# South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017

## TOWARDS ACHIEVING THE UNAIDS 90-90-90 TARGETS

**Collaborators:**

HSRC Human Sciences Research Council

health Department: Health REPUBLIC OF SOUTH AFRICA

CDC Centers for Disease Control and Prevention

saMRC

GLOBAL LABS

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

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*In memory of the late Mr Nico Jacobs, who passed away after a lengthy battle with cancer on the 22nd of June 2019.*

*He was responsible for the financial management of the 2008, 2012 and 2017 national household surveys. His hard work and dedication is appreciated by the team that worked with him to make this survey series a success.*

*May his soul rest in peace.*

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# FOREWORD

As the Chair of the South African National AIDS Council (SANAC), I am entrusted with the coordination of the response to address HIV and AIDS. Our vision as SANAC is to have a South Africa free from the burden of HIV, TB and STIs. This vision is underpinned by the commitment to **zero** new HIV and TB infections, **zero** preventable HIV and TB deaths and **zero** HIV and TB discrimination. The National Strategic Plan (NSP) 2017–2022 sets out eight goals and the Fifth South African National Prevalence, Incidence, Behaviour and Communication Survey (SABSSM V) supports Goal 8 of the NSP, namely, to strengthen strategic information to drive progress towards achieving the NSP goals. The survey contributes to the monitoring and surveillance of the South African HIV epidemic and assists SANAC to assess the progress being made towards zero new HIV infections and zero HIV discrimination as was articulated in the NSP.

The *2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey* represents the fifth wave in a series of cross-sectional surveys, which are conducted every few years by a research consortium led by the HSRC. The consortium includes local researchers from the National Department of Health (NDoH), the South African National AIDS Council (SANAC), the South African Medical Research Council (MRC), the National Institute of Communicable Diseases (NICD), Global Clinical & Viral Laboratories (GCVL) and the University of Cape Town (UCT). International collaborators are also involved, from the US Centers for Disease Control and Prevention (CDC), the Joint United Nations Programme on HIV/AIDS (UNAIDS), the United States Agency for International Development (USAID) and the United Nations Children's Fund (UNICEF). Previous studies were conducted in 2002, 2005, 2008 and 2012.

As with previous surveys, this survey was aimed at determining the HIV status and exposure to antiretroviral medicine (ARV) among South Africans, and identifying the prevalence of behavioural and social factors that place South Africans at risk of contracting the virus. One objective of the survey was to track access to different types of HIV health education and communication interventions and to evaluate several national HIV communication programmes. For the first time, this survey assessed the level of resistance to ARVs by people already on the treatment programme and assessed viral load suppression among those who tested positive. This report is crucial for government, policy-makers and other stakeholders as it outlines the country's progress towards reaching the UNAIDS 90–90–90 targets. These targets mean that 90% of people living with HIV should know their HIV status, and 90% of people who know their status should be on ARVs to ensure that 90% of all patients receiving ARV therapy are virologically suppressed.

I am delighted to present this report titled *South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017* to all stakeholders involved in SANAC and indeed also to all South Africans as well as our loyal friends both locally and internationally who are engaged in the fight against HIV/AIDS with us. I trust that readers will find it useful for assessing the state of the South African HIV epidemic.

In the report, the authors state that South African has made significant progress towards the UNAIDS 90–90–90 targets. Improvements in HIV-testing, increasing awareness of HIV status, and improved treatment of people living with HIV are encouraging. Medical male circumcision has increased significantly since 2012. Steady progress has been made in reducing new HIV infections, with the biggest decline among females.

Although new HIV infections have reduced, the problem remains deeply concerning and requires that we double our efforts to prevent new infections. We must address the

associated social factors, such as age-disparate relationships, inconsistent condom use and early sexual debut.

The survey also found high levels of resistance to first line ARVs among people who had defaulted from treatment. We therefore must work together to ensure that as more people access treatment, we must maintain and strengthen the structures that support them to remain on treatment.

The researchers have also shown that people living in informal areas of the country continue to be most-at-risk for HIV, with a higher HIV incidence than people in other areas. This suggests that a strong multi-sectoral approach is necessary if we want to address socioeconomic challenges that continue to fuel the epidemic.

We appreciate the financial resources that the following organisations have contributed to this survey: the US President's Emergency Plan for AIDS Relief (PEPFAR) through the US Centers for Disease Control and Prevention (CDC) (Cooperative Agreement #GH001629), the Department of Science and Technology, the South African National AIDS Council, the Global Fund, Right to Care, UNICEF, USAID through the Centre for Communication Impact, Soul City and loveLife.

In conclusion, I encourage all those who are working on HIV in South Africa and abroad to use this research report as a reference. May you continue to find ways to prevent new infections and to provide the appropriate treatment and care to those in need.

**Mr David Mabuza**
Deputy President of the Republic of South Africa, and
Chairperson of the South African National AIDS Council (SANAC)

# ACKNOWLEDGEMENTS

We would like to acknowledge the contribution of the people and organisations listed below, for their time and effort in making this survey – the fifth of its kind – a resounding success. We also wish to thank the people of South Africa who willingly opened their doors and hearts to give us private information about themselves for the sake of contributing to a national effort to contain the spread of HIV. Thousands were willing to give blood specimens for testing. This enabled us to estimate the HIV prevalence and incidence, the number of people living with HIV in South Africa, and their viral loads and the level of resistance to antiretroviral drugs. We thank them sincerely for their generosity. Without their participation, we would not have been able to provide critical information necessary for planning more effective HIV prevention and treatment as well as care and support for people living with HIV. Their data can help to mitigate the impact of HIV and AIDS in South Africa.

We are grateful to our international partners, the US President's Emergency Plan for AIDS Relief (PEPFAR), for funding which we received through their cooperative agreement (grant number 5U2GPS000570) with the US Centers for Disease Control and Prevention (CDC). Without this financial support, the study would not have been possible. We also thank the South African National AIDS Council for securing some support for the survey from the Global Fund to Fight AIDS, Tuberculosis and Malaria through the organisation Right to Care. We are also grateful to Soul City, Love Life, the Centre for Communication Impact, the US Agency for International Development, and the United Nations Children's Fund (UNICEF) for co-funding the study.

We appreciate the unwavering support of our research consortium members: South African Medical Research Council, CDC, National Institute for Communicable Diseases (NICD), the Division of Pharmacology Laboratory at the University of Cape Town, and the Global Clinical & Viral Laboratory in Durban.

We also acknowledge the contribution of the local Expert Review Panel members, namely: Mr Pholo Ramothwala, Dr Amala Reddy, Dr Ayesha Kharsany, Ms Phumla Williams, Mr Thulani Masilela, Dr Jonathan Levin, Prof. Deenan Pillay, Dr Kaymarlin Govender, Dr Kevin Kelly, Prof. Carl Lombard, Dr Brian Chirombo, Dr Victoria Pillay-van Wyk, Prof. Yunus Moosa, Dr Jinkhou Zhou and Dr Ali Feizzadah. The panel was chaired by Prof. Helen Rees of the Wits Reproductive Health and HIV Institute. We thank the panel for reviewing our draft report for technical soundness. Additional reviews were received from CDC and from UNICEF headquarters in New York, for which we are grateful.

Many HSRC staff members worked on this large project and we would like to thank them individually. Thanks are due to all the provincial coordinators, the data team and the HIV Testing Services (HTS) managers, who assisted with quality control throughout the study and stayed away from home for long periods. Without them, the study would not have been possible. They are Ms Lebogang Seutlwadi, Dr Yogandra Naidoo, Dr Jacqueline Mthembu, Ms Lehlogonolo Makola, Ms Nthabiseng Malope, Mr Adlai Davids, Ms Tinyiko Chauke, Ms Philile Lukhele, Ms Salome Sigida, Mr Ephafrus Mashatola, Ms Goitse Mafoko, Mr Krish Chetty, Mr Lwando Kondlo, Ms Tebogo Matjokotja, Mr Joel Makhubela, Mr Nhlanhla Sihlangu, Mr Thabiso Tshethlo, Ms Ntombi Mbelle and Dr Rebecca Tadokera.

We would like to thank the programme managers and project administrators who worked tirelessly on the project: Ms Claudia Nyawane, Mr Nicholas Jacobs, Ms Yolande Shean, Ms Faith Ngoaile, Ms Shirley Ilunga, Ms Thembisa Nkomo, Mr Phineas Modiegi Nkoana, Mr Tshepo Sekole, Ms Sue Samuels, Ms Jill Ramlochan, Ms Sinazo Ndiki, Ms Lauren

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Special thanks are due to Ms Yolande Shean and Ms Bridgette Prince. They led the communications team and worked tirelessly to ensure that the advocacy component was efficiently managed throughout the country.

Over 400 fieldwork staff members participated in implementing the survey in various communities across the country. We thank everybody who served as supervisors, fieldworkers, HTS counsellors and drivers. Without them, the survey would not have been possible. We are also grateful to PEPFAR HTS partners and the non-governmental organisations that helped to provide rapid HTS: Thlowana-e-Molomo, Petsana Child Forum, Right to Care, Department of Health, Lifeline, Muslim AIDS Program, Aurum, New Start, Zakheni Development Centre, Agri-AIDS, TB HIV Care, Khethimplilo, Mfesane, Society of Family Health, CareWorks, Mfesane and Health Systems Trust. Finally, we would like to acknowledge the excellent cooperation that we received from the Department of Health, Northern Cape Provincial Government, who provided us with their HTS counsellors. The counsellors accompanied our research teams into people's homes, to provide rapid HIV-testing for those who wished to know their HIV status immediately as part of the survey.

We are also grateful to Dr Eduard Grebe and Prof. Alex Welte from the DST-NRF South African Centre of Excellence in Epidemiological Modelling and Analysis (SACEMA). They gave critical input regarding the calculation of HIV-incidence estimates presented in this report.

No acknowledgement would be complete without recognising the contributions of two esteemed colleagues, who have been pivotal to the success of this survey series since its inception. First, we wish to thank Prof. Olive Shisana, who founded this survey series and led the first four surveys. Second, we thank Prof. Thomas Rehle, founder of the Epidemiology and Strategic Information Unit of the HIV/AIDS, Sexually Transmitted Infections & TB division of the HSRC. He contributed his epidemiological insights and proficiency in this series, especially in the laboratory aspects, including incidence estimation. We are most grateful to them both for their expert leadership of the SABSSM survey series. Their respective inputs on the survey protocols, combined with their unwavering support and guidance during the writing of this report, were vital for the quality of the work delivered in this project.

Last but not least, we would like to thank our own families for their unflinching support and love during all the phases of this survey. Their endurance was especially valued during the fieldwork and writing up of this report.

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AGYW | adolescent girls and young women |
| ARV | antiretroviral |
| CDC | United States Centers for Disease Control and Prevention |
| CI | confidence interval |
| DBS | dried blood spot |
| DREAMS | determined, resilient, empowered, AIDS-free, mentored, and safe partnerships |
| DRM | drug resistant mutation |
| EDTA | ethylenediaminetetraacetic acid |
| EIA | enzyme immunoassay |
| FRR | false recent rate |
| HIVDR | HIV drug resistance |
| HPLC | high performance liquid chromatography |
| HSRC | Human Sciences Research Council |
| HTS | HIV-testing service |
| IPV | intimate partner violence |
| LAg | Limiting-Antigen |
| MDRI | mean duration of recent infection |
| MMC | medical male circumcision |
| MOS | measure of size |
| MRM | multiple reaction monitoring |
| MSP | multiple sexual partners |
| MTCT | mother-to-child transmission |
| NAAT | nucleic acid amplification test |
| NDoH | National Department of Health |
| NGO | non-governmental organisation |
| NICD | National Institute for Communicable Diseases |
| NNRTI | non-nucleoside reverse transcriptase inhibitor |
| NRTI | nucleoside reverse transcriptase inhibitor |
| NSP | National Strategic Plan of HIV & AIDS and STIs, 2012–2016 |
| PCR | polymerase chain reaction |

| | |
|---|---|
| PEPFAR | United States President's Emergency Plan for AIDS Relief |
| PHIA | population-based HIV impact assessment |
| PMTCT | prevention of mother-to-child transmission (of HIV) |
| PSU | primary sampling unit |
| REC | Research Ethics Committee |
| RNA | ribonucleic acid |
| SABSSM | South African HIV Behavioural, Sero-Status and Media Impact Survey |
| SACEMA | South African Centre for Epidemiological Modelling and Analysis |
| SAL | small area layer |
| SAMRC | South African Medical Research Council |
| SANAC | South African National AIDS Council |
| SBCC | social and behavioural change communication |
| SSU | secondary sampling unit |
| STI | sexually transmitted infection |
| TB | tuberculosis |
| UNAIDS | Joint United Nations Programme on HIV/AIDS |
| UNGASS | United Nations General Assembly Special Session |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| USU | ultimate sampling unit |
| VL | viral load |
| VMMC | voluntary medical male circumcision |
| VP | visiting point |

**Note on racial terminology:**
During the apartheid regime, legislation divided the South African populace into four distinct population groups based on racial classification. Although the notion of racial groups is now legal history, it is not always possible to gauge the effects of past discriminatory practices, and the progress of policies to eradicate them, without referring to race. For this reason, the HSRC continues to use the terms 'black African', 'coloured', 'white' and 'Indian/Asian' where pertinent to the data analysis.

## Introduction

The *2017 National HIV Prevalence, Incidence, Behaviour and Communication Survey* is the fifth wave in a series of national cross-sectional surveys that have been undertaken every few years since 2002, by a research consortium led by the Human Sciences Research Council (HSRC). The consortium includes local researchers from the South African Medical Research Council, National Institute for Communicable Diseases, Global Clinical & Viral Laboratories and the University of Cape Town. The consortium also includes international researchers from the Centers for Disease Control and Prevention (CDC), the Joint United Nation's Programme on HIV/AIDS (UNAIDS) and the United Nations Children's Fund. Previous studies were conducted in 2002, 2005, 2008 and 2012.

Against the backdrop of the generalised and mature HIV epidemic in South Africa, this report presents prevalence and incidence data that are crucial for government, policy-makers and other stakeholders. This information supports the ongoing efforts to reduce the epidemic in the country and to achieve the 90–90–90 targets. These targets are aimed at ensuring that 90% of people living with HIV know their HIV status, 90% of people with diagnosed HIV infection receive sustained antiretroviral therapy, and 90% of all people receiving antiretroviral treatment achieve viral load suppression by 2020 (UNAIDS 2014a).

## Aims of survey

The aims of the survey were as follows:

- To maintain the surveillance of HIV infection and behaviour in South Africa, and to obtain a better understanding of the factors driving the HIV epidemic.
- To collect data to evaluate the South African National HIV, AIDS and STI Strategic Plan for 2012–2016.
- To collect data to monitor the HIV indicators required for preparing the country reports for various international bodies.

## Objectives of survey

The main objectives of the survey were to undertake the following analyses of a household-level, nationally representative sample of adults and children (aged 0–17 years) in South Africa:

- To estimate the HIV prevalence at national, provincial and selected district levels among adults and children in South Africa.
- To estimate the HIV incidence (annualised rate of new HIV infections) among adults and children in South Africa.
- To estimate the extent of exposure to antiretroviral therapy (ART) and the level of HIV drug resistance (HIVDR) at national, provincial and selected district levels among adults and children in South Africa.
- To review the progress in reaching UNAIDS 90–90–90 goals for total HIV epidemic control.

Furthermore, to undertake the following analyses at the national and provincial levels and for selected districts:

- To describe trends in HIV prevalence, HIV incidence, and risk behaviour for the period 2002–2017.
- To assess the prevalence of self-reported TB, related knowledge and attitudes.
- To assess the relationship between social and behavioural factors and HIV infection.
- To determine the viral load (VL) in HIV-positive individuals and estimate the proportion of persons receiving antiretroviral therapy who are virally suppressed.

- To track the proportion of males who have been circumcised, including voluntary medical male circumcision (VMMC) and traditional circumcision.
- To track access to different types of HIV health education or communication interventions.
- To report on several national HIV communication programmes in South Africa in terms of the following aspects: exposure and coverage; association with knowledge, attitudes and perceptions relating to HIV and AIDS and association with sexual and other risk behaviours.

## Methodology

### Survey design and sampling

This section summarises the survey design, sampling methods and approaches used to collect data from households and individuals, preparation of data for analysis, and analysis of results.

A cross-sectional, population-based household survey was conducted using a multi-stage stratified random cluster sampling approach. The study design and methods were based on the methods used and validated in the previous four surveys conducted by the HSRC in 2002, 2005, 2008 and 2012. The methods included linked anonymous testing with informed consent.

The survey included household members of all ages who resided in households and hostels across South Africa. People residing in educational institutions, old-age homes, hospitals, and uniformed-service barracks were excluded from the sample (as in previous surveys in the series). The steps in the sampling procedure are listed in the text box below.

1. **Define the target population:** All people in South Africa.
2. **Define the sampling frame:** We used the 2015 national population sampling frame of 84 907 small area layers (SALs) developed by Statistics South Africa (StatsSA 2017b). From this sampling frame, we drew 1 000 SALs.[a]
3. **Define primary sampling units (PSUs):** One thousand (1 000) SALs were sampled from the 2015 database of SALs.
4. **Define measure of size (MOS):** The 2011 estimate of visiting points (VPs), MOS was used in sampling 1 000 SALs.
5. **Allocate the sample:** SALs were disproportionately allocated according to province, race group and geographic type (geotype or locality type).
6. **Define strata:** There were 9 provinces ($n$=9) and 3 geotypes or locality types ($n$=3).
7. **Define reporting domains:** Geotype or locality type was $n$=3; age groups were $n$=4; sex was $n$=2; and race group was $n$=4.
8. **Define secondary sampling units (SSUs):** 15 VPs were systematically sampled from each of the selected 1 000 SALs.
9. **Define ultimate sampling unit (USU):** All individuals living in a household were asked to participate in the survey.

a An enumeration area (EA) is a spatial area that is used by Statistics South Africa (StatsSA) to collect census information on the South African population. An EA consists of approximately 180 households in urban areas, and 80 to 120 households in deep rural areas. An EA is considered to be small enough for one person (a census enumerator) to collect information for StatsSA. The country has been subdivided into about 103 576 EAs.

Small area layers were used as the primary sampling unit, drawn from the master sample through stratified, disproportionate sampling. The selection of SALs was stratified by province and locality type and the allocation of SALs was similar to that in the 2012 survey. The number of VPs was used as a MOS for the sampling of SALs. A VP is a physical address or dwelling where a household or a group of households are located, such as a house, shack, vacant stand, hotel, room in a hostel, shop or block of apartments.

In the previous four surveys, locality type was stratified into four levels: urban formal, urban informal (or informal and squatter settlements), rural informal (tribal) and rural formal (farm) areas. In the current survey, only three locality types were used: urban, rural informal (tribal area) and rural formal (farms). Characteristics that were previously used to classify geolocation, such as access to electricity and potable water, became universally accessible and could no longer be used exclusively to determine geolocation, including population density. Oversampling was performed in communities with mainly Indian, coloured or white populations and in the sparsely populated Northern Cape to achieve the sample-size target.

The VPs and households were the SSUs. Fifteen VPs were randomly selected in each SAL. Within each household, all consenting members of the household formed the USU.

**Weighting of the sample**

As was the case in all previous surveys in the series, weighting procedures were devised post hoc, before data analysis, and applied to enrolled individuals. The data file of drawn SALs contained the selection probabilities, of which the inverses are the respective base sampling weights of the SALs. In each sampled SAL, a systematic random sample of 15 VPs was drawn, with VPs in each SAL having the same base weight. As in the previous surveys in the series (see Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014), final weighting procedures with the relevant adjustments were performed before any analysis of the data. The procedures were done as follows: a) the SAL base weight was adjusted to correct for the valid and realised SALs; b) the VP base weight was proportionally adjusted for the number of invalid and unrealised VPs in each SAL; and c) the final VP sampling weight was computed as the product of the SAL sampling weight and the VP sampling weight.

Demographic and HIV-testing information for all household members in the responding SALs was gathered to calculate individual sample weights. These were further adjusted for questionnaire and HIV-testing non-response. In the final step, information at the individual level was integrated and the final sampling weight for each data record was calculated. This weight was equal to the final SAL weight, multiplied by final VP sampling weight, adjusted for individual non-response. The final individual weights were benchmarked against 2017 mid-year population estimates by age, race, sex and province (StatsSA 2017b). This benchmarking ensured that the sample estimates were generalisable to the respective populations of South Africa as per the 2017 mid-year population estimates.

The process of benchmarking was performed in two steps. The first step entailed benchmarking the 1000-SAL sample for the traditional HIV-prevalence survey (Shisana and Simbayi 2002; Shisana et al. 2005, 2009, 2014) against the mid-year estimates for 2017. This process produced a final sample that was representative of the population in South Africa with regard to sex, age, race, locality type and province.

The second step entailed benchmarking the weights from 16 additional districts against the district-level data, based on the 2017 district-level mid-year population estimates, to ensure that the results were representative of these sampled district populations.

### Questionnaires

As in previous surveys, the following four questionnaires were used in this survey:

- Household questionnaire (also known as a visiting-point questionnaire)
- Questionnaire for parents and guardians of children aged 0–11 years
- Questionnaire for children aged 12–14 years
- Questionnaire for people aged 15 years and older

The main focus of the questions was sexual health and behaviour. New modules were added to the previous survey to gather data about tuberculosis (TB), exposure to various HIV communication campaigns and intimate partner violence (IPV). The IPV module was administered to only one eligible randomly selected respondent per household, who was aged 15 years and older.

### Laboratory methods

Laboratory testing was conducted at the accredited laboratories of collaborating institutions. These were the Global Clinical & Viral Laboratories, the National Institute for Communicable Diseases and the University of Cape Town Pharmacology Laboratory.

Dried blood spot (DBS) samples were collected by finger-prick, or by heel-prick in infants. The samples were tested for HIV antibodies using an algorithm with three different enzyme immunoassays (EIAs). All samples that tested positive for HIV during the first two EIAs (Roche Elecys HIV Ag/Ab assay, Roche Diagnostics, Mannheim, Germany; and Genescreen Ultra HIV Ag/Ab assay, Bio-Rad Laboratories, California, USA) were subjected to a nucleic acid amplification test (COBAS AmpliPrep/Cobas Taqman HIV-1 Qualitative Test, v2.0, Roche Molecular Systems, New Jersey, USA). All test results were then interpreted. The HIV infection status among children aged 2 years or less was confirmed by the same nucleic acid amplification test.

The HIV incidence-testing algorithm used a Limiting-Antigen (LAg) Avidity EIA (Maxim Bio-medical, Rockville, USA) combined with information on ART exposure and HIV VL. Exposure to ARVs in HIV-positive specimens was tested through high-performance liquid chromatography (HPLC) coupled with tandem mass spectrometry. VL was measured using the Abbott platform (Abbott m2000 HIV Real-Time System, Abbott Molecular Inc., Des Plaines, Illinois, USA).

In the 2017 survey, for the first time, HIV drug resistance (HIVDR) was tested in HIV-positive samples. Next-generation sequencing was performed using an in-house assay and amplicons were sequenced using MiSeq v2 (Illumina Inc., San Diego, USA). HIVDR testing was conducted on samples from HIV-positive respondents who were either antiretroviral-therapy-negative (ARV-negative) or failing on ART, classified as VL ≥ 1000 copies/mL. DBSs were excised using a DBS puncher, immersed in 2 mL of NucliSENS lysis buffer (Biomerieux, Nürtingen, Germany) and lysed on a roller mixer at room temperature. Total nucleic acid was extracted using the NucliSENS EasyMAG® automated system according to the manufacturer's instructions. Amplification of a 1,084 bp PCR fragment consisting of codons 1–99 of protease and codons 1–250 of reverse transcriptase was performed as previously described (Zhou et al. 2011), with the exception of 400 µM of each primer that was used for reverse-transcription PCR. Editing of sequences was performed using Recall software v2.10 and drug-resistant mutations were identified using the Stanford HIV database algorithm v7.0 (Liu & Shafer 2006).

## Ethical considerations

The survey protocol was approved by the HSRC Research Ethics Committee (REC: 4/18/11/15), the CDC Division of Global HIV and TB (DGHT) and CDC's Center for

Global Health (CGH). The survey adhered to international ethical standards and complied with the South African Children's Act of 2007. Fieldwork staff were employed by the HSRC and trained in research ethics and how to implement informed-consent procedures, to ensure that voluntary informed consent was obtained for all respondents before the interviews. Written or verbal consent or assent was obtained from every person who participated, in line with the survey protocol.

One-on-one interviews were conducted at the home of each respondent, either inside or outside the dwelling. Every effort was made to safeguard the confidentiality of respondents. No personal identifiers such as names were used during the survey. Instead, unique anonymously linked barcodes were scanned onto the electronic questionnaires after they were attached to blood specimens.

## Data management and analysis

Data analyses included cross-sectional analyses of the 2017 survey findings and trend analyses of the key indicator variables collected in the 2002, 2005, 2008, 2012 and 2017 surveys. Basic descriptive analyses and graphical displays were performed for data at the national and provincial levels and for selected districts. A design-based chi-square test was used to test for association and comparison of estimated proportions among categorical variables. Statistical significance was set at a *p*-value of 5% or less. In some cases, non-overlapping 95% confidence intervals (CIs) were used to conclude statistical significance. Other reliability measures were also computed, such as the coefficient of variation, design effects (DEFF) and square root of the design effect (DEFT), which considered the complex survey design and individual sample weight adjustment for HIV non-response.

The results of the analyses are presented in tables and figures. These represent weighted percentages (as described above) and unweighted counts unless otherwise specified. The individual unweighted counts do not always sum to the overall total shown, because of missing data for certain demographic characteristics.

## Results

The following section presents response rates, HIV prevalence, ART exposure, VL suppression, 90–90–90 indicators and behavioural determinants of HIV. This is followed by sections on tuberculosis knowledge and exposure to HIV media campaigns. Results are presented at the national, provincial and district level where applicable.

### Response rates

The survey targeted 15 000 VPs. Of these, 12 435 (82.9%) VPs were approached. Among these VPs, 11 776 (94.7%) were valid VPs. A household response rate of 82.2% was achieved from the valid VPs.

#### *Individual interview response rate*

In the 9 656 VPs that agreed to participate in the survey, 39 132 individuals were eligible to be interviewed and provide a blood sample. Among the eligible individuals, 36 609 (93.6%) agreed to be interviewed. The distribution of non-responses was as follows: 923 (2.4%) individuals were absent from the household or were also classified as missing data and 1 600 (4.1%) individuals refused to be interviewed and were classified as missing data. Females were slightly more likely to participate (95.2%) than males (92.3%). Participation also varied by race, with black Africans having the highest response rate (95.6%), followed by coloureds (92.3%), then whites (89.7%) and Indians/Asians (82.1%).

### *HIV-testing response rate*

Among the 39 132 eligible individuals, 61.1% provided a blood specimen for HIV-testing; the samples were anonymously linked to the completed questionnaires.

### *Categories of non-response*

People who declined to participate in the questionnaire or to provide blood specimens were as follows:

- 12 686 individuals were interviewed but refused to provide a blood sample; this group represented 32.4% of the original 39 132 individuals who were eligible to participate.
- 1 600 individuals (4.1% of all the originally eligible individuals) refused to be interviewed and were classified as missing data.
- 923 individuals (2.4% of the originally eligible individuals) were absent from the household or were classified as missing data.

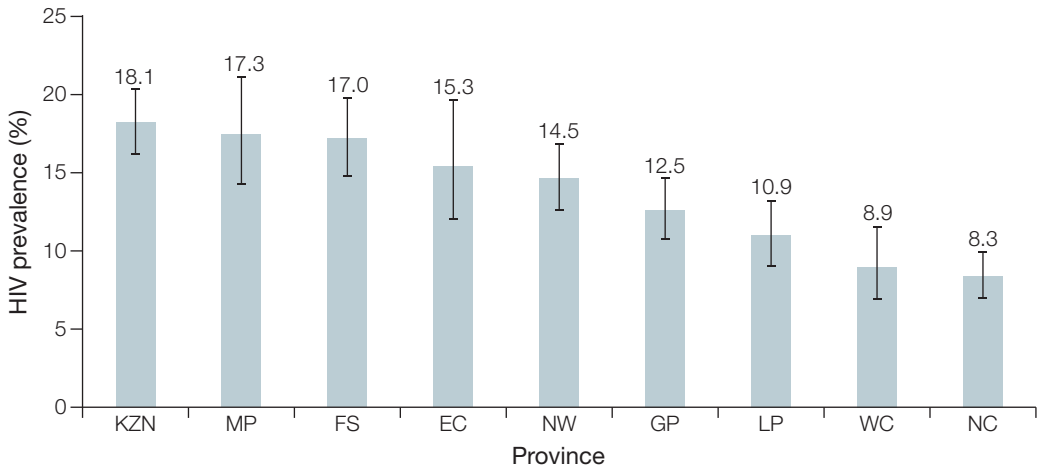
## National HIV prevalence

In 2017, the overall national HIV prevalence estimate for people of all ages who were living in South Africa was 14.0% (95% CI: 13.1–15.0). This figure was significantly higher than the 2012 estimate of 12.2% (95% CI: 11.4–13.1; $p<0.001$). The 2017 estimate translates to an estimated 7.9 million people living with HIV (95% CI: 7.1–8.8 million). It represents an increase of approximately 1.6 million more people living with HIV compared to the 2012 survey estimates. Excluding children younger than 2 years, the prevalence estimate was 14.6%, which is significantly higher ($p<0.001$) than that reported for the same population in 2012 (12.6%; 95% CI: 11.7–13.5) and 2008 (10.9%; 95% CI: 10.0–11.9). These results show a consistent trend of HIV prevalence increasing over time.

## Provincial[b] HIV prevalence

With regard to provincial results, HIV prevalence ranged from 8.3% in Northern Cape to 18.1% in KwaZulu-Natal (see Figure I).

*Figure I: HIV prevalence by province, among people of all ages, South Africa, 2017*




Key: KZN, KwaZulu-Natal; MP, Mpumalanga; FS: Free State; EC: Eastern Cape; N, North West; GP, Gauteng; LP, Limpopo; WC, Western Cape; NC, Northern Cape

b For the purposes of this report, we will refer to all provinces by name without including the word 'province' (i.e. Western Cape or Gauteng).

### HIV prevalence by age and sex

Figure II shows the HIV prevalence across various age ranges, and for males and females. The highest HIV prevalence (26.4%) occurred among people aged 25–49 years. In this population, HIV prevalence was significantly higher among females (33.3%) than males (19.4%). Among children 12 months and younger, where infections were transmitted from mother to child, HIV prevalence was 2.7% in 2017. This was double the 2012 rate (1.3%) but the difference was not statistically significant. The percentages shown in the following graphs refer to each age group rather than the total population for all ages.

Figure III presents the original age categories and breakdown by sex. In all the adult age categories, females carry a disproportionately higher burden of HIV than males. Statistically significant differences by sex were evident from the 20–24-years age group through to the 40–44-years age group. Women aged 20–24 years had an HIV prevalence of 15.6% compared to 4.8% among men ($p$<0.001). The HIV prevalence among women in this age group was comparable to that of men aged 25–29 years (12.4%) and 30–34 years (18.4%). Among people aged 25–29 years, HIV prevalence was more than double among females than males.

Among women, HIV prevalence peaked at 39.4% in the 35–39-years age group, whereas among men it peaked at 24.8% in the 45–49-years age group. HIV prevalence was above 20% for both men and women aged 50–54 years but dropped among people aged 55 years and older. The prevalence among people aged 60 years and older was similar to that among youth aged 15–19 years.

*Figure II: HIV prevalence by selected age groups and sex, South Africa, 2017*

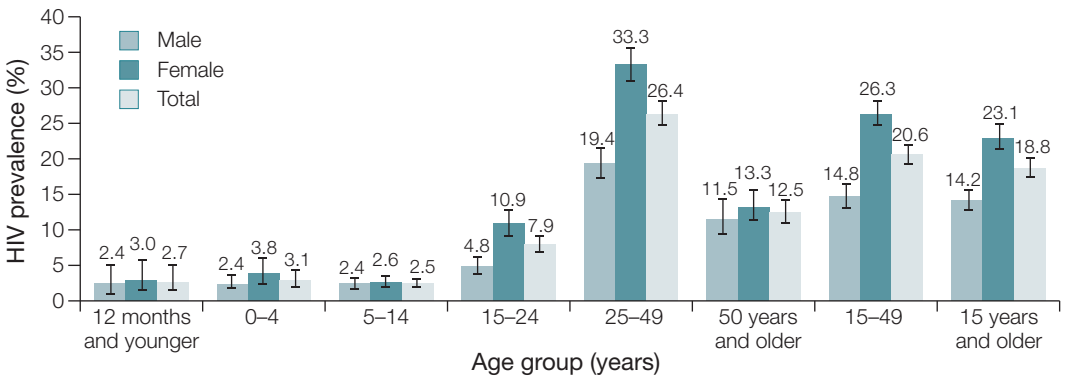
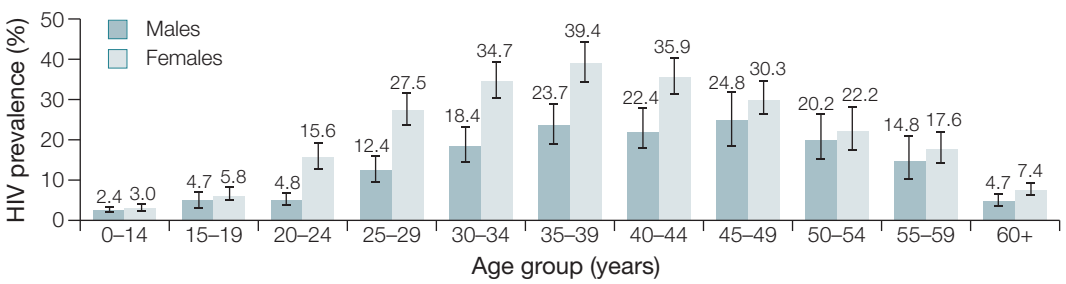


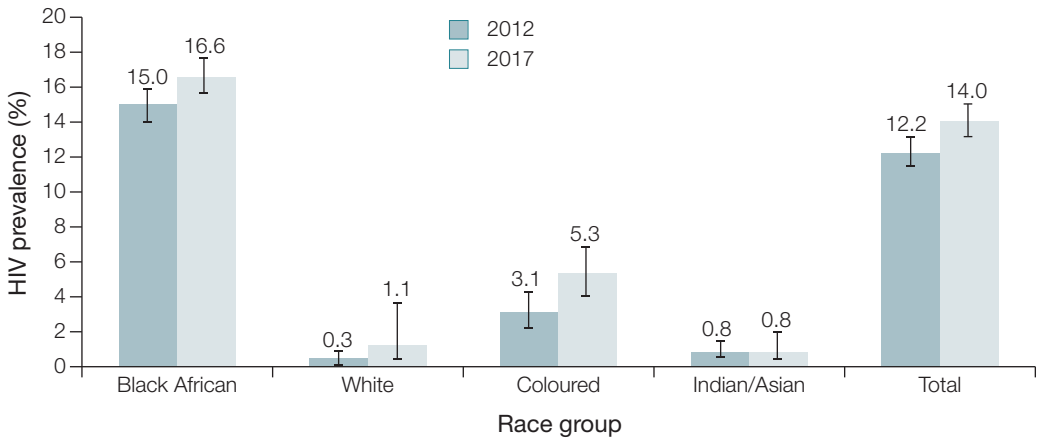

*Figure III: HIV prevalence by age and sex, South Africa, 2017*



### HIV prevalence by race

Figure IV shows that HIV prevalence was higher among black Africans than other races. Compared to 2012, the 2017 results showed a slight increase in HIV prevalence across all race groups except Indians and Asians, among whom the prevalence remained at 0.8%.

*Figure IV: HIV prevalence by race and among people of all ages, South Africa, 2012 and 2017*




### HIV serodiscordance between heterosexual couples and in mother-child pairs

Serodiscordance refers to a situation in which a mother-and-child pair or an adult couple have a mixed HIV status (Ndirangu 2017; Wilton 2015). Of the 1 693 heterosexual couples who provided blood specimens in the survey, 11.3% were serodiscordant. Discordancy involving female HIV-positive and male HIV-negative status (7.9% of 1 693 couples) was more than double the discordancy for male-positive/female-negative (3.4%). Table I shows a cross tabulation for the respondents' sex and HIV status.

*Table I: HIV serodiscordance between couples, South Africa, 2017*

| Female partner HIV status | Male partner HIV status | | Total |
|---|---|---|---|
| | Positive | Negative | |
| **Total** | **181** | **1 512** | **1 693** |
| Positive | 7.3% (6.2–8.7)<br>Sero-concordance: *n*=124 | 7.9% (6.7–9.3)<br>Sero-discordance: *n*=134 | 258 |
| Negative | 3.4% (2.6–4.3)<br>Sero-discordance: *n*=57 | 81.4% (79.5–83.2)<br>Sero-concordance: *n*=1 378 | 1 435 |

**Notes:** 'Female partner' and 'male partner' refer to the primary sexual partners. Totals denote self-identified heterosexual couples. Results are shown as a percentage of this group, with 95% CI in brackets.

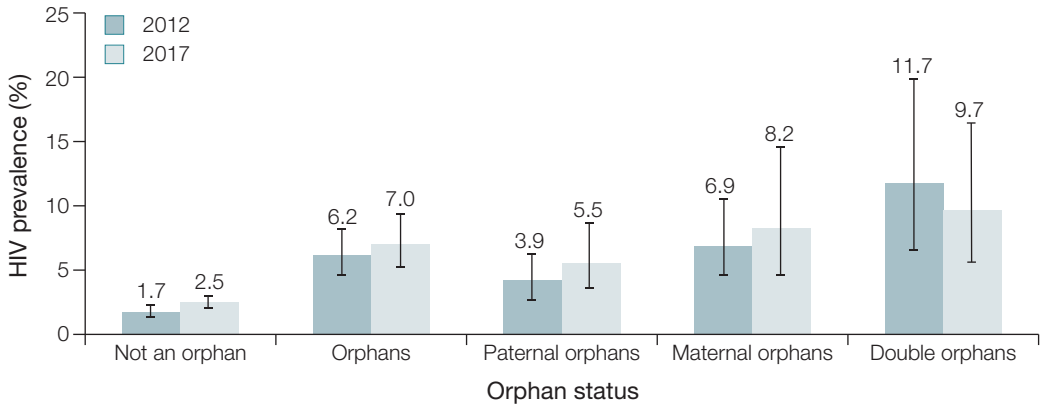
### HIV serodiscordance in mother-and-child pairs

HIV serodiscordance in mother-and-child pairs was high for infants younger than 2 years, and generally high for children younger than 10 years. Among the 415 mother-and-infant child pairs, 90.2% (95% CI: 82.1–94.9) of HIV-positive mothers had an HIV-negative child younger than 2 years. Among the 2 327 mother-and-young-child pairs, 93.6% (95% CI: 91.3–95.3) of HIV-positive mothers had an HIV-negative child younger than 10 years.

### Orphanhood and HIV prevalence

As shown in Figure V, HIV prevalence among orphans was higher than among non-orphans, a finding that was consistent for 2012 and 2017. Children who had lost both parents ('double orphans') had the highest HIV prevalence. Maternal orphans had a higher HIV prevalence than paternal orphans.

*Figure V: HIV prevalence by orphanhood status among children aged 0–18 years, South Africa, 2017*




### Exposure to antiretroviral treatment

Among all people living with HIV, 62.3% (95% CI: 59.2–65.2) were receiving ART, as determined by the presence of antiretroviral drugs in their blood at the time of the interview. This translates to an estimated 4.4 million people (95% CI: 3.9–4.9 million) who were living with HIV and receiving ART in South Africa in 2017. KwaZulu-Natal had the highest ART exposure (69.8%) or 1.2 million people living with HIV who were on ART, followed closely by the Eastern Cape (68.2%; *n*=653 000) and Mpumalanga (65.5%; *n*=437 000). Gauteng had the lowest ART exposure (53.7%) with 896 191 people receiving ART. Proportionately more females (65.5%) were on ART than males (56.3%). Among adults, the proportion of people on ART increased with age from 15 years up. Table II presents the 2017 data on ART.

