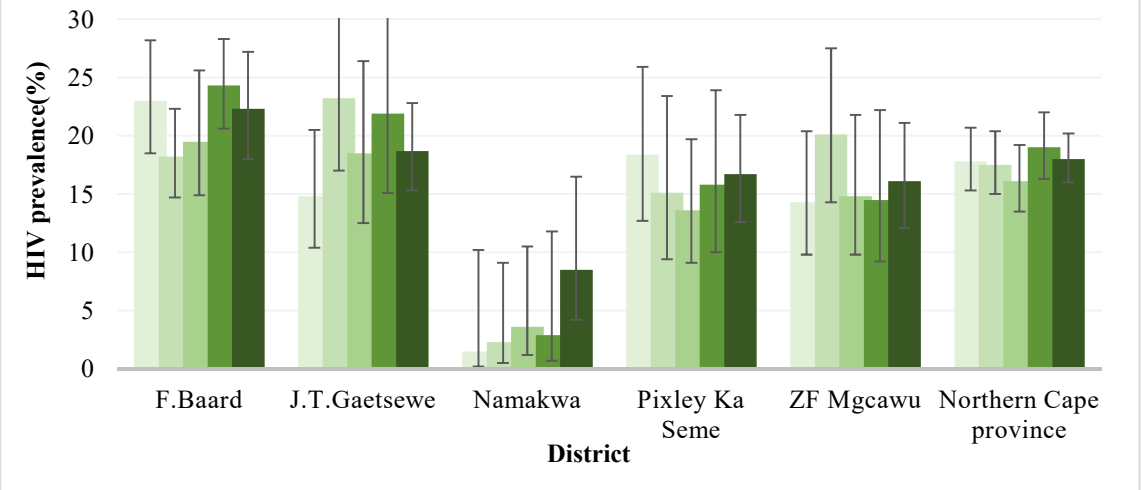
Figure 40: Change in district HIV prevalence estimates – 2015 to 2017, Northern Cape

The level of HIV prevalence among antenatal women varied by district between 2012 and 2017; in general the highest level of prevalence was observed in Frances Baard district and the lowest level was observed in Namakwa district as shown in Table 7 and Figure 41. On average HIV prevalence appears to be slightly increasing over the last five years in Namakwa, Frances Baard and John Taolo Gaetsewe districts.

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
F. Baard	23.0	18.5 - 28.2	18.2	14.7 - 22.3	19.5	14.9 - 25.6	24.3	20.6 - 28.3	22.3	18.0-27.2
J.T. Gaetsewe	14.8	10.4 - 20.5	23.2	17.0 - 30.8	18.5	12.5 - 26.4	21.9	15.1 - 30.7	18.7	15.3-22.8
Namakwa	1.5	0.2 - 10.2	2.3	0.5 - 9.1	3.6	1.2 - 10.5	2.9	0.7 - 11.8	8.5	4.2-16.5
Pixley ka Seme	18.4	12.7 - 25.9	15.1	9.4 - 23.4	13.6	9.1 - 19.7	15.8	10.0 - 23.9	16.7	12.6-21.8
ZF Mgcawu	14.3	9.8 - 20.4	20.1	14.3 - 27.5	14.8	9.8 - 21.8	14.5	9.2 - 22.2	16.1	12.1-21.1
Northern Cape province	**17.8**	**15.3 - 20.7**	**17.5**	**15.0 - 20.4**	**16.1**	**13.5 - 19.2**	**19**	**16.3 - 22.0**	**17.9**	**16.0-20.1**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 7: HIV prevalence by district in the Northern Cape province, 2012 to 2017

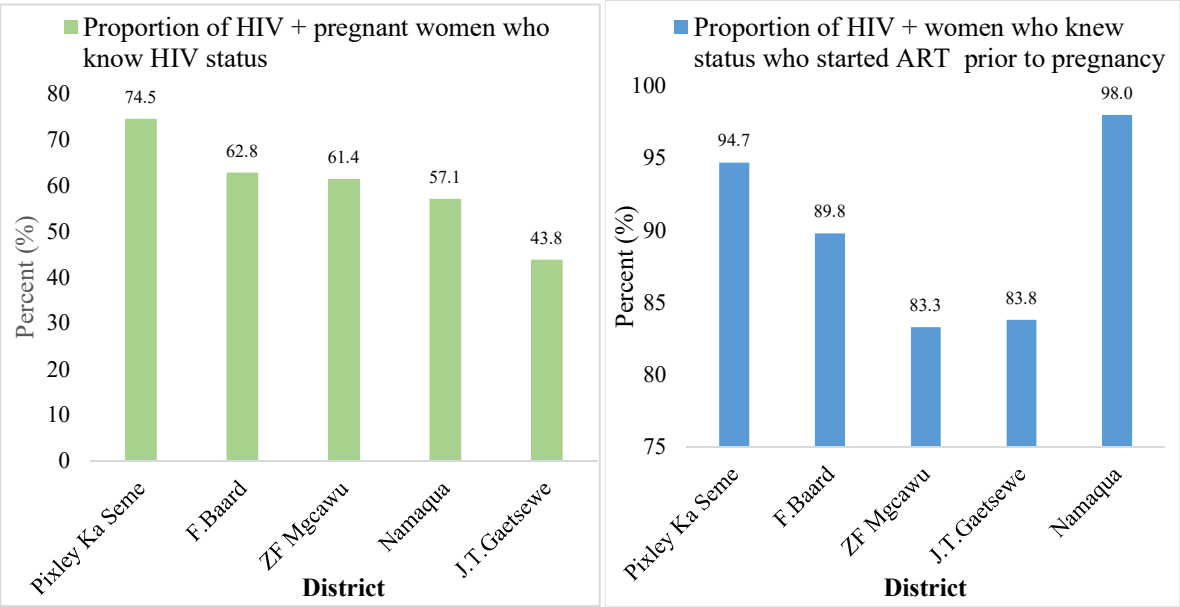


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 41: HIV prevalence trend by district, 2012-2017, Northern Cape

Knowledge of HIV-positive status and ART initiation prior to pregnancy

In the Northern Cape province, knowledge of HIV status prior to pregnancy was 63.2%; 88.4% of those who knew their HIV-positive status prior to pregnancy were on ART prior to pregnancy (Figure 42). Knowledge of HIV status and ART initiation prior to pregnancy varied by district. Knowledge of HIV status and ART initiation prior to pregnancy was higher than the national average (60.8%) in four of the five districts, and ART initiation prior to pregnancy was lower than the national average (91.1%) in three districts. The highest and lowest knowledge of HIV status prior to pregnancy were reported in Pixley ka Seme (74.5%) and John Taolo Gaetsewe (53.4%) districts respectively.

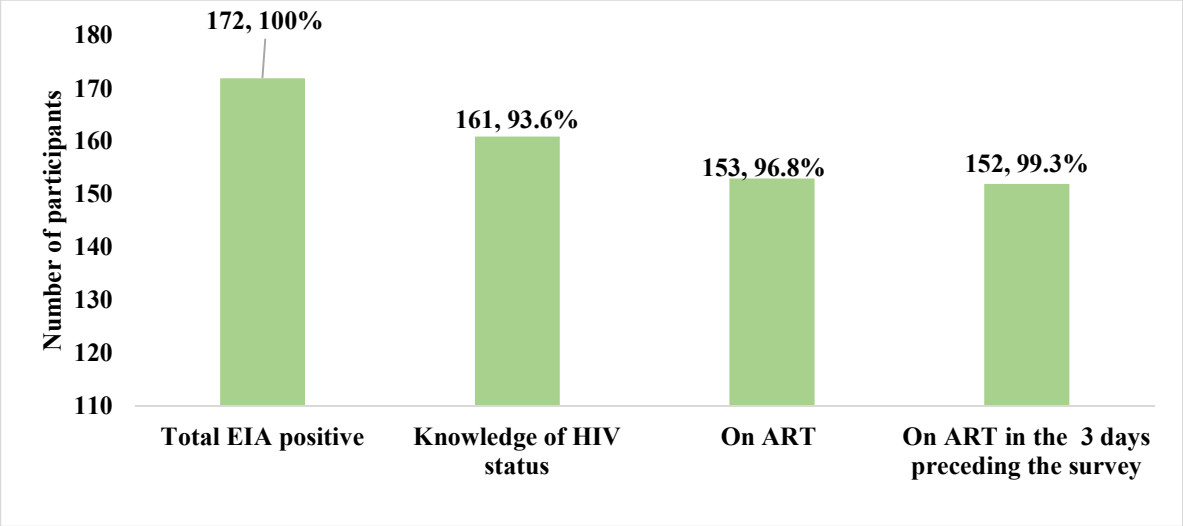


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives. Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 42: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Northern Cape, 2017

PMTCT cascade

Knowledge of HIV status among HIV-positive pregnant women attending follow-up visit in the Northern Cape province in 2017 was 93.6%. Among those women who were aware of their HIV-positive status, 96.8% were on ART; and of those who were on ART, 99.3% reported taking ART in the 3 days preceding the survey (Figure 43).



Weighted percentages

Figure 43: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Northern Cape, 2017

North West

Sample size realization and demographic characteristics

A total of 2,256 pregnant women (sample size realization 74.1%) were sampled from North West province. Dr Ruth Segomotsi and Ngaka Modiri Molema districts had the highest (86.5%, 486) and lowest (59.3%, 411) sample size realizations respectively in the North West province (Annexure 4). Majority of the sample (29.4%) consists pregnant women in the 25-29 years age group and the sample contains 2.4% and 0.1% of women in the 40−44 years and 45−49 years age group respectively (Figure 44).

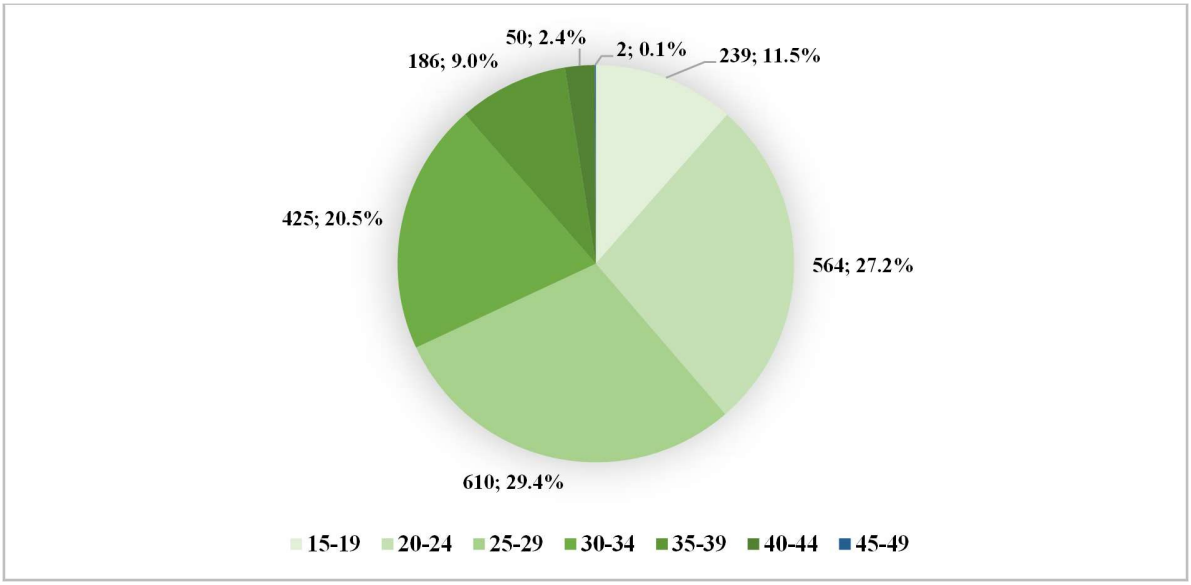
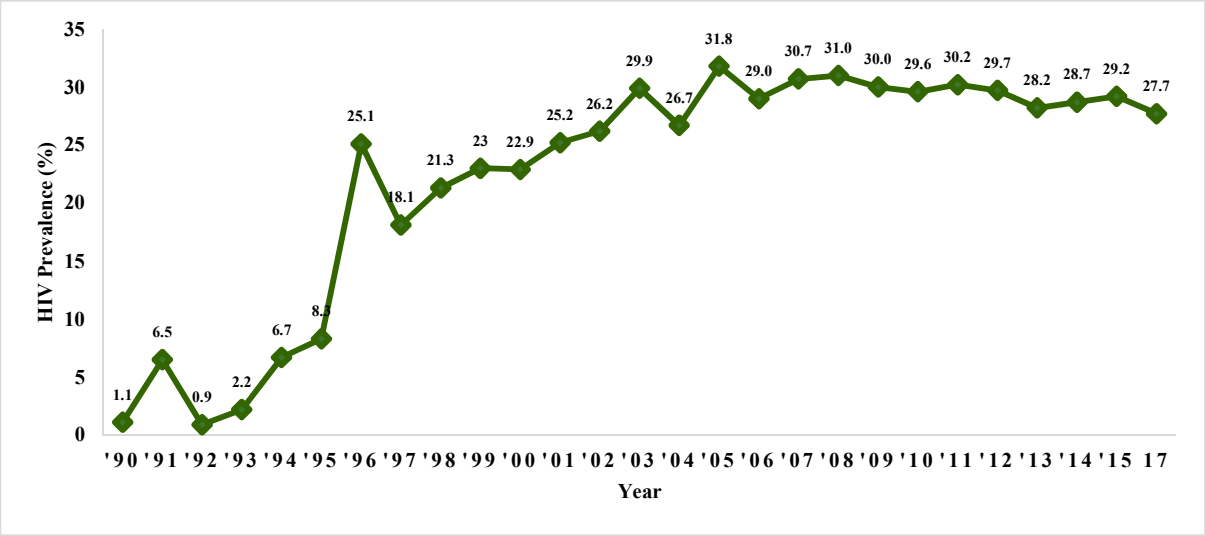