*Table II: Exposure to antiretroviral treatment among people living with HIV who provided blood specimens for ARV testing, by sex, age, race and province, South Africa, 2017*

| Demographic variable | Estimated number of people on ART | Proportion of people with HIV on ART[b] % (95% CI) |
|---|---|---|
| **Total[a]** | **4 402 000** | **62.3 (59.25–65.2)** |
| **Sex** | | |
| Males | 1 404 000 | 56.3 (51.0–61.5) |
| Females | 2 998 000 | 65.5 (62.4–68.4) |
| **Age group (years)** | | |
| 0–14 | 131 000 | 50.0 (36.6–63.3) |
| 15–24 | 274 000 | 39.9 (32.1–48.3) |
| 25–49 | 3 244 000 | 63.1 (59.2–66.8) |
| 50 and older | 753 000 | 76.7 (71.3–81.4) |
| 15–49 | 3 518 000 | 60.4 (57.0–63.6) |
| **Race[a]** | | |
| Black African | 4 284 000 | 62.6 (59.5–65.6) |
| Other | 118 000 | 51.3 (36.4–66.1) |
| **Province** | | |
| Western Cape | 284 000 | 53.9 (43.1–64.4) |
| Eastern Cape | 653 000 | 68.2 (60.5–75.0) |
| Northern Cape | 51 000 | 55.1 (42.3–67.3) |
| Free State | 280 000 | 62.8 (52.3–72.2) |
| KwaZulu-Natal | 1 248 000 | 69.8 (63.6–75.4) |
| North West | 258 000 | 57.6 (50.2–64.8) |
| Gauteng | 896 000 | 53.7 (46.5–60.7) |
| Mpumalanga | 437 000 | 65.5 (58.0–72.3) |
| Limpopo | 296 000 | 61.7 (51.7–70.9) |

**Notes:**
a Totals include missing demographic data
b These results reflect the survey sample, namely people living with HIV who provided blood specimens for ARV testing.

### HIV incidence

Incidence estimates provide critical insight into the dynamics of the HIV epidemic and are the most direct means of assessing the impact of HIV-prevention programmes. HIV incidence is also the biomarker of choice to examine the association between recent infection and recent behaviours or behavioural changes. The HIV-incidence analysis in this survey is based on a laboratory-based testing algorithm. The parameters in the algorithm were aligned to the most recent guidelines for estimating HIV incidence in population-based surveys (UNAIDS, 2018; WHO, 2018).

Table III presents HIV-incidence estimates in both relative terms (% per year) and absolute terms (number of new infections per year). The overall HIV incidence for 2017 for people aged 2 years and older was 0.48% (95% CI: 0.42–0.54), translating to an estimated 231 100 new infections. More new infections occurred in females than in males. Youth aged 15–24 years had the highest incidence, at an estimated 88 400 new infections in 2017.

*Table III: HIV incidence (%) and number of new infections by age and sex, South Africa, 2017*

| Age groups (years) | Sex | Incidence % (95% CI) | Number of new infections *n* (95% CI) |
|---|---|---|---|
| **2 and older** | **Total** | **0.48 (0.42–0.54)** | **231 100 (211 900–260 400)** |
| | Male | 0.46 (0.39–0.51) | 109 200 (92 600–121 100) |
| | Female | 0.51 (0.43–0.59) | 121 900 (102 800–141 000) |
| **2–14** | **Total** | **0.13 (0.03–0.23)** | **18 200 (4 200–32 200)** |
| | Male[a] | – | – |
| | Female[a] | – | – |
| **15–24** | **Total** | **1.0 (0.86–1.15)** | **88 400 (76 000–101 600)** |
| | Male | 0.49 (0.27–0.71) | 22 200 (19 400–29 500) |
| | Female | 1.51 (1.31–1.71) | 66 200 (57 500–75 000) |
| **25 and older** | **Total** | **0.48 (0.40–0.59)** | **124 600 (103 800–153 100)** |
| | Male | 0.54 (0.48–0.60) | 70 200 (62 400 78 000) |
| | Female | 0.45 (0.39–0.51) | 54 400 (47 100–61 600) |
| **15–49** | **Total** | **0.79 (0.67–0.91)** | **199 700 (169 300–230 000)** |
| | Male | 0.69 (0.60–0.76) | 92 400 (80 300–104 400) |
| | Female | 0.93 (0.71–1.11) | 107 300 (86 500–120 100) |

a Sample was too small for reliable estimates by sex

Young women in this age group had an HIV incidence rate of 1.51%, which was about 3-fold the male rate and comprised more than a quarter of all new infections.

HIV incidence was higher in urban areas (0.58%) than rural areas (0.23%). Single individuals (1.07%) had a higher HIV incidence rate than married people (0.61%).

To enable a valid comparison of estimates from the current survey with those from the 2012 survey, we recalculated the 2012 estimates based on the test parameters used in 2017. This analysis showed that there was a decline in HIV incidence between 2012 and 2017. The overall incidence decreased from 0.85% (recalculated for 2012) to 0.48% (2017) and the total number of new HIV infections per year decreased by nearly 40%. The overall profile of HIV incidence remains unchanged, with higher rates among youth and especially young women, and among single individuals and people living in urban areas.

### Viral load suppression

HIV viral load (VL) suppression, defined as a VL of <1000 copies HIV RNA/mL, is a measure of ART efficacy. It is also a proxy indicator for adherence to treatment and for the risk of HIV transmission (UNAIDS 2015). The greater the VL suppression, the more effective the treatment. In this survey, VL results were available for 2 946 people living with HIV. Of these, 62.3% (95% CI: 59.5–65.0) were virally suppressed.

Among males, viral suppression was highest among HIV-positive people aged 50 years and older (76.4%) and 45–49 years (71.8%). Similarly among females, VL suppression was highest among those aged 45–49 years (74.6%) and those aged 50 years and older (71.2%).

Overall, proportionally more HIV-positive adults aged 45 years or older (>70%) were virally suppressed, compared to younger HIV-positive people. Males aged 25–34 years had the lowest proportion of VL suppression for people living with HIV (41.5%), followed by females aged 15–24 years (47.1%). Figure VI shows the percentages of HIV-positive people in whom VL suppression had been achieved, by sex and age. The percentages refer to each age group rather than the total population.

At the provincial level, overall VL suppression was highest in the Eastern Cape (68.0%), KwaZulu-Natal (67.5%) and the Free State (66.2%) and lowest in the Northern and Western Cape (52.8% and 54.7% respectively). Figure VII shows the provincial results.

*Figure VI: Viral load suppression by age and sex, South Africa, 2017*

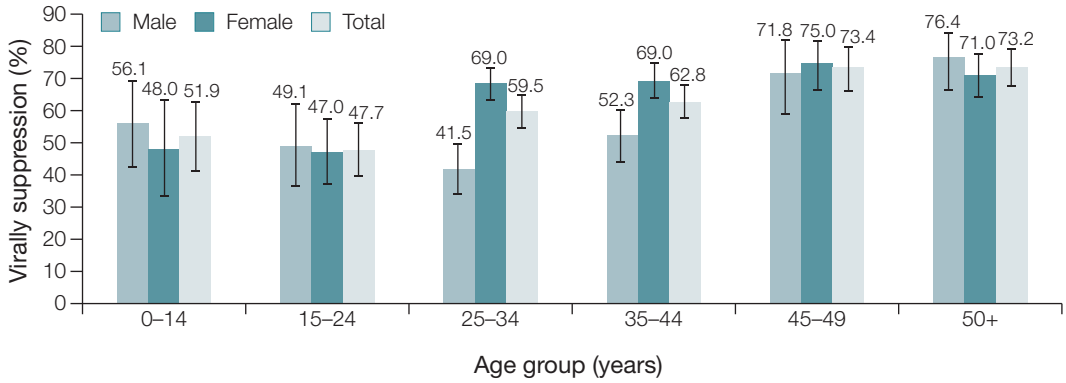
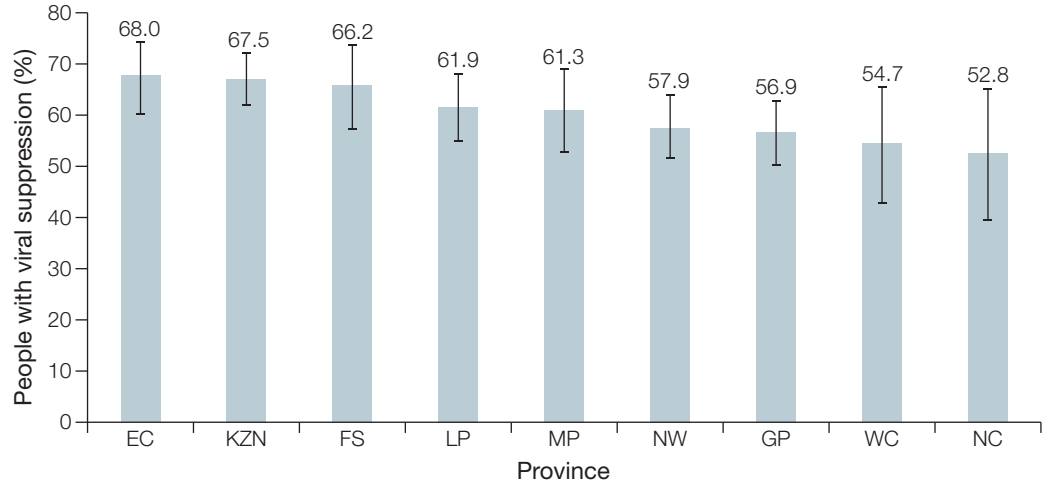



*Figure VII: Viral load suppression among all people living with HIV by province, South Africa, 2017*




Key: EC, Eastern Cape; KZN, KwaZulu-Natal; FS, Free State; LP, Limpopo; MP, Mpumalanga; NW, North West; GP, Gauteng; WC, Western Cape; NC, Northern Cape

### *Viral load suppression among people living with HIV on ART*

Overall, VL suppression was 87.3% among people living with HIV who were on ART. In most age, sex, locality and provincial subgroups, VL suppression levels were above 85%. The lowest VL suppression levels among ART users were noted for males (82.4%), children aged 0–14 years (81.9%), people living with HIV who resided on farms (82.6%) and people living in Mpumalanga (82.9%).

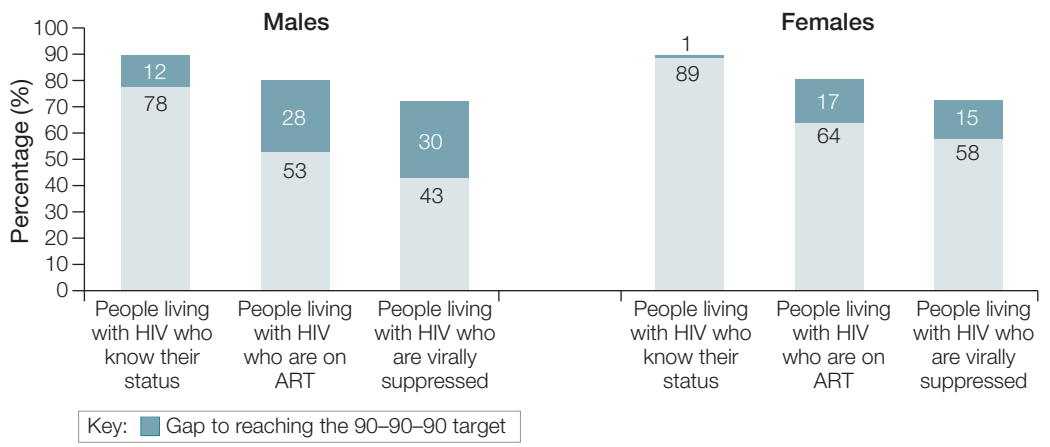
## 90–90–90 indicators

The 90–90–90 indicators are defined by UNAIDS (2014a) as follows:

1. The first 90 – the proportion of people living with HIV who know their HIV-positive status. In this study, people were classified as knowing their HIV-positive status if they tested HIV positive and reported that they knew their HIV status; or their blood sample (for this study) was confirmed as positive for ARV by a laboratory.
2. The second 90 – the proportion of people who were receiving ART, as a subgroup of those who knew their HIV-positive status. Receiving ART was defined as having ARVs detected in the blood specimen.
3. The third 90 – the proportion who were virally suppressed among those who knew their HIV status and were on ART (as defined above).

Almost 85% of people living with HIV aged 15–64 years knew their HIV status at the time of the survey (first 90). Among those who knew their HIV status, 70.6% were on ART (second 90); among this group on ART, 87.5% had laboratory-confirmed suppressed VL (third 90). More females than males knew their HIV status (88.9% vs 78.0%), were on ART (72.2% vs 67.4%) and had better VL suppression (89.9% vs 82.1%). The 90–90–90 cascade is presented in Figure VIII, for both males and females respectively. The top of each bar shows that the gaps that need to be filled to reach 90–90–90 targets are higher for males than females.

*Figure VIII: 90–90–90 cascade for people living with HIV aged 15–64 years, South Africa, 2017*




## HIV drug resistance

Testing for HIV drug resistance (HIVDR) was conducted on samples from HIV-positive respondents who were virally unsuppressed, defined as VL ≥ 1000 copies/mL. Drug-resistant mutations (DRMs) were identified in 27.4% (95% CI: 22.8–32.6) of samples. Of these, 18.9% of samples showed resistance to non-nucleoside reverse transcriptase

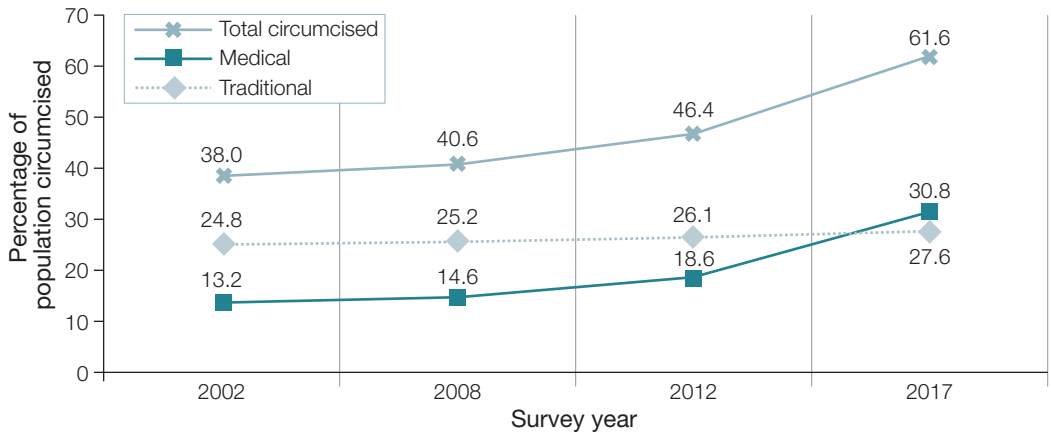
inhibitors (NNRTIs) only, 7.8% had dual resistance to NNRTIs and nucleoside reverse transcriptase inhibitors (NRTIs), and 0.5% had resistance to second-line regimens that included protease inhibitors (PIs) (that is, resistance to NNRTI, NRTI and PI).

HIVDR among people on ARVs (ARV-positive) was 55.7%, compared to 22.8% of those not on ARVs (ARV-negative) ($p$<0.001). By drug class, NNRTI-only resistance was found in 14.3% of the ARV-positive samples and in 20% of the ARV-negative samples ($p$=0.311). By contrast, dual NNRTI and NRTI resistance occurred in 40% of ARV-positive and 2.1% of ART-negative samples ($p$<0.001). Among those who were ARV-negative but self-reported taking ARVs daily, 75.9% had DRMs, with 56.4% having resistance to NNRTIs only and 14.3% having dual NNRTI and NRTI resistance. There were no significant age or sex differences among the samples that were either NNRTI-only resistant or dual NNRTI- and NRTI-resistant. The number of specimens with DRM among those that were classified as recently infected with HIV, was too low for reliable estimates of the prevalence of transmitted drug resistance (TDR).

### Male circumcision

Since 2002, the proportion of circumcised males aged 15 years and older has increased significantly from 38.2% in 2002 when the majority were traditionally circumcised to 61.6% in 2017 when the majority were circumcised medically (Figure IX). The number of adult males reporting that they had been medically circumcised rose steadily from 1 582 000 in 2002 to 2 269 000 in 2008, 3 301 000 in 2012 and 4 330 000 in 2017. Males in rural informal (tribal) areas (65.0%) and urban areas (61.9%) reported significantly higher rates of circumcision than their counterparts in rural formal areas (45.4%). Overall, 13.6% of male children younger than 15 years had been circumcised, with the majority of them (89.9%) having had it performed in medical settings.

*Figure IX: Trends in adult male self-reported circumcision by type, South Africa, 2002, 2008, 2012 and 2017*



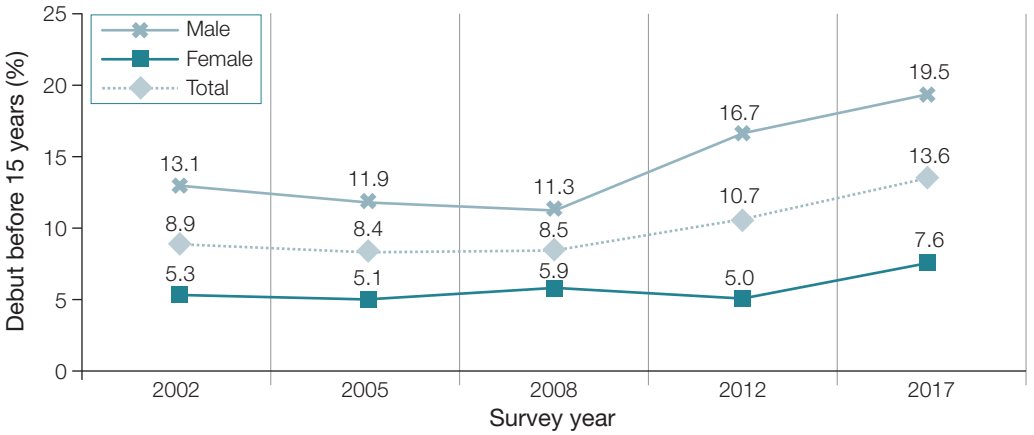

### Behavioural determinants of HIV

Several behaviours are considered key drivers of the HIV epidemic in South Africa. The behaviours discussed in this section include sexual debut, age-disparate relationships, multiple sexual partners, condom use, awareness of HIV status, HIV risk perception, knowledge of HIV and tuberculosis risk factors, exposure to HIV media campaigns, HIV stigma and orphanhood status.

### *Sexual debut*

Overall, early sexual debut among males and females – that is, people who indicated that they had had sex for the first time when younger than 15 years – remained relatively stable between 2002 and 2008. Fewer than 10% of 15–24-year-olds stated that they had had early sexual debut. However, the proportion of people who had an early sexual debut increased from 8.5% in 2008 to 13.6% in 2017 (Figure X). Across all survey rounds, early sexual debut was more common among males than females.

*Figure X: Early sexual debut among young men and women aged 15–24 years, South Africa, 2002, 2005, 2008, 2012 and 2017*

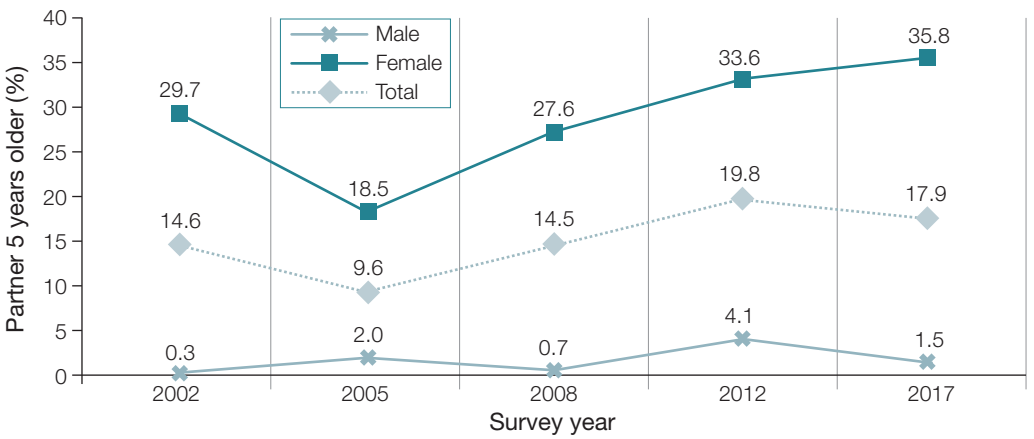



### *Age-disparate relationships*

Figure XI shows the trend in age-disparate relationships for young people aged 15–19 years from 2002 to 2017. Age disparity is defined as having a sexual partner five or more years older than oneself (the respondent). Overall, age-disparate relationships were consistently more common among females than males.

In 2017, fewer males had age-disparate relationships compared to those reported in the 2012 survey. By contrast, an upward trend is observed among females since 2005, which means that more women are currently engaged in relationships with older partners.

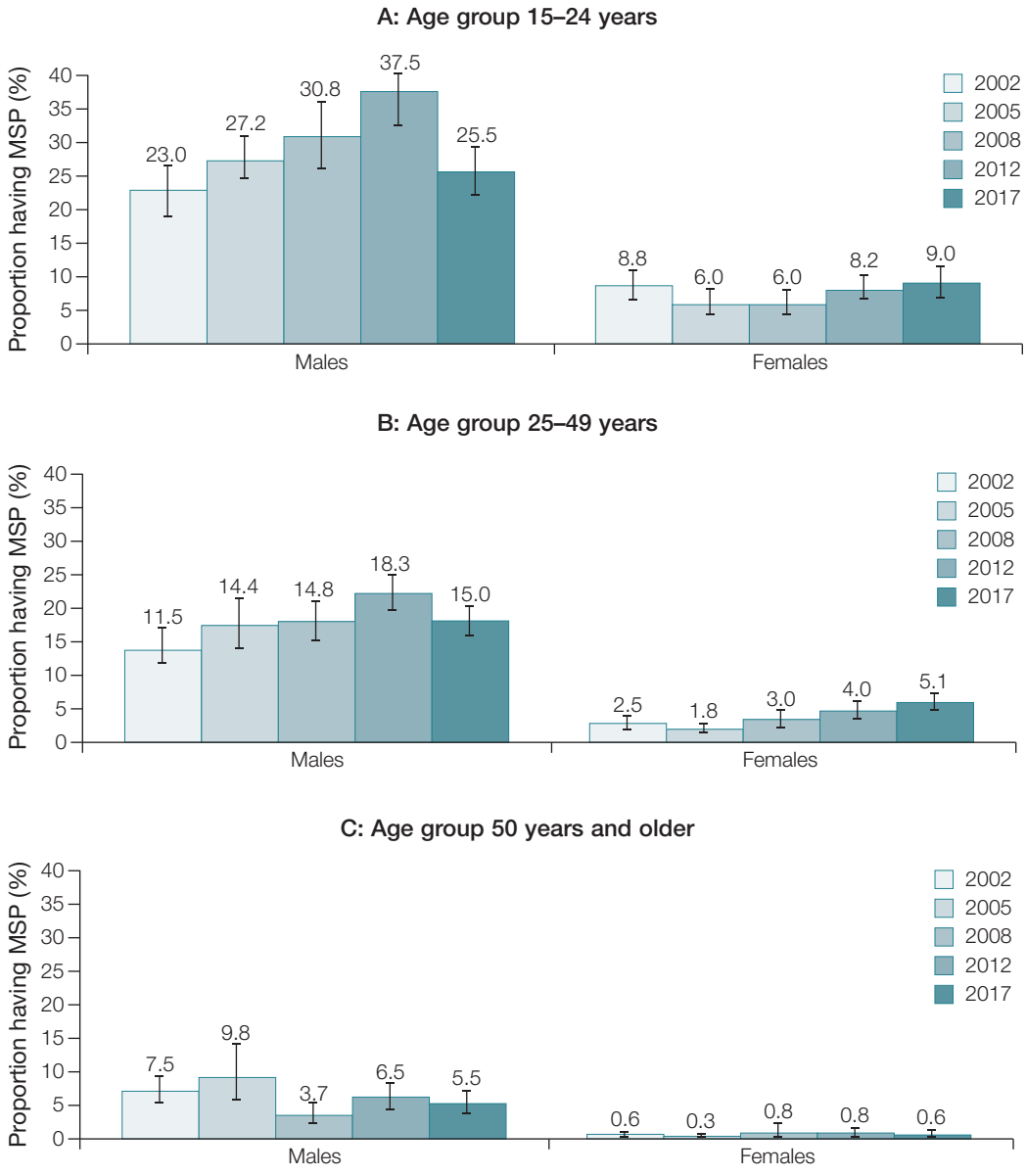
*Figure XI: Age-disparate sexual relationships in the 15–19-year age group by sex, South Africa, 2002, 2005, 2008, 2012 and 2017*



### *Multiple sexual partners*

Multiple sexual partners (MSPs) is defined as having more than one sexual partner in the previous 12 months. Males were more likely than females to report having MSPs among all age groups aged 15 years and older (Figure XII A–C). A decline was noted in self-reported MSPs among males from 2012 to 2017. Among females, there has been an increasing trend since 2008 in the 15–49 age range (Figure XII A–B).

*Figure XII: Sexually active people aged 15 years and older, who had more than one sex partner in the last 12 months, South Africa, 2002, 2005, 2008, 2012 and 2017*



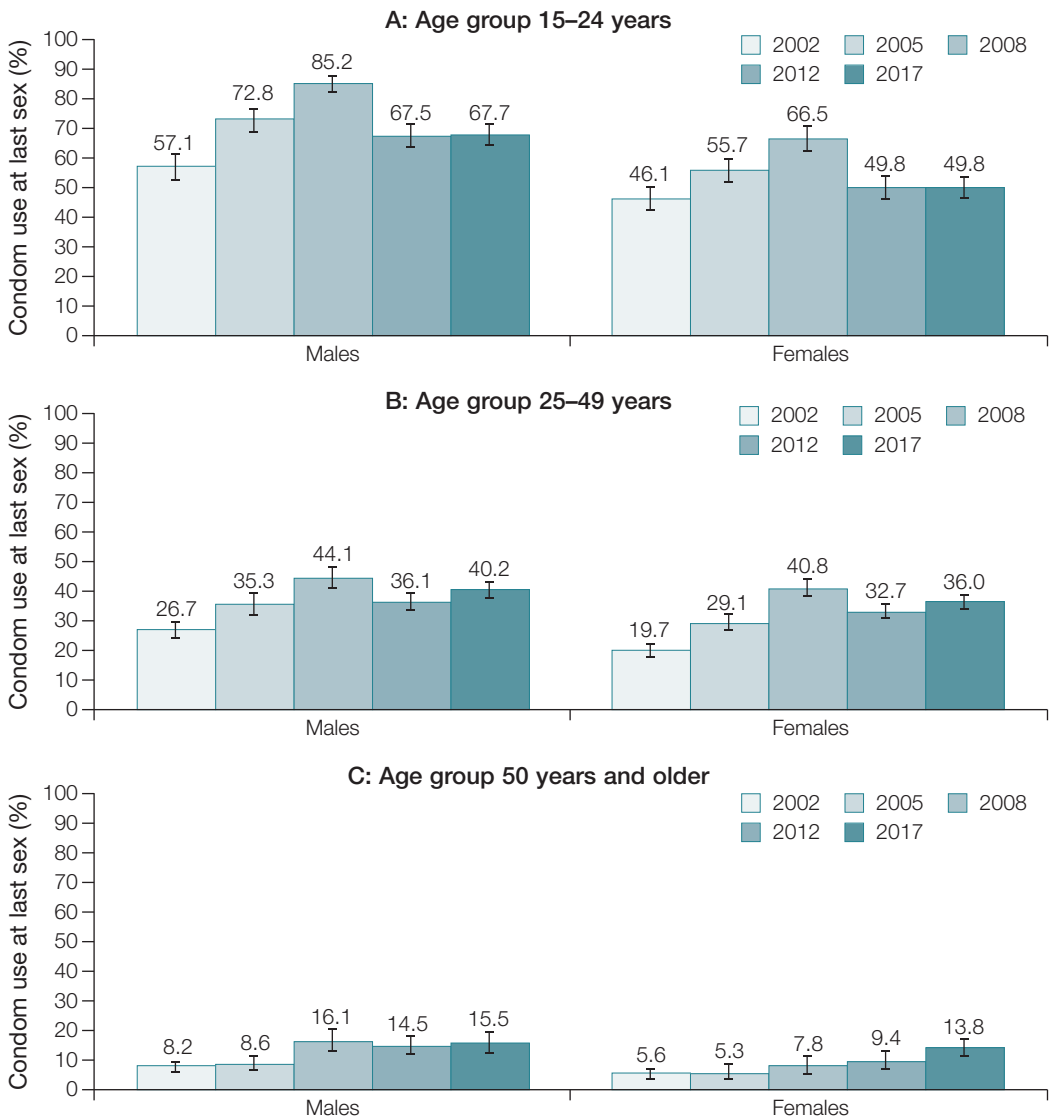
### *Condom use*

Figure XIII shows the trends in condom use at last sexual encounter, among people aged 15 years and older, by sex. The results across the survey series (2002–2017) are shown. The graphs show the proportions of each group that reported having used a condom at their last sexual encounter. Reported condom use at last sexual encounter was generally higher among males than females across all age groups.

A peak in condom use occurred in 2008 for males of all ages and for females aged 15–49 years, followed by a decline in 2012. Thereafter, a slight increase was observed in 2017 among all adults aged 25 years and older.

Condom use at last sexual encounter was consistently highest among people aged 15–24 years (Figure XIII A). For women aged 50 years or older, since 2002 there has been a steady increase in condom use at the last sexual encounter (Figure XIII C). In 2002 the self-reported figure for women aged 50 years and older was 5.6%, compared with 13.8% in 2017.

*Figure XIII: Most recent condom use by age and sex, South Africa, 2002, 2005, 2008, 2012 and 2017*



### HIV-testing services and awareness of HIV status

Most people (94.6%) indicated that they knew of a nearby HIV-testing service (HTS) and had been tested for HIV at some point ('ever-testing') (75.2%). The high proportion of people in the ever-testing category was consistent when the data were stratified by demographic variables such as sex, race and locality. This finding suggests that HTSs were perceived as accessible. Notably, youth aged 15–24 years reported the lowest-ever testing rate (58.8%).

Testing within the past year increased significantly ($p<0.001$) from 49.1% in 2008 to 66.8% in 2017. Most people who had been tested in the previous 12 months were females (79.3%) and were aged between 25 and 49 years (85.0%).

Figure XIV (A–D) shows the proportions of people (aged 15 years and older) who provided a blood specimen for HIV-testing during the survey, who had also been tested for HIV elsewhere in the past 12 months and had received those results. The graphs show the results for people who were both HIV-positive and HIV-negative according to the blood-specimen findings for this survey.

Generally, males aged 15 years or older were less aware of having an HIV-positive status compared to their female counterparts. Across all age and sex groups, males aged 15–24 years were least likely to be aware of their HIV-positive status, with 75.9% of HIV-positive men in this category being unaware of their status compared to 36.2% of HIV-positive women in the same age group. However, women aged 50 years and older were less likely than their male counterparts of having an HIV-positive status, with 53.8% of this subgroup being unaware of their status compared to 45.4% of their male counterparts within the same age group.

It should be noted that people who had tested HIV-positive longer than 12 months ago might not have had any reason to be tested again. This scenario could have influenced the findings.

### Perceived susceptibility to HIV infection

For perceived risk of HIV infection, almost half of the people surveyed (49.4%) indicated they would 'definitely not get infected'. Only 3% indicated that they would 'definitely get infected' with HIV.

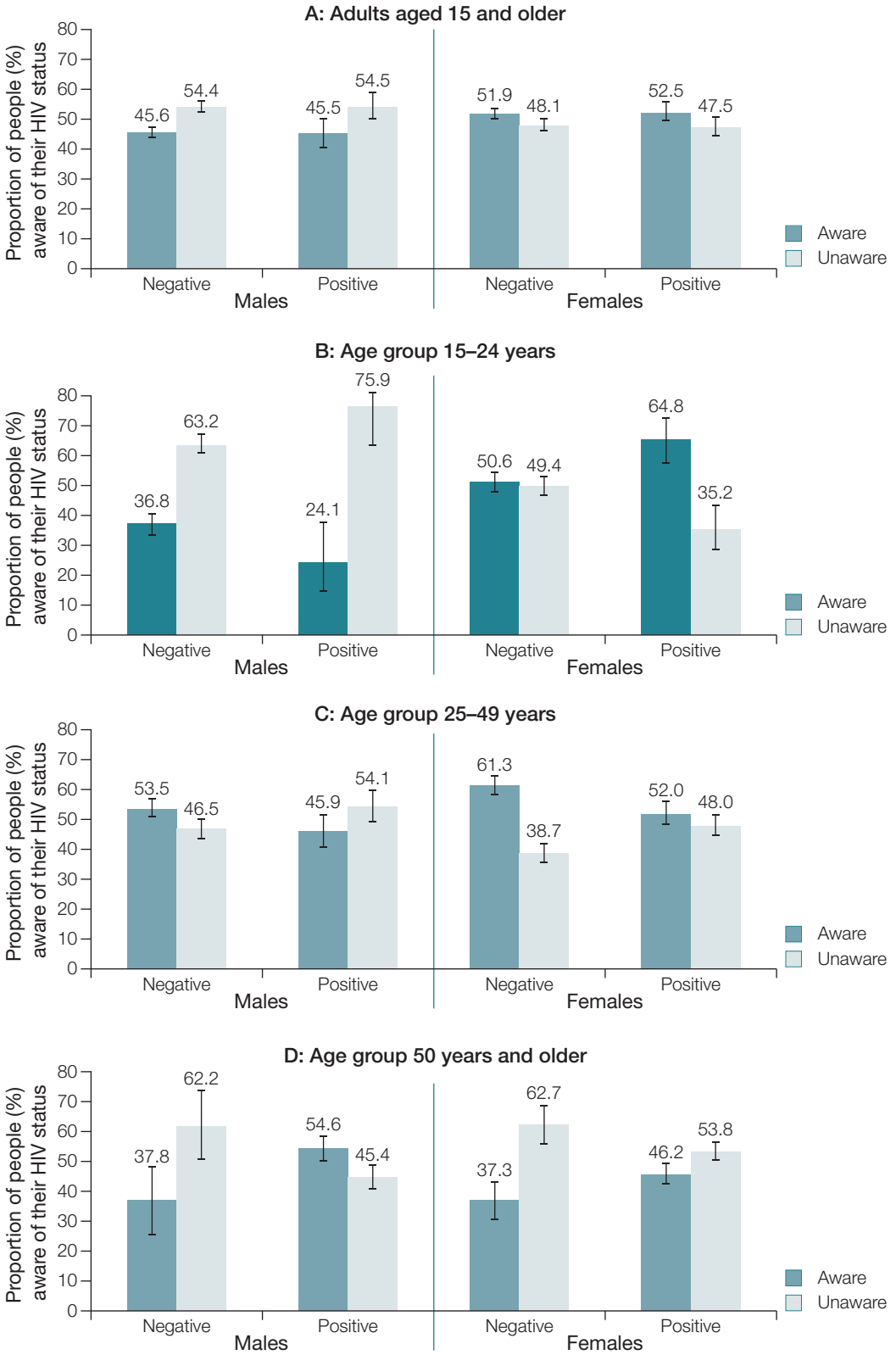
Groups that reported higher rates of self-perceived risk included black Africans (19.7%), people aged 25–49 years (21.0%), people residing in rural informal (tribal) areas (20.3%) and people living in Mpumalanga (23.2%). The Western Cape had the lowest proportion of people who perceived themselves to be at risk for contracting HIV (10.5%). Actual HIV prevalence was 10% among people aged 15 years and older who perceived themselves to be at low risk of HIV infection and 17.2% among those who perceived themselves to be at high risk (see Table IV).

*Table IV: Perceived risk of HIV infection among people aged 15 years and older, by sex and HIV status, South Africa, 2017*

| | Perception of low risk | | | Perception of high risk | | |
|---|---|---|---|---|---|---|
| Sex | *n* | HIV+ status[a] | 95% CI | *n* | HIV+ status | 95% CI |
| **Total** | **13 673** | **10.0** | **9.1–11.0** | **2 310** | **17.2** | **15.3–19.3** |
| Male | 5 720 | 8.8 | 7.7–10.0 | 974 | 11.2 | 8.8–14.2 |
| Female | 7 953 | 11.2 | 10.0–12.5 | 1 336 | 23.3 | 20.5–26.3 |

a HIV-positive status is shown as a percentage of the relevant population group

*Figure XIV: Awareness of HIV status in the past 12 months, males and females aged 15 years and older, South Africa, 2017*



### Knowledge about HIV transmission

Overall, more than a third of people (36.3%) identified two knowledge items correctly and rejected three myths about the sexual transmission of HIV, in accordance with the UNAIDS (2013) definition. No sex difference was found between males and females for the level of correct knowledge among people aged 15 years and older. The two younger groups were significantly more knowledgeable about HIV transmission than those aged 50 years and older. In the 15–24-year group, 36.1% of people met the above criteria for 'knowledgeable', compared with 38.7% of the 25–49-year group and 30.8% of people aged 50 years and older (30.8%).

Whites (50.2%), Indians/Asians (42.8%), and coloureds (38.8%) had higher levels of correct knowledge than black Africans (34.2%). These results are for people aged 15 years and older. Correct knowledge about HIV transmission was highest in the Western Cape (46.4%) and lowest in North West (24.5%).

### Knowledge about tuberculosis

Overall, there were no differences by sex or age regarding knowledge of tuberculosis (TB) or related attitudes and perceptions.

#### *Knowledge about TB transmission and treatment*

Most people were aware that TB is an airborne disease. Consistently high levels (>90%) of correct knowledge about the transmission of TB was evident across all socio-demographic categories, namely the variables of sex, age, race, locality type and province.

#### *Perceptions about TB and HIV comorbidity*

Overall, only 14.8% of people believed that people who have TB are always HIV positive. This misconception was least common among coloureds (6.2%) and whites (7.3%). It was more widespread among people in Mpumalanga (19.1%) and Northern Cape (18.1%).

#### *History of TB diagnosis*

A few survey respondents reported a history of TB diagnosis (5.6%), with similar proportions recorded for both males (5.8%) and females (5.4%). Among those with a self-reported history of TB diagnosis, the highest proportions were found among black Africans (6.1%), people aged 50 years or older (7.3%) and inhabitants of Eastern Cape (9.9%).

#### *TB stigma*

Nearly 14% of the above subgroup reported that they had been insulted because they had TB, and 19.9% reported that they had been gossiped about. Roughly the same proportion (13.3%) reported that they had felt unclean at the time they were diagnosed with TB. More than half of those diagnosed with TB did not disclose the diagnosis to anyone.

### Social and behavioural change communication (SBCC) programmes on HIV

#### *Access to various types of media*

Regarding access to various media types, most people said they watched television (83.9%) and listened to the radio (66.6%). Most people (59.7%) also accessed social media at least once a week.

*SBCC communication programme exposure and reach*

Four levels of SBCC exposure were defined: 'high' exposure was classified as being exposed to 16 or more SBCC programmes in the last year, 'moderate' as exposure to between 6 and 15 programmes, and 'low' to between 1 and 5 programmes. Exposure was rated as 'none' if the person had not watched, heard or participated in any of the 43 mentioned programmes that were identical in the questionnaire. This section reports findings from respondents aged 15 years and older only, who responded to questions on SBCC.