Figure 44: Distribution of survey participants by five-year age group - North West, 2017

HIV prevalence

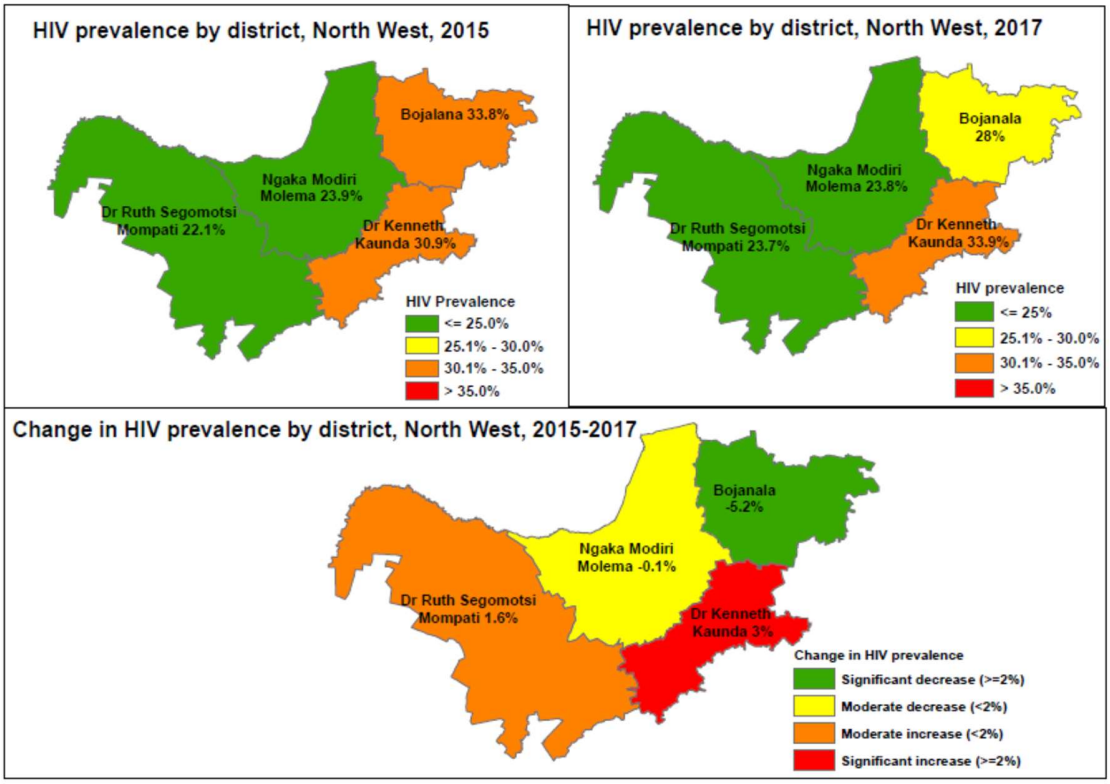
The HIV prevalence rate among pregnant women attending ANC clinics in the North West Province was linearly increasing between 1997 and 2005 except that in 2004 where it dropped by 4% (Figure 45). The prevalence has dropped by a little less than 2% between 2005 and 2006. In general the prevalence has been declining slowly starting from 31.0% in 2008 to 27.7 in 2017.



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 45: The HIV epidemic curve among antenatal women, North West, 1990-2017

Figure 46 provides a geographic representation of HIV prevalence and change in HIV prevalence by district in the North West province between 2015 and 2017. The level of HIV prevalence among antenatal women has decreased by 5.2% in Bojanala district between 2015 and 2017. In the same period, prevalence increased by 3% in Dr. Kenneth Kaunda and 1.6% in Dr. Ruth Segomotsi Mompati districts.



The prevalence reported is for both first and follow-up visit attendees

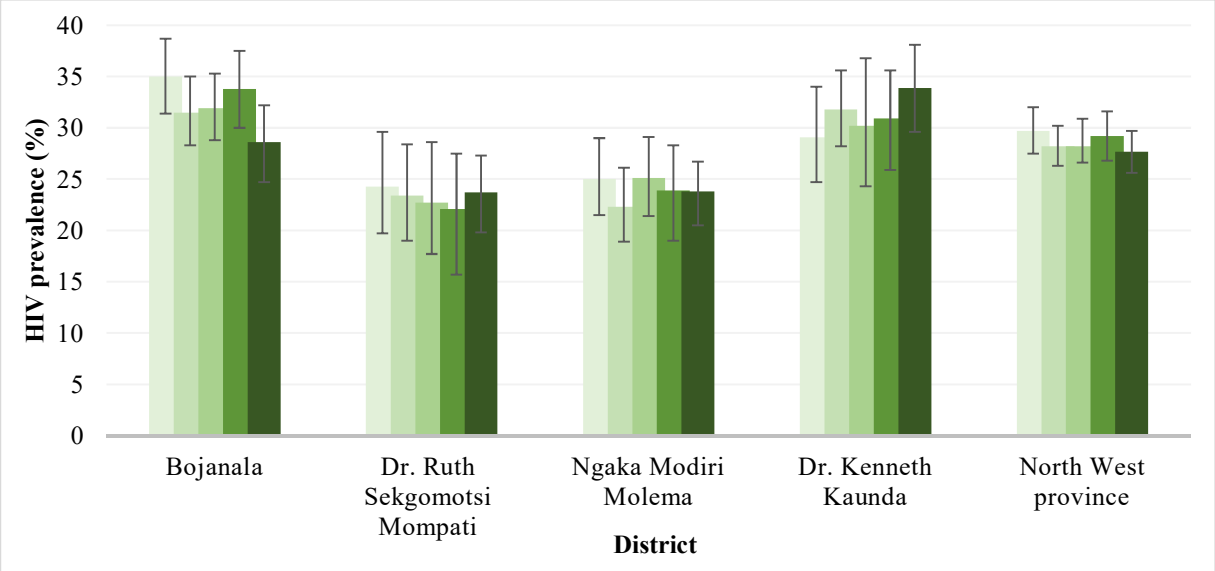
Figure 46: Change in district HIV prevalence estimates, 2015−2017, North West