People's self-reported exposure to the 43 potential communication programmes showed that 16.8% of them had heard, watched or participated in 16 or more programmes (high level of exposure). The percentage of people who were exposed to between 5 and 15 SBCC programmes (low to moderate exposure) was 46.6%. Overall, levels of exposure were similar for males and females.

Among the SBCC communication programmes offered by the Centre for Communication Impact (CCI), the most recognised ones mentioned were the Brothers for Life logo (49.0%), the 'granny and girl at the clinic' advert (27.8%) and the Zing advert (23.7%) An estimated 16.5 million people were reached by the Brothers for Life programme. Slightly more males (51.5%) than females (46.6%) recognised the Brothers for Life logo, whereas more females (26.4%) than males (21.0%) reported having seen the Zing advert. Generally, exposure to the three programmes decreased with age.

The most recognised Soul City programmes were Soul City TV (14.3%) with an estimated population reach of 4.8 million people. Close to 12% (an estimated reach of 4.0 million people) reported that they had read the Circumcision for Life booklet, whereas 9% (estimated population reach of 3.0 million) had read the HIV-free booklet. Slightly more females (10.6%) than males (7.3%) had read the HIV-free babies booklet. There was little difference between males (11.7%) and females (12.0%) who had read the Circumcision for Life booklet.

The loveLife logo was seen by 37.4% people, representing an estimated 12.6 million people. In addition, 5.5% (an estimated population reach of 1.9 million) had listened to the loveLife talk show on radio.

Among males, 18.5% had participated in face-to-face SBCC programmes and among females the proportion who had participated in such programmes was 23.5%. Examples of these programmes are community meetings, community dialogues or other HIV-related meetings during the last year.

*SBCC exposure and behavioural outcomes*

More people who had high exposure to SBCC communication messages (78.7%) reported that they had taken an HIV test in the previous year than those with no exposure (64.9%). The percentage reporting condom use at last sexual encounter, as well as those reporting consistent condom use, decreased with decreasing levels of SBCC exposure (37.4% vs 22.2%). The percentages of people who rejected HIV myths were as follows: 69% of people who had high exposure to SBCCs, 65% among the moderate-exposure group, 60% among the low-exposure group and 48% among those with no exposure at all. The proportions of people reporting that they had been circumcised among the various SBCC exposure groups were 74% for high exposure, 74.5% for moderate exposure, 61.5% for low exposure and 51.4% for those not exposed. The percentage of medically circumcised

males was 55.6%, 53.8%, 51% and 45.1% for high, moderate, low and no-exposure groups, respectively.

Positive trends in which lower risk was associated with higher SBBC exposure were reported for the following variables: testing for HIV, using condoms at last sexual encounter, consistent condom use, rejecting myths about HIV, being circumcised and medical male circumcision. Negative trends, in which higher risk was paradoxically associated with higher SBCC exposure, were reported for the following variables: age at sexual debut (among the 15–24-year group), number of sexual partners in past year, use of recreational drugs and excessive alcohol use.

### Attitudes towards people living with HIV

Overall, of the six questions relating to stigma, five yielded results that showed that most people (between 85.8% and 91.7% of survey participants) held positive attitudes towards people who live with HIV. A question about willingness to care for a family member with AIDS received the highest proportion of favourable responses. Over two-thirds of people (66.7%) indicated that they were willing to keep the HIV-positive status of a family member secret.

### Experiences of intimate partner violence

The IPV scale used in the survey measured both the current and past experience and perpetration of violence. Men and women who were ever in an intimate relationship responded to questions about their 'partner'. For both sexes, the most common reported acts of intimate partner violence (IPV) included being pushed, shaken, having an object thrown at them (12.9%) and being slapped (12.9%). More females experienced IPV than males for all but one of the categories of violence assessed. Females reported more experiences of having their arms twisted or hair pulled (7.4% for females vs 2.8% for males); being kicked, dragged or beaten up (8.5% vs 2.9%) and having been forced to have sex against their will (3.5% vs 1.4%). The category that was an exception was violence involving the threat of weapon use or the actual use of a weapon, that is, being threatened or attacked with a knife, gun, or other weapon. Both sexes reported having experienced a similar number of such incidents (3.7% for males vs 3.2% for females).

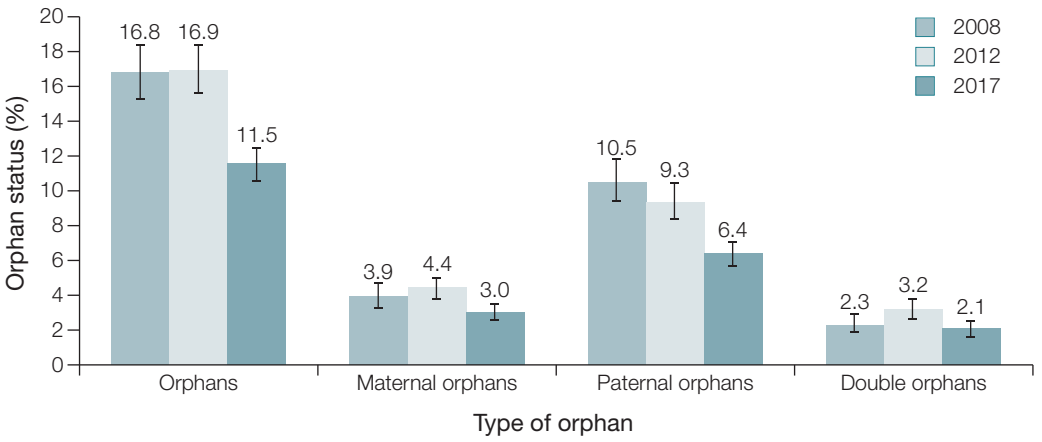
To determine the frequency of incidents of physical violence, we asked respondents to indicate how often they had experienced this during the last 12 months. Most people (72.1%) indicated that they had not experienced any physical violence in the past 12 months, and less than a third (26.5%) had experienced violence sometimes. Physical violence was experienced frequently by 1.3% of people, with females reporting slightly higher proportions (1.6%) than males (1.1%).

Both men and women who reported IPV showed higher prevalence of HIV-positive status than people who did not report IPV. For males, the difference in HIV status was significant (28.6% vs 14.1%; $p$=0.001).

### Orphanhood status

The term 'orphan' refers to children younger than 18 years who have lost either their mother (maternal orphan), father (paternal orphan) or both biological parents (double orphan) (StatsSA 2013). The overall prevalence of orphanhood was 11.5%, with the highest percentage of orphans being paternal orphans (see Figure XV). The trend analysis showed a slight increase between 2008 and 2012, with the estimated number of orphans

*Figure XV: Orphanhood status among children aged 18 years and younger, South Africa, 2008, 2012, 2017*




being 3 032 000 in 2008 and 3 132 000 in 2012. In 2017 a decrease was noted, with the number of orphans declining to an estimated 2 135 000.

## High-risk groups

### HIV prevalence

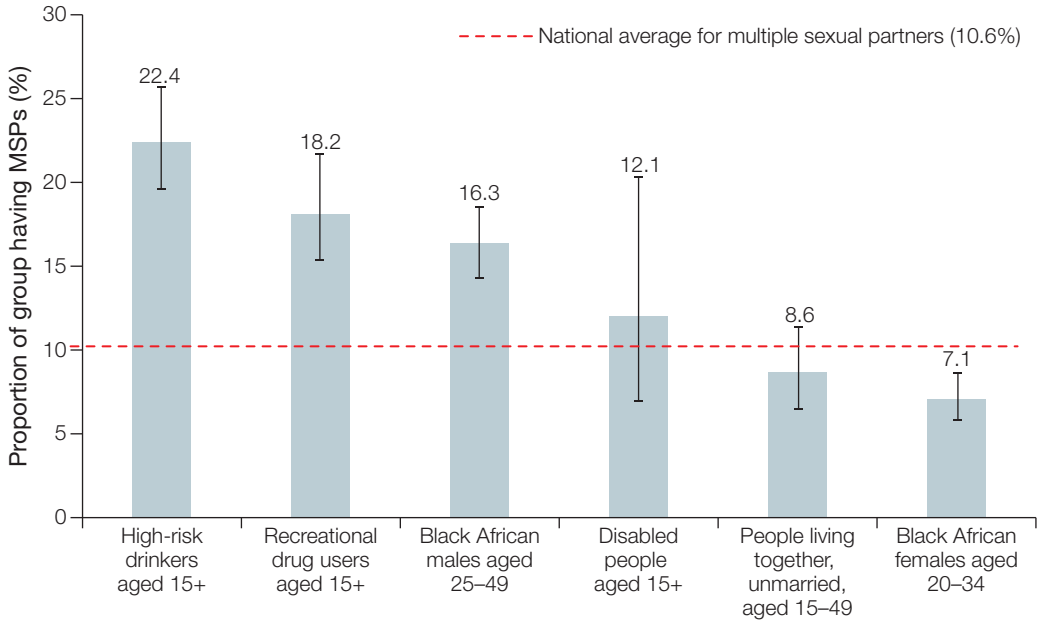
In this survey, as in the 2012 one, high-risk groups were identified as the following: black African women aged 20–34 years, people who were cohabiting, black African men aged 25–49 years, recreational drug users, high-risk alcohol drinkers, and persons with disabilities who were aged 15 years or older. These groups were investigated to support the finding from the 2012 survey that these populations were empirically at high risk for HIV.

In 2017, a decreased HIV prevalence relative to 2012 was noted for the following groups: black African women 20–34 years (29.9%), cohabiting individuals (25.4%) and black African men (22.9%). However, HIV prevalence had increased since 2012 among high-risk alcohol drinkers (17.0%), persons with disabilities (23.1%) and recreational drug users (using injectables and non-injectables) (18.7%).

### Multiple sexual partners

Figure XVI shows the proportions of people who reported having multiple sexual partners (MSPs) in the previous 12 months among high-risk groups. Hazardous drinkers reported the highest proportion of MSPs (22.4%), followed by recreational drug users (18.2%), black African men aged 25–49 years (16.3%) and persons with disabilities (12.1%). Unmarried people living together aged 15–49 years (8.6%) and black African women aged 20–34 years (7.1%) reported the lowest proportion of MSPs in the previous 12 months. The dotted line shows the national average for MSPs among the national population – that is, not only among high-risk groups.

*Figure XVI: Sexually active people having more than one sexual partner in the past 12 months, among high-risk groups, South Africa, 2017*




## Condom use among high-risk groups

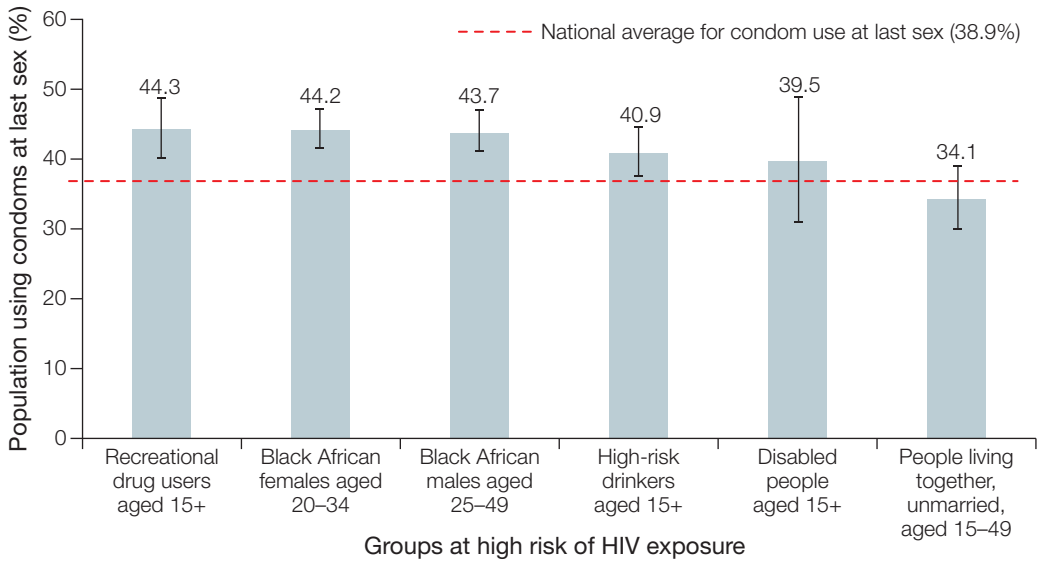
Among high-risk groups, consistent condom use with the most recent partner and during the last 12 months was highest among black African men aged 25–49 years (37.5%), followed by black African women aged 20–34 years (35.6%). The lowest proportion of consistent condom use was reported by cohabiting people aged 15–49 years (15.4%). A large proportion of people (45.6%) reported never having used a condom with their most recent sexual partner. Table IV shows the results for consistency of condom use over the past 12 months among the high-risk groups.

*Table V: Consistency of condom use during past 12 months, high-risk groups, South Africa, 2017*

| | | Every time | | Almost every time | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|---|
| Population subgroup | *n* | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **8 065** | **26.7** | **25.2–28.2** | **5.9** | **5.1–6.8** | **21.8** | **20.4–23.3** | **45.6** | **43.7–47.6** |
| Black African females aged 20–34 years | 1 403 | 35.6 | 32.7–38.7 | 8.0 | 6.5–9.9 | 29.0 | 25.9–32.4 | 27.3 | 24.4–30.4 |
| Black African males aged 25–49 years | 831 | 37.5 | 33.1–42.1 | 8.1 | 5.8–11.3 | 25.0 | 21.5–28.8 | 29.4 | 25.4–33.7 |
| Living with partner, aged 15–49 years years | 3 421 | 15.4 | 13.4–17.5 | 4.0 | 3.1–5.1 | 17.9 | 15.9–20.0 | 62.7 | 59.8–65.6 |
| High-risk drinkers aged 15 years and older | 1 077 | 29.1 | 25.2–33.3 | 5.5 | 3.7–8.3 | 21.9 | 18.5–25.7 | 43.5 | 39.3–47.9 |
| Recreational drug users aged 15 years and older | 1 078 | 32.1 | 28.2–36.2 | 7.3 | 5.4–9.7 | 19.5 | 16.2–23.3 | 41.2 | 37.0–45.4 |
| Persons with disabilities aged 15 years and older | 255 | 28.2 | 21.1–36.4 | 1.4 | 0.5–3.7 | 22.3 | 15.2–31.4 | 48.2 | 39.6–56.8 |

Figure XVII shows self-reported condom use at last sexual encounter or with the most recent sexual partner. The percentages among all high-risk groups were higher than the national average for the general population (38.9%), with the exception of people who were living together.

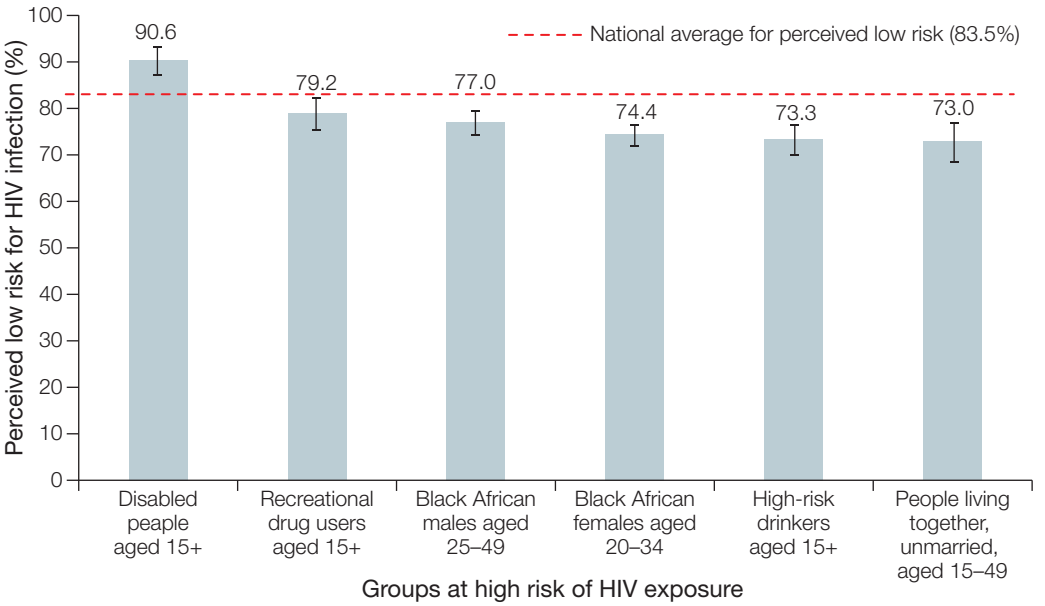
*Figure XVII: Condom use at last sex among high-risk groups, South Africa, 2017*




## Perceived risk of HIV infection

Most people (73% to 80%) in all high-risk groups believed themselves to be at low risk for HIV infection. The comparative national average for perceived low risk among the general population was 83.5%. However, persons with disabilities displayed a particularly high proportion (90.6%) of perceived low risk for HIV infection (Figure XVIII).

*Figure XVIII: Perceived low risk for HIV infection among high-risk groups (people aged 15 years and older), South Africa, 2017*

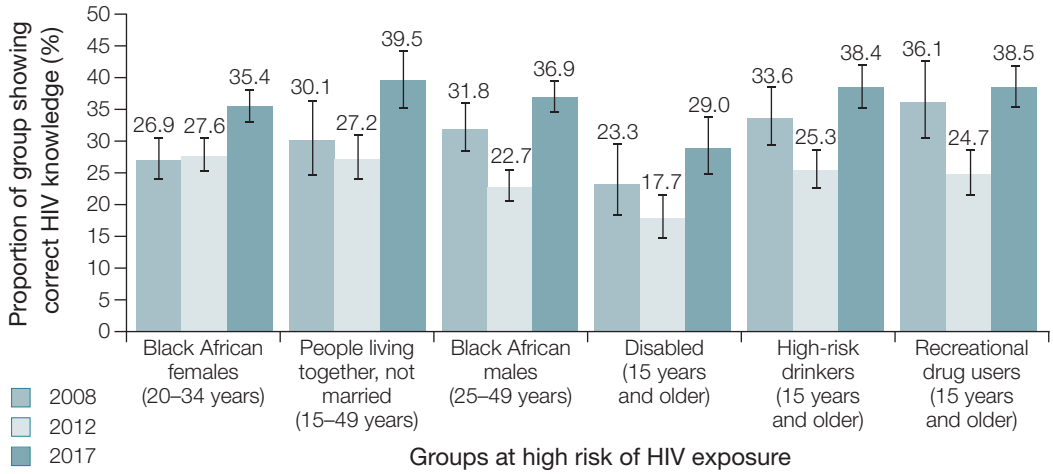


### Correct knowledge of HIV

Figure XIX shows the levels of correct knowledge about preventing the sexual transmission of HIV and rejecting misconceptions about HIV transmission among the six high-risk groups. This knowledge indicator was similar to that measured in 2008 and 2012. The results show that although the levels of correct HIV knowledge among high-risk groups decreased from 2008 to 2012, knowledge levels increased again between 2012 and 2017 (see Figure XIX). There was significant improvement in the level of accurate HIV knowledge among black African women aged 20–34 years. Accurate HIV knowledge was lowest among people with self-reported disabilities.

As was reported for the general population, knowledge about the sexual transmission of HIV has generally improved over time among high-risk groups. However, despite this general progress, the level of accurate knowledge about HIV transmission remained relatively low among all high-risk groups in 2017.

*Figure XIX: Accurate knowledge among high-risk groups about preventing sexual transmission of HIV and rejecting myths about HIV transmission, South Africa, 2008, 2012 and 2017*




## Analysis of HIV in 16 selected districts

### Survey design and sampling

In addition to the 1000 SALs, which were nationally representative samples that replicated the sampling method of the previous four surveys, a further 457 SALs were sampled in 13 districts. This enabled an estimation of HIV prevalence at the district level. In addition, we analysed the prevalence in the three metro districts of Johannesburg in Gauteng, Cape Town in the Western Cape, and eThekwini (Durban) in KwaZulu-Natal. These metro districts alone would have provided adequately representative samples at the national and provincial levels. The 13 additional districts were iLembe, Umzinyathi, Uthukela and Uthungulu in KwaZulu-Natal; Ehlanzeni and Gert Sibande in Mpumalanga; OR Tambo in the Eastern Cape; Sekhukhune in Limpopo; Bojanala Platinum in North West; and Ekurhuleni, Sedibeng, Tshwane and West Rand in Gauteng (see Figure 2.7 in Chapter 2). Hence all five districts in Gauteng and five districts in KwaZulu-Natal formed part of the sample. This yielded 16 districts that provided representative samples for the study.

### Weighting of the sample

In addition to the weighting procedure for the national sample, the final step was to benchmark the weights from the 16 additional districts and metro areas. This was done using district-level data from the StatsSA 2017 mid-year estimates to ensure that the results were representative of these district populations. The process produced a final sample that was fully representative of the population in South Africa in terms of sex, age, race, locality type and province; it also yielded a final sample that represented the population of the 16 additional districts. As a final check, two separate data-analysis teams verified the weighing procedure independently and obtained similar results.

### Response rate

Data collection in the additional selected districts identified 44 353 individuals who were eligible to participate, of whom 94.3% agreed to be interviewed (*n*=41 842). Of the 44 353 eligible individuals in selected districts, 61.2% agreed to provide a blood specimen for HIV-testing anonymously linked to their questionnaires.

More males (36.8%) than females (30.9%) refused to be tested for HIV as part of this survey. The 15–24 age group displayed the highest level of participation (66.6%), and children and infants under 2 years were subjected to the fewest blood tests (39.5%). More black Africans (63.9%) and coloureds (56.7%) agreed to HIV-testing, whereas only 42% of whites and Indian or Asians agreed to be tested.

### HIV prevalence

Table VI presents HIV prevalence in the 16 selected districts. HIV prevalence was highest in Gert Sibande district in Mpumalanga (22.9%), followed closely by the Uthukela (22.4%) and Uthungulu districts (20.4%) in KwaZulu-Natal. Greater Sekhukhune district in Limpopo had the lowest prevalence (7.5%).

*Table VI: HIV prevalence in 16 selected districts, South Africa, 2017*

| Districts | *n* | % | 95% CI |
|---|---|---|---|
| **National average estimate** | **23 826** | **14.0** | **13.1–15.0** |
| Ehlanzeni (Mpumalanga) | 1 809 | 20.0 | 17.5–22.8 |
| Gert Sibande (Mpumalanga) | 2 246 | 22.9 | 19.9–26.1 |
| OR Tambo (Eastern Cape) | 1 274 | 17.3 | 14.4–20.7 |
| iLembe (KwaZulu-Natal) | 2 609 | 19.4 | 17.0–21.9 |
| Umzinyathi (KwaZulu-Natal) | 2 249 | 14.7 | 12.7–16.8 |
| Uthukela (KwaZulu-Natal) | 2 576 | 22.4 | 19.5–25.6 |
| Uthungulu (KwaZulu-Natal) | 2 351 | 20.4 | 18.0–23.0 |
| eThekwini (KwaZulu-Natal) | 1 786 | 16.7 | 12.6–22.0 |
| Sekhukhune (Limpopo) | 1 235 | 7.5 | 5.9–9.5 |
| Ekurhuleni (Gauteng) | 1 203 | 15.0 | 11.9–18.6 |
| Sedibeng (Gauteng) | 1 938 | 12.8 | 10.1–16.1 |
| City of Tshwane (Gauteng) | 993 | 10.5 | 7.7–14.1 |
| West Rand (Gauteng) | 797 | 12.3 | 8.0–18.5 |
| City of Johannesburg (Gauteng) | 1 054 | 12.9 | 9.6–17.2 |
| Bojanala Platinum (North West) | 1 446 | 16.0 | 13.8–18.6 |
| City of Cape Town (Western Cape) | 1 517 | 9.5 | 6.8–13.1 |

### District-level ART coverage among all people living with HIV

Among people in the additional sample who were living with HIV, and who were interviewed and provided blood specimens, 62.9% were on ART (see Table VII). ART coverage was the greatest in Uthungulu (77.4%) and the worst in Ekurhuleni (52.5%).

*Table VII: Exposure to ART in individuals living with HIV in the 16 selected districts, South Africa, 2017*

| Districts | Estimated number of people on ART (*n*) | Proportion of people with HIV on ART (%) 95% CI |
|---|---|---|
| **National average estimate** | **4 401 872** | **62.3 (59.2–65.2)** |
| Ehlanzeni (Mpumalanga) | 220 111 | 67.2 (60.5–73.4) |
| Gert Sibande (Mpumalanga) | 159 161 | 67.4 (61.5–72.8) |
| OR Tambo (Eastern Cape) | 144 315 | 65.6 (57.9–72.5) |
| iLembe (KwaZulu-Natal) | 70 813 | 61.0 (48.8–72.0) |
| Umzinyathi (KwaZulu-Natal) | 45 134 | 66.7 (43.9–83.7) |
| Uthukela (KwaZulu-Natal) | 102 487 | 68.0 (61.7–73.6) |
| Uthungulu (KwaZulu-Natal) | 130 006 | 77.4 (72.7–81.5) |
| eThekwini (KwaZulu-Natal) | 450 238 | 72.3 (61.5–81.0) |
| Sekhukhune (Limpopo) | 47 047 | 59.6 (48.3–70.0) |
| Ekurhuleni (Gauteng) | 260 975 | 52.5 (45.1–59.9) |
| Sedibeng (Gauteng) | 64 007 | 58.0 (47.4–67.8) |
| City of Tshwane (Gauteng) | 141 436 | 49.3 (32.5–66.3) |
| West Rand (Gauteng) | 65 605 | 65.8 (54.4–75.6) |
| City of Johannesburg (Gauteng) | 384 698 | 60.7 (42.3–76.4) |
| Bojanala Platinum (North West) | 168 365 | 60.9 (51.7–69.4) |
| City of Cape Town (Western Cape) | 229 631 | 61.1 (45.7–74.6) |

### Viral load suppression

The highest rate of VL suppression was among people living with HIV in Uthungulu (71.2%) in KwaZulu-Natal. Relatively fewer people were virally suppressed in Tshwane (52.8%) and Ekurhuleni (54.2%) in Gauteng and in Greater Sekhukhune in Limpopo (54.3%). The proportion of people living with HIV on ART who were virally suppressed was high, reaching levels above 90% in the following five districts: City of Cape Town, Sedibeng, Umzinyathi, Uthungulu and the West Rand. The lowest rates of VL suppression among people on ART were found in Ehlanzeni (65.3%), Gert Sibande (77.4%) and eThekwini (78.3%).

### 90–90–90 indicators

People living with HIV who knew their HIV-positive status (first 90) was generally high across all selected districts. Districts that achieved levels of 90% or more (for the first 90) were as follows: Ehlanzeni (90.6%), OR Tambo district (94.1%), Uthukela (92.7%), West Rand (93.6%) and eThekwini (96.7%). Several districts had first-90 levels above 80%, namely City of Cape Town (87.8%), Sedibeng (81.8%), and Umzinyathi (84.4%). Districts with levels below 80% (for the first 90) were iLembe (72.1%) and City of Tshwane (77.4%).

iLembe (82.7%), Uthungulu (81.8%) and Gert Sibande (81.2%) had the highest coverage of ART among people who were aware of their HIV-positive status (second 90). The two districts with the lowest coverage were City of Tshwane (55.1%) and Ekurhuleni (59.8%), which were the only districts that achieved levels below 60%.

As mentioned in the previous section, VL suppression among people on ART (third 90) was generally high. The rates were above 80% for all districts except Ehlanzeni (65.3%),

*Table VIII: 90–90–90 indicators for people aged 15–64 years, selected districts, South Africa, 2017*

| | Diagnosed (first 90) | | | ART coverage (second 90) | | | Virally suppressed (third 90) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **National average estimate** | **2 756** | **84.9** | **81.7–87.7** | **2 197** | **70.6** | **67.4–73.6** | **1 548** | **87.5** | **84.9–89.7** |
| **District** | | | | | | | | | |
| Ehlanzeni (Mpumalanga) | 319 | 90.6 | 85.7–93.9 | 282 | 73.2 | 66.4–79.1 | 206 | 84.9 | 78.5–89.6 |
| Gert Sibande (Mpumalanga) | 433 | 81.2 | 74.2–86.7 | 334 | 81.2 | 73.5–87.1 | 250 | 77.0 | 66.9–84.7 |
| OR Tambo (Eastern Cape) | 184 | 94.1 | 89.8–96.7 | 173 | 69.0 | 60.0–76.8 | 127 | 82.5 | 71.3–89.9 |
| iLembe (KwaZulu-Natal) | 471 | 72.1 | 56.4–83.7 | 331 | 82.7 | 73.0–89.4 | 269 | 80.8 | 64.6–90.6 |
| Umzinyathi (KwaZulu-Natal) | 298 | 84.4 | 75.1–90.7 | 250 | 76.6 | 54.9–89.8 | 211 | 90.1 | 82.1–94.7 |
| Uthukela (KwaZulu-Natal) | 471 | 92.7 | 87.9–95.7 | 410 | 76.4 | 68.3–82.9 | 316 | 87.3 | 75.7–93.8 |
| Uthungulu (KwaZulu-Natal) | 508 | 89.4 | 82.0–94.0 | 407 | 81.8 | 76.9–85.9 | 333 | 89.6 | 83.9–93.5 |
| eThekwini (KwaZulu-Natal) | 132 | 96.7 | 93.4–98.4 | 115 | 76.6 | 65.4–84.9 | 81 | 77.4 | 66.3–85.6 |
| Sekhukhune (Limpopo) | 78 | 88.6 | 75.1–95.2 | 69 | 67.6 | 56.3–77.1 | 45 | 80.6 | 67.5–89.2 |
| Ekurhuleni (Gauteng) | 163 | 89.0 | 83.7–92.7 | 139 | 59.8 | 51.0–68.0 | 86 | 88.9 | 78.8–94.5 |
| Sedibeng (Gauteng) | 297 | 81.8 | 65.1–91.6 | 256 | 67.2 | 56.1–76.6 | 181 | 92.5 | 83.7–96.7 |
| City of Tshwane (Gauteng) | 101 | 77.4 | 47.8–92.8 | 82 | 55.1 | 36.2–72.6 | 52 | 91.1 | 74.2–97.3 |
| West Rand (Gauteng) | 119 | 93.6 | 84.2–97.6 | 98 | 69.4 | 55.8–80.3 | 62 | 92.0 | 74.3–97.8 |
| City of Johannesburg (Gauteng) | 87 | 81.3 | 62.4–91.9 | 76 | 67.2 | 49.5–81.1 | 47 | 88.8 | 76.4–95.1 |
| Bojanala Platinum (North West) | 214 | 87.7 | 80.0–92.7 | 193 | 69.5 | 60.9–76.8 | 134 | 86.2 | 78.0–91.7 |
| City of Cape Town (Western Cape) | 105 | 87.8 | 79.5–93.1 | 82 | 76.2 | 68.6–82.5 | 58 | 92.4 | 78.4–97.6 |

Gert Sibande (77.4%), and eThekwini (78.3%). Table VIII shows the 90–90–90 indicator results for exposure to ART among people aged 15–64 years.

### Behavioural determinants of HIV at the district level

#### *Condom use in 16 selected districts*

Table IX shows the results for self-reported condom use at the last sexual encounter, in the 16 selected districts in South Africa. Overall, 39.2% of people indicated that they had used condoms in their most recent sexual encounters during the past 12 months. The three districts with the highest proportion of condom use were Uthungulu (50.0%), Sedibeng (49.6%) and Gert Sibande (49.3%). The three cities of Tshwane, Cape Town and Johannesburg had the lowest condom use over the last 12 months.

*Table IX: Percentage of condom use at last sex among people aged 15 years and older in 16 selected districts, South Africa, 2017*

| | | Recent condom use | |
|---|---|---|---|
| District | *n* | % | 95% CI |
| **National average estimate** | **11 943** | **38.9** | **37.3–40.5** |
| Ehlanzeni (Mpumalanga) | 868 | 46.8 | 42.5–51.2 |
| Gert Sibande (Mpumalanga) | 1 116 | 49.3 | 45.1–53.5 |
| OR Tambo (Eastern Cape) | 353 | 42.3 | 37.6–47.2 |
| iLembe (KwaZulu-Natal) | 952 | 45.0 | 38.4–51.7 |
| Umzinyathi (KwaZulu-Natal) | 753 | 41.1 | 31.9–50.9 |
| Uthukela (KwaZulu-Natal) | 1 007 | 47.4 | 41.0–53.8 |
| Uthungulu (KwaZulu-Natal) | 1 157 | 50.0 | 45.5–54.5 |
| eThekwini (KwaZulu-Natal) | 1 177 | 46.2 | 39.8–52.7 |
| Sekhukhune (Limpopo) | 452 | 39.9 | 33.8–46.4 |
| Ekurhuleni (Gauteng) | 798 | 38.6 | 34.6–42.7 |
| Sedibeng (Gauteng) | 1 060 | 49.6 | 42.7–56.6 |
| City of Tshwane (Gauteng) | 665 | 32.2 | 26.8–38.1 |
| West Rand (Gauteng) | 520 | 40.1 | 34.6–45.9 |
| City of Johannesburg (Gauteng) | 620 | 33.1 | 26.8–40.1 |
| Bojanala Platinum (North West) | 811 | 41.6 | 36.7–46.7 |
| City of Cape Town (Western Cape) | 829 | 35.3 | 28.4–42.9 |

#### *District-level multiple sexual partners*

Table X presents the proportion of sexually active people with multiple sexual partners (MSPs) in the previous 12 months, for the 16 selected districts in South Africa. eThekwini and West Rand had the highest proportions of MSPs at 14.8%, followed closely by Ekurhuleni (14.5%). Gert Sibande (5.6%) had the lowest proportion of people who reported having MSPs.

*Table X: Percentage of sexually active people aged 15 years and older who reported having multiple sexual partners in the past 12 months in 16 selected districts, South Africa, 2017*

| | | One partner | | Two or more partners | |
|---|---|---|---|---|---|
| District | *n* | % | 95% CI | % | 95% CI |
| **National average estimate** | **12 031** | **89.4** | **88.4–90.3** | **10.6** | **9.7–11.6** |
| Ehlanzeni (Mpumalanga) | 877 | 92.3 | 89.7–94.3 | 7.7 | 5.7–10.3 |
| Gert Sibande (Mpumalanga) | 1 132 | 94.4 | 91.9–96.2 | 5.6 | 3.8–8.1 |
| OR Tambo (Eastern Cape) | 354 | 87.6 | 81.5–91.9 | 12.4 | 8.1–18.5 |
| iLembe (KwaZulu-Natal) | 962 | 90.1 | 87.1–92.4 | 9.9 | 7.6–12.9 |
| Umzinyathi (KwaZulu-Natal) | 755 | 91.7 | 87.3–94.6 | 8.3 | 5.4–12.7 |
| Uthukela (KwaZulu-Natal) | 998 | 91.5 | 88.5–93.8 | 8.5 | 6.2–11.5 |
| Uthungulu (KwaZulu-Natal) | 1 149 | 91.7 | 89.5–93.4 | 8.3 | 6.6–10.5 |
| eThekwini (KwaZulu-Natal) | 1 194 | 85.2 | 81.2–88.5 | 14.8 | 11.5–18.8 |
| Sekhukhune (Limpopo) | 447 | 89.0 | 83.8–92.6 | 11.0 | 7.4–16.2 |
| Ekurhuleni (Gauteng) | 800 | 85.5 | 82.3–88.2 | 14.5 | 11.8–17.7 |
| Sedibeng (Gauteng) | 1 064 | 86.6 | 82.3–90.1 | 13.4 | 9.9–17.7 |
| City of Tshwane (Gauteng) | 668 | 88.6 | 81.3–93.2 | 11.4 | 6.8–18.7 |
| West Rand (Gauteng) | 521 | 85.2 | 78.8–89.9 | 14.8 | 10.1–21.2 |
| City of Johannesburg (Gauteng) | 627 | 86.6 | 81.5–90.5 | 13.4 | 9.5–18.5 |
| Bojanala Platinum (North West) | 815 | 89.2 | 85.4–92.1 | 10.8 | 7.9–14.6 |
| City of Cape Town (Western Cape) | 840 | 91.6 | 89.0–93.7 | 8.4 | 6.3–11.0 |

### *Awareness of HIV status – district level*

Table XI presents self-reported awareness of HIV status in the last 12 months, at district level, among people aged 15 years and older in the selected districts. Overall, there was no significant difference in the awareness of HIV status across the 16 selected districts (50.0%). The two districts with the highest awareness were Bojanala Platinum (59.6%) and West Rand (59.5%). The two districts with the lowest awareness of HIV status were the City of Cape Town (40.3%) and Uthukela (40.7%).

*Table XI: Self-reported awareness of HIV status among people aged 15 and older in 16 selected districts, South Africa, 2017*

| | | Aware of HIV status | |
|---|---|---|---|
| Districts | *n* | % | 95% CI |
| **Total** | **25 909** | **50.0** | **48.2–51.7** |
| Ehlanzeni (Mpumalanga) | 1 718 | 51.5 | 48.6–54.3 |
| Gert Sibande (Mpumalanga) | 2 302 | 56.3 | 52.5–60.0 |
| OR Tambo (Eastern Cape) | 849 | 45.2 | 40.5–50.0 |
| iLembe (KwaZulu-Natal) | 2 211 | 42.2 | 37.7–46.9 |
| Umzinyathi (KwaZulu-Natal) | 1 947 | 44.1 | 40.3–48.0 |
| Uthukela (KwaZulu-Natal) | 2 290 | 40.7 | 36.7–44.8 |
| Uthungulu (KwaZulu-Natal) | 2 449 | 51.2 | 44.7–57.8 |

| Districts | n | Aware of HIV status | |
|---|---|---|---|
| | | % | 95% CI |
| Sekhukhune (Limpopo) | 790 | 52.1 | 47.4–56.7 |
| Ekurhuleni (Gauteng) | 1 291 | 55.0 | 50.3–59.6 |
| Sedibeng (Gauteng) | 1 837 | 55.0 | 47.9–61.9 |
| City of Tshwane (Gauteng) | 1 095 | 49.1 | 42.0–56.3 |
| West Rand (Gauteng) | 780 | 59.5 | 53.3–65.4 |
| Bojanala Platinum (North West) | 1 459 | 59.6 | 56.2–62.8 |
| City of Cape Town (Western Cape) | 1 512 | 40.3 | 35.7–45.0 |
| eThekwini (KwaZulu-Natal) | 2 257 | 48.8 | 42.9–54.7 |
| City of Johannesburg (Gauteng) | 1 122 | 50.4 | 45.5–55.3 |

### *Medical male circumcision*

Table XII shows the results regarding medical male circumcision for males aged 15 years and older in the 16 selected districts. Four of the five districts in Gauteng – with the exception of Ekurhuleni (33.6%) – reported the highest proportion (>40%) of males who were circumcised. The City of Johannesburg achieved the highest rate (50.2%) among the 16 districts. The lowest rates of medical male circumcision were in Sekhukhune (8.7%), OR Tambo district (11.2%) and City of Cape Town (18.5%).

*Table XII: Medical male circumcision for males aged 15 years and older in 16 selected districts, South Africa, 2017*

| Districts | n | Proportion of population that is medically circumcised | |
|---|---|---|---|
| | | % | 95% CI |
| **Total** | **7 620** | **33.9** | **31.3–36.6** |
| Ehlanzeni (Mpumalanga) | 528 | 38.0 | 33.2–43.0 |
| Gert Sibande (Mpumalanga) | 763 | 38.3 | 32.4–44.5 |
| OR Tambo (Eastern Cape) | 245 | 11.2 | 6.1–19.8 |
| iLembe (KwaZulu-Natal) | 568 | 30.4 | 25.4–35.9 |
| Umzinyathi (KwaZulu-Natal) | 462 | 30.0 | 21.9–39.5 |
| Uthukela (KwaZulu-Natal) | 537 | 30.8 | 25.8–36.4 |
| Uthungulu (KwaZulu-Natal) | 630 | 35.5 | 31.4–39.7 |
| Sekhukhune (Limpopo) | 213 | 8.7 | 4.9–14.9 |
| Ekurhuleni (Gauteng) | 402 | 33.6 | 28.2–39.5 |
| Sedibeng (Gauteng) | 587 | 46.6 | 40.0–53.4 |
| City of Tshwane (Gauteng) | 360 | 40.6 | 32.6–49.1 |
| West Rand (Gauteng) | 300 | 40.2 | 30.6–50.6 |
| Bojanala Platinum (North West) | 471 | 25.2 | 20.1–31.0 |
| City of Cape Town (Western Cape) | 459 | 18.5 | 13.1–25.4 |
| eThekwini (KwaZulu-Natal) | 737 | 31.5 | 25.6–38.1 |
| City of Johannesburg (Gauteng) | 358 | 50.2 | 41.9–58.4 |

### *Knowledge of HIV transmission*

Table XIII presents the levels of correct knowledge and rejection of myths about HIV among people living in the 16 selected districts. The City of Cape Town (47.2%), iLembe (40.0%) and eThekwini district (39.6%) had the highest levels of correct HIV knowledge. The three districts in which people had the lowest levels of correct HIV knowledge were Sekhukhune (24.6%), West Rand (27.5%) and Bojanala Platinum (27.2%).

*Table XIII: Correct knowledge and rejection of myths of HIV among people aged 15 years and older in 16 selected districts, South Africa, 2017*

| | | Correct knowledge of HIV transmission | |
|---|---|---|---|
| District | *n* | % | 95% CI |
| **National average estimate** | **23 668** | **36.3** | **34.9–37.7** |
| Ehlanzeni (Mpumalanga) | 1 755 | 30.7 | 26.9–34.8 |
| Gert Sibande (Mpumalanga) | 2 453 | 34.5 | 31.7–37.3 |
| OR Tambo (Eastern Cape) | 860 | 33.8 | 29.6–38.2 |
| iLembe (KwaZulu-Natal) | 2 262 | 40.0 | 34.6–45.6 |
| Umzinyathi (KwaZulu-Natal) | 1 997 | 31.9 | 27.0–37.1 |
| Uthukela (KwaZulu-Natal) | 2 334 | 35.5 | 29.9–41.5 |
| Uthungulu (KwaZulu-Natal) | 2 487 | 34.0 | 26.4–42.5 |
| Sekhukhune (Limpopo) | 784 | 24.6 | 20.2–29.7 |
| Ekurhuleni (Gauteng) | 1 309 | 32.6 | 28.5–37.0 |
| Sedibeng (Gauteng) | 1 853 | 36.9 | 30.1–44.3 |
| City of Tshwane (Gauteng) | 1 106 | 35.5 | 31.1–40.2 |
| West Rand (Gauteng) | 791 | 27.5 | 21.9–33.8 |
| Bojanala Platinum (North West) | 1 478 | 27.4 | 23.2–32.0 |
| City of Cape Town (Western Cape) | 1 554 | 47.2 | 40.8–53.8 |
| eThekwini (KwaZulu-Natal) | 2 292 | 39.6 | 35.1–44.2 |
| City of Johannesburg (Gauteng) | 1 137 | 36.9 | 31.4–42.6 |

### *District-level orphanhood*

Table XIV shows the status of orphanhood in the 16 selected districts in South Africa, for children aged 18 years and younger. Across the 16 districts, most of the orphans were paternal orphans (7.1%). The highest rates of orphanhood occurred in OR Tambo district (11.8%) and eThekwini (11.0%). The City of Tshwane (3.9%) had the smallest percentage of paternal orphans. The prevalence of maternal and double orphans remained relatively low across all 16 districts. Most of the maternal orphans resided in Sekhukhune (4.6%) and the City of Cape Town had the fewest (0.7%). The greatest proportion of double orphans occurred in iLembe (3.8%) and the smallest proportion was in the West Rand (0.4%).

## Recommendations

Based on the above findings, it is recommended that all key stakeholders – including SANAC, government departments, civil society, labour, business, donors, traditional leaders and individuals – should acknowledge the need for a focused response to HIV in South Africa. This response needs to be targeted and comprehensive, multi-sectoral, and evidence-based, and should focus on halting the HIV and AIDS epidemic.

*Table XIV: Orphanhood status among children aged 18 years and younger, in 16 selected districts, South Africa, 2017*

| Districts | *n* | Maternal | | Paternal | | Double orphan | | Not orphan | |
|---|---|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **National average estimate** | **12 845** | **3.0** | **2.6–3.5** | **6.4** | **5.8–7.0** | **2.1** | **1.7–2.5** | **88.5** | **87.6–89.4** |
| Ehlanzeni (Mpumalanga) | 1 188 | 3.5 | 2.5–4.9 | 7.9 | 6.1–10.3 | 1.8 | 1.2–2.9 | 86.8 | 83.9–89.2 |
| Gert Sibande (Mpumalanga) | 1 459 | 2.7 | 1.8–4.0 | 5.5 | 4.1–7.4 | 1.4 | 0.9–2.2 | 90.4 | 87.9–92.4 |
| OR Tambo (Eastern Cape) | 659 | 4.3 | 2.7–6.8 | 11.8 | 9.1–15.0 | 2.7 | 1.5–4.9 | 81.2 | 76.7–85.0 |
| iLembe (KwaZulu-Natal) | 1 641 | 2.2 | 1.1–4.4 | 4.4 | 2.9–6.8 | 3.8 | 2.5–5.9 | 89.5 | 86.0–92.3 |
| Umzinyathi (KwaZulu-Natal) | 1 627 | 3.2 | 2.2–4.5 | 6.0 | 4.8–7.4 | 2.1 | 1.3–3.4 | 88.8 | 86.9–90.5 |
| Uthukela (KwaZulu-Natal) | 1 820 | 2.1 | 1.4–3.3 | 7.4 | 5.7–9.5 | 3.7 | 1.9–7.2 | 86.7 | 83.1–89.7 |
| Uthungulu (KwaZulu-Natal) | 1 818 | 1.7 | 0.9–3.0 | 5.7 | 3.9–8.1 | 1.8 | 1.2–2.6 | 90.9 | 87.2–93.6 |
| Sekhukhune (Limpopo | 633 | 4.6 | 2.6–7.9 | 7.8 | 5.5–10.8 | 1.9 | 0.8–4.5 | 85.8 | 81.8–89.0 |
| Ekurhuleni (Gauteng) | 683 | 3.9 | 2.0–7.6 | 8.5 | 5.4–13.2 | 1.4 | 0.6–3.1 | 86.2 | 81.1–90.1 |
| Sedibeng (Gauteng) | 1 002 | 3.5 | 2.0–6.0 | 6.3 | 4.1–9.6 | 3.0 | 1.4–6.3 | 87.3 | 83.8–90.1 |
| City of Tshwane (Gauteng) | 505 | 0.9 | 0.2–3.6 | 3.9 | 2.4–6.3 | 0.5 | 0.1–2.1 | 94.6 | 91.7–96.6 |
| West Rand (Gauteng) | 345 | 1.2 | 0.5–3.1 | 9.1 | 6.2–13.4 | 0.4 | 0.1–2.0 | 89.2 | 84.4–92.6 |
| Bojanala Platinum (North West) | 860 | 3.6 | 2.4–5.4 | 7.8 | 5.8–10.3 | 1.7 | 0.9–3.3 | 86.9 | 83.8–89.5 |
| City of Cape Town (Western Cape) | 772 | 0.7 | 0.2–2.0 | 6.1 | 3.7–9.7 | 2.2 | 1.1–4.4 | 91.1 | 86.8–94.1 |
| eThekwini (KwaZulu-Natal) | 920 | 4.2 | 2.5–7.0 | 11.0 | 7.4–16.1 | 2.8 | 1.5–5.2 | 81.9 | 76.0–86.6 |
| City of Johannesburg (Gauteng) | 565 | 2.0 | 1.0–3.7 | 4.6 | 2.6–8.1 | 1.9 | 0.8–4.6 | 91.5 | 86.5–94.7 |

The following specific measures are recommended.

Interventions should focus on upscaling the diagnosis of HIV, increasing the number of HIV-positive people on ART, and achieving better VL suppression among HIV-positive individuals especially among males and youth of both sexes if we are to meet the UNAIDS 90–90–90 targets by 2022.

- Key stakeholders should support the targeted implementation of HIV-testing campaigns and timely linkage to a care programme. Apart from provider-initiated services, this could also include the use of mobile clinics and home-based testing especially among males, who generally dislike seeking health services from public health care facilities to increase the uptake of the service. In addition, self-testing should also be promoted.
- The ART programme should also support and strengthen interventions to ensure treatment adherence and to retain patients in care.
- Monitoring of early warning indicators of HIVDR should be strengthened and the gaps identified should be addressed through appropriate public health and/or programmatic interventions.

There is a need to revitalise, strengthen and provide support for behaviour-change interventions that target the reduction of new HIV infections especially among both adolescents and young people of both sexes. Proven prevention-based interventions that rely on a combination approach, should be made available, with continued emphasis on the high-risk groups, especially females aged 15–24 years, as well as condom use and pre-exposure prophylaxis. The risk behaviours that should be discouraged include the inconsistent use of condoms, age-disparate sexual relationships especially between older men and younger women, and dissuading people from having MSPs.

People with a known HIV-positive status, who were tested before the introduction of testing and treatment in 2016, should be encouraged to 'return to care'.

In addition, both neonatal and male child circumcision should be formally considered for inclusion in the VMMC programme. There is also a need to strengthen the integration of traditional circumcision and VMMC especially in the Eastern Cape, Limpopo and Western Cape, where traditional male circumcision was found to be more common than VMMC. Circumcision should be promoted and a demand for VMMC created, with the initial goal of saturating the 15–34-year age group.

There is a need to intensify efforts at each step of the PMTCT cascade and programmes targeting maternal health in order to eliminate mother-to-child transmission (EMTCT) of HIV.

New and more innovative SBCC campaigns must be developed which include social media and other information and communication technology platforms.

The message that everyone in South Africa is still at risk for HIV must be communicated more effectively. The educational interventions developed should include information about specific risk factors for each target population.

Finally, interventions are needed which promote healthy relationships among couples to prevent intimate partner violence (IPV).

# Introduction

The last decade has seen a massive increase in financial investment to manage AIDS and to reduce the incidence of HIV globally and in South Africa (UNAIDS 2017a). With an estimated 7.2 million people living with HIV in 2017, South Africa continues to display the worst HIV epidemic in the world (StatsSA 2017a).

However, the country has achieved a decline in the incidence of HIV infection and an increase in the number of people initiated to antiretroviral treatment (Johnson et al. 2017; SANAC 2017a; UNAIDS 2017a). The decline is due to a combination of interventions, including social and behavioural change communication (SBCC), condom distribution, the scaling-up of HIV-testing, voluntary medical male circumcision (VMMC), ART, and pre-exposure prophylaxis (PrEP) provided for selected populations and vulnerable groups (NDoH 2017; SANAC 2017a). A key factor in the recent progress was a coordinated multi-sector response, guided by the National Strategic Plan (NSP) and led by the South African National AIDS Council (SANAC), headed by the deputy president.

## 1.1 Policy landscape

The National Development Plan (NDP) and the NSP are guiding documents that set out the vision and goals for South Africa (National Planning Commission 2012; SANAC 2017b). The sustainable development goals (SDGs) provide targets against which to track the country's progress on key indicators (UNAIDS 2015). Goal 3, especially Target 3.3, aims 'to end the epidemics of AIDS and tuberculosis (TB) by 2030'.

The 2017–2022 NSP is the fourth consecutive National Plan aligned to the vision of the United Nations Programme on HIV/AIDS (UNAIDS) and the National Department of Health (NDoH) to eliminate HIV, tuberculosis (TB) and sexually transmitted infections as public health threats by 2030. South Africa was among the first countries to adopt the UNAIDS Fast-Track strategy to end HIV by 2030 (UNAIDS 2014a). As part of this strategy, UNAIDS set targets, namely the UNAIDS 90–90–90 targets, aimed at ensuring that 90% of people living with HIV know their HIV status, 90% of people with diagnosed HIV infection receive sustained ART, and 90% of all people receiving ART achieve VL suppression by 2020 (UNAIDS 2014a). These targets are linked to the TB 90–90–90 strategy. The strategy seeks to have 90% of high-risk and vulnerable groups screened for TB, 90% of people with active TB diagnosed and initiated to effective treatment, and 90% of TB cases successfully treated (UNAIDS 2014a). In 2016, South Africa also adopted the Global Plan to End TB 2016–2020 (WHO 2017c).

There have also been efforts to revive the country's response to STIs, an area which has been neglected in South Africa. The National Strategic Plan 2017–2022 for HIV, TB and STIs highlights the need for standardised guidelines and a treatment plan to enhance screening and treatment (SANAC 2017b). The NSP 2017–2022 sets out eight goals[1] that

1 The current NSP sets out eight goals: 1) To accelerate prevention to reduce new HIV and TB infections and STIs; 2) To reduce morbidity and mortality by providing HIV, TB and STI treatment, care and adherence support for all; 3) To reach all key and vulnerable populations with customised and targeted interventions; 4) To address the social and structural drivers of HIV, TB and STIs, and link these efforts to the National Development Plan (NDP); 5) To ground the response to HIV, TB and STIs in human rights principles and approaches; 6) To promote leadership and shared accountability for a sustainable response to HIV, TB and STIs; 7) To mobilise resources to support the achievement of NSP goals and ensure a sustainable response; and 8) To strengthen strategic information to drive progress towards the achievement of the NSP goals (SANAC 2017b).

prioritise the following areas: prevention; the provision of HIV, TB and STI treatment, care and adherence support; reaching key and vulnerable populations with targeted interventions; and addressing the social and structural drivers of HIV, TB and STIs. The strategic plan sets specific targets, such as reducing HIV incidence by more than 60% by 2022, eliminating mother-to-child HIV transmission, reducing new infections among adolescent girls and young women from 2 000 a week to less than 800, reducing TB incidence by at least 30%, and ensuring that the 90–90–90 target is achieved (SANAC 2017b).

To maximise efforts within the limited funding parameters, South Africa has conducted an investment case exercise to compare all the known HIV and TB interventions that have been implemented. Their impact on both HIV and TB across all layers of the population has been calculated (NDoH 2016). This exercise identifies the enablers and barriers and recommends ways to address them. It is envisaged that subsequent investment case exercises will focus on provincial and district levels, making it critical to collect evidence of impact at these levels too (NDoH 2016).

## 1.2 Tracking the epidemic in South Africa: Past, present and future of household surveys

To track progress on the above goals, baseline values are required and systems must be strengthened to ensure that accurate and useful strategic information is available. Such data enable monitoring the progress of programmes and improving their effectiveness (SANAC 2017b). The Fifth South African National Prevalence, Incidence, Behaviour and Communication Survey (SABSSM V) was conducted by a consortium led by the Human Sciences Research Council (HSRC). The study supports Goal 8 of the NSP, namely, to strengthen strategic information to drive progress towards achieving the National Strategic Plan (NSP) goals. The survey is recognised globally for its contribution to the monitoring and surveillance of the South African HIV epidemic. It has evolved over 15 years, and each survey conducted has provided an opportunity to showcase fresh innovations in tracking the epidemic.

The survey has also responded to the complexities of measuring a maturing HIV epidemic. An aspect of interest is the increased uptake of ART, which markedly influences HIV prevalence patterns, requiring more sophisticated approaches for analysis and interpretation of epidemiological data. The 2012 survey saw changes that included novel laboratory methodologies, such as the multi-assay algorithm for HIV-incidence testing and high-performance liquid chromatography (HPLC), coupled with tandem mass spectrometry (MWS/MS) for antiretroviral drug testing. The latter enabled direct estimates of HIV incidence and exposure to ART (see Shisana et al. 2014 for a detailed account of changes in the methodology over time).

The current survey, with a sample of 60 000 individuals, allowed the estimation of HIV prevalence and incidence at district level for selected districts and three metro areas (see Chapter 2 for details on methodology). The past four surveys provided data for estimates of provincial HIV prevalence only. As certain districts within provinces are known to have higher HIV prevalence and incidence rates, more localised data for prevalence estimates were needed (SANAC 2017a). The SABSSM V collected four key variables – age, sex, race and locality – for describing the distribution of HIV in the country. It also tracked key indicators that are used to evaluate the impact of interventions.

Tests for biomarkers were expanded to include viral load (VL) testing to estimate the levels of VL suppression in people living with HIV. This information is critical for tracking progress on the 90–90–90 targets. Testing for HIDVR is another new addition that addresses concerns about the development of drug resistance. In SABSSM V, HIV-testing Services (HTSs) – that is, rapid HIV testing – was used, and actionable biomedical survey results were returned to nearby clinics so that people could access their results if they chose to. This aspect reflects guidance received from The United States Presidents' Emergency Plan for AIDS Relief (PEPFAR) and the US Centers for Disease Control and Prevention (CDC). The approach is similar to that of population-based HIV impact assessment (PHIA) surveys.[2]

The 2017 survey included new modules to cover self-reported TB and intimate partner violence (IPV). The previous modules were included again to provide behavioural data pertinent to reducing new infections. Similar to the 2005 survey, a component on SBCC programmes implemented by the Centre for Communication Impact, Soul City and LoveLife as part of the national HIV response was included. A total of 43 SBCC programmes were assessed to measure the extent to which people are exposed to the communication programmes. The data enabled the evaluation of the impact of such exposure on key behavioural factors (condom use, HIV counselling and testing, and health services such as medical male circumcision and contraceptives) and knowledge outcomes. All the above additions provide a new dimension in data triangulation and enhance the interpretation of the data.

## 1.3 The state of the South African HIV epidemic

Thirty-eight years after HIV was discovered, South Africa continues to grapple with a generalised and maturing HIV epidemic. Not only does the country have the largest number globally of people living with HIV, it also has one of the highest burdens of TB globally. The two diseases are often referred to as twin or dual epidemics (UNAIDS 2017a). A total of 244 053 TB cases were reported in 2016, with TB/HIV co-infection levels estimated at 59% (WHO 2017c). Previous studies have shown that the South African HIV epidemic is not homogenous but that prevalence and incidence vary at the local, district and provincial levels. They also vary by age, race, gender and socioeconomic status (Shisana et al. 2009, 2014, 2015).

HIV prevalence for the whole population rose from 10.9% in 2002 to 12.6% in 2017 (Johnson, Dorrington & Moolla 2017; StatsSA 2017a). The increase has been attributed to the effect of ART in extending people's life expectancy, as well as the occurrence of new infections. Although the prevalence of HIV remains high and disparate, it has decreased significantly among children aged 14 years and younger, from 9.3% in 2002 to 7.1% in 2012 (Shisana et al. 2014); and among youth aged 15–24 years, from 7.3% in 2002 to 4.6% in 2017 (StatsSA 2017a). New HIV infections decreased from 360 000 in 2012 to 270 000 in 2016 (SANAC 2017a). Young women aged 15–24 years still have the highest burden among all age groups and accounted for 100 000 new HIV infections in 2017.

The decline among children is attributed to the success of the scaling up of South Africa's prevention of mother-to-child transmission (PMTCT) programme. The evidence suggests

2 As in SABSSM V, PHIA surveys are aimed at measuring the reach and impact of HIV programmes in PEPFAR-supported countries through national surveys (http://phia.icap.columbia.edu/). The results are used to measure national and regional progress toward the UNAIDS 90–90–90 goals and to guide HIV policy and funding priorities. PHIA surveys were first conducted in Malawi (MPHIA), Zambia (ZAMPHIA) and Zimbabwe (ZIMPHIA) (http://phia.icap.columbia.edu/).

that an estimated 70% of infections in children occur during breastfeeding, a matter that is of concern (Johnson et al. 2016). Increased ART coverage is needed among children (UNAIDS 2018).

Black Africans continue to carry the highest burden of HIV. Black African women aged 20–34 years have the highest HIV prevalence at 31.6%, and the highest HIV incidence at 4.5% per year (Shisana et al. 2014). Although new infections among adults declined by 54% from 1999 to 2017, the incidence remains high, with an estimated 253 081 new HIV infections reported in 2017 (Johnson et al. 2017). Adolescent girls and young women (AGYW) aged 15–24 years remain at high risk of infection, with a prevalence estimated to be eight times that of their male counterparts (Dellar, Dlamini & Karim 2015; Shisana et al. 2015).

Although the epidemic in South Africa is generalised, certain populations are classified as vulnerable or high-risk groups (Shisana et al. 2014, 2015). HIV prevalence among these groups are as follows: black African women aged 20–35 years, 31.6%; cohabiting couples, 30.9%; black African men aged 25–49 years, 25.7%; persons with disabilities aged 15 years and older, 16.7%; high-risk alcohol drinkers aged 15 years and older, 14.3%; and recreational drug users, 12.7% (Shisana et al. 2014, 2015).

Variations in HIV prevalence and incidence are also seen at provincial level. Modelling estimates suggest that HIV incidence in adults aged 15–49 years varied from 0.55% (95% CI: 0.47–0.66%) in Western Cape to 1.45% (95% CI: 1.32–1.60%) in Mpumalanga and 1.62% (95% CI: 1.55–1.71%) in KwaZulu-Natal in 2014/15 (Johnson, Dorrington & Moolla 2017). Similar rankings were observed in 2015 with regard to adult (15–49 years) HIV prevalence. At the provincial level, prevalence varied from 9.4% (95% CI: 8.7–10.3%) in Western Cape to 27% (95% CI: 26.3–27.8%) in KwaZulu-Natal (Johnson, Dorrington & Moolla 2017).

Wide variation was also observed at district level. From 2011 to 2015, HIV prevalence among pregnant women aged 15–49 years reportedly increased in 30 out of 52 districts (NDoH 2015). Districts in KwaZulu-Natal showed the highest increase overall, with Zululand having the highest HIV prevalence at 48.4% (95% CI: 40.2%–56.8%). Fezile Dabi (Free State) and Gert Sibande (Mpumalanga) were reported to have the most significant reductions in HIV prevalence estimates since 2011, with reductions of 7.5% and 9.1% respectively (NDoH 2015).

### 1.3.1 Key drivers of HIV infections in South Africa

The risk of HIV infection increases with certain socio-behavioural and structural factors. These include multiple sexual partners (MSPs), age-disparate sexual relations (Evans et al. 2016, 2017; Shisana et al. 2014), inconsistent condom use, high mobility, migration, exposure to sexual violence, and alcohol use (Madiba & Ngwenya 2017; McGrath et al.; Pitpitan et al. 2016). Below we discuss some of these drivers.

**Lack of HIV-testing:** The 90–90–90 UNAIDS strategy identifies HIV-testing as the entry point for initiating people living with HIV to ART and achieving VL suppression (UNAIDS 2014a). The South African government has embarked on a deliberate effort to scale up and strengthen the quality of HTS at all health facilities and other sites (NDoH 2016, 2017). Within the country, the proportion of people who have received an HIV test and are aware of their status has increased from 50% in 2008 to 66.5% in 2012 (Shisana et al. 2009, 2014). Statistics from the Department of Health's annual report show an increase from 13 000 000 in 2012 to 14 233 123 in 2016/17 (financial year) for men and women aged 15–49 years who accessed HTSs (NDoH 2017).

**Age-disparate sex:** Previous surveys have shown that age-disparate sexual relationships, in which partners have an age gap of five years or more, are associated with increased risk for HIV infection among AGYW (Evans et al. 2016, 2017; Shisana et al. 2014). These relationships have increased among AGYW, rising from 13.1% in 2002 to 16.7% in 2012 (Evans et al. 2016; Shisana et al. 2014). Age-disparate relationships often intersect with transactional sex (exchanging sex for gifts, money and services), which further increases the risk due to an imbalanced power dynamic between the partners (Evans et al. 2016, 2017; Maughan-Brown, Evans & George 2016). Recent evidence using national datasets has confirmed that age-disparate relationships increase the risk among young women (Evans et al. 2016, 2017; Maughan-Brown, Evans & George 2016; Shisana et al. 2014). Phylogenetic studies in KwaZulu-Natal have also shown that partnerships between younger women and older men is a key driver of HIV transmission (De Oliveira et al. 2017).

**Early sexual debut:** Age at sexual debut is an important determinant of HIV infection. Early sexual debut among young women and men, who have their first sexual intercourse before the age of 15 years, is associated with risks to sexual and reproductive health (Richter, Mabaso, Ramjith & Norris 2015). South African studies have shown that three times more males than females reported having sex for the first time before the age of 15 years (Martinez & Abma 2015; Shisana et al. 2014). An early sexual debut increases the lifetime HIV risk and is associated with other HIV risk factors (Mabaso et al. 2018; McGrath et al. 2009; Wand & Ramjee 2012).

**Medical male circumcision among sexually active males:** The NDoH implemented a national VMMC plan 2011/12–2015/16, with a target of 4.3 million VMMCs by 2016, which would have represented 80% coverage. By February 2017, only 3 million circumcisions had been performed. Challenges include changing policy guidelines with regard to the age groups to be targeted and the continued preference for traditional male circumcision in communities that view traditional circumcision as a rite of passage (Shisana et al. 2014).

**Condom use:** Deterministic models have shown that condom use – promoted as part of the NSP – was the most significant factor associated with the reported decline in HIV and STI incidence in South Africa. (Johnson et al. 2013; SANAC 2017b). In South Africa, male and female condoms are provided through a free condom distribution programme that is regarded as one of the largest and most established in the world (SANAC 2017b; UNAIDS 2017b). While condom distribution has been on the increase (NDoH 2017), evidence suggests that actual condom use is on the decline, not only in South Africa but globally (UNAIDS 2016). The 2012 household survey found that condom use at the last sexual encounter among people aged 15 years and older was 36.2% (Shisana et al. 2014).

**Knowledge of HIV and AIDS:** The country's response includes social and behaviour change HIV communication programmes (SANAC 2017b). Knowledge levels remained generally low and seemed to decline in recent years, not only in South Africa but within the sub-Saharan region (Shisana et al. 2014; UNAIDS 2016). There is evidence that knowledge is not internalised and translated into preventative practices (Sathiparsad & Taylor 2006). According to the UNFPA (2016), only 59% of young people in South Africa possess comprehensive knowledge of the ways to prevent HIV.

**Stigma and HIV:** The current NSP emphasises combating stigma and discrimination. A serious barrier to adherence to care and treatment is HIV-related stigma. Surveys conducted between 2005–2012 reported a decline in stigma and discrimination directed

towards people living with HIV, relative to the 2002 survey results (Shisana et al. 2005c, 2009, 2014). However, both internalised and community-based stigma remain significant challenges (Cloete et al. 2014; Hargreaves et al. 2017). It is argued that individuals become hesitant to seek care if they fear that doing so will lead to prejudice and discrimination. Testing and treatment for HIV and AIDS has been shown to improve where programmes exist to combat discrimination and stigma in southern Africa (UNAIDS 2017a).

**Multiple sexual partnerships:** MSPs have been shown to increase the spread of HIV during the acute and early infection phases (Pines et al. 2016; UNAIDS 2015). Transmission can also occur among partners living with HIV in the form of a super-infection, especially if they are exposed to different strains of HIV (Kalichman et al. 2005). The link between MSPs and HIV infection is well established (Morris & Kretzschmar 1997). Recent evidence from South Africa confirms the increase in risk for black South African women, particularly younger women (Kenyon et al. 2016). Recent studies on the determinants of MSPs have shown that household, interpersonal and individual factors are associated with MSPs (Muchiria et al. 2017; Onoya et al. 2014). Onoya et al. (2014) found that among women, MSP determinants included economic vulnerability, younger age at sexual debut, and living in formal urban rather than formal rural areas. Reducing partner turnover and the overall number of sexual partners is therefore crucial in the effort to reduce the incidence of HIV.

**Serodiscordance between couples and mother-and-child pairs:** Serodiscordance contributes to HIV transmission (Merenu et al. 2016; Rispel et al. 2011) and refers to situations where a mother-and-child pair or a sexually active couple have a mixed HIV status (Ndirangu 2017; Wilton 2015). Information on HIV serodiscordance between mother-and-child pairs and couples is crucial to HIV prevention and treatment programming. A recent review of studies documented the increased biological susceptibility of women during pregnancy and post-partum (Drake et al. 2014). The prevalence of serodiscordant relationships is growing in South Africa and was recently reported to be 27.4% (Lingappa et al. 2018). Testing of couples and the early initiation of ART dramatically reduces HIV transmission to HIV-negative partners in serodiscordant relationships (Cohen et al. 2015).

## 1.4 South Africa's response to HIV and AIDS and advances in addressing the epidemic

The policy and intervention measures implemented by the South African public health sector, highlighted in the previous paragraphs, have led to a decline in the overall incidence of HIV. The decrease is especially obvious for prenatal HIV infections. In addition, the number of people on the ART programme has increased markedly (Johnson, Dorrington & Moolla 2017; Shisana et al. 2014). The country has witnessed a sharp increase in national life expectancy, estimated at 63.5 years in 2017. South Africa adopted the universal test-and-treat (UTT) approach recommended by the WHO in September 2016. This policy provides immediate ART to all HIV-positive individuals, regardless of their immunocompetence status. (Immunocompetence refers to the body's ability to produce a normal immune response when exposed to a foreign body or toxin.)

The infection of young girls is a challenge that has received increased attention in the country. Interventions include national campaigns with a comprehensive set of packages to target young women aged 15-24 years primarily, with a secondary focus on males aged 15–35 years, as high-risk categories in the population (NDoH 2017). These include

the 'She Conquers' campaign[3] (NDoH 2017; SANAC 2017b) and the implementation of a pilot rollout of PrEP at selected institutions of higher learning (Moretlwe & Mullick 2017). Substantial funding has been received from PEPFAR through the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe partnership (DREAMS) for preventing HIV among adolescent girls and young women (AGYW).

To address the reported decline in condom use, the government has rebranded the male condoms – previously called 'Choice' and now 'Max' – and has introduced flavoured options, aimed at catering for the preferences of young people (Ashmore & Henwood 2015; NDoH 2016). There have also been efforts to improve the availability (target of 40 million) and quality of female condoms (NDoH 2017; SANAC 2017b). The country is addressing the observed decline in levels of correct knowledge with regard to the prevention of HIV (Shisana et al. 2014) through implementing behavioural change communication interventions.[4] These SBCC programmes play an important role in increasing people's knowledge and skills; influencing their beliefs and attitudes; challenging existing and prevailing norms; deepening perception of risk for HIV infection; and influencing cognitive, emotional and social ideation (ideational factors). During the 2012–2017 period, non-governmental organisations such as Soul City, Centre for Communication Impact, loveLife, and Community Media Trust implemented HIV communication programmes as part of the national response to HIV in the country. In late 2015, a campaign called Phila led by the NDoH was initiated. Non-government-based SBCC interventions were focused geographically and on high-risk populations as well as structural drivers.

In conclusion, the country has made significant strides to address the epidemic. The interventions highlighted above represent only part of the HIV and AIDS response in South Africa, as it is beyond the scope of this report to discuss every intervention on the ground.

## 1.5 Aims and objectives

### 1.5.1 Aims

- To maintain surveillance of HIV infection and behaviour in South Africa, and to obtain a better understanding of factors driving the HIV epidemic.
- To collect data to evaluate the South African National HIV, AIDS and STI Strategic Plan for 2012–2016.
- To collect data to monitor the HIV indicators required for preparing the country reports to submit to various international bodies.

### 1.5.2 Objectives

To undertake the following in a household-based, nationally representative sample of adults and children (aged 0–17 years) in South Africa:

- To estimate the HIV prevalence at national, provincial and selected district levels, among adults and children in South Africa.

3 The 'She Conquers' campaign is aimed at reducing HIV incidence, school absenteeism, gender-based violence, and teenage pregnancy among girls, while also empowering women with economic opportunities. There is a specific focus on orphans and vulnerable children, young sex workers, youth with disabilities, and women and girls living in rural areas (NDoH 2017, SANAC 2017).

4 Interventions include Soul City, ZAZI and loveLife initiatives and programmes, such as MTV Shuga, men's health and empowerment, women's health, and LGTBI initiatives. These programmes aim to address multiple and concurrent partnerships, alcohol abuse, and gender-based violence. They also encourage medical circumcision among young men, HIV testing and access to health services. The empowerment of women is another priority.

- To estimate the HIV incidence (annualised rate of new HIV infections) among adults and children in South Africa.
- To estimate the extent of exposure to antiretroviral therapy (ART) and the level of HIV drug resistance (HIVDR) at national, provincial and selected district levels, among adults and children in South Africa.
- To review the progress towards reaching the UNAIDS 90–90–90 goals for HIV epidemic control.

Furthermore, to undertake the following analyses at the national and provincial levels and for selected districts:

- To describe trends in HIV prevalence, HIV incidence, and risk behaviour for the period 2002–2017.
- To assess the prevalence of self-reported TB, related knowledge and attitudes.
- To assess the relationship between social and behavioural factors and HIV infection.
- To determine the viral load (VL) in individuals living with HIV and to estimate the proportion of persons receiving ART who are virally suppressed.
- To track the proportion of circumcised males, including a breakdown for voluntary medical male circumcision (VMMC) and traditional male circumcision.
- To track the extent of access to different types of HIV health education and communication interventions.
- To evaluate several national South African HIV communication programmes regarding the extent of their exposure and coverage; their impact on people's knowledge, attitudes and perceptions relating to HIV and AIDS and their impact on sexual and risky behaviours.

# Methodology

This chapter summarises the survey design, sampling methods and approaches used to collect data from randomly sampled households and individuals during the survey. Data were collected digitally using electronic tablets, and dried blood spot (DBS) samples were collected for biomarker testing. The chapter also discusses the methods of data management, the weighting of survey data and the data analysis. Most of this discussion focuses on the main survey, which used nationally and provincially representative samples. Section 2.12 provides information about the additional 16 selected districts.

## 2.1 Survey design

A cross-sectional, population-based household survey was conducted using a multi-stage stratified random cluster sampling approach. The study design and methods were based on the methods used and validated in the four previous surveys by HSRC in 2002, 2005, 2008 and 2012 (Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014). The methodology included the use of linked anonymous blood testing with informed consent (WHO, CDC & FHI 360 2017). In the first two surveys (2002 and 2005), a maximum of three people were randomly sampled in each household, based on pre-determined age categories, namely a child aged 2–14 years, a youth aged 15–24 years, and an adult aged 25 years or older (see Shisana & Simbayi 2002; Shisana et al. 2005, 2009). In 2008, infants aged 2 years and younger were included in the sample as a fourth possible person.

In 2012, a more robust and representative approach commenced in which all household members were included in the survey (Shisana et al. 2014). This approach enabled the linking of results for mother-and-child pairs and the linking of cohabiting or married sexual partners in the same household, to determine HIV serodiscordancy.

## 2.2 Survey population

This survey included people of all ages living in South Africa. All members in the selected households[5] were invited to participate, including people living in hostels.[6] Those staying in educational institutions, old-age homes, hospitals, and uniformed-service barracks or prisons were excluded from the survey. The exclusion criteria were based on whether people were able to provide clear consent according to their understanding and comprehension of the consent process and the information provided.

## 2.3 Sampling

The 2017 survey design was similar to that of previous household surveys (Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014). As in the previous surveys, a multi-stage disproportionate and stratified cluster sampling approach was used (see Box 1). However, unlike the previous versions of household surveys, the 2017 survey used small area layers (SALs) as the primary sampling unit (PSU) instead of the enumeration areas[7] (EAs) that

5 A household is defined as a group of people who live together, eat together and share resources, or a person who lives alone.

6 A hostel is defined as former male-only flats used during the apartheid era, which have now been coverted to family residences.

7 An enumeration area (EA) is a spatial area that is used by Statistics South Africa (StatsSA) to collect census information on the South African population. An EA consists of approximately 180 households in urban areas, and 80 to 120 households in deep rural areas. An EA is considered to be small enough for one person (a census enumerator) to collect information for StatsSA. The country has been subdivided into about 103 576 EAs.

were used in previous surveys (StatsSA 2011). SALs exist at a level higher than EAs. EAs having relatively few visiting points (VPs[8]) were merged together to form an SAL. A VP is defined as a stand or an address that may include one or more households. A household is defined as a group of people who live and eat together from the same pot. For example, individuals in a hostel who eat together are considered a single household; alternatively, they may be classified as separate households with a single person in each household.

Statistics South Africa (StatsSA) released a sampling frame at the SAL level because of confidentiality issues related to EAs that have few VPs. An SAL consists of one or more EAs and is better defined geographically than the EA (StatsSA 2015).

For the 2017 survey, a new HSRC master sample was developed through the disproportionate stratified sampling of 1 000 SALs from the newly released National Sampling Frame of 84 907 SALs (StatsSA 2011). The SALs were sampled with a probability proportional to its size with the number of VPs as a measure of size (MOS). The released SALs were updated in 2015 and mapped using aerial photography to create a new master sample, which was used as a basis for sampling households in the 2017 survey (ESRI 1969). The box below describes the sampling steps.

*Box 1: Steps in sampling for national estimates*

1. **Define the target population:** All people living in households in South Africa.
2. **Define the sampling frame:** We used the 2015 national population sampling frame of 84 907 small area layers developed by Statistics South Africa (StatsSA 2017b). From this sampling frame, we drew 1 000 SALs.
3. **Define primary sampling units:** 1 000 SALs were sampled from the 2015 database of SALs.
4. **Define measure of size:** The 2011 estimate of visiting points (VPs), MOS was used in sampling 1 000 SALs.
5. **Allocate the sample:** SALs were disproportionately allocated according to province, race group and geographic type (geotype or locality type).
6. **Define strata:** There were 9 provinces ($n$=9) and 3 geotypes or locality types ($n$=3).
7. **Define reporting domains:** Geotype or locality type was $n$=3; age groups were $n$=4; sex was $n$=2; and race group was $n$=4.
8. **Define secondary sampling units:** 15 VPs were systematically sampled from each of the selected 1000 SALs.
9. **Define ultimate sampling unit:** All individuals living in a household were asked to participate in the survey.