As can be seen in Table 8 and Figure 47, HIV prevalence appear to be higher in Bojanala and Dr Kenneth Kaunda district municipalities between 2012 and 2017. HIV prevalence decreased slightly in Bojanala and Dr Ruth Sekgomotsi Mompati districts except the slight increase that was observed in 2015 and 2017 respectively. In Dr Kenneth Kaunda district HIV prevalence appears to be moving upward slightly. There is no clear pattern of HIV prevalence among antenatal women in Ngaka Modiri Molema district.

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Bojanala	35.0	31.4 - 38.7	31.5	28.3 - 35.0	31.9	28.8 - 35.3	33.8	30.1 - 37.6	28.6	25.0- 32.5
Dr. Ruth	24.3	19.7 - 29.6	23.4	19.0 - 28.4	22.7	17.7 - 28.6	22.1	16.7 - 28.5	23.7	20.1- 27.6
Ngaka Modiri Molema	25	21.5 - 29.0	22.3	18.9 - 26.1	25.1	21.4 - 29.1	23.9	19.5 - 28.8	23.8	20.9- 27.1
Dr. Kenneth Kaunda	29.1	24.7 - 34.0	31.8	28.2 - 35.6	30.2	24.3 - 36.8	30.9	26.2 - 35.9	33.9	29.7- 38.2
North West Province	**29.7**	**27.5 - 32.0**	**28.2**	**26.3 - 30.2**	**28.2**	**26.6 - 30.9**	**29.2**	**26.8 - 31.6**	**27.7**	**25.7- 29.8**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 8: HIV prevalence by district in the North West province, 2012–2017



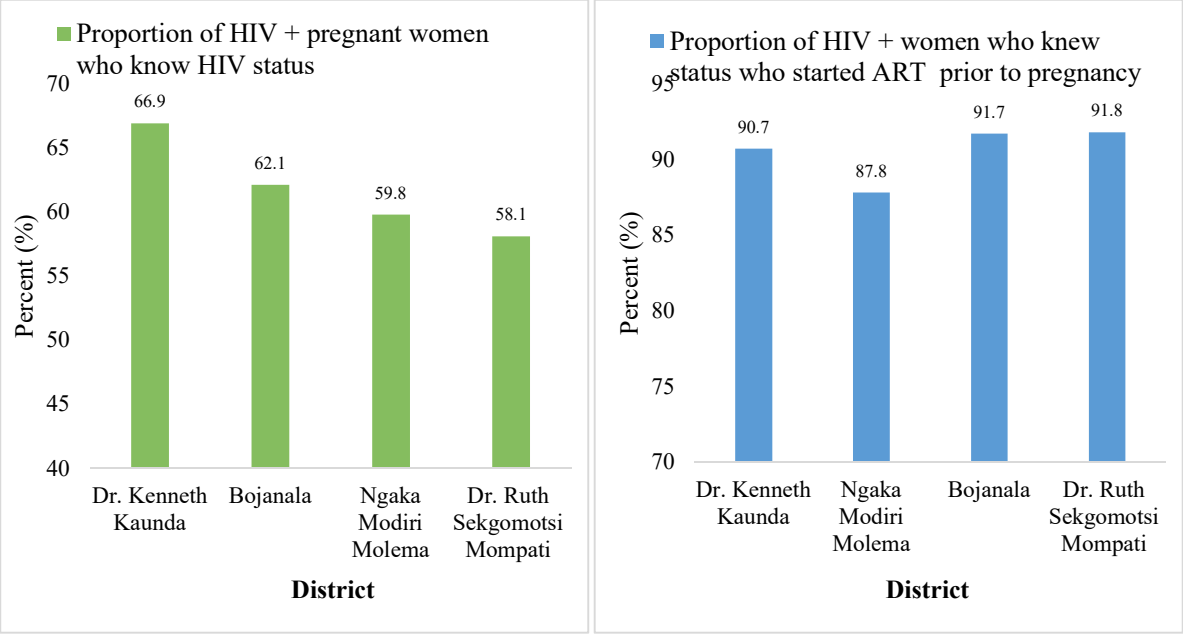
The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 47: HIV prevalence by district, 2012–2017, North West

Knowledge of HIV-positive status and ART initiation prior to pregnancy

Knowledge of HIV status prior to pregnancy among pregnant women in the North West province (62.2%) was slightly higher as compared to the national average. ART initiation prior to pregnancy

among women in the study (90.9%) was almost equal to the national average (91.1%) (Figure 48). Knowledge of HIV status prior to pregnancy among pregnant women was higher than the national average in Dr Kenneth Kaunda (66.9%) and Bojanala (62.1%) districts. Knowledge of HIV status prior to pregnancy among pregnant women was the lowest in Dr Ruth Sekgomotsi Mompati district (58.1%). ART initiation prior to pregnancy was higher than the national average (91.1%) in Bojanala (91.7%) and Dr Ruth Sekgomotsi Mompati (91.8%) districts.