The selection of SALs was stratified by province and locality type. In the four previous surveys, locality type was stratified into four levels: urban formal, urban informal (informal or squatter settlements), rural informal (tribal area)[9] and rural formal areas (farms). By contrast, in the current survey only three locality types were identified: urban, rural informal (tribal area) and rural formal (farms). Characteristics that were used previously to

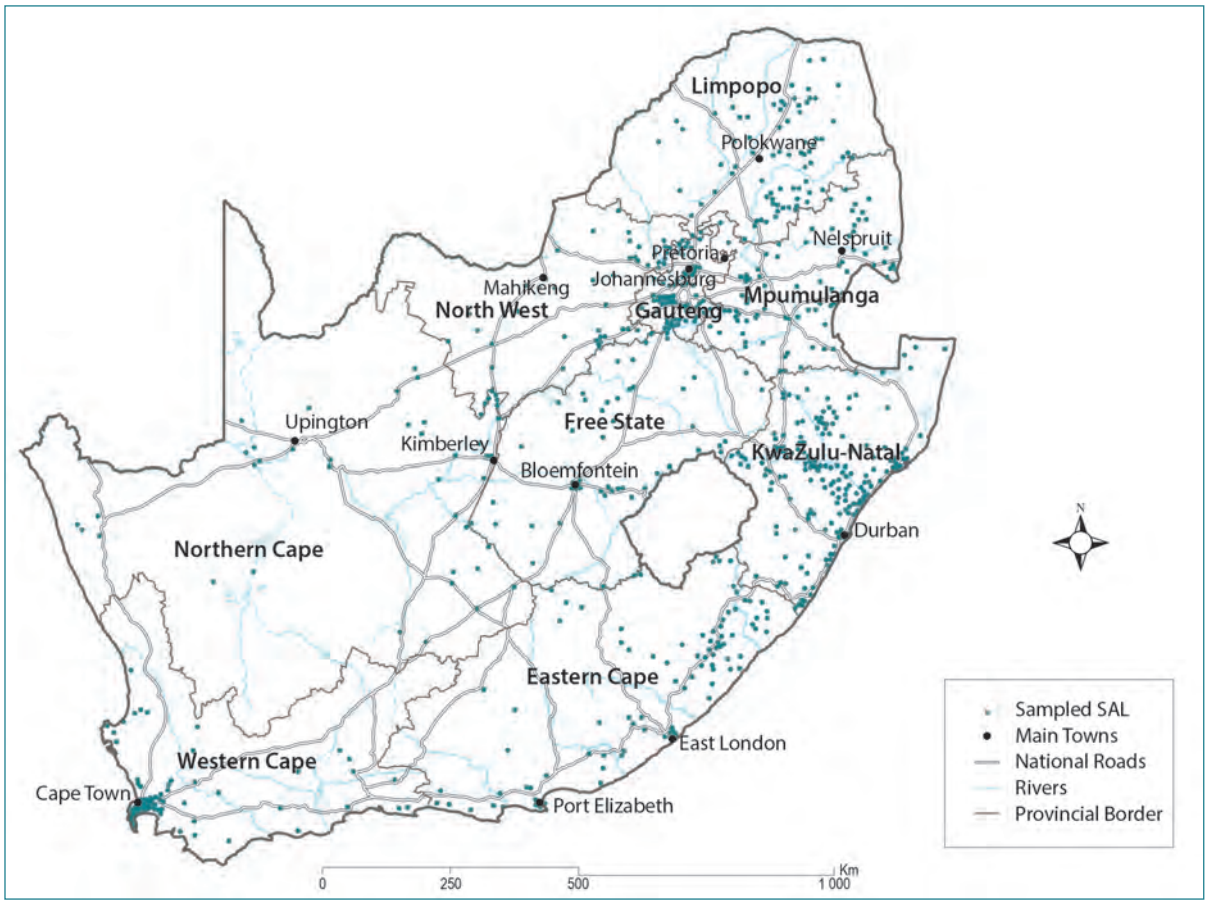
8 A visiting point is a physical address or a dwelling where a household or a group of households can be found. It can be a house, shack, vacant stand, hotel, a room in a hostel, shop, house under construction, hut, tent, or a block of flats or apartments. There may be more than one household at a visiting point.

9 Tribal areas are essentially rural informal areas in which tribal chiefs are regarded as the key agents for law enforcement (StatsSA 2004).

classify geolocation, such as access to electricity and potable water, as well as population density (among other variables), have become more universal and thus could not be associated with geolocation exclusively. In urban localities, the race category was used as a third stratification variable, based on the predominant race group in the selected SAL (as informed by the 2016 Community Survey).

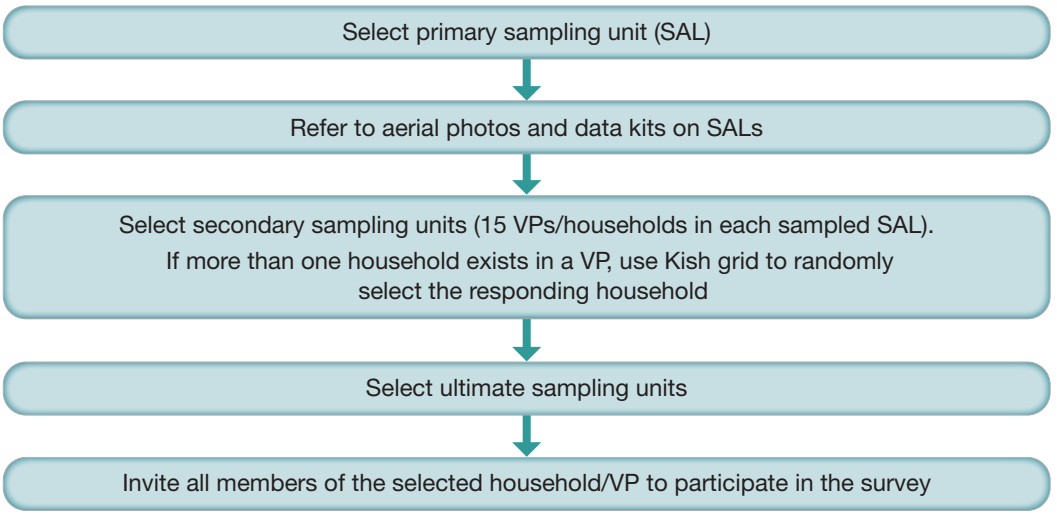
The allocation of SALs was disproportionate. We over-sampled areas that were dominated by Indian, coloured or white race groups as well as the sparsely populated Northern Cape, to ensure that the minimum required sample sizes were obtained for the three minority race groups in South Africa and Northern Cape (see also Section 4.3 on sample weighting). Figure 2.1 presents the distribution of the sampled SALs. The total allocation of SALs was similar to that in the 2012 survey (Shisana et al. 2014).

*Figure 2.1: Map showing SALs realised in the survey*




VPs and households were used as secondary sampling units (SSUs). Within each household, all consenting members formed the ultimate sampling unit (USU). Figure 2.2 shows the sampling approach used in the field. A systematic random sample of 15 VPs was selected from each of the 1 000 SALs, yielding a total sample of 15 000 households or VPs. If more than one household existed in a VP, a Kish grid (Kish 1965) was used to randomly select a responding household in which all household members were eligible to participate. Therefore, in the final sample, one household was sampled in each VP. Figure 2.2 summarises the sampling procedure.

*Figure 2.2: Steps in sampling to obtain national estimates*




The preselected households for the study were identified using aerial maps, with the aid of GPS instruments if necessary. Up to four visits were made to each selected household to ensure maximum participation. This approach meant that an interviewer visited the household first, explained the purpose of the survey, sought informed consent from the head of the household or a representative, completed the VP questionnaire, and provided information about the study. The household was then informed that the same data collector (possibly together with other collectors) would conduct a survey with individual members of the household who were at home on the day of the first visit, or at a later visit at a pre-agreed time. Electronic tablets were used for data collection. Any household from which a member was absent at the first visit was revisited up to three more times. The revisits were conducted according to people's availability on certain days of the week and at certain times of the day.

The completed VP survey included a list of all the household members. A field supervisor ensured that all individual members of the household were accounted for by appropriately recording persons who refused to participate. The demographic characteristics (age, sex, race) of individuals who refused were obtained from the relevant VP questionnaire.

## 2.4 Sample size estimation

The estimation of the proposed sample size for the 2017 survey considered the expected response rates at both household and individual levels. In the 2012 survey, the household response rate was 84.7% and the response rate for individual surveys was 89.5%. The response rate for HIV-testing was 67.5%. In estimating the expected sample size and its distribution by key reporting domains, similar response rates were assumed for the current survey (see Table 2.1).

The sample distribution in Table 2.1 formed the basis for generating the 2017 survey estimates by age, sex, race, locality/geotype and province. This basis ensured that comparison with previous surveys would be valid and provided the data for trend analyses of important HIV-related indicators. As in the previous surveys, the sample size for trend analysis satisfied the following two requirements:

1. The requirement for measuring change over time to detect a 5% change in HIV prevalence in each of the main reporting domains, namely sex, age group, race, locality type and province (5% level of significance, 80% power, two-sided test).
2. The requirement for acceptable precision in estimates per reporting domain. HIV prevalence was estimated for each of the main reporting domains, with a precision level of less than ±5%, which is equivalent to the expected width of the 95% confidence interval (CI) (*z*-score at 95% for two-sided test). A design effect of 2 was assumed.

The unique feature of the 2017 survey – compared to the previous surveys – is its extended design, which allows for estimation at district level for the 16 selected districts embedded in the survey. Table 2.1 presents the additional expected sample size that would allow for the estimates for the 16 additional districts.

*Table 2.1: Expected sample sizes by key reporting domains, South Africa, 2017*

| Demographic variable | Expected sample size for national estimates | | Additional expected sample size for district estimates | | Total respondents for national and additional estimates |
|---|---|---|---|---|---|
| | Survey respondents | HIV-test[a] respondents | Survey respondents | HIV-test respondents | |
| **Total** | **39 033** | **29 430** | **20 423** | **15 430** | **59 456** |
| **Sex** | | | | | |
| Male | 18 429 | 13 223 | 9 607 | 6 396 | 28 036 |
| Female | 20 600 | 16 184 | 10 815 | 7 938 | 31 415 |
| **Race** | | | | | |
| Black Africans | 23 398 | 19 167 | 13 909 | 11 182 | 37 307 |
| Whites | 3 716 | 1 786 | 2 185 | 885 | 5 901 |
| Coloureds | 7 443 | 5 789 | 2 342 | 1 690 | 9 785 |
| Indian/Asian | 4 477 | 2 702 | 1 911 | 550 | 6 388 |
| **Locality type** | | | | | |
| Urban formal | 22 758 | 15 184 | 11 389 | 6 792 | 34 147 |
| Urban informal | 4 110 | 3 339 | 2 496 | 1 973 | 6 606 |
| Rural informal (tribal areas)[b] | 8 731 | 7 806 | 5 534 | 5 026 | 1 4265 |
| Rural formal (farms) | 3 431 | 3 098 | 1 001 | 819 | 4 432 |
| **Age group (years)** | | | | | |
| 0 to <2 | 1 569 | 905 | 856 | 474 | 2 425 |
| 2 to 14 | 9 324 | 7 315 | 4 948 | 3 854 | 1 4272 |
| 15 to 24 | 7 521 | 6 018 | 3 978 | 3 033 | 11 499 |
| 25 and above | 20 611 | 15 150 | 10 638 | 6 966 | 31 249 |

| Demographic variable | Expected sample size for national estimates | | Additional expected sample size for district estimates | | Total respondents for national and additional estimates |
|---|---|---|---|---|---|
| | Survey respondents | HIV-test[a] respondents | Survey respondents | HIV-test respondents | |
| **Province** | | | | | |
| Western Cape | 4 769 | 3 411 | – | – | 4 769 |
| Eastern Cape | 4 898 | 4 149 | 806 | 609 | 5 704 |
| Northern Cape | 2 974 | 2 410 | – | – | 2 974 |
| Free State | 2 810 | 2 139 | – | – | 2 810 |
| KwaZulu-Natal | 8 785 | 7 177 | 8 771 | 6 627 | 17 556 |
| North West | 2 736 | 2 049 | 930 | 703 | 3 666 |
| Gauteng | 5 753 | 3 099 | 5 440 | 4 110 | 11 193 |
| Mpumalanga | 2 853 | 2 305 | 3 401 | 2 570 | 6 254 |
| Limpopo | 3 454 | 2 691 | 1 074 | 812 | 4 528 |

Column totals include missing demographic information.
a HIV-testing was performed by dried blood spot analysis.
b 'Tribal areas' refers essentially to rural informal (tribal) areas in which tribal chiefs are the main agents for law enforcement (StatsSA 2004).

## 2.5 Measures

The main survey used the same four questionnaires used in the previous surveys with five changes. First, certain modules on fertility, morbidity, mortality, and child and maternal health included in the 2012 survey were removed because a separate South African Demographic Health Survey (SADHS) was conducted in 2016. Second, a new module was added to cover knowledge, attitudes and perceptions of TB. Third, the module on media, communication and norms was expanded to include several sub-modules that probed the extent of exposure among respondents to various HIV communication campaigns. (This area was covered in previous national HIV communication surveys; see the 2012 survey report by Johnson et al. 2013). Fourth, a modified module on migration was added, based on the Kenyan AIDS Impact Survey (National AIDS and STI Control Programme, Ministry of Health, Kenya 2013). Finally, the module on violence was changed so that it no longer focused on violence in the community but rather on intimate partner violence (IPV). Intimate partner violence was measured using the Revised Conflict Tactics Scale (Straus et al. 1996). This IPV scale used in the survey measured both the experience and perpetration of violence among those who were ever in an intimate relationship. Men and women responded to questions regarding experiences with their 'partner'. Thus, the respondents defined their respective partnerships. Respondents were asked about ever experiencing or perpetrating violence. Frequency of experiencing physical violence from a partner in the past year was also measured. The IPV module was administered to only one randomly sampled respondent per household, who was aged 15 years or older and was selected using a Kish grid, in accordance with the WHO ethical and safety recommendations for research on domestic violence (WHO 2001).

The survey administered four questionnaires, namely:
- household questionnaires (also known as visiting-point questionnaires);
- questionnaires for parent or guardian of children aged 11 years or younger;
- questionnaires for children aged 12 to 14 years; and
- questionnaires for people aged 15 years or older.

The questionnaires and protocol were shared with various stakeholders, such as SANAC and government departments – including the National Department of Health, the Gauteng Provincial Department of Health, the National Department of Basic Education, the National Department of Social Development and the Department of Public Service and Administration. They were also shared with NGOs and other research agencies to obtain their input. Consultative meetings were held where both the questionnaires and the study protocol were presented. Suggestions and inputs were received at these meetings so that the instruments and protocol could be refined.

As in 2012, all questionnaires, information sheets and informed consent forms were translated from English into ten other South African official languages: Afrikaans, isiZulu, isiXhosa, Sesotho, Setswana, Sepedi, SiSwati, Xitsonga, Tshivenda and IsiNdebele. They were then pretested during the preparatory phase of the project. A service provider was appointed to translate all English survey documents. For quality control, several HSRC staff proficient in the translated languages reviewed and back-translated each of the questionnaires into English. The translated documents were then pretested among respondents from 150 households from ten SALs during September 2016. Five SALs each were covered in KwaZulu-Natal and the North West. Table 2.2 shows the modules included in the household questionnaires.

*Table 2.2: Household questionnaires used in the 2017 survey*

| Section/Module | Household information | Personal information |
|---|---|---|
| Geographic location of household | ✗ | |
| Interview details | ✗ | |
| Refusal particulars | ✗ | |
| Source, availability, and safety of potable water | ✗ | |
| Type of sanitation and sharing of facilities | ✗ | |
| Energy sources | ✗ | |
| Household amenities and assets | ✗ | |
| Housing: Number of rooms in dwelling | ✗ | |
| Type of dwelling | ✗ | |
| Material of roof and walls of dwelling | ✗ | |
| Vulnerability: Qualitative measure of income | ✗ | |
| Vulnerability: Food insecurity | ✗ | |
| Relationship of members | | ✗ |
| Sex (male, female) | | ✗ |
| Age | | ✗ |
| Race | | ✗ |
| Language | | ✗ |
| Receipt of government social support grants | | ✗ |

Table 2.3 shows the various modules included in each of the individual questionnaires. In the 2017 survey, the additional modules included media, communication and norms, IPV and mental health.

*Table 2.3: Questionnaires completed for each individual in the 2017 survey*

| Questionnaire module | Children aged 0–11 years (reported by parent/ guardian) | Children aged 12–14 years (self-reported) | Youth and adults aged 15 years and older (self-reported) |
|---|---|---|---|
| **Demographics**<br>• Age, sex (male, female, transgender, intersex), race, nationality, employment, marital status, importance of religion, income, education, number of children, disability (physical, visual, hearing, speech and mental impairments), migration | ✗ | ✗ | ✗ |
| **Orphan status**<br>• Parental survivor (under 20)<br>• Age of child at death of parent | ✗ | ✗ | ✗<br>(under 20 only) |
| **Education**<br>• School attendance<br>• Reasons for missing school<br>• Educational level achieved<br>• Safety at school | ✗ | ✗ | ✗<br>✗<br>✗<br>✗<br>✗<br>(under 19 only) |
| **Media, communication and norms**<br>• Media access and use<br>• Sources of HIV information<br>• Participation in HIV activities (HIV-related workshops, seminars and meetings, etc.)<br>• Exposure to and reach of various HIV communication programmes (Brothers for Life, ZAZI, Siyayinqoba, Beat It, Inside Story, Soul City, loveLife) | | ✗ | ✗ |
| **Knowledge, attitudes, beliefs and values**<br>• Knowledge about and attitude towards HIV and AIDS, HIV-related practices and behaviours, and TB | | ✗ | ✗ |

| Questionnaire module | Children aged 0–11 years (reported by parent/ guardian) | Children aged 12–14 years (self-reported) | Youth and adults aged 15 years and older (self-reported) |
|---|---|---|---|
| **Sexual history**<br>• Sexual debut<br>• Partner history<br>• Sexual orientation and identity<br>• Transactional sex<br>• Concurrency<br>• Age mixing<br>• Condom use<br>• Use of other contraceptives | | ✗ | ✗ |
| **Sexually transmitted infections**<br>• Current and previous symptoms | | | ✗ |
| **Delivery and care details**<br>• Current pregnancy<br>• Antenatal care services<br>• Breastfeeding, formula feeding, pre-mastication | ✗ (for respondents under 2 years) | | ✗ |
| **Male circumcision**<br>• Circumcision status<br>• Age and place of circumcision<br>• Reasons<br>• Complications<br>• Knowledge | ✗ | ✗ | ✗ |
| **HIV testing and risk perception**<br>• Testing history<br>• Source of testing<br>• Reason for testing<br>• Antiretroviral treatment<br>• Risk perception | ✗ (for respondents under two years) | ✗ | ✗ |
| **Drug and alcohol use**<br>• Use and impact | ✗ (5–11 years exposure to use within household) | ✗ (including exposure to use within household) | ✗ |
| **Health status**<br>• Perception of general health<br>• Hospitalisation | ✗ | ✗ | ✗ |
| **Mental health**<br>• Perceived psychological distress | | | ✗ |
| **Violence in relationships**<br>• Occurrence of intimate partner violence | | | ✗ |

As in the previous surveys (see Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014), the same key behavioural indicators are presented in this report. They include the following:

- **Consistency of condom use.** This variable was measured by asking the respondent *How often do you use a condom with this particular partner?* The response choices were as follows:
  Every time ..... 1
  Almost every time ..... 2
  Sometimes. ..... 3
  Never ..... 4
- **Multiple sexual partnerships.** These were measured by indicating the respondent's sexual partners (including the number of partners) in the past 12 months.
- **Knowledge of HIV and AIDS.** The survey used a composite measure of precise knowledge, based on responses to the five questions probing knowledge of HIV prevention. The first two questions were:
  - *Can a person reduce the risk of getting HIV by using a condom every time they have sex?*
  - *Can a person reduce the risk of HIV by having fewer sexual partners?*

  Three misconceptions were probed, as follows:
  - *Can AIDS be cured?*
  - *Can a person get HIV by sharing food with someone who is infected?'*(This question was recommended by UNAIDS 2013a)
  - *Can a healthy-looking person have HIV?*

  An additional question was asked:
  - *Can HIV be transmitted from a mother to her unborn baby?*
- In terms of scoring a person's knowledge about HIV transmission and prevention, if they answered the first set of two questions correctly, they scored 1. If they answered any questions incorrectly, they scored 0 (UNAIDS 2013a). Concerning misconceptions about HIV transmission, if a person correctly rejected the two myths about the disease they scored 1; if they answered any question incorrectly, they scored 0 (UNAIDS 2013b). This report only presents the proportion of respondents who answered both sets of questions correctly.
- **Correct knowledge of TB prevention.** This survey utilised a composite measure of precise knowledge, based on responses to five statements about TB prevention. Three of the statements presented correct knowledge about prevention, namely:
  - *A person can prevent spreading TB by covering the mouth when coughing or sneezing.*
  - *A person can prevent getting TB by opening windows at home and in public areas.*
  - *A person can prevent getting TB by limiting close contact with people who have TB that is not treated.*

  Two statements presented myths about TB prevention, as follows:
  - *A person can prevent TB by avoiding shaking hands.*
  - *A person can prevent TB by completing religious or traditional practices.*

To score the extent of correct knowledge about TB prevention, if the person endorsed the first set of three statements correctly, they scored 1. If they responded incorrectly to any statements, they scored 0. This report presents the proportion of respondents who correctly endorsed both sets of statements.

- **High-risk alcohol drinking.** This variable was measured using the Alcohol Abuse Disorder Identification Test (AUDIT) score in the module on drug and alcohol use. The AUDIT is a 10-item self-report instrument that includes quantity and frequency of alcohol use. It was designed to identify individuals for whom alcohol use is a risk factor, either for developing alcohol problems or those who already experience alcohol-related problems (see Kalichman et al. 2007). AUDIT scores range from 0 to 40, and in South Africa scores of 8 or more identify individuals who may be at risk for alcohol problems or are already experiencing such problems – also referred to as hazardous or harmful drinking. 'Hazardous drinking' is defined as a quantity or pattern of alcohol consumption that places people at risk for adverse health events, whereas 'harmful drinking' is defined as alcohol consumption that results in adverse events (e.g., physical or psychological harm to themselves or others) (see Peltzer, Davids & Njuho 2011).
- **Exposure to Social and Behaviour Change Communication campaigns.** Information on social and behaviour change communication (SBCC) programmes offered by CCI, Soul City and loveLife was collected as part of the national HIV survey. To minimise the impact of recall bias, the analysis for this section was restricted to SBCC programmes that were conducted within the year before the survey. A total of 43 SBCC programmes were included. Some well-known programmes included Brothers for Life; Zing; ZAZI; Siyayinqoba; Soul City TV; Soul City magazines and booklets; and loveLife programmes, such as Uncut and groundBreakers. The SBCC analysis was restricted to respondents aged 15–55 years, in line with the 2012 NCS; in addition, this was the main target population for the SBCC programmes that were assessed.

  Exposure to SBCC campaigns was used to examine the relationship between SBCC exposure and certain behavioural outcomes related to HIV, such as HIV-testing, sexual partners and substance use. The first SBCC exposure variable was defined by counting the number of SBCC programmes that an individual had seen, watched, heard or participated in, and classifying the extent of the exposure according to the number of programmes. 'High exposure' was classified as being exposed to 16 or more SBCC programmes in the last year. 'Moderate exposure' referred to 6 to 15 programmes, and 'low exposure' to between 1 and 5 programmes. If the person had not seen, watched, heard or participated in any of the 43 programmes, their exposure was rated as 'none'.

  The second exposure variable was termed 'interpersonal exposure'. Here, the respondents were asked to report whether they had participated in any community dialogue or meeting, or taken part in any activity dealing with HIV issues. The responses to this variable were dichotomised into 'yes' or 'no', regardless of the number of programmes the person had participated in.

## 2.6 Ethical considerations

The survey protocol was approved by the HSRC Research Ethics Committee (REC: 4/18/11/15) and by the Centers for Disease Control and Prevention (CDC), the Division of Global HIV and TB (DGHT), and the Center for Global Health (CGH). The survey adhered to international ethical standards and the South African Children's Act of 2007, as described below.

### 2.6.1 Informed consent procedures

Fieldwork staff were trained in research ethics and the implementation of informed consent procedures, to ensure that voluntary informed consent was obtained for all respondents. All youths and adults who agreed to participate were required to provide

written consent, or if the respondent was illiterate, verbal consent to participate. As in the 2005, 2008 and 2012 surveys (see Shisana & Simbayi 2002; Simbayi et al. 2005, 2009, 2014), a waiver of written consent per 45CFR46 was requested when respondents were unable to provide written consent or if they gave verbal consent.[10] This procedure was in line with the CDC's basic policy for protecting research participants. In such situations, an impartial witness signed on behalf of the person to certify that informed verbal consent had been given. Parents and guardians of children under 18 were asked to give informed consent or permission to include children in the survey, and verbal assent was obtained from all children aged 7–17 years to provide a specimen for HIV-testing.

The respondents were informed that they could stop participating at any point if they no longer wished to continue with the study. A person could complete the questionnaire but decline to provide a blood specimen. However, a person was not permitted to provide a specimen only without having first completed the survey; such cases were recorded as a refusal to participate.

### 2.6.2 Procedures to ensure confidentiality

Interviews were held one-on-one with each individual respondent, inside or outside their homes. Fieldwork staff ensured there was no interference from other members of the household, which also ensured the confidentiality of the responses provided. Furthermore, no names of individuals were recorded either on the tracking forms or on the specimens. A barcode was instead scanned into the electronic questionnaire after the barcode had been attached to the blood specimen. If the scanner malfunctioned, the fieldworkers entered the barcode into the tablet manually. To enhance confidentiality, the data were analysed nationally, provincially, by district and by SAL locality type, as in previous surveys.

### 2.6.3 Provision of HIV test results to survey respondents and HIV-testing services

In line with the 2012 survey (see Shisana et al. 2014), the current study implemented two strategies for returning HIV test results to the participants. Importantly, these strategies offered study participants pre- and post-test HIV counselling, which is a key requirement of the South African National HIV Testing Services (HTS) guideline. They also provided agency for linking newly identified people living with HIV to HIV treatment and care services. The respondents had three options for receiving their HIV test results:

1. To undergo home-based rapid HTS immediately after completing the behavioural interview and giving a DBS specimen to the researchers. Enrolled individuals had the option of obtaining their HIV test result immediately.
2. To retrieve their results 8 to 12 weeks after participating in the survey at their household, at a clinic within the SAL in which they lived (as was the case in the previous survey).
3. Participants could elect to receive both of the above services.

In essence, the survey followed the standardised evidence-based HIV-testing strategies. The procedure for HTS followed the recent WHO recommendations outlined in the *Consolidated Guidelines for HIV Testing Services* (WHO 2015). Respondents were given the opportunity to receive their HIV-status information generated by the survey, and were then immediately linked with the relevant HIV services available through the country's public health services.

10 Guidelines can be obtained from https://www.cdc.gov/od/science/integrity/docs/cdc-policy-human-research-protections.pdf.

For participants who opted to receive home-based rapid HTS, this was provided immediately after completing the interview and obtaining a DBS specimen. Following the national guidelines, rapid HIV tests were completed and the results were made available immediately to study participants, along with appropriate referral to services for people who had tested HIV-positive. A trained HTS team, attached either to a PEPFAR partner or to an NGO associated with provincial Department of Health HTS services, performed this function. Respondents with HIV-positive test results (including discordant results among pairs) were counselled and then formally referred to a nearby public health clinic for HIV clinical care and ART treatment.

As in the 2012 survey, respondents who agreed to provide a sample for HIV-testing and wished to receive feedback 8–12 weeks later, rather than immediately through the home-based rapid HTS, were provided with an HIV specimen result request voucher. The voucher referred them to a nearby HTS site, usually a clinic, to access their HIV-antibody test results (see Shisana et al. 2014). The voucher included a unique respondent questionnaire number so that clinic staff could link the HIV laboratory result correctly to the referred respondent. HIV or viral load (VL) test results were returned to respondents using the nearby referral clinics.

Survey respondents had the option to decline i) HIV-testing by DBS during the survey and ii) rapid HTS. Participants in the survey also had the option of refusing any test results. All respondents who declined HIV-testing, in either format, were asked to complete a simple questionnaire to document their reason for refusing. Although the preparatory study results suggested that few people would pursue this option, some respondents consented to rapid HIV-testing but later refused to receive their results. In such circumstances, the National HTS Policy states that unclaimed rapid HIV test results should be shared with the HTS facility or service provider in the geographic catchment area (NDoH 2016). This facilitates documentation, reporting and client tracking, in line with the national guidelines and standard practice for community and home-based rapid HIV-testing services.

### 2.6.4 Ethical considerations and dealing with minors

To comply with the mandatory reporting of child abuse as regulated in the Child Care Act (No. 74 of 1983 and the new Children's Act (No. 38 of 2005) as amended, researchers who study children in South Africa are required to adhere to certain rules.[11] First, no direct questions were asked about child abuse in the survey. Second, information about a child's experience of sexual abuse that was given voluntarily by the respondents was handled on an individual (case-by-case) basis. The cases were dealt with by survey staff in consultation with the supervisors, principal investigators or project directors of the study.

Researchers who encountered situations of child abuse contacted the appropriate service providers, such as social work offices and Child Protection Units in the respective areas. A copy of the referral form – including the date of referral, age of the child, type of referral, and the referral agency – was retained by the researchers.

The following steps were adhered to for minors older than 12 and younger than 18 years.[12] The minor decided whether to participate and assented (expressed their will) after parental or legal-guardian consent had been given. The parent or legal guardian assisted the minor to make an informed choice and either give their permission or not.

11 The rules are available at http//www.dsd.gov.za/index.
12 The guidelines can be obtained from www.dsd.gov.za/index.

The parental permission and minor's decision had to be consistent. Thus, if the minor decided not to participate, the parent could not override this decision.

If no parent was present, a legal guardian was substituted, either court-appointed or as indicated by the parent in a will (in accordance with Section 27 of the Children's Act). If there was no guardian, a foster parent by order of the Children's Court could be a substitute. (Social workers should specifically request this authority to give permission to be included in the court order.) If there was no foster parent, a caregiver could act. In line with the Children's Act, a caregiver was defined as follows:

> Any person other than a parent or guardian, who factually cares for a child and includes – a) a foster parent; b) a person who cares for the child with the implied or express consent of a parent or guardian of the child; c) a person who cares for the child whilst the child is in temporary safe care; d) the person at the head of a child and youth care centre where a child has been placed; e) the person at the head of a shelter; f) a child and youth care worker who cares for a child who is without appropriate family care in the community; and g) the child at the head of a child-headed household.

If a minor (a child of 16 and younger in a recognised 'child-headed household') was the caregiver, then a 'responsible person' – in line with Section 137 of the Children's Act – assisted them. The responsible person could have been appointed by the Children's Court, a government body or an NGO. Assisting the minor caregiver in this way was in the best interests of all children concerned. Ignoring the opportunity to assist would arguably have been unethical. If a minor was the caregiver and there was no supervisory adult, a trusted adult could be nominated by the minor, including but not limited to a social worker, community worker or teacher. If a minor caregiver was so isolated that no responsible adult was available, the minor was not recruited into the study and was regarded as a vulnerable child. Appropriate interventions were then initiated, outside of the research context, to support that child.

For minors younger than 12 years, permission was sought from the parent or substitute, as outlined above, as independent consent by such young minors is not generally permissible. The minor was asked to decide whether to participate and permission from the parent could not override the child's decision.

To ensure the research was conducted according to the highest ethical standards, the following additional measures were implemented. Each section of the questionnaire included a short introduction, indicating what was covered in the section, explaining why the questions were asked, and assuring respondents about the confidentiality of their responses. Data collectors were trained in research ethics and in applying the ethical guidelines in the training manual. Specific training was also given on how to manage children and any crises that may occur in the field. Data collectors were monitored to ensure they complied with all ethical provisions.

## 2.7 Fieldwork procedures

Data collection was completed in an average of four days for the 15 preselected households in each of the 1 457 SALs included in the survey sampling frame. Fieldwork materials included aerial maps that showed the locations of the 15 households in each SAL and directions for accessing them. Eligible household members were defined as 'everyone

in the selected household who had slept there the night before the interview.' The survey was divided into two parts:

- the behavioural questionnaire; and
- biomedical specimen collection and testing.

Informed consent and assent were sought before collecting either the behavioural data or the specimen. Courier services were used to send materials to the field and to transport the specimens to laboratories.

### 2.7.1 Survey fieldwork

Data were collected for the survey from December 2016 to February 2018. Research trainees from the HSRC acted as provincial survey coordinators and supervisors were recruited externally to provide support in the field for the interviewers (fieldworkers). Training manuals were used as reference documents during data collection. The various manuals included:

- A training manual that covered topics related to informed consent procedures; interviewing skills for administering tablet-based questionnaires; the collection of DBS specimens; and procedures related to quality control, ethics and general conduct.
- The DBS-specimen collection manual, containing detailed standard operating procedures for collecting the specimen into a microtainer that also contained ethylenediaminetetraacetic acid (EDTA), and spotting the DBS cards using a disposable Pasteur pipette.
- The Mecer A105 tablet manual, which described the accessories, and the Census and Survey Processing System (CSPro) software package and its operating instructions.

### 2.7.2 Preparatory work

Preparatory work included testing the electronic tablets used for collecting behavioural data, refining the HIV-testing and services, performing routine administration, and conducting a pilot study.

*Tablets*

Electronic data collection was introduced to the survey series for the first time in the current survey. Mecer A105 tablets, which replaced the hard-copy paper questionnaires used in previous surveys, were used to collect data from respondents. An electronic application was configured and free CSPro software was used. The implementation of electronic data collection resulted in several enhancements to the survey, including:

- automatic saving of collected data;
- improved data quality through automatic validation and error checking; and
- electronic transfer of data to the laptops of supervisors and provincial coordinators.

This enabled statisticians to access and identify errors and to verify the corrections before data were incorporated in larger datasets in the central encrypted main server, located in the mainframe computer at the HSRC's IT Department.

The electronic system also allowed for the rapid and routine verification of completed questionnaires and DBS specimens collected daily by each interviewer. This verification supported the continuity of fieldwork and facilitated the monitoring of the quality of data.

As an additional back-up system, data were also downloaded from each tablet using a universal serial bus (USB) and then uploaded to the HSRC main computer server in Pretoria, using the supervisors' laptops. Data were deleted from the laptop immediately after the collected interviews were uploaded to a secure server. Uploading confirmed that

the data had been received by the supervisor, and the deletion was performed to reduce the amount of survey data carried on the laptops. It also minimised the number of records that may have been compromised if the laptop had been lost, stolen or damaged.

All portable devices used in the field were password-protected. Only the survey staff had password access to the data. Once a device was no longer used for the project and all data had been uploaded, the hard drives were wiped clean and reformatted.

Supervisors completed questionnaire-tracking sheets daily to record the number of surveys that had been completed. Once the uploading and downloading had been completed, a statistician compared the data received with the questionnaire-tracking information for quality assurance, accuracy and completeness. Any problems were addressed immediately.

*Administration*

Office-based administrators were recruited for the survey by the HSRC offices in Gauteng, KwaZulu-Natal and Cape Town. They were trained in preparation for the following tasks: distributing DBS collection materials to the teams nationally; providing timely travel and other logistical arrangements for fieldwork teams; form processing; financial administration (including salaries, advances and claims); dealing with a high volume of enquiries from the field; and facilitating the communication between survey managers, provincial coordinators, field supervisors and provincial leaders in large provinces, to ensure seamless feedback at all levels.

*Preparatory study*

In KwaZulu-Natal and North West, a separate one-week preparatory study was conducted with 10 SALs in each province. The study took place over one week in September 2016, immediately after the completion of the 10-day training, to test all aspects of the fieldwork. Aspects that were evaluated included the administration of the electronic questionnaires, the performance of the tablet software, and determining how best to provide rapid HTS for respondents who opted for this service.

The overall experience was positive and all technical challenges related to the tablets regarding data capturing, technical or human error, and administration were addressed. As explained earlier, the use of PEPFAR-HTS partners in North West was more successful in providing rapid HIV-testing for respondents than the HSRC's in-house trained HTS counsellors. As a result, the PEPFAR HTS-partner model was chosen to provide the rapid testing option in the main survey.

### 2.7.3 Training of field staff

Fieldworkers and supervisors were successfully trained in three separate 13-day sessions conducted by researchers from the HSRC. Staff from the Global Clinical and Viral Laboratory, the South African Medical Research Council (SAMRC) and the National Institute for Communicable Diseases, together with HSRC trainers, conducted the training about collection of DBS specimens. The first main survey training of 218 recruits drawn from the Western Cape, Mpumalanga, the Free State, Eastern Cape and KwaZulu-Natal was conducted in November 2016 in Durban. Most trainees performed well and passed the assessment tests. However, 20 trainees failed the training because they were unable to collect blood or administer questionnaires using the tablets.

The second training session was held in Pretoria in January 2017 with 238 fieldworkers from the remaining four provinces (Gauteng, North West, Limpopo and Northern Cape).

Refresher training sessions were held for the fieldworkers from the five provinces who had trained in November. Additional training was held with eight recruits in Durban in September 2017, with two white trainees from Limpopo and the Eastern Cape. Towards the end of the survey, an additional 16 white community liaison staff members were trained in Pretoria, for three days. Their role was to assist with entry into communities in predominantly white SALs throughout the country.

In summary, 60 supervisors and 350 fieldworkers were trained to administer the current survey (see Appendix 3 for a list of all field staff). The work in the nine provinces was managed by 13 provincial coordinators. There were 26 white community liaisons for entry onto farms and white SALs.

### 2.7.4 Field survey

The fieldwork for the main survey commenced in December 2016 in KwaZulu-Natal and lasted only two weeks. Thirteen SALs, mostly in Indian areas, were covered. Typically, a fieldwork team took an average of four days to cover the 15 selected households in each SAL. Overall, 1 457 SALs were covered nationally. In urban areas, fieldwork activities were conducted partly during the early evenings and weekends to accommodate respondents who worked during the day. In rural areas, the timing of fieldwork activities varied, depending on seasonal farming activities in the area and the times when people were available. The precise time of data collection was determined by the respondents' preferred times for providing information, which was established by the fieldwork coordinators in their initial visits.

Fieldwork materials included aerial maps showing the locations of the 15 preselected households in each SAL, a directional map showing how to get to the SAL, and global positioning system (GPS) coordinates of all 15 preselected households in the urban formal and rural informal (tribal) areas. The preselected households were identified using aerial maps with the aid of GPS guidance. Where the preselected household consisted of a non-residential structure, this was noted as an invalid household and no substitution was made at either the household or the individual level. This procedure ensured the integrity of the sampling approach. In informal settlements among urban areas and in rural informal (tribal) areas, households were selected systematically on the day of the survey, after a census had been conducted of all households in the selected SAL just before the survey.

Entry into the SALs was carefully designed to suit each geotype. For example, before fieldworkers accessed households in informal rural areas, the chief or his (or her) representatives were approached to inform them about the survey and seek their support. Similarly, in rural formal (farm) areas, the appropriate security teams were approached for the same reasons and so that they could escort the research team to the various households. In some urban areas, especially those plagued by gang violence or crime, protection was sought from the police and fieldwork was undertaken on a single pre-arranged day. Similar arrangements were made in security complexes and blocks of flats through body corporates.

This approach to accessing unique areas ensured that authorities were informed about the research teams' movements around their areas and ensured the safety of the research teams. Where possible, the field staff and respondents were matched according to race group and ethnicity. The aim was to increase participation among respondents by avoiding non-participation due to potential safety concerns or the preference for using a specific language. During the fieldwork phase of the survey, weekly project management meetings were held to monitor progress.

*General management*

Field supervisors used subsidised cellular telephones to facilitate communication with fieldwork teams and coordinate the field teams' operations. Aspects that were managed included maintenance of material stocks and workflow from one household to the next.

Weekly project meetings were held at which feedback and updates were given to office managers. Progress was monitored and guidance was provided to provincial coordinators, provincial leaders, field supervisors and interviewers. Where necessary, emergency project meetings were called during which field teams were linked telephonically.

*Data collection procedures*

Up to three revisits were made to each selected household to ensure maximum participation. When the fieldwork team arrived at the selected household, the supervisor first visited the household to introduce the survey and to introduce the interviewer to the head of the household. Next, an accompanying interviewer explained the purpose of the survey and provided the necessary background information and clarification on any points that the head of household did not understand. This was followed by obtaining informed consent, after which the interviewer completed the household questionnaire by interviewing the head of household or a proxy.

The completed household questionnaire listed all the household members. The head of the household was informed that one or more interviewers would return to conduct individual interviews with members of the household who were at home on the day of the first visit, following the completion of consent or assent procedures. If the household was found to have been destroyed or vacated, the household was noted as invalid. No substitution took place at either the household or the individual level. In the case of children aged 11 years and younger, a household member or the child's parent or guardian gave consent.

On arrival at the identified home, the interviewer invited all members of the household to participate individually in the survey, and conducted the questionnaire-based interviews using a tablet. After the interview, the respondent (or a child's parent or guardian) was asked to provide their consent for a DBS specimen to be drawn for HIV-testing. For respondents 12 and older, consent was requested for the respondent to be interviewed and to provide a DBS. For children under 12, verbal assent for specimen collection was obtained if the child was old enough to assent. This was done after consent was given by the child's parent or guardian.

With regard to the completion of individual questionnaires, the household was revisited up to three times at different times of the day, to find the appropriate respondents to complete the questionnaire. If the respondent was still not available at the third revisit, the visit was noted as a non-response.

For the communication component of the survey, respondents aged 15 years and older were shown programme cards and asked specific questions about each HIV communication programme. These questions probed their exposure and knowledge of the programmes.

### 2.7.5 Specimen collection

The DBS specimen collection strategy offered unique advantages. Refrigeration of DBS samples is not necessary, which meant that samples were easily couriered from the field to the laboratory.

DBS specimens were collected from each respondent who had consented or assented to the procedure. The HSRC has used this strategy successfully in previous surveys. DBS specimens were collected on absorbent paper, as in previous surveys, using Whatman Grade 903 cards. Whole blood, obtained by finger-prick or heel-prick (in infants), was collected into EDTA-coated microtainer tubes. Disposable Pasteur pipettes were then used to pipette and spot the blood in each of the 10 circles on the Whatman cards (5 circles on one card), with approximately 50 µL of blood per circle. Five circles were spotted for children aged 2 years and younger. Field staff were trained to spot all five or 10 circles where applicable, if sufficient blood could be obtained without causing discomfort to the person.

After spotting the blood specimens, the DBS cards were placed on drying racks and left to dry overnight or for a minimum of 4 hours. The cards were then packaged for storage and couriered to the laboratory. The specimens were packaged into gas-impermeable plastic zipper (resealable) bags containing desiccant packs and humidity indicator cards. While waiting to be couriered to the laboratory, the DBS specimens were stored by the supervisors at room temperature in locked security bags, accessible only to study investigators. The specimens were dispatched weekly by courier to the laboratory for testing.

Supervisors were responsible for ensuring that the specimen-tracking sheets were completed correctly, including matching the study barcodes on the DBS cards to specimen-tracking sheets using a scanner. The supervisors also conducted quality checks on all specimens before they were packed for the courier.

### 2.7.6 Quality control of fieldwork

Quality control procedures implemented in the study began before the fieldwork and continued throughout the study. These procedures ensured that the data collected were of an acceptable standard.

#### *Activities before starting the fieldwork*

The quality control manager checked all maps for image quality and readability, and also checked that visiting points (VPs) were clearly demarcated.

A dedicated stock manager controlled the logistics for all DBS collection kits, electronic devices, administration forms and general stationery. The stock manager also ensured that all field teams were well stocked with supplies at all times.

All interviewers were trained and were then evaluated daily. Candidates who were deemed incompetent in any section of the training sessions were not included in the fieldwork team.

#### *Quality-control activities during the field survey*

Each fieldwork team worked under the management of a team supervisor, whose duty it was to daily ensure all study protocols were adhered to by their respective teams. This included correctly identifying the SALs and VPs and managing the fieldwork in the SAL to ensure the integrity of interviews and DBS specimen collection. The team supervisors also uploaded the data collected by their respective teams.

A team of 13 HSRC researchers served as provincial coordinators. All supervisors and their teams in each province reported to a provincial coordinator. These coordinators ensured

that teams in their province adhered to the overall principles of the study and followed fieldwork and administrative protocols. The provincial coordinators visited all teams and accompanied them to different SALs to ensure compliance with the study protocols.

Project investigators, project directors and project managers visited the research sites to meet with and observe the teams.

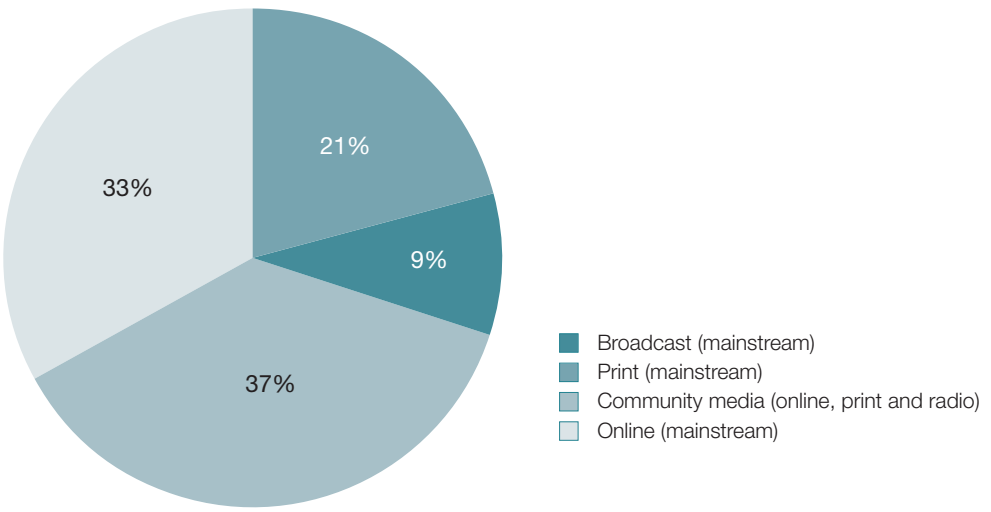
Independent quality-control teams visited a random selection of completed SALs, to ascertain whether fieldworkers had visited the correct VPs and had correctly interviewed the selected respondents in a household. Checks were also made regarding how long a fieldworker had spent at the house, how long they had taken to complete an individual questionnaire, the number of DBS samples collected (if any), and whether the respondents had been treated politely and respectfully.

## 2.8 Community awareness

The communication strategy developed for this survey was built on lessons learnt from past surveys, which included evaluating the effectiveness of previous strategies. New methods and technologies to reach potential respondents were used and a communication company was engaged to implement the communication strategy.

The success of this type of survey rests on individual participation. Hence, the communication strategy was aimed at various levels, as shown in Figure 2.3. The graph shows that community media were used as the main method for communicating about the survey. Reaching communities by garnering support from local community influencers was essential. Key stakeholders such as traditional and community leaders, ward councillors, local business leaders, youth leaders, local NGOs, nurses and the police played a role in this regard. Online social media, such as Facebook and Twitter, were the second most widely used method of communicating about the survey.

*Figure 2.3: Communication strategy and media coverage, South Africa, 2017*



## 2.9 Laboratory methods

Laboratory testing was conducted at the accredited laboratories of the collaborating institutions. These were the Global Clinical & Viral Laboratories, the National Institute for Communicable Diseases and the University of Cape Town.

### 2.9.1 Specimen tracking

The following procedure guided the specimen-tracking process. Batches of barcoded DBS specimens were sent to a central laboratory and tracked through specimen-tracking sheets and waybill numbers. The specimens and laboratory request forms (LRFs), together with the DBS barcode, were couriered in gas-impermeable resealable plastic bags that also contained desiccant packs and humidity indicator cards.

Consecutively numbered laboratory barcodes were assigned to the specimens as they were received by the laboratory. The specimen barcode, the corresponding laboratory code, and demographic information on the specimen LRFs were captured into the laboratory information management system (LIMS). This information was then exported in batches into Excel to create the study database. Specimen barcodes were scanned into the database a second time to rule out potential sample mix-ups.

Laboratory managers performed a second quality-control step. This step involved matching the specimen barcodes to LRFs, checking all results and demographics on the LIMS, examining specimen quality, and signing off the specimens for testing.

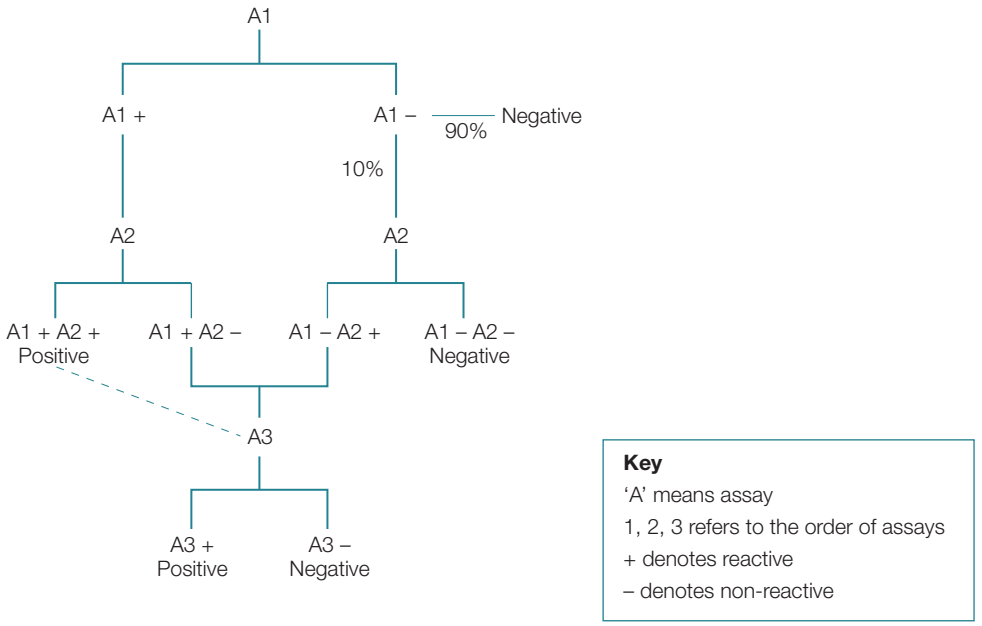
### 2.9.2 HIV-antibody testing

As reported in the previous surveys (Shisana et al. 2005, 2009, 2014), DBS spots were punched into a test-tube that was pre-labelled with the corresponding testing laboratory barcode number. The puncher was decontaminated by punching four blank spots after each DBS spot to ensure there was no carryover. Each filter paper disc was eluted overnight at 4 °C with phosphate buffered saline (PBS, pH 7.3–7.4). An aliquot of the eluted sample was then used for the HIV-testing assays, in accordance with the manufacturer's instructions.

The HIV-antibody testing strategy is shown in Figure 2.4. Two fourth-generation HIV-1 EIAs, Roche Elecys HIV Ag/Ab assay (EIA 1) (Roche Diagnostics, Mannheim, Germany) and Genescreen Ultra HIV Ag/Ab assay (EIA 2) (Bio-Rad Laboratories, California, USA) were used to test for HIV antibodies. All samples were tested using EIA 1. All samples that tested positive using EIA 1 were retested using EIA 2. In addition, 10% of the samples that tested HIV-negative using EIA 1 were retested for quality assurance purposes using EIA 2. All samples that tested positive with both EIAs were submitted to a nucleic acid amplification test (COBAS AmpliPrep/Cobas Taqman HIV-1 Qualitative Test, v2.0, Roche Molecular Systems, New Jersey, USA) for final confirmation of the HIV status.

Children younger than 2 years were tested for the presence of HIV antibodies as described above. In addition, given that the HIV-antibody test does not distinguish between HIV infection and the presence of passively acquired maternal HIV-antibodies in infants, samples from children younger than 2 years were retested using a NAT (Roche TaqMan, v2.0, California, USA) to confirm HIV infection.

*Figure 2.4: HIV-antibody testing strategy used in this study*




As part of the external quality control, SAMRC did an on-site quality control at Global Clinical & Viral Laboratory. These samples were selected randomly after all collected specimens had been tested.

### 2.9.3 Antiretroviral testing

The presence of ARVs in HIV-positive DBS samples was determined by high-performance liquid chromatography (HPLC) coupled with tandem mass spectrometry. The qualitative detection of Nevirapine, Efavirenz, Lopinavir, Atazanavir and Darunavir was performed through a validated method developed in-house by the Division of Clinical Pharmacology in the Department of Medicine at the University of Cape Town. These selected drugs form the backbone of ART in South Africa.

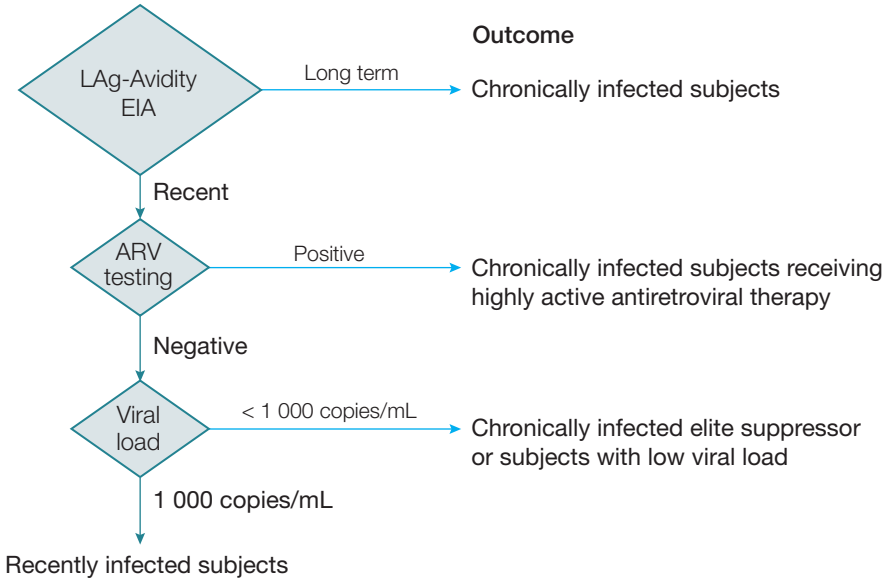
Drugs were extracted using deuterated internal standards for each analyte in question. Detection was performed using an Applied Biosystems API 4000 tandem mass spectrometer (California, USA) in the multiple reaction monitoring (MRM) detection mode for each drug, with the appropriate MRM transitions. Blank and quality control samples were included with each run. Each drug was assayed in the presence of all others. Due to the high specificity of the testing technology and the high degree of validation testing, no observable interference in the detection of one drug by the others was anticipated. The detection limit was set at 0.02 µg/mL for each drug, with a signal-to-noise ratio of at least 5:1 for all the drugs.

### 2.9.4 HIV-incidence testing

HIV incidence was estimated from blood samples by detecting recent infections among survey respondents aged 2 years and older who were confirmed to be HIV-positive. HIV-incidence estimation testing accounted for recent developments in this area and the most recent recommendations for HIV-incidence estimation using cross-sectional blood specimens (Rehle et al. 2015; UNAIDS 2018; WHO 2018; WHO, CDC & FHI 360 2017).

The HIV-incidence testing algorithm shown in Figure 2.5 is based on the LAg-Avidity EIA (Maxim Biomedical Inc, Rockville, Maryland, USA) with a cut-off optical density of 1.5, in combination with additional information on exposure to ARVs and HIV viral load (VL) (Abbott m2000 HIV real-time system, Abbott Molecular Inc., Des Plaines, Illinois, USA). Incidence was calculated as an annual instantaneous rate. The computational tools used were developed by the South African Centre for Epidemiological Modelling and Analysis (SACEMA) at Stellenbosch University (Kassanjee et al. 2016).

*Figure 2.5: Testing algorithm for recent infection*




The following formula was used to calculate HIV incidence as an annual instantaneous rate ($I_r$):

$$I_r = \frac{R - \varepsilon P}{(1 - \varepsilon)\omega N}$$

The parameters were specified as follows:
$N$ is the number of people who tested HIV-negative in the survey;
$P$ is the number of people testing HIV-positive in the survey;
$R$ is the number of people classified as LAg-Avidity assay recent;
$\omega$ is the mean duration of recent infection (MDRI), namely 161 days; and
$\varepsilon$ is the false recent rate (FRR), namely 0.06%, to account for early treatment with ARVs.

Two parameters used in the calculations to generate the 2017 estimates differed from those used in 2012. They were as follows:

1. The mean duration of recent infection (MDRI). This is the average time for which a sample satisfied a particular definition for a 'recent infection' case, within a specified cut-off time after detectable infection. In 2012, a cut-off of 130 days was used, whereas in 2017, 161 days was used based on recent testing by the CDC (Doung et al. 2015).
2. The false recent rate (FRR). The FRR accounts for the fact that in a few tests on individuals who are detectably infected for longer than the time cut-off time, a false recent result is produced. Recent guidelines thus advise researchers to 'estimate a

context-specific false recent ratio by considering the composition of the population where the recent infection testing algorithm is being applied, including incidence, prevalence, treatment coverage and the distribution of time since infection' (UNAIDS 2018; WHO 2018). In 2012, an FRR of 0.00 was used, while in 2017 0.06 was used.

### 2.9.5 HIV viral-load testing

HIV VL testing was used to determine the level of viraemia, which refers to the amount of HIV virus in the blood specimens of people living with HIV. This is a key clinical indicator of the effectiveness of treatment and of the potential for transmission. HIV VL testing in population-based survey samples enables the assessment of community VL profiles and measures the proportion of people living with HIV who display suppressed VL. VL testing in HIV-positive samples is also a critical component of the HIV-incidence testing algorithm (see Section 2.9.4) to reduce misclassification and improve assay-based HIV-incidence estimates.

HIV VL testing on all confirmed HIV-positive specimens from individuals of all ages was performed using the recommended testing platform for HIV-1 RNA testing in DBS samples (Abbott m2000 HIV Real-Time System, Abbott Molecular Inc., Des Plaines, Illinois, USA). The Abbott platform for determining HIV VL utilises a ribonucleic acid (RNA)-specific extraction procedure for DBS, which minimises the problem of deoxyribonucleic acid contributing to the VL counts. The Abbott *m*2000sp and *m*2000rt instruments were used for automated extraction and sample preparation and for real-time amplification and detection, respectively. An open-mode protocol was applied. The kit was supplied with three controls – negative, low positive and high positive – and these were included in each run, to determine the validity of the run and to calculate the VL concentrations of the samples. All analyses were conducted according to the manufacturer's instructions by testers who were certified competent to run the open-mode protocol that was validated in the laboratory.

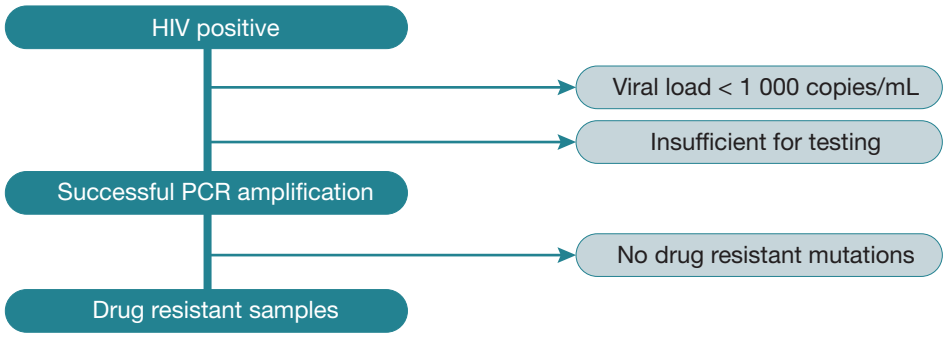
### 2.9.6 HIV drug-resistance testing

The current ART programme in South Africa has numerous patients on treatment. A serious concern is therefore development of HIVDR. Drug resistance (DR) testing was therefore included in the 2017 survey for the first time.

Testing was conducted on samples from respondents living with HIV who were virally unsuppressed, as measured by VL ≥ 1 000 copies/mL. Spots were excised using a DBS puncher and were then immersed in 2 mL of NucliSENS lysis buffer (Biomerieux, Nürtingen, Germany) and lysed on a roller mixer at room temperature. Total nucleic acid was extracted using the NucliSENS EasyMAG® automated system according to the manufacturer's instructions. Amplification of a 1 084bp polymerase chain reaction (PCR) fragment consisting of codons 1-99 of protease and codons 1-250 of reverse transcriptase was performed as previously described (Zhou et al. 2011), with the exception of 400 µM of each primer that was used for reverse-transcription PCR. Editing of sequences was performed using Recall software v2.10 and drug-resistant mutations were identified using the Stanford HIV database algorithm v7.0 (Liu & Shafer 2006). Next-generation sequencing was performed using an in-house assay and amplicons were sequenced using MiSeq v2 (Illumina Inc., San Diego, USA). All sequences were phylogenetically analysed to establish similarity at a nucleotide level, defined as a p-distance greater than 98% (within and across the study). Any two or more specimens meeting this criteria were repeated. If the outcome

remained the same as at the first processing, only then was the sequence accepted and reported. This process is the accepted method for managing contamination identification, as described by the WHO. Figure 2.6 shows this algorithm.

*Figure 2.6: HIV drug-resistance testing algorithm*




## 2.10 Weighting of the sample

As in all previous surveys in the series, weighting procedures were performed before the data analysis. The weighting was as follows. The data file of drawn SALs contained the selection probabilities and the sampling weights of these SALs. The weights reflected the disproportionate allocation of SALs according to the three stratification variables, namely race, province and locality type. Table 2.4 presents the allocation of SALs by the main reporting domains. The table shows the disproportionate allocation of SALs by stratification variables, namely the oversampling of SALs dominated by the Indian/Asian race group in KwaZulu-Natal.

The VP sampling weight was then calculated. This weight was computed as the counted number of VPs in the SAL, corrected proportionally for invalid VPs and divided by the number of VPs participating in the survey. The final VP sampling weight was the product of the SAL sampling weight and the VP sampling weight. Demographic and HIV-testing information on all people in all households in all responding SALs was gathered to calculate individual sample weights. These individual weights were adjusted for HIV-testing non-response.

In the final step, the information at the individual level was integrated and the final sampling weight for each data record was calculated. This weight was equal to the final SAL weight multiplied by the final VP sampling weight, adjusted for individual non-response.

The final individual weights were benchmarked against 2017 mid-year population estimates by age, race, sex and province (StatsSA 2017b). This process was conducted in two steps. The first step consisted of benchmarking the 1 000-SAL sample for the traditional HIV prevalence survey (Shisana and Simbayi 2002; Shisana et al. 2005, 2009, 2014) against the mid-year estimates for 2017. The second step was to benchmark the weights from the 16 additional districts against the district-level data from the 2017 mid-year estimates to ensure the results were representative of these district populations. This process produced a final sample that was representative of the population in South Africa in terms of sex, age, race, locality type and province. It also produced a final sample that was representative of the population of the 16 additional districts.

*Table 2.4: Allocation of SALs by main reporting domains*

| Geography type | Province | Population group | | | | Total |
|---|---|---|---|---|---|---|
| | | Black African | Coloureds | Indian/Asian | White | |
| **Urban** | Western Cape | 18 | 65 | 5 | 28 | 116 |
| | Eastern Cape | 29 | 24 | 2 | 26 | 81 |
| | Northern Cape | 17 | 24 | 0 | 21 | 62 |
| | Free State | 27 | 7 | 0 | 18 | 52 |
| | KwaZulu-Natal | 30 | 8 | 79 | 20 | 137 |
| | North West | 19 | 4 | 0 | 15 | 38 |
| | Gauteng | 55 | 19 | 30 | 58 | 162 |
| | Mpumalanga | 21 | 2 | 2 | 19 | 44 |
| | Limpopo | 13 | 0 | 2 | 14 | 29 |
| **Subtotal** | | **229** | **153** | **120** | **219** | **721** |
| **Rural informal (tribal areas)** | Western Cape | 0 | 0 | 0 | 0 | 0 |
| | Eastern Cape | 38 | 0 | 0 | 0 | 38 |
| | Northern Cape | 3 | 0 | 0 | 0 | 3 |
| | Free State | 10 | 0 | 0 | 0 | 10 |
| | KwaZulu-Natal | 31 | 0 | 0 | 1 | 32 |
| | North West | 24 | 0 | 0 | 0 | 24 |
| | Gauteng | 10 | 0 | 0 | 0 | 10 |
| | Mpumalanga | 40 | 0 | 0 | 0 | 40 |
| | Limpopo | 20 | 0 | 0 | 0 | 20 |
| **Subtotal** | | **176** | **0** | **0** | **1** | **177** |
| **Rural formal (farms)** | Western Cape | 2 | 10 | 0 | 1 | 13 |
| | Eastern Cape | 7 | 3 | 0 | 2 | 12 |
| | Northern Cape | 5 | 7 | 0 | 1 | 13 |
| | Free State | 9 | 2 | 0 | 2 | 13 |
| | KwaZulu-Natal | 10 | 0 | 1 | 3 | 14 |
| | North West | 10 | 0 | 0 | 2 | 12 |
| | Gauteng | 2 | 0 | 0 | 1 | 3 |
| | Mpumalanga | 10 | 0 | 0 | 1 | 11 |
| | Limpopo | 10 | 0 | 0 | 1 | 11 |
| **Subtotal** | | **65** | **22** | **1** | **14** | **102** |
| **All types combined** | Western Cape | 20 | 75 | 5 | 29 | 129 |
| | Eastern Cape | 74 | 27 | 2 | 28 | 131 |
| | Northern Cape | 25 | 31 | 0 | 22 | 78 |
| | Free State | 46 | 9 | 0 | 20 | 75 |
| | KwaZulu-Natal | 71 | 8 | 80 | 24 | 183 |
| | North West | 53 | 4 | 0 | 17 | 74 |
| | Gauteng | 67 | 19 | 30 | 59 | 175 |
| | Mpumalanga | 71 | 2 | 2 | 20 | 95 |
| | Limpopo | 43 | 0 | 2 | 15 | 60 |
| **Grand total** | | **470** | **175** | **121** | **234** | **1 000** |

The HIV estimates obtained did not differ significantly and varied by less than a percentage point (results not shown). As a final check, two separate data-analysis teams verified the weighting procedure independently and obtained similar results.

## 2.11 Data management in the field

In 2017, data were captured electronically in the field using the digital data-capturing software CSPro, implemented on tablets. The collected data were immediately downloaded into a data-entry program, effectively cutting out the data-entry procedure. A synchronous transfer of data from each tablet was implemented using the general packet radio service (GPRS), Wi-Fi, 3G or USB cable to connect to the XForms-compatible server. USBs were used to transfer data from tablets to laptops.

Questionnaires were programmed using navigation logic and entry constraints that inherently minimised data cleaning. This process tailored the questionnaire uniquely for each individual, based on how they had answered previous questions and sections. Quality control was improved as individual sections could be checked for time-to-complete, which was automatically stamped onto each section of the relevant questionnaire. The daily uploading of data allowed the validation and analysis of the sample to be conducted daily.

A team of 16 data checkers received data files from the server and downloaded each file, concatenated with similar questionnaires, to generate a file of combined questionnaires from each SAL. This large file was sent to one of four data managers, who were responsible for appending the files cumulatively from each questionnaire type. This was an ongoing process culminating in a comprehensive file for the VP questionnaire, the parent/guardian questionnaire, the child questionnaire and the youth/adult questionnaire.

## 2.12 Data analysis

Data were checked and verified for consistency using CSPro and other statistical packages, such as SPSS, STATA and SAS. The final weights were computed, incorporating the sampling weights for the SAL, household and individual levels, and the HIV-antibody testing response. This procedure ensured that the estimates of HIV incidence, prevalence and other outcomes of interest were representative of the overall and respective sub-population of South Africa.

Data analysis included cross-sectional analysis of the 2017 survey findings and trend analysis of the key indicator variables collected in the 2002, 2005, 2008, 2012 and 2017 surveys. Basic descriptive analyses were calculated and graphical displays created for findings at the national and provincial levels and the selected districts. A design-based chi-squared test was used to test for association and comparison of estimated proportions in categorical variables. A $p$-value of 5% or less was set for statistical significance. In some cases, non-overlapping 95% confidence intervals were used to conclude statistical significance. Other reliability measures were also computed, including the coefficient of variation, design effects (DEFF) and square root of the design effect (DEFT), which considered the complex design and individual sample weights, adjusting for HIV non-response. A trend test based on chi-squared test was computed to examine trends in surveys conducted in 2002, 2005, 2008, 2012 and 2017.

The results are presented in tables and figures. The results depict the weighted percentages and unweighted counts (unless otherwise specified). The sum of the individual unweighted counts might not add to the overall total because of missing data for certain demographic variables.

## 2.13 Additional selected districts

In addition to the 1 000 SALs that formed a nationally representative sample and replicated the samples from the previous four surveys, a further 457 SALs were sampled in 13 districts. This enabled HIV prevalence to be estimated at district level (see Table 2.5) and in three metro districts: Johannesburg in Gauteng, Cape Town in the Western Cape and eThekwini (Durban) in KwaZulu-Natal. The 13 additional districts were iLembe, Umzinyathi, Uthukela and Uthungulu in KwaZulu-Natal; Ehlanzeni and Gert Sibande in Mpumalanga; OR Tambo in the Eastern Cape; Sekhukhune in Limpopo; Bojanala Platinum in North West; and Ekurhuleni, Sedibeng, Tshwane and West Rand in Gauteng. The final sample included 16 districts, all of which provided representative samples for the study (see Figure 2.7).

The 13 districts[13] shown in Table 2.5 were selected purposively and were agreed on by the Survey Advisory Committee, which consisted of key stakeholders such as SANAC, NDoH and PEPFAR South Africa, including USAID and CDC. The requirements for including a district were as follows: those with putatively high HIV prevalence, supported by data from the Antenatal Care HIV sentinel surveillance system; districts selected as a priority for HIV and TB interventions by the NDoH and SANAC; and those enlisted as PEPFAR-focus districts. Additional consideration was given to excluding districts in which

*Table 2.5: Selected districts and SALs sampled in the 2017 survey, South Africa, 2017*

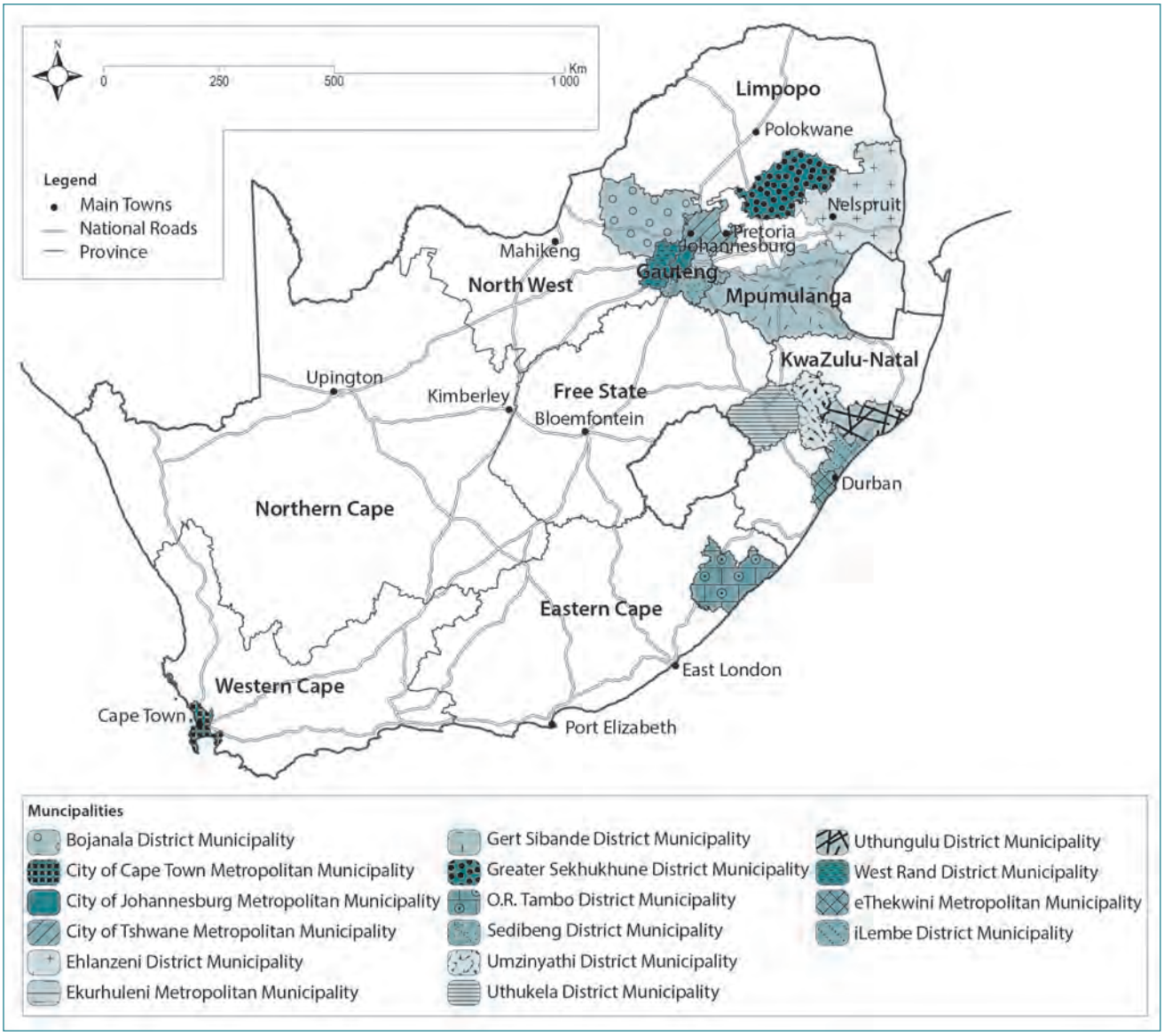
| Province | District | SALs in SABSSM 2017 | Additional SALs sampled | Survey respondents | Respondents who agreed to HIV-testing (DBS) |
|---|---|---|---|---|---|
| **Total** | | **225** | **457** | **20 422** | **15 432** |
| Mpumalanga | Ehlanzeni | 24 | 37 | 1 656 | 1 251 |
| Mpumalanga | Gert Sibande | 24 | 39 | 1 745 | 1 319 |
| Eastern Cape | OR Tambo | 18 | 18 | 806 | 609 |
| KwaZulu-Natal | iLembe | 7 | 52 | 2 327 | 1 758 |
| KwaZulu-Natal | Umzinyathi | 5 | 43 | 1 924 | 1 454 |
| KwaZulu-Natal | Uthukela | 8 | 46 | 2 059 | 1 555 |
| KwaZulu-Natal | Uthungulu | 2 | 55 | 2 461 | 1 860 |
| Limpopo | Sekhukhune | 0 | 24 | 1 074 | 812 |
| Gauteng | Ekurhuleni | 42 | 22 | 985 | 744 |
| Gauteng | Sedibeng | 9 | 66 | 2 954 | 2 232 |
| Gauteng | Tshwane | 45 | 5 | 214 | 162 |
| Gauteng | West Rand | 7 | 29 | 1 287 | 973 |
| North West | Bojanala Platinum | 34 | 21 | 930 | 703 |

13 Three districts were in the original sampling frame, giving a total of 16 selected districts.enforcement (StatsSA 2004).

alternative sources of local HIV-prevalence data were being pursued through focused survey and surveillance activities in the period 2015–2017, such as the Demographic Surveillance Sites and the PEPFAR-led DREAMS initiative.

A sampling approach was implemented in these additional 457 SALs that was similar to the sampling of the nationally representative sample of 1 000 SALs described above. This increased the sample size by about 20 000 respondents, bringing the total projected sample size to almost 60 000 people.

*Figure 2.7: Map showing 16 districts with district-level estimates, South Africa, 2017*



# Results

This chapter assesses and discusses the generalisability of the survey results. This is followed by an analysis of the household and individual response rates, and an assessment of the validity of the HIV-seroprevalence response rates and HIV-seroprevalence estimates. The epidemiology of HIV and AIDS is then presented for the national, provinces, and for the selected districts or metro areas. This information includes HIV prevalence and incidence, the extent of ART coverage, viral load (VL) suppression and socio-behavioural results. The results for migration, interpersonal violence and ARV drug resistance are reported in a later chapter.

## PART A: NATIONAL AND PROVINCIAL RESULTS

In this section, the national and provincial estimates are presented.

### 3.1 Assessment of 2017 survey data

#### 3.1.1 Generalisability of the survey results

The representativeness of a sample indicates the extent to which the results of a study can be generalised to the whole population from which the sample was drawn. Table 3.1 compares the socio-demographic characteristics of the survey sample to the 2017 mid-year population estimates provided by Statistics South Africa (StatsSA 2017b). The weighted sample was similar to the StatsSA 2017 mid-year population estimates, suggesting that the 2017 survey sample was representative of the whole South African population in 2017. Therefore, the weighted survey sample closely resembled the mid-year estimates in terms of sex, age, race group and province. Variability within 5% is considered acceptable (Kish 1965).

*Table 3.1: Comparison of demographic characteristics of survey sample versus StatsSA population estimates for 2017*

| | Weighted sample (current HIV survey) | | Mid-year population 2017 (StatsSA) | |
|---|---|---|---|---|
| Demographic variable | N | % | N | % |
| **Total** | **56 521 950** | **100** | **56 521 948** | **100** |
| **Sex** | | | | |
| Male | 27 620 644 | 48.9 | 27 620 642 | 48.9 |
| Female | 28 901 306 | 51.1 | 28 901 306 | 51.1 |
| **Age group (years)** | | | | |
| 0–14 | 16 724 830 | 29.6 | 16 724 983 | 29.6 |
| 15–24 | 9 623 272 | 17.0 | 9 623 267 | 17.0 |
| 25–49 | 21 195 597 | 37.5 | 21 195 431 | 37.5 |
| 50 and older | 8 978 252 | 15.9 | 8 978 267 | 15.9 |
| **Race** | | | | |
| Black African | 45 656 394 | 80.8 | 45 656 401 | 80.8 |
| White | 4 493 522 | 8.0 | 4 493 523 | 8.0 |
| Coloured | 4 962 930 | 8.8 | 4 96 2922 | 8.8 |
| Indian/Asian | 1 409 104 | 2.5 | 1 40 9103 | 2.5 |

| Demographic variable | Weighted sample (current HIV survey) | | Mid-year population 2017 (StatsSA) | |
|---|---|---|---|---|
| | N | % | N | % |
| **Province** | | | | |
| Western Cape | 6 510 312 | 11.5 | 6 510 312 | 11.5 |
| Eastern Cape | 6 498 683 | 11.5 | 6 498 683 | 11.5 |
| Northern Cape | 1 213 996 | 2.1 | 1 213 996 | 2.1 |
| Free State | 2 866 678 | 5.1 | 2 866 678 | 5.1 |
| KwaZulu-Natal | 11 074 784 | 19.6 | 11 074 784 | 19.6 |
| North West | 3 856 174 | 6.8 | 3 856 174 | 6.8 |
| Gauteng | 14 278 669 | 25.3 | 14 278 669 | 25.3 |
| Mpumalanga | 4 444 212 | 7.9 | 4 44 4212 | 7.9 |
| Limpopo | 5 778 442 | 10.2 | 5 778 442 | 10.2 |

### 3.1.2 Response-rate analysis

The survey team endeavoured to increase the response rate above that of previous surveys and to maximise participation in the study at the community and individual levels. Several activities were implemented to ensure a high response rate. These included:

- notifying the targeted communities and gatekeepers of the impending survey, using various methods – such as community engagement through community leaders;
- providing detailed explanations to potential respondents about the value of their participation;
- ensuring that well-trained interviewers conducted the fieldwork;
- revisiting a household up to four times if necessary, to obtain an interview with the head of each sampled household and to gain consent for his or her family to participate in the survey; and
- ensuring the privacy of respondents when conducting the interviews.

To enhance overall participation in the survey, both the questionnaire-based interviews and the collection of DBS were carried out during the same session.

*Household response rate*

During the fieldwork, a few selected households or VPs were found to be invalid. For example, if the household or VP had been destroyed or vacated, or the building was a business enterprise, the VP was not included in the response analysis at the household level. Such instances were not considered to be a non-response. Several other factors also contributed to a loss of realised VPs, including the absence of any households within an SAL. At times, whole neighbourhoods had disappeared through being demolished or because the residents were relocated, or the area's status had changed from informal urban to formal urban areas, or from formal rural to informal urban areas, as a result of development. That is, the area was completely different from the sampling structure, thus VPs were not identifiable. Table 3.2 shows the response rates among the households, and their demographics.

To determine the household response rate, the number of valid VPs that yielded completed interviews was divided by the number of occupied valid VPs.