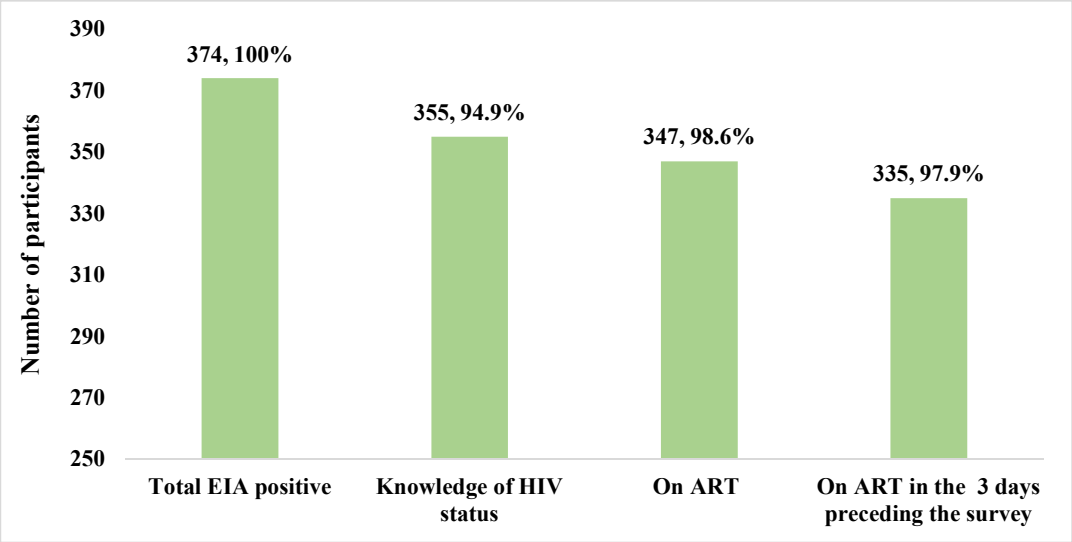


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 48: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, North West, 2017

PMTCT cascade

In the North West Province, 94.9% of HIV-positive pregnant women attending follow-up visit knew their HIV status. Of those women who were aware of their HIV status, 98.6% were initiated on ART, and 97.9% of those where were on ART reported taking ART in the 3 days preceding the survey (Figure 49).



Weighted percentages

Figure 49: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, North West, 2017

Western Cape

Sample size realization and demographic characteristics

The total sample size in the Western Cape province was 3,571. Sample size realization was 98.8%. The highest sample size realization (104.0%, 938) was in the city of Cape Town Metropolitan Municipality and the lowest sample size realization (92.4%, 844) was in Cape Winelands district (Annexure 4). The largest proportion of participants (31.9%) were in the 20−24 years age group and lowest was observed in the age group ≥40 (1.9%) (Figure 50).

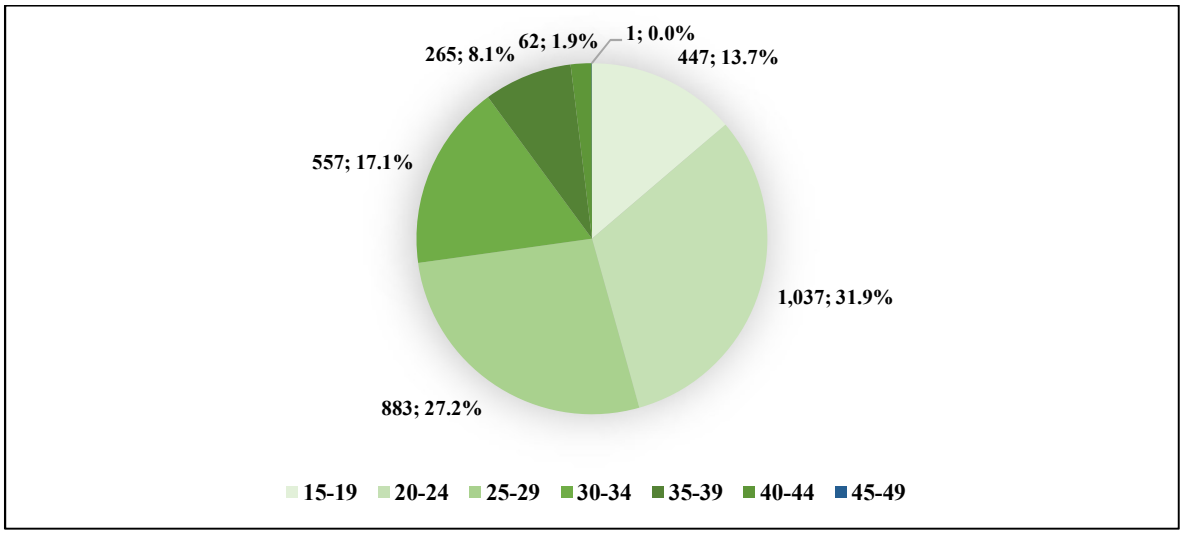
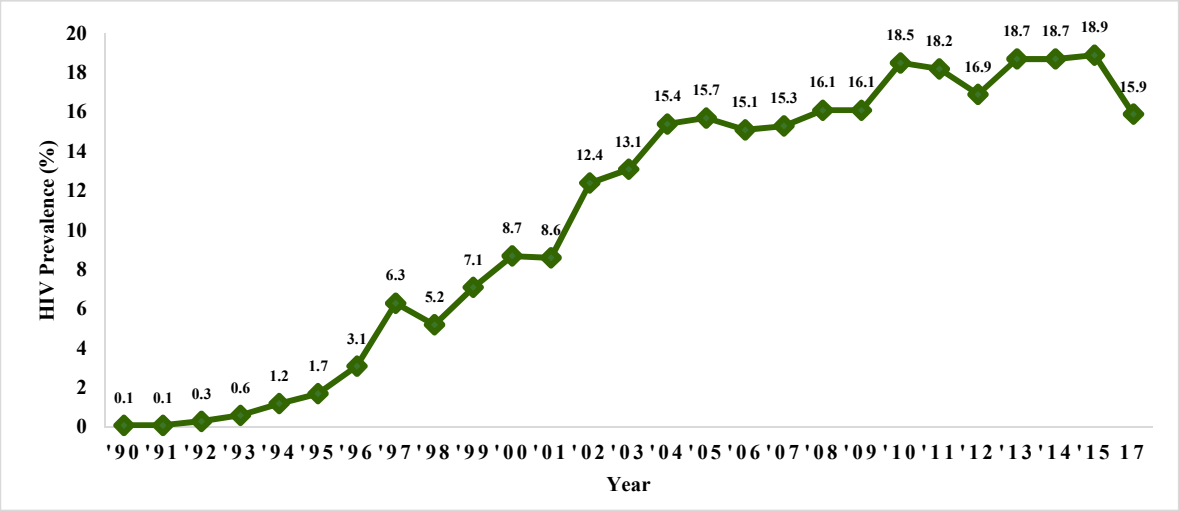


Figure 50: Distribution of survey participants by five-year age group - Western Cape, 2017

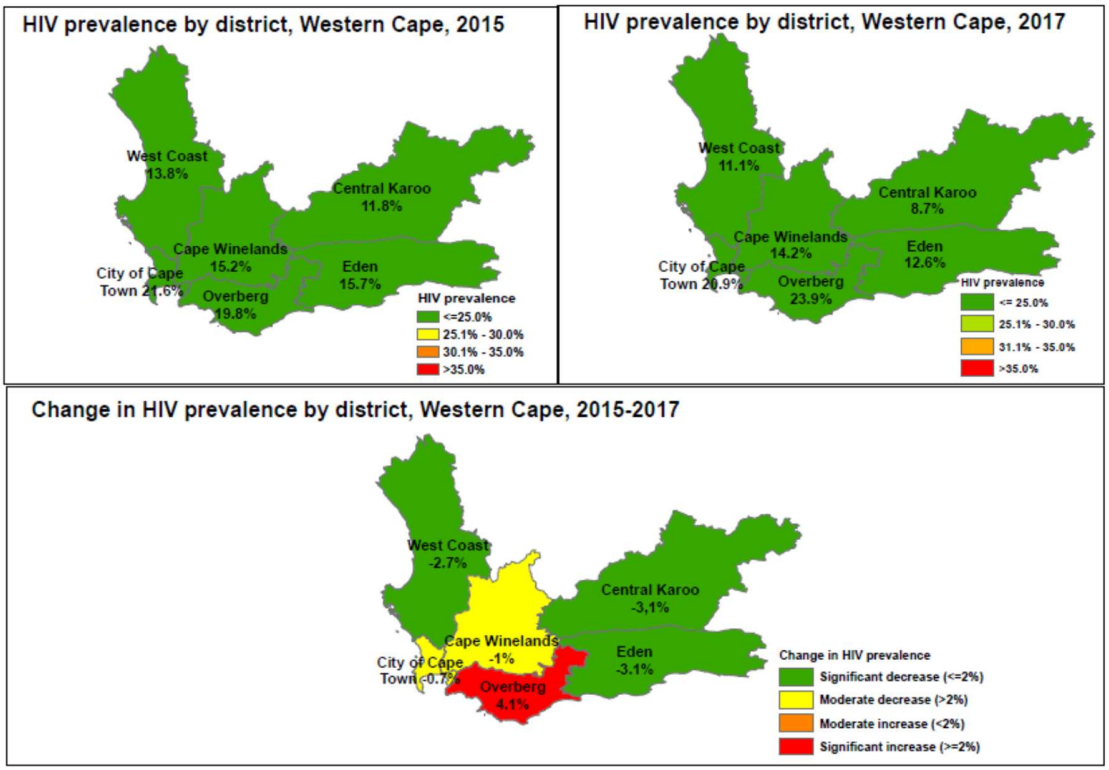
The HIV prevalence rate among pregnant women attending ANC clinics in the Western Cape province had been increasing until 2010; thereafter the prevalence seemed to be stabilizing till 2015 except the slight drop in prevalence that was observed in 2012 (Figure 51). The prevalence has dropped by 3% from a value of 18.9% (95% CI: 16.4%-21.7) in 2015 to 15.9% (95% CI: 14.2% - 17.8%) in 2017.



The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 51: The HIV epidemic curve among antenatal women, Western Cape, 1990-2017

Map of antenatal HIV prevalence and change in antenatal HIV prevalence by district in Western Cape between 2015 and 2017 is shown in Figure 52. Antenatal HIV prevalence has increased by 4.1% between 2015 and 2017 in Overberg district. In Eden, West Coast and Central Karoo districts antenatal HIV prevalence has declined by 3.1%, 2.7% and 3.1% respectively, between 2015 and 2017, and a moderate decline has been observed in Cape Winelands district.



The prevalence reported is for both first and follow-up visit attendees

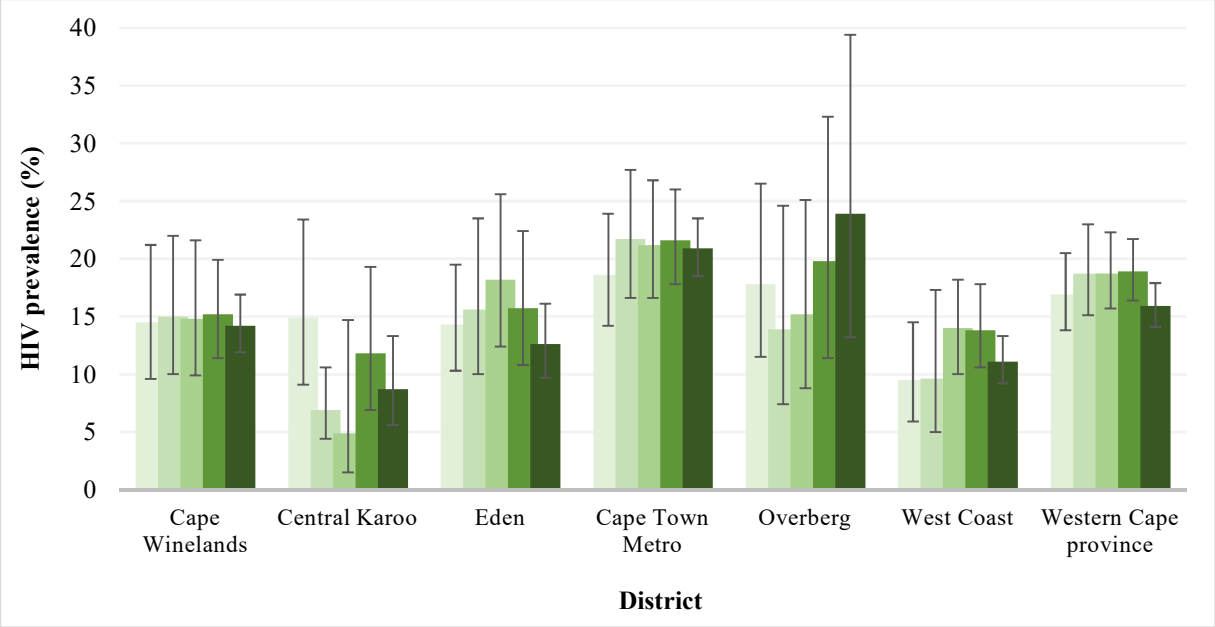
Figure 52: Change in district HIV prevalence estimates – 2015 to 2017, Western Cape

HIV prevalence among antenatal women varied by district between 2012 and 2017 as shown in Table 9 and Figure 53. HIV prevalence has been declining between 2012 and 2017 in Eden and Cape Winelands districts, except the slight bump that was observed in 2014 in Eden whereas antenatal HIV prevalence has been increasing in Overberg and West Coast districts in the same period. The HIV prevalence in the Cape Town Metro appeared to be stabilizing around 21%.