*Table 3.2: Household (visiting point) response rates, demographic characteristics, South Africa, 2017*

| | Total visited | Valid visiting points | | Interviewed | | Refused | | Absent/missing | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | *n* | % | *n* | % | *n* | % | *n* | % |
| **Total** | **12 435** | **11 776** | **94.7** | **9 656** | **82.0** | **1 307** | **11.1** | **813** | **6.9** |
| **Locality** | | | | | | | | | |
| Urban area | 8 964 | 8 527 | 95.1 | 6 636 | 77.8 | 1194 | 14.0 | 697 | 8.2 |
| Rural informal (tribal areas) | 2 297 | 2 119 | 92.3 | 2 002 | 94.5 | 61 | 2.9 | 56 | 2.6 |
| Rural formal (farms) | 1 174 | 1 130 | 96.3 | 1 018 | 90.1 | 52 | 4.6 | 60 | 5.3 |
| **Province**[a] | | | | | | | | | |
| Western Cape | 1 613 | 1 540 | 95.5 | 1 214 | 78.8 | 211 | 13.7 | 115 | 7.5 |
| Eastern Cape | 1 437 | 1 349 | 93.9 | 1 143 | 84.7 | 119 | 8.8 | 87 | 6.4 |
| Northern Cape | 905 | 875 | 96.7 | 800 | 91.4 | 33 | 3.8 | 42 | 4.8 |
| Free State | 1 081 | 993 | 91.9 | 847 | 85.3 | 80 | 8.1 | 66 | 6.6 |
| KwaZulu-Natal | 2 585 | 2 481 | 96.0 | 2 003 | 80.7 | 310 | 12.5 | 168 | 6.8 |
| North West | 921 | 900 | 97.7 | 808 | 89.8 | 72 | 8.0 | 20 | 2.2 |
| Gauteng | 2 063 | 1 988 | 96.4 | 1 472 | 74.0 | 340 | 17.1 | 176 | 8.9 |
| Mpumalanga | 825 | 778 | 94.3 | 669 | 86.0 | 62 | 8.0 | 47 | 6.0 |
| Limpopo | 972 | 839 | 86.3 | 700 | 83.4 | 80 | 9.5 | 59 | 7.0 |

a Column totals for 'Province' contain missing provincial information.

The survey targeted 15 000 VPs but only 12 435 of these (82.9%) were approached. Among the 12 435 VPs, only 11 776 (94.7%) were valid VPs (see Table 3.2). Of all the VPs approached, 5.6% (659) were invalid or clearly abandoned households. An additional 813 VPs were not realised for other reasons, as mentioned earlier. Of the 11 776 valid VPs, 9 656 agreed to participate in the survey at the household level. This translates to a household response rate of 82%. The proportions of non-responses at household level were as follows:

- A total of 1 307 of 11 776 (11.1%) households refused to take part in the survey.
- A total of 813 of 11 776 (6.9%) were valid VPs but the households were found to be empty after the required four repeat visits to interview the head of the household, or could not be considered for other reasons.

Table 3.2 shows the household response rates by locality type and province. Residences in the traditional tribal areas showed a relatively high participation rate, whereas those in urban areas showed the lowest participation. Gauteng residences were the least likely to agree to participate, followed by Limpopo. Northern Cape residences were the most likely to participate, followed by North West.

### *Individual interview response rate*

Among the 9 656 VPs that agreed to participate in the survey, 39 132 individuals were eligible to be interviewed and provide a blood sample. Among the eligible individuals, 36 609 (93.6%) agreed to be interviewed. The distribution of non-responses was as follows: 923 (2.4%) individuals were absent from the household or were classified as missing data and 1 600 (4.1%) individuals refused to be interviewed and were classified as missing data. Females were slightly more likely to participate (95.2%) than males (92.3%). Participation also varied by race, with black Africans having the highest response rate (95.6%), followed by coloureds (92.3%), then whites (89.7%) and Indians/Asians (82.1%).

### *HIV-testing response rate*

Among the 39 132 eligible individuals, 61.1% provided a blood specimen for HIV-testing; the specimens were anonymously linked to the completed questionnaires.

### *Categories of non-response*

People who declined to participate in the questionnaire or to provide blood specimens were as follows:

- A total of 12 686 individuals were interviewed but refused to provide a blood sample; this group represented 32.4% of the original 39 132 individuals who were eligible to participate.
- A total of 1 600 individuals (4.1% of all the originally eligible individuals) refused to be interviewed and were classified as missing data.
- A total of 923 individuals (2.4% of the originally eligible individuals) were absent from the household or were classified as missing data.

Table 3.3 shows the response rates broken down by the main reporting domains, namely sex, age, race, province and locality type. In addition to the categories for coverage (tested) and non-response (not tested), the HIV-testing response rate was higher among females than males. The 15–24-year group was the most likely to agree to participate (66.9%), and children and infants under 2 years had the least number of tests done (48.1%). Black Africans and coloureds were more likely to agree to HIV-testing, whereas only 42.3% of whites and 42.6% of Indians and Asians agreed to be tested. The tribal or traditional areas, followed by farms, showed the highest response rate (Table 3.3). Among the provinces, Limpopo had the highest response rate and KwaZulu-Natal had the lowest.

*Table 3.3: HIV-testing coverage by demographic characteristics: percentage distribution among respondents by testing status, South Africa, 2017*

| | Tested (%) | Not tested (%) | | | N[b] |
|---|---|---|---|---|---|
| | | Refused | Absent | Missing[a] | |
| **Total** | **61.1** | **36.5** | **1.3** | **1.0** | **39 132** |
| **Sex of respondent** | | | | | |
| Male | 57.7 | 39.4 | 1.6 | 1.2 | 17 683 |
| Female | 64.3 | 34.0 | 0.8 | 0.8 | 21 273 |
| **Age (years)** | | | | | |
| 0 to <2 | 48.1 | 51.1 | 0.5 | 0.3 | 1 767 |
| 2 to 14 | 57.3 | 41.7 | 0.5 | 0.5 | 10 084 |
| 15 to 24 | 66.9 | 30.7 | 1.4 | 1.0 | 6 854 |
| 25 to 49 | 61.5 | 35.4 | 1.8 | 1.2 | 12 607 |
| 50 and older | 64.4 | 33.3 | 1.0 | 1.3 | 7 685 |
| 15-49 | 63.4 | 33.8 | 1.7 | 1.1 | 19 461 |
| **Race group** | | | | | |
| Black African | 65.4 | 32.8 | 1.1 | 0.7 | 25 837 |
| White | 42.3 | 54.3 | 1.8 | 1.5 | 2 555 |
| Coloured | 61.7 | 35.6 | 1.6 | 1.1 | 7 197 |
| Indian/Asian | 42.6 | 53.6 | 1.5 | 2.3 | 3 369 |
| **Locality type** | | | | | |
| Urban area | 57.3 | 39.9 | 1.6 | 1.2 | 25 199 |
| Rural informal (tribal areas) | 69.3 | 29.2 | 0.8 | 0.7 | 9 735 |
| Rural formal (farms) | 65.1 | 33.3 | 0.8 | 0.8 | 4 198 |
| **Province** | | | | | |
| Western Cape | 63.2 | 33.4 | 2.2 | 1.1 | 4 619 |
| Eastern Cape | 63.8 | 34.2 | 1.3 | 0.7 | 4 321 |
| Northern Cape | 62.7 | 35.5 | 1.1 | 0.8 | 3 422 |
| Free State | 67.6 | 29.9 | 0.9 | 1.6 | 2 859 |
| KwaZulu-Natal | 53.1 | 44.8 | 1.0 | 1.2 | 8 897 |
| North West | 65.9 | 32.3 | 1.1 | 0.7 | 3 213 |
| Gauteng | 57.6 | 39.1 | 1.9 | 1.5 | 5 341 |
| Mpumalanga | 60.8 | 38.4 | 0.6 | 0.2 | 3 521 |
| Limpopo | 72.1 | 24.8 | 2.0 | 1.2 | 2 939 |

a No recorded information about testing status.
b Column totals contain missing demographic information.

Table 3.4 compares characteristics among survey respondents (15 and older) for those who agreed to provide a blood specimen versus those who refused to do so. All respondents in this specific analysis were interviewed. No data were available for people who were absent or refused to be interviewed (as well as refusing to provide a blood sample). Information on HIV-risk characteristics was available for household members

who were interviewed but refused to provide a blood sample. One reason for this analysis was that if respondents refused to provide a blood specimen and yet reported risky sexual behaviour or awareness of their HIV status, the results might over- or under-estimate HIV prevalence.

*Table 3.4: HIV-risk associated characteristics among respondents aged 15 years and older who were interviewed and either provided or did not provide a blood sample, South Africa, 2017*

| Demographic or risk characteristic | Interviewed and tested | | Interviewed but refused to provide blood sample | | *p*-value |
|---|---|---|---|---|---|
| | *n* | % | *n* | % | |
| **Sex** | | | | | |
| Male | 6 937 | 40.1 | 3 666 | 47.2 | <0.001*** |
| Female | 10 345 | 59.9 | 4 102 | 52.8 | <0.001*** |
| **Total** | **17 282** | **100** | **7 768** | **100** | |
| **Marital status** | | | | | |
| Married/civil union | 4 652 | 32.6 | 2 682 | 38.1 | <0.001*** |
| Going steady/living together | 3 247 | 22.8 | 1 323 | 18.8 | 0.003** |
| Single | 4 566 | 32.0 | 2 277 | 32.3 | 0.789 |
| Divorced | 662 | 4.6 | 273 | 3.9 | 0.607 |
| Widowed | 1 139 | 8.0 | 487 | 6.9 | 0.462 |
| **Total** | **14 266** | **100** | **7 042** | **100** | |
| **Perceived risk of getting HIV** | | | | | |
| At risk | 12 413 | 85.5 | 6 328 | 89.1 | <0.001*** |
| Not at risk | 2 113 | 14.6 | 776 | 10.9 | 0.012** |
| **Total** | **14 526** | **100** | **7 104** | **100** | |
| **Ever had an HIV test** | | | | | |
| No | 4 048 | 25.6 | 2 204 | 29.8 | <0.001*** |
| Yes | 11 759 | 74.4 | 5 197 | 70.2 | <0.001*** |
| **Total** | **15 807** | **100** | **7 401** | **100** | |
| **Recency of HIV test** | | | | | |
| Never tested | 4 048 | 28.6 | 2 204 | 32.9 | <0.001*** |
| Less than a year ago | 7 572 | 53.4 | 3483 | 51.9 | 0.148 |
| Between 1–2 years ago | 1 600 | 11.3 | 605 | 9.0 | 0.125 |
| Between 2–3 years ago | 960 | 6.8 | 417 | 6.2 | 0.706 |
| **Total** | **14 180** | **100** | **6 709** | **100** | |
| **Aware of HIV status** | | | | | |
| Yes | 7 335 | 46.3 | 3 362 | 45.5 | 0.397 |
| No | 8 493 | 53.7 | 4 033 | 54.5 | 0.356 |
| **Total** | **15 828** | **100** | **7 395** | **100** | |
| **Sexual activity in the last 12 months** | | | | | |
| No | 4 219 | 33.3 | 1 776 | 32.3 | 0.443 |
| Yes | 8 448 | 66.7 | 3 725 | 67.7 | 0.270 |
| **Total** | **12 667** | **100** | **5 501** | **100** | |

| Demographic or risk characteristic | Interviewed and tested | | Interviewed but refused to provide blood sample | | *p*-value |
|---|---|---|---|---|---|
| | *n* | % | *n* | % | |
| **Number of partners in last 12 months** | | | | | |
| One sexual partner | 7 550 | 90.5 | 3 426 | 92.7 | <0.001*** |
| Two sexual partners | 501 | 6.0 | 173 | 4.7 | 0.518 |
| Three or more sexual partners | 295 | 3.5 | 97 | 2.6 | 0.664 |
| **Total** | **8 346** | **100** | **3 696** | **100** | |
| **Condom use last sex** | | | | | |
| No | 1 161 | 28.1 | 494 | 28.7 | 0.823 |
| Yes | 2 966 | 71.9 | 1 229 | 71.3 | 0.724 |
| **Total** | **4 127** | **100** | **1 723** | **100** | |

*** significant at $p<0.001$; ** $p<0.01$

In Table 3.4, a significant result (last column) means that the variable in question had a bearing on whether the person decided to provide a blood specimen or not. Two characteristics showed a highly significant ($p<0.001$) association with a respondent choosing to provide a blood specimen; these were female sex and previously having had an HIV test. Other variables that were significant were going steady/living together ($p<0.01$), and perceiving oneself not to be at risk for HIV ($p<0.05$).

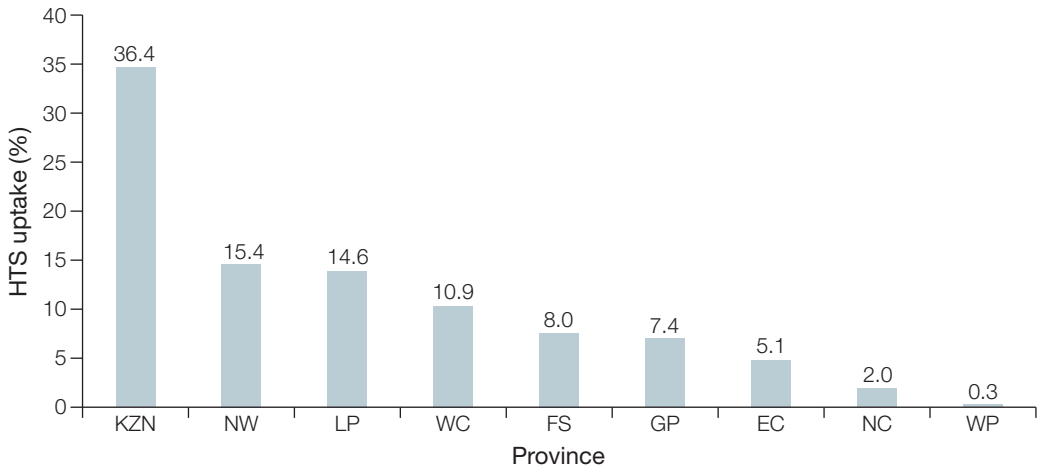
Characteristics that showed a highly significant ($p<0.001$) association with a respondent deciding not to give a blood specimen were as follows: male sex, being married or in a civil union, perceiving oneself to be at risk for HIV, never having had an HIV test, and having only one sexual partner.

Being single, divorced or widowed was not significantly associated with the person's decision to provide a blood specimen or not. Having more than one sexual partner was similarly not associated with the decision about whether to provide a blood specimen. Neither were awareness of HIV status, sexual activity in the last 12 months, or condom use at last sexual intercourse. Overall, looking at the sexual behavioural factors, it does not appear that the HIV testing patterns in this survey were strongly biased by a systematic influence that might have caused people to refuse to provide a blood sample. This interpretation is supported by the validity of the HIV-prevalence estimates.

### 3.1.3 HIV-testing services: Uptake and return of clinic results

In addition to the HIV testing performed for the survey, which involved DBS for laboratory analysis, all respondents were offered a full package of HIV-testing services (HTS). This included point-of-care HIV rapid testing, pre- and post-test HIV counselling, and linkage to care, in accordance with the South Africa national guidelines for HTS and the HIV rapid testing algorithm. Respondents with HIV-positive results from the rapid test – including discordant test results – were counselled and formally referred to nearby public health clinics for HIV clinical care and ART treatment. Figure 3.1 presents the proportion of respondents who accepted HTS in the field during the study. It is important to note that persons who self-reported an HIV-positive status were able to participate in the survey testing or to decline rapid testing.

*Figure 3.1: Uptake of HTS during the survey by province, South Africa, 2017*




Key: KZN, KwaZulu-Natal; NW, North West; LP, Limpopo; WC, Western Cape; FS, Free State; GP, Gauteng; EC, Eastern Cape; NC, Northern Cape; MP, Mpumalanga

## 3.2 Validity of HIV-prevalence estimates

The survey used a complex sampling design, namely, multistage stratified random cluster sampling. This approach was preferable to simple random sampling for the present research because it avoided potential under-representation of specific subgroups, such as the white and Indian/Asian populations as well as the sparsely populated Northern Cape. Adequate sample sizes were essential to obtain accurate estimations. The complex sampling design allowed for oversampling in specific population groups.

The survey data were subsequently benchmarked against the 2017 mid-year estimates to ensure that data for subgroups that were over- or under-represented were adjusted, to represent the respective population sizes appropriately. This procedure allowed for generalising the survey estimates of HIV prevalence to the respective subpopulations.

Appendix 1 shows the HIV prevalence, socio-demographic characteristics, standard error of the simple random sample, standard error of the multistage stratified random cluster sampling, coefficient of variation (CV), and the design effect. Several of these measures were used to assess the validity of the survey results. Low CV values are desirable as they indicate that estimates of HIV have small confidence bounds, whereas high values indicate that prevalence estimates are less certain. In this study, an HIV-prevalence estimate was regarded as valid if a CV was less than 20%, using the Kish (1965) criterion. CV values close to 20% are considered adequate (Kish 1965). In this study, all HIV-prevalence estimates met this criterion except for those relating to the white and Indian/Asian populations, which had CVs of 61.9% and 41.6% respectively. Hence, these estimates had large confidence bounds and thus were less certain.

## 3.3 HIV prevalence

South Africa has the largest HIV epidemic in the world. Therefore, it is crucial to monitor the epidemic and its determinants as well as the level of access to treatment and the impact of treatment. Data are key to ensuring accountability in managing the epidemic. South Africa is one of the few countries that have conducted five nationally representative population-based HIV surveys in households.

### 3.3.1 Overall HIV prevalence

In 2017, the national estimate for HIV prevalence among people of all ages living in South Africa was 14.0% (95% CI: 13.1–15.0). This estimate is significantly higher than the 2012 estimate of 12.2% ($p$<0.001). In absolute numbers, the 2017 estimate translates to 7.9 million people (95% CI: 7.1– 8.8) who were living with HIV and represents an increase of approximately 1.6 million people with HIV compared with the 2012 estimate.[1] When children younger than 2 years were excluded from the analysis, the prevalence estimate was 14.6%, which was again significantly higher ($p$<0.001) than the figure for the same population in 2012 (12.6%) or 2008 (10.9%). Thus, the trend shows a steady increase in the proportion of people in South Africa who are living with HIV.

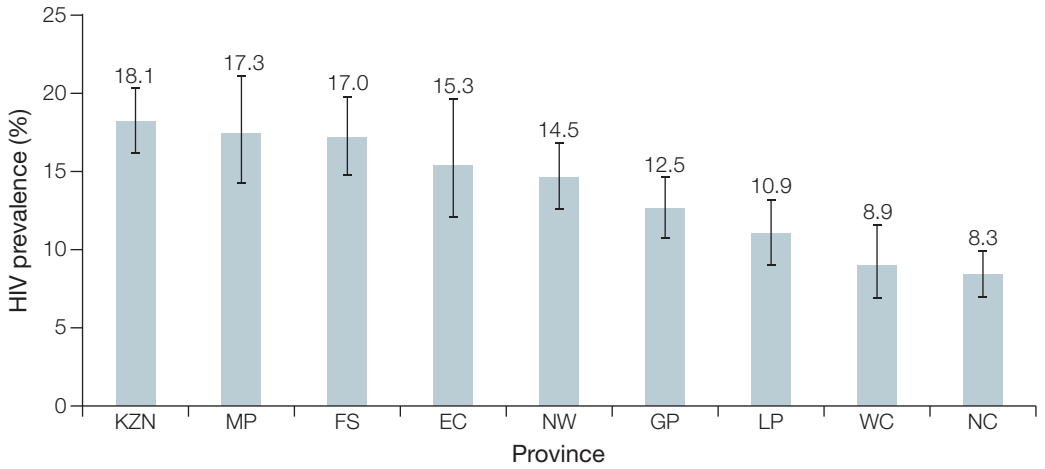
Table 3.5 shows the 2017 HIV-prevalence estimates in South Africa broken down by demographic variables. Overall, HIV prevalence varies by sex, age, race and locality type; the same patterns were noted in previous surveys. There was a significant association ($p$<0.001) between sex and HIV status: females had a significantly higher HIV prevalence (17.3%) than males (10.6%). HIV prevalence was lowest in children younger than 15 years (2.7%) and was relatively low (7.9%) among youth aged 15–24 years. Adults aged 25–49 years had the highest prevalence, with just over a quarter of adults (26.4%) in this group living with HIV.

*Table 3.5: Overall HIV prevalence by sex, age, race and locality, South Africa, 2017*

| Demographic variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **23 826** | **14.0** | **13.1–15.0** |
| **Sex** | | | |
| Male | 10 178 | 10.6 | 9.6–11.7 |
| Female | 13 648 | 17.3 | 16.1–18.5 |
| **Age (years)** | | | |
| 0–14 | 6 587 | 2.7 | 2.2–3.3 |
| 15–24 | 4 572 | 7.9 | 6.8–9.1 |
| 25–49 | 7 730 | 26.4 | 24.6–28.2 |
| 50 and older | 4 937 | 12.5 | 10.9–14.4 |
| 15–49 | 12 302 | 20.6 | 19.2–22.0 |
| **Race** | | | |
| Black African | 16 894 | 16.6 | 15.6–17.7 |
| White | 1 063 | 1.1 | 0.3–3.6 |
| Coloured | 4 434 | 5.3 | 4.0–6.8 |
| Indian/Asian | 1 435 | 0.8 | 0.4–1.9 |
| **Locality type** | | | |
| Urban | 14 375 | 13.2 | 12.1–14.3 |
| Rural informal (tribal areas) | 6 729 | 15.2 | 13.5–17.1 |
| Rural formal (farms) | 2 722 | 17.5 | 14.5–20.9 |

1 For trend analysis using the 2002 data, only people aged 2 and older were included.

*Figure 3.2: HIV prevalence by province, among people of all ages, South Africa, 2017*




Key: KZN, KwaZulu-Natal; MP, Mpumalanga; FS: Free State; EC: Eastern Cape; N, North West; GP, Gauteng; LP, Limpopo; WC, Western Cape; NC, Northern Cape

Although HIV has affected all race groups, black Africans had the highest HIV prevalence (16.6%), considerably higher than coloureds (5.1%) and whites (1.1%), and Indians/Asians had the lowest prevalence (below 1%). The prevalence among coloureds and whites had increased significantly from the 2012 figures of 3.1% and 0.3% respectively.

Analysis by the three locality types showed that people living in rural formal farming areas had the highest HIV prevalence (17.5%). Those living in urban areas had the lowest prevalence (13.2%).

Figure 3.2 presents HIV prevalence by province. The figure shows considerable variation in prevalence between the provinces. As in 2012, KwaZulu-Natal had the highest HIV prevalence (18.1%), followed closely by Mpumalanga and then Free State. Eastern Cape had the fourth highest prevalence, with North West in fifth place and Gauteng sixth. Northern Cape had the lowest prevalence (8.3%). The Western Cape's estimated HIV prevalence of 8.9% was considerably higher than the province's 2012 estimate of 5%. Overall, the ranking of provinces by HIV prevalence differed from that observed in the 2012 survey.

### 3.3.2 Trend analysis for HIV prevalence by province

Table 3.6 shows the trend analysis for HIV prevalence from 2002 to 2017 at provincial level for people aged 2 years and older. Between 2005 and 2008, HIV prevalence was stable but rose after 2012, reaching its highest point to date in 2017. This is probably the result of new HIV infections and the provision of ART enabling people to live longer. Overall HIV prevalence in this age group has increased significantly, from 11.4% in 2002 to 14.5% in 2017 ($p$<0.001). Given the relatively small sample size in the 2002 survey, comparisons at the provincial level are made only from the 2005 results onwards.

In 2005 and 2008, KwaZulu-Natal, Mpumalanga and Free State had the highest HIV prevalence, in that order. KwaZulu-Natal has retained the highest estimated prevalence among the provinces since 2005. Free State and Mpumalanga had the next highest estimates in 2017, with both provinces having similar estimates (17.8% for Free State and 17.7% for Mpumalanga).

*Table 3.6: HIV prevalence by province among people aged 2 years and older, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **8 428** | **11.4** | **10.0–12.7** | **15 851** | **10.8** | **9.9–11.6** | **14 222** | **10.9** | **10.0–11.9** | **27 860** | **12.6** | **11.7–13.5** | **23 221** | **14.5** | **13.5–15.5** |
| Western Cape | 1 267 | 10.7 | 6.4–15.0 | 2 204 | 1.9 | 1.2–3.0 | 2 098 | 3.8 | 2.7–5.3 | 3 288 | 5.1 | 3.6–7.2 | 2 843 | 9.1 | 7.0–11.8 |
| Eastern Cape | 1 221 | 6.6 | 4.5–8.7 | 2 428 | 8.9 | 7.0–11.4 | 1 984 | 9.0 | 7.2–11.2 | 3 928 | 12.2 | 10.5–14.1 | 2 686 | 15.8 | 12.0–20.6 |
| Northern Cape | 694 | 8.4 | 5.0–11.7 | 1 144 | 5.4 | 4.0–7.2 | 1 227 | 5.9 | 4.5–7.8 | 2 284 | 7.8 | 4.7–12.6 | 2 060 | 9.1 | 7.3–11.2 |
| Free State | 540 | 14.9 | 9.5–20.3 | 1 066 | 12.6 | 9.5–16.7 | 960 | 12.6 | 10.5–15.1 | 1 998 | 14.7 | 11.6–18.4 | 1 865 | 17.8 | 15.4–20.4 |
| KwaZulu-Natal | 1 579 | 11.7 | 8.2–15.2 | 2 729 | 16.5 | 14.0–19.3 | 2 464 | 15.8 | 13.4–18.6 | 6 798 | 17.4 | 15.8–19.2 | 4 621 | 18.7 | 16.7–20.9 |
| North West | 626 | 10.3 | 6.8–13.8 | 1 056 | 10.9 | 8.4–14.0 | 1 156 | 11.3 | 9.1–14.0 | 1 923 | 13.9 | 12.0–16.1 | 2 030 | 15.6 | 13.6–17.9 |
| Gauteng | 1 272 | 14.7 | 11.3–18.1 | 2 430 | 10.8 | 8.9–12.9 | 2 093 | 10.3 | 8.3–12.7 | 2 899 | 12.8 | 10.5–15.5 | 3 018 | 12.7 | 10.9–14.9 |
| Mpumalanga | 550 | 14.1 | 9.7–18.5 | 1 224 | 15.2 | 12.3–18.5 | 988 | 15.4 | 11.9–19.7 | 2 180 | 14.5 | 12.0–17.3 | 2 058 | 17.7 | 14.7–21.3 |
| Limpopo | 679 | 9.8 | 5.9–13.7 | 1 570 | 8.0 | 6.0–10.6 | 1 252 | 8.8 | 6.5–11.9 | 2 562 | 9.4 | 7.0–12.4 | 2 040 | 11.4 | 9.5–13.7 |

*Table 3.7: HIV prevalence by sex and age, South Africa, 2017*

| Age group (years) | Males | | | Females | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **10 178** | **10.6** | **9.6–11.7** | **13 648** | **17.3** | **16.1–18.5** | **23 826** | **14.0** | **13.1–15.0** |
| 0–14 | 3 258 | 2.4 | 1.8–3.2 | 3 329 | 3.0 | 2.3–3.9 | 6 587 | 2.7 | 2.2–3.3 |
| 15–19 | 1 106 | 4.7 | 3.1–7.1 | 1 267 | 5.8 | 4.4–7.5 | 2 373 | 5.2 | 4.1–6.7 |
| 20–24 | 959 | 4.8 | 3.4–6.8 | 1 240 | 15.6 | 12.6–19.1 | 2 199 | 10.2 | 8.5–12.3 |
| 25–29 | 803 | 12.4 | 9.6–15.9 | 1 161 | 27.5 | 23.7–31.7 | 1 964 | 20.0 | 17.5–22.8 |
| 30–34 | 679 | 18.4 | 14.5–23.1 | 1 051 | 34.7 | 30.3–39.4 | 1 730 | 26.5 | 23.5–29.7 |
| 35–39 | 584 | 23.7 | 19.3–28.9 | 840 | 39.4 | 34.5–44.5 | 1 424 | 31.5 | 27.7–35.6 |
| 40–44 | 501 | 22.4 | 17.7–27.9 | 815 | 35.9 | 31.6–40.4 | 1 316 | 29.0 | 25.6–32.7 |
| 45–49 | 478 | 24.8 | 18.8–32.0 | 818 | 30.3 | 26.2–34.8 | 1 296 | 27.6 | 23.6–32.1 |
| 50–54 | 451 | 20.2 | 15.0–26.6 | 774 | 22.2 | 17.2–28.2 | 1 225 | 21.3 | 17.5–25.6 |
| 55–59 | 384 | 14.8 | 10.2–21.1 | 697 | 17.6 | 14.0–21.9 | 1 081 | 16.3 | 13.2–20.0 |
| 60 and older | 975 | 4.7 | 3.4–6.5 | 1 656 | 7.4 | 6.0–9.2 | 2 631 | 6.3 | 5.2–7.6 |

In 2017, HIV prevalence was marginally higher in the Eastern Cape compared to North West, with Gauteng reflecting a lower prevalence. The pattern between these three provinces changed in 2012, and again in 2017. In 2005 and 2008, the prevalence estimates for North West and Gauteng were almost identical and were a few percentage points higher than that of Eastern Cape. In 2012, the prevalence for the Eastern Cape rose and the rates for the three provinces became similar (within 1.7 percentage points of each other). In 2017, estimated HIV prevalence increased in both the Eastern Cape and North West, with Gauteng reflecting a more stable and lower rate.

The Western Cape and Northern Cape had the lowest provincial HIV prevalence estimates in 2017, both at 9.1%. Western Cape has consistently attained the lowest prevalence estimates since 2005, with Northern Cape consistently achieving the second lowest prevalence (until 2017). HIV prevalence in Northern Cape increased from 5.4% in 2005 to 9.1% in 2017, and in Western Cape it increased from 1.9% to 9.1% in the same period.

The Western Cape has experienced the largest increase (4 percentage points) in HIV prevalence among all the provinces since the last survey. Before 2012, the province showed small but steady increases from one survey to the next. The only province that achieved a drop in estimated HIV prevalence between 2012 and 2017 was Gauteng, with a 0.1 percentage-point decrease.

Table 3.7 shows the distribution of HIV prevalence by sex and age categories for 2017. HIV prevalence was lowest among people younger than 15 years (2.7%). It increased to 5.2% among people aged 15–19 years and to 10.2% in the 20–24-year group. It increased sharply for people aged 25–34 years (20% to 26.5%) and peaked in the 35–39-year group (31.5%). It declined steadily among people aged 40 years and older, declining to 16.3% for the 55–59-year age group. Among people aged 60 years or older, HIV prevalence was 6.3%.

The epidemiological curve for the HIV epidemic in the country indicates that females continue bear a disproportionately higher HIV burden than males. This pattern and trend was observed in all age groups (Figure 3.3). However, there was no statistically significant difference in prevalence rates for males versus females in the 14 and younger and 15–19-year age cohorts. Statistically significant differences were evident in the 20–24 cohort through to the 40–44 cohort. Females aged 20–24 years had an HIV prevalence of 15.6%, compared to 4.8% among their male counterparts ($p<0.001$). The HIV prevalence among females of this age was comparable to that of males aged 25–29 years (12.4%) and 30–34 (18.4%). Among adults aged 25–29 years, HIV prevalence in females was more than double that of males. For women, HIV prevalence peaked at 39.4% in the 35–39-year group, whereas for men it peaked at 24.8% in the 45–49-year group. HIV prevalence remained above 20% for both males and females in the 44–49-year age group before declining among people aged 55 years and older.

*Figure 3.3: HIV prevalence by sex and age, South Africa, 2017*

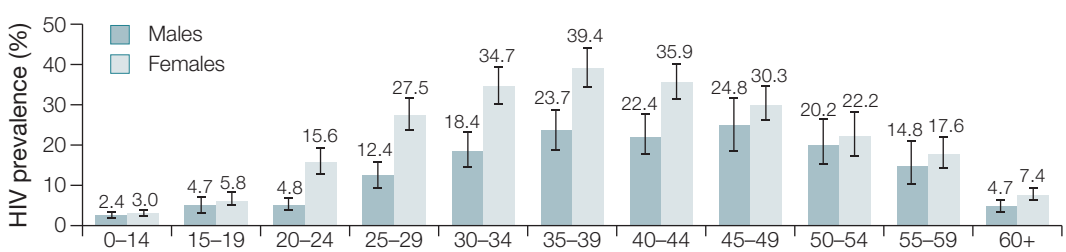


*Table 3.8 HIV prevalence by sex for age groups, South Africa, 2017*

| Age group (years) | Male | | | Female | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | CI | *n* | % | CI | *n* | % | CI |
| 1 year and younger | 308 | 2.4 | 1.1–5.3 | 323 | 3.0 | 1.6–5.9 | 631 | 2.7 | 1.5–5.0 |
| 0–4 | 917 | 2.4 | 1.5–3.8 | 960 | 3.8 | 2.3–6.1 | 1 877 | 3.1 | 2.1–4.5 |
| 5–14 | 2 341 | 2.4 | 1.7–3.3 | 2 369 | 2.6 | 1.9–3.5 | 4 710 | 2.5 | 2.0–3.1 |
| 15–24 | 2 065 | 4.8 | 3.7–6.2 | 2 507 | 10.9 | 9.2–12.9 | 4 572 | 7.9 | 6.8–9.1 |
| 25–49 | 3 045 | 19.4 | 17.4–21.6 | 4 685 | 33.3 | 31.0–35.7 | 7 730 | 26.4 | 24.6–28.2 |
| 50 and older | 1 810 | 11.5 | 9.1–14.3 | 3 127 | 13.3 | 11.3–15.6 | 4 937 | 12.5 | 10.9–14.4 |
| 15–49 | 5 110 | 14.8 | 13.3–16.5 | 7 192 | 26.3 | 24.5–28.2 | 12 302 | 20.6 | 19.2–2.0 |

Table 3.8 shows the HIV prevalence by sex for selected age groups. Among children 12 months and younger, where infections are likely to have been transmitted from mother to child, HIV prevalence was 2.7%. This figure marks a 2-fold increase from 2012 (1.3%). However, the difference was not statistically significant. HIV prevalence was not different among male and female children. HIV prevalence among children younger than 5 years was 3.1% and among children aged 5–14 years it was 2.5%. In both age groups, the prevalence was higher than in 2012 but the differences were not statistically significant. There was no statistical significant difference for HIV prevalence between male and female children aged 0–14 years.

Among youth aged 15–24 years and adults aged 25–49 years, females had a significantly higher HIV prevalence than males ($p<0.001$ in both cases). Among adults aged 50 years and older, HIV prevalence did not differ significantly between males and females ($p=0.267$).

Table 3.9 shows HIV prevalence rates by respondent age and survey year, among people aged 2 years and older. Overall, HIV prevalence declined from 11.4% in 2002 to 10.8% in 2005, but a steady increase followed, peaking at 14.6% in 2017. HIV prevalence in children aged 2–14 years has remained relatively stable since 2008, with a slight increase between 2012 and 2017. Overall, HIV prevalence has decreased significantly in this age group, from 5.6% in 2002 to 2.7% in 2017 ($p<0.001$). HIV prevalence has also decreased among youth aged 15–24 years during the past 15 years.

### 3.3.3 HIV prevalence among children aged 2–14 years by province

Table 3.10 shows the provincial trend analysis for the past five surveys regarding HIV prevalence among children aged 2–14 years. The provincial sample sizes for this age stratum are small, and the relatively wide confidence intervals mean that the estimates should be interpreted with caution. Since 2002, the overall provincial HIV prevalence has decreased from 5.6% to 2.7% ($p<0.001$). For all provinces other than Mpumalanga and KwaZulu-Natal, the 2017 estimates are lower than in 2002. There are also notable differences between the 2017 prevalence estimates across provinces and the results of the 2012 survey. In 2012, KwaZulu-Natal had the highest HIV prevalence at 4.4%, whereas in 2017 Mpumalanga had the highest estimate at 6.2%. Mpumalanga and Free State showed the largest percentage increases between 2012 and 2017, from 1.7% to 6.2% in Mpumalanga and from 1.7% to 4.1% in Free State. HIV prevalence also increased in the Western and Eastern Cape between 2012 and 2017, but decreased in Northern Cape, Gauteng, North West, KwaZulu-Natal and Limpopo.

*Table 3.9: HIV prevalence by age (people aged 2 years and older), South Africa, 2002, 2005, 2008, 2012 and 2017*

| Age group (years) | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **8 429** | **11.4** | **10.0–12.7** | **15 847** | **10.8** | **9.9–11.8** | **14 222** | **10.9** | **10.0–11.9** | **27 860** | **12.6** | **11.7–13.5** | **23 003** | **14.6** | **13.6–15.6** |
| 2–14 | 2 349 | 5.6 | 3.7–7.4 | 3 815 | 3.3 | 2.3–4.8 | 3 414 | 2.5 | 1.9–3.5 | 7 154 | 2.4 | 2.0–3.0 | 5 764 | 2.7 | 2.2–3.4 |
| 15–24 | 2 099 | 9.3 | 7.3–11.2 | 4 120 | 10.3 | 8.7–12.0 | 3 617 | 8.7 | 7.2–10.4 | 5 890 | 7.1 | 6.2–8.1 | 4 572 | 7.9 | 6.8–9.1 |
| 25 and above | 3 981 | 15.5 | 13.5-17.5 | 7 912 | 15.6 | 14.2–17.1 | 7 191 | 16.8 | 15.3–18.4 | 14 816 | 19.9 | 18.3–21.6 | 12 667 | 22.2 | 20.7–23.9 |
| 15–49 | 4 795 | 15.6 | 13.9–17.6 | 9 245 | 16.2 | 14.9–17.7 | 8 106 | 16.9 | 15.5–18.4 | 14 720 | 18.8 | 17.5–20.3 | 12 302 | 20.6 | 19.2–22 |

*Table 3.10: Prevalence of HIV by province in the 2–14-year age group, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **2 349** | **5.6** | **3.7–7.4** | **3 815** | **3.3** | **2.3–4.8** | **3 414** | **2.5** | **1.9–3.5** | **7 154** | **2.4** | **2.0–3.0** | **5 764** | **2.7** | **2.2–3.4** |
| Western Cape | 378 | 7.1 | 4.1–11.8 | 573 | 0.3 | 0.1–2.4 | 528 | 1.1 | 0.4–2.5 | 638 | 0.7 | 0.2–2.1 | 555 | 3.0 | 1.0–9.0 |
| Eastern Cape | 339 | 3.4 | 1.5–7.7 | 623 | 1.2 | 0.6–2.3 | 503 | 2.1 | 0.9–5.0 | 1 114 | 1.3 | 0.7-–2.3 | 731 | 2.8 | 1.7–4.5 |
| Northern Cape | 193 | 3.8 | 1.6–8.6 | 283 | 0.6 | 0.2–2.1 | 314 | 2.3 | 0.8–6.1 | 571 | 1.2 | 0.5–3.0 | 478 | 0.7 | 0.3–1.7 |
| Free State | 145 | 4.7 | 1.9–11.8 | 264 | 2.3 | 0.9–5.6 | 217 | 4.1 | 1.6–10.2 | 520 | 1.7 | 0.9–3.2 | 474 | 4.1 | 2.2–7.5 |
| KwaZulu-Natal | 439 | 3.9 | 1.7–9.4 | 553 | 7.9 | 3.5–16.5 | 508 | 2.8 | 1.2–6.9 | 1 771 | 4.4 | 3.2–5.9 | 1 139 | 4.0 | 2.7–5.9 |
| North West | 171 | 4.3 | 1.9–9.5 | 259 | 1.4 | 0.4–5.1 | 282 | 3.2 | 1.2–8.3 | 539 | 2.2 | 1.1-4.1 | 567 | 1.5 | 0.7–3.2 |
| Gauteng | 312 | 5.0 | 2.7–9.2 | 520 | 2.9 | 1.6–5.1 | 478 | 2.2 | 1.2–3.8 | 647 | 2.1 | 1.1–4.1 | 660 | 1.2 | 0.6–2.5 |
| Mpumalanga | 165 | 3.7 | 1.9–7.1 | 316 | 5.4 | 3.3-8.9 | 258 | 3.8 | 1.7–8.1 | 632 | 1.7 | 0.9–3.2 | 510 | 6.2 | 4.3–8.8 |
| Limpopo | 207 | 4.7 | 2.4–8.9 | 424 | 4.7 | 2.8–8.0 | 326 | 2.5 | 1.2–5.1 | 722 | 2.8 | 1.7–4.6 | 650 | 1.4 | 0.7–3.0 |

### 3.3.4 HIV prevalence among youth aged 15–24 years across South Africa

Table 3.11 shows HIV prevalence broken down by socio-demographic variables for youth aged 15–24 years. Those in this age group, especially females, have been identified as a high-risk group for HIV infection. The overall HIV prevalence among youth in this age group was 7.9%, slightly higher than the 7.1% estimated in 2012; the increase was not statistically significant.