District	2012		2013		2014		2015		2017	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Cape Winelands	14.5	9.6 - 21.2	15.0	10.0 - 22.0	14.8	9.9 - 21.6	15.2	11.4 - 19.9	14.2	11.9-16.9
Central Karoo	14.9	9.1 - 23.4	6.9	4.4 - 10.6	4.9	1.5 - 14.7	11.8	6.9 - 19.3	8.7	5.6-13.3
Eden	14.3	10.3 - 19.5	15.6	10.0 - 23.5	18.2	12.4 - 25.6	15.7	10.8 - 22.4	12.6	9.7-16.1
Cape Town Metro	18.6	14.2 - 23.9	21.7	16.6 - 27.7	21.2	16.6 - 26.8	21.6	17.8 - 26.0	20.9	18.5-23.5
Overberg	17.8	11.5 - 26.5	13.9	7.4 - 24.6	15.2	8.8 - 25.1	19.8	11.4 - 32.3	23.9	13.2-39.4
West Coast	9.5	5.9 - 14.5	9.6	5.0 - 17.3	14	10.6 - 18.2	13.8	10.6 - 17.8	11.1	9.2-13.3
Western Cape province	**16.9**	**13.8 - 20.5**	**18.7**	**15.1 - 23.0**	**18.7**	**15.7 - 22.3**	**18.9**	**16.4 - 21.7**	**15.9**	**14.2-17.8**

The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Table 9: HIV prevalence by district in the Western Cape province, 2012 to 2017

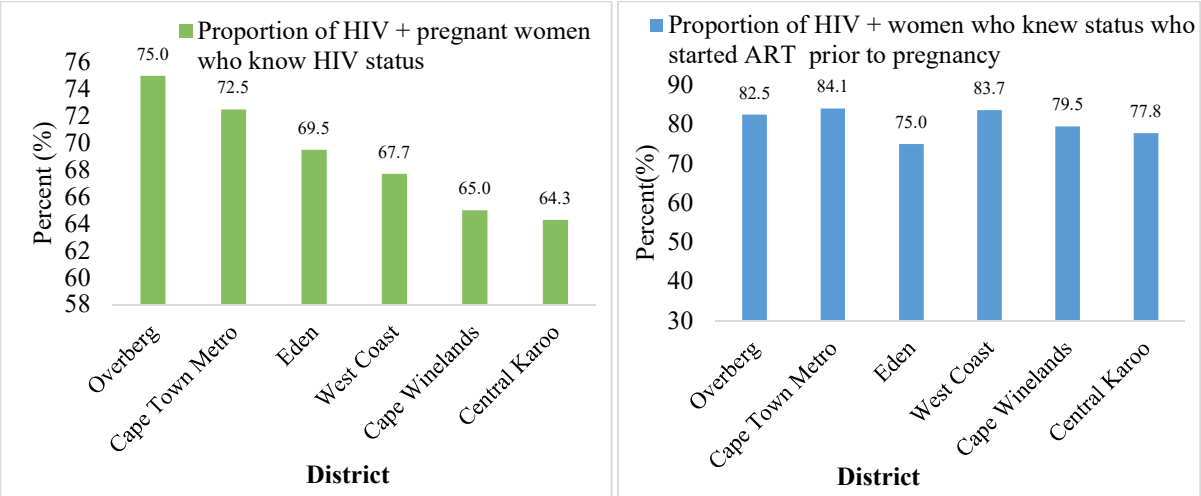


The prevalence reported in 2015 and 2017 is for both first and follow-up visit attendees

Figure 53: HIV prevalence trend by district, 2012-2017, Western Cape

Knowledge of HIV-positive status and ART initiation prior to pregnancy

HIV status knowledge prior to pregnancy among pregnant women was 70.0% in the Western Cape province; 81.4% of those who knew their status prior to pregnancy was initiated on ART prior to pregnancy (Figure 54). Knowledge of HIV status and ART initiation prior to pregnancy among pregnant women differed by district. Knowledge of HIV status prior to pregnancy was higher than the national average (60.8%) in all six districts. The highest proportion of pregnant women who reported knowledge of HIV-positive status prior to pregnancy were from Overberg (75.0%) and Cape Town Metropolitan (72.5%) districts. ART initiation prior to pregnancy among those who were aware of their HIV status prior to pregnancy was lower than the national average (91.1%) in all six districts.

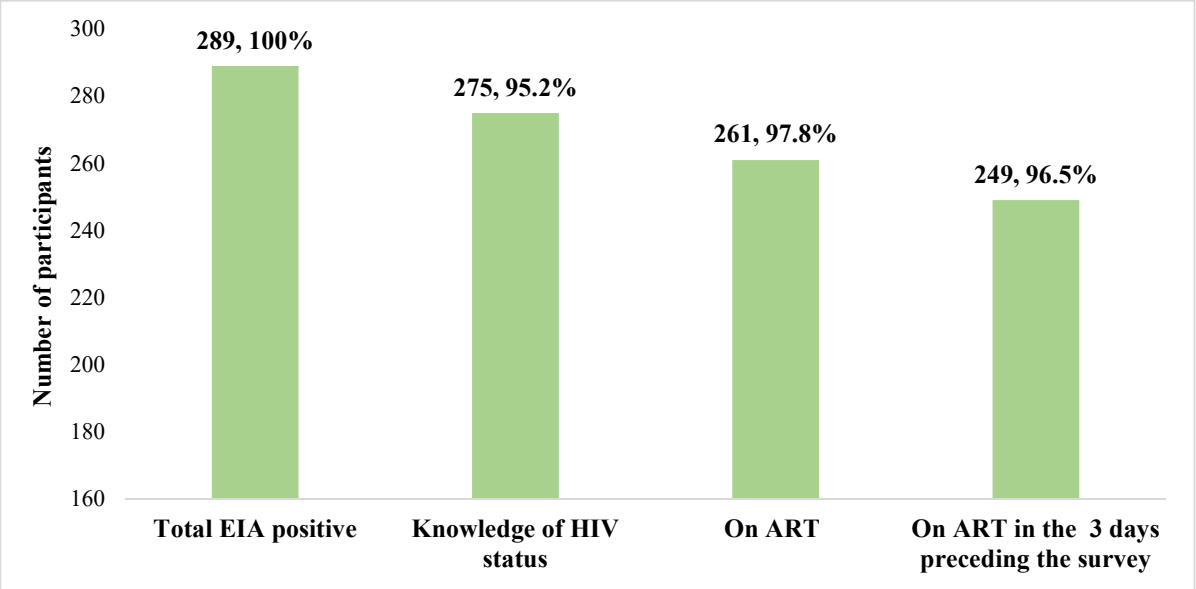


Denominator for knowledge of HIV-positive status prior to pregnancy was EIA positives.
Denominator for ART initiation prior to pregnancy was the number of HIV-positive women who were aware of their HIV-positive status prior to pregnancy

Figure 54: Knowledge of HIV-positive status and ART initiation prior to pregnancy by district, Western Cape, 2017

PMTCT cascade

Knowledge of HIV status among HIV-positive pregnant women attending follow-up visits was 95.2%; 97.8% of women who were aware of their HIV status were on ART (Figure 55). Among women who were on ART, 96.5% reported taking ART in the 3 days preceding the survey.



Weighted percentages

Figure 55: PMTCT cascade among HIV-positive pregnant women attending follow-up ANC visit, Western Cape, 2017

Annexure 4: Sample size realization by district, geo-type and size

1. Sample size realization by district

Table 1: sample size realization by district

Province	District	Planned sample size	Sample size collected	Sample size realization
Eastern Cape	ec Oliver Tambo District Municipality	1143	949	83.0
Eastern Cape	ec Buffalo City Metropolitan Municipality	545	441	80.9
Eastern Cape	ec Joe Gqabi District Municipality	528	402	76.1
Eastern Cape	ec Alfred Nzo District Municipality	596	453	76.0
Eastern Cape	ec Sarah Baartman District Municipality	510	373	73.1
Eastern Cape	ec Nelson Mandela Bay Municipality	876	634	72.4
Eastern Cape	ec Chris Hani District Municipality	577	400	69.3
Eastern Cape	ec Amathole District Municipality	563	388	68.9
Free State	fs Mangaung Metropolitan Municipality	648	669	103.2
Free State	fs Fezile Dabi District Municipality	489	499	102.0
Free State	fs Lejweleputswa District Municipality	560	553	98.8
Free State	fs Thabo Mofutsanyana District Municipality	657	646	98.3
Free State	fs Xhariep District Municipality	378	367	97.1
Gauteng	gp City of Tshwane Metropolitan Municipality	930	985	105.9
Gauteng	gp City of Johannesburg Metropolitan Municipality	1015	1043	102.8
Gauteng	gp West Rand District Municipality	1144	1171	102.4
Gauteng	gp City of Ekurhuleni Metropolitan Municipality	1132	1129	99.7
Gauteng	gp Sedibeng District Municipality	529	516	97.5
KwaZulu-Natal	kz uMzinyathi District Municipality	719	756	105.1
KwaZulu-Natal	kz uMgungundlovu District Municipality	963	955	99.2

KwaZulu-Natal	kz Harry Gwala District Municipality	608	595	97.9
KwaZulu-Natal	kz eThekwini Metropolitan Municipality	960	936	97.5
KwaZulu-Natal	kz uThukela District Municipality	748	713	95.3
KwaZulu-Natal	kz Zululand District Municipality	736	699	95.0
KwaZulu-Natal	kz Amajuba District Municipality	738	696	94.3
KwaZulu-Natal	kz uMkhanyakude District Municipality	614	563	91.7
KwaZulu-Natal	kz King Cetshwayo District Municipality	749	685	91.5
KwaZulu-Natal	kz Ugu District Municipality	932	804	86.3
KwaZulu-Natal	kz iLembe District Municipality	982	840	85.5
Limpopo	lp Vhembe District Municipality	656	627	95.6
Limpopo	lp Sekhukhune District Municipality	466	403	86.5
Limpopo	lp Capricorn District Municipality	868	742	85.5
Limpopo	lp Mopani District Municipality	560	448	80.0
Limpopo	lp Waterberg District Municipality	617	427	69.2
Mpumalanga	mp Gert Sibande District Municipality	570	585	102.6
Mpumalanga	mp Ehlanzeni District Municipality	1219	1219	100.0
Mpumalanga	mp Nkangala District Municipality	1175	1066	90.7
North West	nw Dr Ruth Segomotsi Mompati District Municipality	562	486	86.5
North West	nw Bojanala Platinum District Municipality	1126	910	80.8
North West	nw Dr Kenneth Kaunda District Municipality	683	449	65.7
North West	nw Ngaka Modiri Molema District Municipality	693	411	59.3
Northern Cape	nc Pixley ka Seme District Municipality	322	312	96.9
Northern Cape	nc Frances Baard District Municipality	381	359	94.2
Northern Cape	nc Namakwa District Municipality	92	82	89.1
Northern Cape	nc Zwelentlanga Fatman Mgcawu District Municipality	409	364	89.0
Northern Cape	nc John Taolo Gaetsewe District Municipality	467	395	84.6
Western Cape	wc City of Cape Town Metropolitan Municipality	902	938	104.0

Western Cape	wc Eden District Municipality	678	676	99.7
Western Cape	wc Central Karoo District Municipality	164	162	98.8
Western Cape	wc West Coast District Municipality	609	596	97.9
Western Cape	wc Overberg District Municipality	377	355	94.2
Western Cape	wc Cape Winelands District Municipality	913	844	92.4

1. Sample size realization by geo-type and size

Comparison of the proportion of sample size collected from urban, rural and peri-urban sites with the annual ANC visit volume (for 2016) showed both urban, rural and peri-urban sites are adequately represented at national level (Table 1). At province level, in 7 out of the 9 provinces (except Gauteng and Western Cape), urban sites had slightly higher (5-10% higher) representation than rural and peri-urban areas.

Geo-type	ANC volume (2016)		ANC survey		Planned Sample Size	Sample size realization (%)
	N	%	N	%		
Peri-Urban	70,324	7.3	2,652	8.1	2,906	91.3
Rural	297,045	30.8	10,147	31.0	11,851	85.6
Urban	596,959	61.9	19,917	60.9	21,258	93.7
Total	**964,328**	**100.0**	**32,716**	**100.0**	**36,015**	**90.8**

Table 1: Representation of rural, peri-urban and urban geographical types in the2017 antenatal survey

The survey oversampled large clinics. Small clinics were not adequately represented (Table 2).

Size	ANC volume (2016)		ANC survey	
	N	%	N	%
Small	101,675	10.5	2,112	6.5
Medium	257,336	26.7	8,016	24.5
Large	605,317	62.8	22,588	69.0
Total	**964,328**	**100.0**	**32,716**	**100.0**

Table 2: Representation of small, medium and large clinics in the 2017 antenatal survey