A comparison by sex showed that female youth had a significantly higher HIV prevalence than their male counterparts; the prevalence among females was more than double that of males. Black Africans had the highest HIV prevalence (8.9%), whereas whites and coloureds had considerably lower estimates at 2.6% and 2.5% respectively. No cases were reported among Indian and Asian youth, meaning the HIV prevalence for this subgroup in 2017 was 0%. HIV prevalence has increased among black African, white and coloured youth. However, estimates for white and coloured youth should be interpreted with caution because of small sample sizes.

Youth living in rural formal areas (farms) had the highest HIV prevalence, followed by those living in rural informal (tribal) areas. Youth living in urban areas had the lowest prevalence. Eastern Cape (12.3%) and Mpumalanga (12.2%) had the highest prevalence in this age group in 2017, followed by KwaZulu-Natal (9.2%).

*Table 3.11: HIV prevalence among youth aged 15–24 years by race, province and locality type, South Africa, 2017*

| Demographic variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **4 572** | **7.9** | **6.8–9.1** |
| **Sex** | | | |
| Male | 2 065 | 4.8 | 3.7–6.2 |
| Female | 2 507 | 10.9 | 9.2–12.9 |
| **Race** | | | |
| Black African | 3 393 | 8.9 | 7.7–10.3 |
| White | 130 | 2.6 | 0.4–15.9 |
| Coloured | 825 | 2.5 | 1.5–4.3 |
| Indian/Asian | 224 | No cases | |
| **Locality type** | | | |
| Urban | 2 729 | 6.8 | 5.6–8.3 |
| Rural informal (tribal areas) | 1 338 | 9.5 | 7.4–12.1 |
| Rural formal (farms) | 505 | 11.2 | 7.4–16.5 |
| **Province** | | | |
| Western Cape | 543 | 4.4 | 2.5–7.7 |
| Eastern Cape | 491 | 12.3 | 8.2–18.1 |
| Northern Cape | 432 | 4.4 | 2.6–7.4 |
| Free State | 334 | 5.7 | 3.8–8.6 |
| KwaZulu-Natal | 914 | 9.2 | 7.1–11.7 |
| North West | 392 | 6.5 | 4.1–10.1 |
| Gauteng | 601 | 6.5 | 4.3–9.6 |
| Mpumalanga | 470 | 12.2 | 8.4–17.4 |
| Limpopo | 395 | 5.8 | 4.2–7.9 |

*Table 3.12: HIV prevalence among youth aged 15–24 years by province, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **2 099** | **9.3** | **7.5–11.4** | **4 120** | **103.3** | **8.7–12.0** | **3 617** | **8.7** | **7.2–10.4** | **5 890** | **7.1** | **6.2–8.1** | **4 572** | **7.9** | **6.8–9.1** |
| Western Cape | 311 | 11.2 | 6.0–19.9 | 559 | 2.3 | 1.2–4.4 | 553 | 3.0 | 1.5–5.8 | 677 | 4.4 | 2.6–7.5 | 543 | 4.4 | 2.5–7.7 |
| Eastern Cape | 320 | 9.2 | 5.4–15.2 | 676 | 11.7 | 7.1–18.7 | 495 | 6.6 | 3.8–11.0 | 856 | 6.2 | 4.2–9.1 | 491 | 12.3 | 8.2–18.1 |
| Northern Cape | 154 | 11.8 | 6.5–20.5 | 272 | 6.4 | 3.9–10.3 | 277 | 3.9 | 2.0–7.7 | 452 | 4.1 | 2.1–7.7 | 432 | 4.4 | 2.6–7.4 |
| Free State | 127 | 8.7 | 3.4–20.2 | 268 | 10.3 | 6.3–16.5 | 238 | 3.8 | 1.9–7.2 | 404 | 4.5 | 2.8–7.1 | 334 | 5.7 | 3.8–8.6 |
| KwaZulu-Natal | 420 | 7.2 | 3.5–14.0 | 727 | 16.1 | 12.5– 20.4 | 618 | 15.3 | 11.8–19.7 | 1 438 | 12.0 | 9.8–14.7 | 914 | 9.2 | 7.1–11.7 |
| North West | 148 | 8.3 | 4.5–15.0 | 269 | 6.6 | 3.7–11.4 | 274 | 6.3 | 3.3–11.6 | 400 | 8.2 | 4.8–13.7 | 392 | 6.5 | 4.1–10.1 |
| Gauteng | 302 | 11.6 | 7.5–17.4 | 591 | 9.0 | 6.1–13.2 | 558 | 10.1 | 5.9–16.7 | 605 | 5.8 | 4.0–8.2 | 601 | 6.5 | 4.3–9.6 |
| Mpumalanga | 144 | 11.7 | 6.6 –19.7 | 324 | 10.1 | 6.4–15.6 | 255 | 13.5 | 9.2–19.3 | 501 | 10.0 | 7.4–13.5 | 470 | 12.2 | 8.4–17.4 |
| Limpopo | 173 | 5.6 | 2.7 –11.2 | 434 | 7.4 | 4.4–12.3 | 349 | 3.9 | 2.1–7.3 | 557 | 3.1 | 1.6–5.7 | 395 | 5.8 | 4.2–7.9 |

Table 3.12 shows the HIV trend among youth aged 15–24 years by province over the five survey periods. Eastern Cape and Mpumalanga had the highest youth-related HIV prevalence in 2017, whereas in 2012 it was highest among KwaZulu-Natal youth. Northern and Western Cape had the lowest prevalence among youth in 2017, with estimates largely unchanged from the 2012 levels. Prevalence among the youth in Eastern Cape had decreased to 6.2% in 2012 but rose sharply to 12.3% in 2017. In Mpumalanga and Limpopo, HIV prevalence increased from 10% and 3.1% in 2012 to 12.2% and 5.8% in 2017, respectively.

### 3.3.5 HIV prevalence among the reproductive-age population aged 15–49 years

Table 3.13 shows the HIV prevalence among people of reproductive age in South Africa (15–49 years). In 2017, the overall HIV prevalence in this age group was 20.6% and was significantly higher among females (26.3%) than males (14.8%) ($p<0.001$). When HIV prevalence was stratified by race, black Africans had the highest rate, followed by coloureds, with whites and Indian/Asians having far lower estimates. The estimates for whites and Indians/Asians should be interpreted with caution because of the small sample sizes.

*Table 3.13: HIV prevalence among people aged 15–49 years by race, province and locality type, South Africa, 2017*

| Demographic variable | *n* | (%) | 95% CI |
|---|---|---|---|
| **Total** | **12 302** | **20.6** | **19.2–22.0** |
| **Sex** | | | |
| Male | 5 110 | 14.8 | 13.3–16.5 |
| Female | 7 192 | 26.3 | 24.5–28.2 |
| **Race** | | | |
| Black African | 8 826 | 24.1 | 22.6–25.7 |
| White | 474 | 1.3 | 0.2–8.2 |
| Coloured | 2 304 | 7.2 | 5.6–9.4 |
| Indian/Asian | 698 | 1.2 | 0.5–3.2 |
| **Locality type** | | | |
| Urban | 7 640 | 18.8 | 17.2–20.6 |
| Rural informal (tribal areas) | 3 031 | 24.8 | 21.9–27.9 |
| Rural formal (farms) | 1 631 | 23.5 | 20.0–27.4 |
| **Province** | | | |
| Western Cape | 1 687 | 12.6 | 9.7–16.1 |
| Eastern Cape | 1 264 | 25.2 | 19.8–31.5 |
| Northern Cape | 1 163 | 13.9 | 11.4–16.8 |
| Free State | 950 | 25.5 | 21.7–29.7 |
| KwaZulu-Natal | 2 357 | 27.0 | 23.9–30.4 |
| North West | 1 084 | 22.7 | 19.6–26.2 |
| Gauteng | 1 681 | 17.6 | 14.8–20.7 |
| Mpumalanga | 1 156 | 22.8 | 18.1–28.4 |
| Limpopo | 960 | 17.2 | 14.5–20.1 |

*Table 3.14: HIV prevalence by province among people aged 15–49 years, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **4 795** | **15.6** | **13.9–17.5** | **9 245** | **16.2** | **14.8–17.7** | **8 106** | **16.9** | **15.5–18.4** | **14 720** | **18.8** | **17.5–20.3** | **12 302** | **20.6** | **19.2-22** |
| Western Cape | 380 | 13.2 | 8.0–20.2 | 1 250 | 3.2 | 1.9–5.3 | 1 240 | 5.3 | 3.7–7.5 | 1 890 | 7.8 | 5.5–10.9 | 1 687 | 12.6 | 9.7–16.1 |
| Eastern Cape | 653 | 10.2 | 7.2–14.2 | 1 353 | 15.5 | 12.1–19.8 | 1 069 | 15.2 | 11.9–19.1 | 1 963 | 19.9 | 17.1–23.0 | 1 264 | 25.2 | 19.8–31.5 |
| Northern Cape | 359 | 9.6 | 6.4–14.2 | 651 | 9.0 | 6.4–12.5 | 675 | 9.0 | 6.6–12.3 | 1 207 | 11.9 | 6.8–20.2 | 1 163 | 13.9 | 11.4–16.8 |
| Free State | 728 | 19.4 | 13.7–26.8 | 629 | 19.2 | 13.3–26.9 | 554 | 18.5 | 15.2–22.4 | 1 071 | 20.4 | 15.4–26.5 | 950 | 25.5 | 21.7–29.7 |
| KwaZulu-Natal | 357 | 15.7 | 11.6–21.1 | 1 616 | 21.9 | 18.3–25.9 | 1 426 | 25.8 | 22.1–29.8 | 3 536 | 27.9 | 25.2–30.8 | 2 357 | 27.0 | 23.9–30.4 |
| North West | 902 | 14.4 | 10.3–19.9 | 620 | 18.0 | 13.7–23.2 | 606 | 17.7 | 13.9–22.3 | 994 | 20.3 | 17.5–23.4 | 1 084 | 22.7 | 19.6–26.2 |
| Gauteng | 318 | 20.3 | 16.1–25.3 | 1 538 | 15.8 | 13.0–19.1 | 1 274 | 15.2 | 12.1–19.0 | 1 673 | 17.8 | 14.6–21.6 | 1 681 | 17.5 | 14.8–20.7 |
| Mpumalanga | 797 | 21.0 | 15.5–27.9 | 704 | 23.0 | 18.8–27.9 | 577 | 23.1 | 18.4–28.7 | 1 125 | 21.8 | 17.5–26.9 | 1 156 | 22.8 | 18.1–28.4 |
| Limpopo | 301 | 11.5 | 7.6–17.1 | 884 | 11.0 | 8.2–14.5 | 685 | 13.7 | 9.7–19.0 | 1 261 | 13.9 | 10.2–18.7 | 960 | 17.2 | 14.5–20.1 |

When stratified by locality type, HIV prevalence was highest among people living in tribal or traditional areas (24.8%), followed by those on farms (23.5%) and in urban areas (18.8%). KwaZulu-Natal had the highest HIV prevalence (27%), followed by Free State (25.5%) and Eastern Cape (25.2%). The Western Cape and Northern Cape had the lowest provincial HIV prevalence estimates among people of reproductive age, at 12.5% and 13.9% respectively.

### 3.3.6 Trend analysis of HIV prevalence in the reproductive-age population

As shown in Table 3.14, the trend in HIV prevalence has shown an increase since 2002 among adults aged 15–49 years. HIV prevalence increased from 15.6% in 2002 to 20.6% in 2017 ($p$<0.001).

As was the case in previous surveys, the 2017 prevalence estimates varied across the provinces. In 2017, HIV prevalence was highest in KwaZulu-Natal at 27%, a slight increase from the 25.2% recorded in 2012. Free State had the second highest HIV prevalence (25.5%), an increase over the 20.4% reported in the 2012 survey and the highest rate for the province since 2002. Prevalence in the Eastern Cape was also high at 25.2%, increasing from 19.9% in 2012. Although the Western Cape had the lowest prevalence at 12.6%, this figure marked a substantial increase from the 2012 estimate of 7.8%.

### 3.3.7 Trends in HIV prevalence among adults aged 25 years and older

Table 3.15 shows the trends in HIV prevalence among adults aged 25 years and older during the five surveys, broken down by race, province and locality type. In this age group, overall HIV prevalence has gradually increased from 15.5% in 2002 to 22.2% in 2017 ($p$<0.001).

*Table 3.15: HIV prevalence among adults aged 25 years and older by race, province and locality type, South Africa, 2017*

| Demographic variable | *n* | (%) | 95% CI |
|---|---|---|---|
| **Total** | **12 667** | **22.2** | **20.7–23.9** |
| **Sex** | | | |
| Male | 4 855 | 17.3 | 15.6–19.1 |
| Female | 7 812 | 26.8 | 24.9–28.8 |
| **Race** | | | |
| Black African | 8 349 | 27.8 | 26.0–29.6 |
| White | 813 | 0.9 | 0.3–3.1 |
| Coloured | 2 453 | 7.8 | 6.0–10.0 |
| Indian/Asian | 1 052 | 1.3 | 0.6–2.8 |
| **Locality type** | | | |
| Urban | 8 087 | 20.0 | 18.2–21.9 |
| Rural informal (tribal areas) | 3 008 | 28.3 | 25.0–31.9 |
| Rural formal (farms) | 1 572 | 24.4 | 21.0–28.1 |
| **Province** | | | |
| Western Cape | 1 735 | 12.2 | 9.2–16 |
| Eastern Cape | 1 437 | 23.9 | 17.9–31.0 |
| Northern Cape | 1 145 | 14.7 | 11.6–18.4 |
| Free State | 1 014 | 28.7 | 24.4–33.5 |
| KwaZulu-Natal | 2 536 | 31.2 | 27.6–35.0 |
| North West | 1 062 | 25.9 | 22.5–29.6 |
| Gauteng | 1 742 | 18.7 | 15.8–22.1 |
| Mpumalanga | 1 012 | 26.5 | 21.1–32.6 |
| Limpopo | 984 | 20.4 | 17.2–24.1 |

*Table 3.16: HIV-prevalence trends by province among adults aged 25 years and older, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **3 981** | **15.5** | **13.6–17.6** | **7 912** | **15.6** | **14.2–17.1** | **7 191** | **16.8** | **15.3–18.4** | **14 816** | **19.9** | **18.3–21.6** | **12 667** | **22.2** | **20.7–23.9** |
| Western Cape | 579 | 11.2 | 6.6–18.3 | 1 072 | 2.7 | 1.6–4.6 | 1 017 | 5.4 | 3.7–7.9 | 1 973 | 6.8 | 4.6–9.9 | 1 735 | 12.2 | 9.2–16.1 |
| Eastern Cape | 562 | 8.1 | 5.5–11.9 | 1 128 | 13.8 | 10.9–17.4 | 986 | 15.6 | 12.0–20.1 | 1 958 | 22.0 | 19.0–25.3 | 1 437 | 23.9 | 17.9–31.0 |
| Northern Cape | 347 | 10.6 | 7.0–15.6 | 588 | 8.0 | 5.6–11.4 | 636 | 8.6 | 6.2–11.9 | 1 261 | 12.5 | 7.3–20.8 | 1 145 | 14.7 | 11.6–18.4 |
| Free State | 268 | 22.0 | 14.3–32.2 | 534 | 19.7 | 13.2–28.4 | 505 | 20.4 | 17.0–24.3 | 1 074 | 23.7 | 18.4–30.1 | 1 014 | 28.7 | 24.4–33.5 |
| KwaZulu-Natal | 720 | 14.9 | 10.1–21.5 | 1 449 | 20.5 | 16.8–24.6 | 1 338 | 23.5 | 19.7–27.8 | 3 589 | 30.1 | 26.9–33.6 | 2 536 | 31.2 | 27.6–35.0 |
| North West | 307 | 17.8 | 13.4–23.3 | 528 | 18.9 | 14.3–24.5 | 600 | 17.7 | 13.9–22.2 | 984 | 21.1 | 18.2–24.3 | 1 062 | 25.9 | 22.5–29.6 |
| Gauteng | 658 | 18.1 | 13.8–28.8 | 1 317 | 14.9 | 11.9–18.4 | 1 057 | 14.4 | 11.4–18.0 | 1 647 | 18.8 | 15.0–23.4 | 1 742 | 18.7 | 15.8–22.1 |
| Mpumalanga | 241 | 21.0 | 14.8–28.8 | 584 | 24.4 | 19.6–30.0 | 475 | 24.5 | 18.4–31.9 | 1 047 | 23.6 | 18.8–29.2 | 1 012 | 26.5 | 21.1–32.6 |
| Limpopo | 299 | 14.0 | 8.8–21.8 | 712 | 11.4 | 8.7–14.9 | 577 | 16.7 | 12.2–22.4 | 1 283 | 16.3 | 12.1–21.6 | 984 | 20.4 | 17.2–24.1 |

### 3.3.8 HIV prevalence among adults aged 50 years and older

The prevalence of HIV in adults aged 50 years and older is high, at 12.5% (see Table 3.17). Females had a higher prevalence than males although the difference was not statistically significant. Black Africans had a considerably higher HIV prevalence than all the other race groups.

HIV prevalence among people in this age group living in urban areas (10.5%) was significantly lower than among people living in rural formal (farm) areas (16.9%) ($p$<0.001). Western Cape had the lowest prevalence, followed by Northern Cape. Prevalence among older people was highest in Mpumalanga, followed by KwaZulu-Natal and Free State.

Table 3.18 shows that HIV prevalence by province has increased overall from 6.9% in 2002 to 12.5% in 2017 ($p$<0.001). HIV prevalence decreased in Northern Cape, remained stable in the Western Cape and increased in the remaining provinces.

*Table 3.17: HIV prevalence among adults aged 50 years and older, South Africa, 2017*

| Demographic variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **4 937** | **12.5** | **10.9–14.4** |
| **Sex** | | | |
| Male | 1 810 | 11.5 | 9.1–14.3 |
| Female | 3 127 | 13.3 | 11.3–15.6 |
| **Race** | | | |
| Black African | 2 916 | 17.7 | 15.4–20.2 |
| White | 469 | 0.9 | 0.2–4.7 |
| Coloured | 974 | 4.7 | 2.7–8.1 |
| Indian/Asian | 578 | 0.6 | 0.2–2.0 |
| **Locality type** | | | |
| Urban | 3 176 | 10.5 | 8.6–12.7 |
| Rural informal (tribal areas) | 1 315 | 16.6 | 13.3–20.6 |
| Rural formal (farms) | 446 | 16.9 | 12.1–22.9 |
| **Province** | | | |
| Western Cape | 591 | 4.0 | 2.3–7.0 |
| Eastern Cape | 664 | 11.2 | 6.5–18.5 |
| Northern Cape | 414 | 6.2 | 4.1–9.3 |
| Free State | 398 | 16.4 | 12.1–22.0 |
| KwaZulu-Natal | 1 093 | 17.9 | 13.9–22.8 |
| North West | 370 | 14.3 | 10.4–19.4 |
| Gauteng | 662 | 11.1 | 7.6–15.8 |
| Mpumalanga | 326 | 19.8 | 15.5–25.0 |
| Limpopo | 419 | 14.8 | 10.9–19.7 |

*Table 3.18: Trends in HIV prevalence by province among adults aged 50 years and older, South Africa, 2002, 2005, 2008, 2012 and 2017*

| | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Province | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **1 285** | **6.9** | **4.8–9.7** | **2 787** | **5.7** | **4.4–7.4** | **2 702** | **5.4** | **4.3–6.8** | **5 986** | **7.6** | **6.5–8.8** | **4 937** | **12.5** | **10.9–14.4** |
| Western Cape | 162 | 4.5 | 2.0–9.8 | 381 | 0.7 | 0.2–3.1 | 330 | 3.1 | 1.4–6.7 | 760 | 1.8 | 0.8–4.0 | 591 | 4.0 | 2.3–7.0 |
| Eastern Cape | 229 | 3.6 | 1.6–7.9 | 451 | 4.7 | 2.6–8.5 | 412 | 4.1 | 2.4–6.8 | 851 | 8.5 | 5.9–12.1 | 664 | 11.2 | 6.5–18.5 |
| Northern Cape | 121 | 14.2 | 7.4–25.5 | 209 | 2.5 | 1.0–6.1 | 238 | 2.7 | 1.1–6.4 | 506 | 6.1 | 3.3–10.8 | 414 | 6.2 | 4.1–9.3 |
| Free State | 77 | 11.7 | 3.9–30.3 | 173 | 8.0 | 3.0–19.4 | 189 | 6.6 | 3.5–12.2 | 407 | 13.9 | 9.7–19.4 | 398 | 16.4 | 12.1–22.0 |
| KwaZulu-Natal | 238 | 11.0 | 4.5–24.3 | 560 | 9.5 | 5.9–14.8 | 530 | 6.1 | 3.7–10.1 | 1 491 | 9.8 | 7.4–12.8 | 1 093 | 17.9 | 13.9–22.8 |
| North West | 98 | 7.0 | 3.3–14.4 | 177 | 2.8 | 1.1–6.6 | 268 | 6.5 | 3.5–11.7 | 390 | 9.2 | 5.5–14.9 | 370 | 14.3 | 10.4–19.4 |
| Gauteng | 163 | 2.9 | 1.3–6.7 | 370 | 4.5 | 2.0–9.6 | 341 | 4.0 | 1.9–8.1 | 579 | 6.9 | 4.4–10.5 | 662 | 11.1 | 7.6–15.8 |
| Mpumalanga | 84 | 6.3 | 2.5–15.2 | 204 | 7.3 | 4.0–13.0 | 153 | 10.9 | 6.1–18.7 | 423 | 10.1 | 6.9–14.6 | 326 | 19.8 | 15.5–25.0 |
| Limpopo | 113 | 9.8 | 4.0–22.2 | 262 | 6.1 | 3.5–10.3 | 241 | 6.4 | 3.5–11.2 | 579 | 7.3 | 4.7-11.2 | 419 | 14.8 | 10.9–19.7 |

*Table 3.19: HIV prevalence by race and locality type among people of all ages, South Africa, 2017*

| | Black African | | | White | | | Coloured | | | Indian/Asian | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locality type | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **16 894** | **16.6** | **15.6–17.7** | **1 063** | **1.1** | **0.3–3.6** | **4 434** | **5.3** | **4.0–6.8** | **1 435** | **0.8** | **0.4–1.9** |
| Urban | 8 191 | 17.0 | 15.7–18.4 | 907 | 1.2 | 0.3–3.8 | 3 876 | 5.2 | 3.9–6.8 | 1 401 | 0.9 | 0.4–1.9 |
| [a]Rural informal (tribal areas) | 6 683 | 15.3 | 13.6–17.3 | – | – | – | – | – | – | – | – | – |
| [b]Rural formal (farms) | 2 020 | 21.0 | 17.3–25.3 | 114 | 0.0 | – | 557 | 6.6 | 3.9–10.9 | 31 | 0.6 | 0.1–4.0 |

a Some sample sizes were were too small for reliable estimates.
b Some sample sizes were too small for reliable estimates

### 3.3.9 HIV prevalence by race and locality type

Table 3.19 (page 60) shows the results of an analysis of the relationship between HIV prevalence and the variables of race and locality type. Black Africans residing on farms had the highest HIV prevalence (21%), followed by those living in urban areas (17%). However, there was no significant difference in HIV prevalence among black Africans in the various locality types.

In the coloured population, HIV prevalence was higher among those living on farms (6.6%) than those living in urban areas (5.2%). HIV prevalence among inhabitants of urban areas was 1.2% for whites and 0.9% for Indians/Asians. No occurrence of HIV among whites living on farms was reported. With respect to other locality types for whites and Indians/Asians, there were too few observations for meaningful analysis and comparisons.

### 3.3.10 Groups in the general population at high risk for HIV

This survey presents an opportunity to track the changes in HIV prevalence in groups identified as high risk during the previous surveys. These groups require targeted interventions to manage the epidemic. Key population groups, such as sex workers and men who have sex with men, were not included because there were too few available observations for reliable estimates. As shown in Table 3.20, in the 2017 survey the high-risk groups (at risk of HIV exposure) were:

- black African women aged 20–34 years;
- cohabiting individuals;
- black African men aged 25–49 years;
- recreational drug users;
- high-risk alcohol drinkers; and
- persons with disabilities aged 15 years and older.

Table 3.20 shows the HIV prevalence among these high-risk populations. HIV prevalence among black African women aged 20–34 years, cohabiting individuals, and black African men had decreased relative to 2012, although the changes were not significant. HIV prevalence among high-risk alcohol drinkers and persons with disabilities aged 15 years and older had increased.

*Table 3.20: HIV prevalence among groups at high risk for HIV exposure, South Africa, 2017*

| High-risk groups | *n* | % | 95% CI |
|---|---|---|---|
| Black African women (aged 20–34 years) | 2 562 | 29.9 | 27.1–32.9 |
| People living together, not married (aged 15–49 years) | 978 | 25.4 | 21.2–30.1 |
| Black African men (aged 25–49 years) | 2 149 | 22.9 | 20.5–25.4 |
| Disabled people (aged 15 years and older) | 645 | 23.1 | 16.8–31.0 |
| High-risk drinkers (aged 15 years and older) | 1 503 | 17.0 | 14.0–20.5 |
| Recreational drug users (aged 15 years and older) | 1 374 | 19.2 | 15.7–23.2 |

### 3.3.11 HIV serodiscordance

The previous sections have focused mainly on individuals. This section concentrates on couples in a sexual relationship and on mother–child pairs, to better understand the transmission of HIV. In couples, sexual transmission within the couple is examined. In mother–child pairs, greater understanding is sought on the vertical transmission from mother to child. The possible horizontal transmission of HIV in children is also examined.

#### *Couples*

Table 3.21 shows HIV serodiscordance among couples involved in a sexual relationship. Among the 1 693 couples whose data were obtained in the 2017 survey, 11.3% were serodiscordant; 7.9% were serodiscordant with a female partner living with HIV and 3.4% were discordant with a male partner living with HIV. HIV serodiscordance with females living with HIV and males not living with HIV was more than double the reverse situation.

*Table 3.21: HIV serodiscordance and seroconcordance between couples, South Africa, 2017*

| Female partner HIV status | Male partner HIV status | | Total |
|---|---|---|---|
| | HIV-positive | HIV-negative | |
| **Total** | **181** | **1 512** | **1 693** |
| HIV-positive | 7.3% (6.2–8.7)<br>*n*=124<br>Seroconcordance | 7.9% (6.7–9.3)<br>*n*=134<br>Serodiscordance | 258 |
| HIV-negative | 3.4% (2.6–4.3)<br>*n*=57<br>Serodiscordance | 81.4% (79.5–83.2)<br>*n*=1 378<br>Seroconcordance | 1 435 |

*Notes:*
1 693 couples provided the information for this analysis. 'Male partner' and 'female partner' refer to the respondent's main sexual partner (that is, each other). Results are shown as a percentage of n=1 693, with 95% CI in brackets.

#### *Mother-child pairs*

Table 3.22 shows HIV serodiscordance between mother-and-child pairs for children in the 2 years and younger age group. Of the 415 identified mother-and-child pairs, 90.2% of mothers living with HIV had a child who was HIV-negative. There was a single case in which the mother was HIV-negative and the child HIV-positive, suggesting the horizontal transmission of HIV to the child.

*Table: 3.22: HIV serodiscordance between mother-and-child pairs for children aged 2 years and younger, South Africa, 2017*

| Child's HIV status | Mother's HIV status | | Total |
|---|---|---|---|
| | HIV-positive | HIV-negative | |
| **Total** | **92** | **323** | **415** |
| HIV-positive | 9.8% (5.1–17.9])<br>*n*=9<br>Seroconcordance | 0.31% (0.04–2.19)<br>*n*=1<br>Serodiscordance | 10 |
| HIV-negative | 90.2% (82.1–94.9)<br>*n*=83<br>Serodiscordance | 99.7% (97.8–100.0)<br>*n*=322<br>Seroconcordance | 405 |

Table 3.23 shows HIV serodiscordancy between mother-and-child pairs where the children were younger than 10 years. Of the 2 327 mother-and-child pairs identified, 93.6% of mothers living with HIV had an HIV-negative child, and 99.7% of HIV-negative mothers were seroconcordant with their children. Only eight cases were found where the child was found to be HIV-positive and the mother HIV-negative. The remaining 39 children were also seroconcordant with their mothers.

*Table 3.23: HIV serodiscordancy between mother-and-child pairs in which children were younger than 10 years, South Africa, 2017*

| | Mother's HIV status | | |
|---|---|---|---|
| Child's HIV status | HIV-positive | HIV-negative | Total |
| **Total** | **607** | **1 720** | **2 327** |
| HIV-positive | 6.4% (4.7–8.7)<br>*n*=39<br>Seroconcordance | 0.46% (0.23–0.93)<br>*n*=8<br>Serodiscordance | 47 |
| HIV-negative | 93.6% (91.3–95.3)<br>*n*=568<br>Serodiscordance | 99.5% (99.1–99.8)<br>*n*=1 712<br>Seroconcordance | 2 280 |

### 3.3.12 Orphans and HIV prevalence

The term 'orphan' refers to children younger than 15 years who have lost either their mother (maternal orphan), father (paternal orphan) or both biological parents (double orphan) (StatsSA 2013). Some studies expand this definition to include children up to 18 years (Skinner et al. 2004). Furthermore, approximately 150 000 children in South Africa are estimated to be living in child-headed households (UNICEF 2016).

Data were analysed using a two-category orphanhood status and a three-category orphanhood type. To summarise, the HIV prevalence among orphaned children was stratified into three age groups (see Tables 3.24 to 3.26). Among the 7 458 children aged 0–18 years who were tested for HIV in the survey, 3% were found to be HIV-positive (Table 3.25). In this age group (0–18), orphans were nearly three times more likely (7%) to be HIV-positive compared to non-orphans (2.5%) ($p$<0.001). The highest HIV prevalence was found in double orphans (9.7%), followed by maternal orphans (8.2%) ($p$=0.280).

*Table 3:24: HIV prevalence by orphanhood status and type among children aged 18 years and younger, South Africa, 2017*

| Orphanhood status and type | *n* | HIV-positive (%) | 95% CI |
|---|---|---|---|
| **Total** | **7 458** | **3.0** | **2.5–3.7** |
| **Orphanhood status** | | | |
| Not orphan | 6 412 | 2.5 | 1.9–3.1 |
| Orphan | 1 046 | 7.0 | 5.2–9.3 |
| **Type of orphanhood** | | | |
| Maternal | 265 | 8.2 | 4.5–14.5 |
| Paternal | 587 | 5.5 | 3.5–8.5 |
| Double orphan | 194 | 9.7 | 5.5–16.4 |
| Not orphan | 6 412 | 2.5 | 1.9–3.1 |

The analysis of HIV prevalence in children younger than 15 years showed that 5.6% of children who were living with HIV were also orphaned, and a further 2.4% of children were living with HIV but still had a parent. These young orphaned children living with HIV were mainly double orphans (7%) or maternal orphans (6.2%), with a slightly smaller proportion being paternal orphans (5%). The differences among orphan type were significant ($p$=0.002) (Table 3.25).

*Table 3.25: HIV prevalence by orphanhood status and type among children aged 14 years and younger, South Africa, 2017*

| Status/type of orphanhood | *n* | HIV-positive (%) | 95% CI |
|---|---|---|---|
| **Total** | **5 716** | **2.7** | **2.1–3.4** |
| **Status of orphanhood** | | | |
| Not orphan | 5 097 | 2.4 | 1.8–3.1 |
| Orphan | 619 | 5.6 | 3.8–8.3 |
| **Type of orphanhood** | | | |
| Maternal | 171 | 6.2 | 2.8–12.9 |
| Paternal | 355 | 5.0 | 2.9–8.6 |
| Double | 93 | 7.0 | 2.9–16.1 |

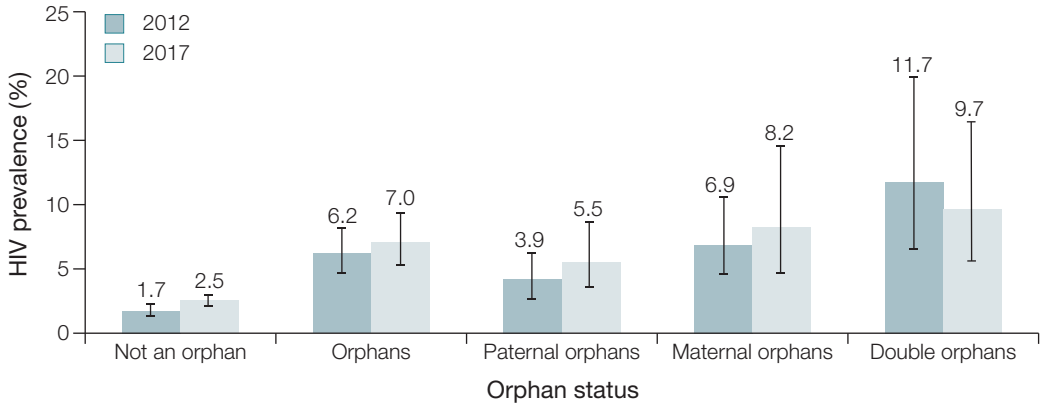
Significantly more children aged 15–18 years who were orphans were living with HIV (9.0%) than non-orphans (2.9%) ($p$<0.001). Most of these teenagers living with HIV were maternal orphans (13.1%) or double orphans (12.4%), with fewer paternal orphans (6.3%) and non-orphans (2.9%) ($p$<0.001). Table 3.26 shows the results for the teenage group (aged 15–18 years).

*Table 3.26: HIV prevalence by orphanhood status and type among teenagers aged 15–18 years, South Africa, 2017*

| Status/type of orphanhood | *n* | HIV-positive (%) | 95% CI |
|---|---|---|---|
| **Total** | **1 742** | **4.5** | **3.3–6.0** |
| **Status of orphanhood** | | | |
| Not orphan | 1 315 | 2.9 | 1.9–4.5 |
| Orphan | 427 | 9.1 | 5.9–13.9 |
| **Type of orphanhood** | | | |
| Maternal | 94 | 13.1 | 5.3–28.7 |
| Paternal | 232 | 6.3 | 3.2–11.8 |
| Double | 101 | 12.4 | 5.9–24.3 |
| Not an orphan | 1 315 | 2.9 | 1.9–4.5 |

Figure 3.4 shows the trend in HIV prevalence according to orphanhood status for children aged 0–18 years. Paternal and maternal orphans increased in 2017 relative to 2012, whereas the number of double orphans decreased.

*Figure 3.4: HIV prevalence and orphanhood status among children aged 18 years and younger, South Africa, 2017*




## 3.4 Exposure to antiretroviral treatment

As in 2008 and 2012, the 2017 survey protocol included methodologies for directly estimating exposure to ART among those living with HIV. Measuring ART exposure in the HIV-positive survey population is critical for assessing progress made towards the UNAIDS 90–90–90 treatment targets. Such information also helps in assessing the impact of ART on HIV-prevalence levels and in interpreting HIV-prevalence trends.

Table 3.27 provides estimates of the total number of people living with HIV, the number of people on ART, and the proportion of people living with HIV who were on ART at the time of the survey. By mid-2017, of an estimated 7 920 000 people in South Africa who were living with HIV, 4 402 000 (62.3%) were exposed to ART. A greater proportion of females (65.5%) than males (56.3%) had accessed treatment. Half of all children living with HIV aged 14 years and younger had received ART. Exposure to ART was highest among people aged 50 years or older and lowest among youth aged 15–24 years. Among the 7.6 million black Africans estimated to be living with HIV who were tested for exposure to ART, 62.6% were receiving treatment. The proportion of ART exposure in other race groups (combined) was lower, at 51.3%.

Access to treatment varied by locality type, with rural traditional (tribal) areas having more people on treatment than in urban areas and farms. (These results are not shown in the table.) KwaZulu-Natal had the highest number of people on treatment.

*Table 3.27: Exposure to antiretroviral treatment among people living with HIV, by sex, age, race and province, South Africa, 2017*

| Variable | Estimated number of people on ART (*n*) | Proportion of people living with HIV and receiving ART % (95% CI) |
|---|---|---|
| **Total** | **4 402 000** | **62.3 (59.2–65.2)** |
| **Sex** | | |
| Males | 1 404 000 | 56.3 (51.0–61.5) |
| Females | 2 998 000 | 65.5 (62.4–68.4 |
| **Age group (years)** | | |
| 0–14 | 131 000 | 50.0 (36.6–63.3) |
| 15–24 | 274 000 | 39.9 (32.1–48.3) |
| 25–49 | 3 244 000 | 63.1 (59.2–66.8) |
| 50 and older | 753 000 | 76.7 (71.3–81.4) |
| 15–49 | 3 518 000 | 60.4 (57.0–63.6) |
| **Race** | | |
| Black African | 4 284 000 | 62.6 (59.5–65.6) |
| Other | 118 000 | 51.3 (36.4–66.1) |
| **Province** | | |
| Western Cape | 284 000 | 53.9 (43.1–64.4) |
| Eastern Cape | 653 000 | 68.2 (60.5–75.0) |
| Northern Cape | 51 000 | 55.1 (42.3–67.3) |
| Free State | 280 000 | 62.8 (52.3–72.2) |
| KwaZulu-Natal | 1 248 000 | 69.8 (63.6–75.4) |
| North West | 258 000 | 57.6 (50.2–64.8) |
| Gauteng | 896 000 | 53.7 (46.5,60.7) |
| Mpumalanga | 437 000 | 65.5 (58.0–72.3) |
| Limpopo | 296 000 | 61.7 (51.7–70.9) |

*Notes:* Column totals contain missing demographic information. The results were obtained for people with HIV who provided blood specimens for ARV testing.

## 3.5 HIV incidence

HIV incidence estimates provide critical insight into the dynamics of the HIV epidemic and are the most direct means of assessing the impact of HIV-prevention programmes. HIV incidence is also the biomarker of choice in studying people's recent behaviours and behavioural changes. In the era of a mature epidemic, and in the presence of multi-pronged prevention, treatment and care interventions, interpreting HIV-prevalence figures has become an increasingly complex task. HIV-incidence rates are thus crucial for disentangling the impact of prevention and treatment programmes.

### 3.5.1 HIV-incidence estimates for 2017

In this section, we present HIV-incidence measures from HIV-incidence testing, based on the blood specimens collected in the 2017 survey (see Section 2.9.4 under Methods).

Table 3.28 shows the HIV-incidence estimates for South Africa in 2017, based on assays, in both relative terms (% per year) and absolute terms (number of new infections per year). The table presents a breakdown by sex and age. Overall HIV incidence was 0.48%, translating to an estimated 231 100 new infections, with more infections in females than males. There were approximately 18 200 new infections among children aged 2–14 years, with an estimated incidence of 0.13%. Youth aged 15–24 years had the highest incidence, with an estimated 88 400 new infections in 2017. Young women in this age group had an HIV incidence of 1.51% or 66 200 new infections. Among people aged 25 years and older, HIV incidence was 0.48% (124 600 new infections), with a higher incidence among males than females.

Overall, HIV incidence among people aged 15–49 years was 0.79%, translating to nearly 200 000 new infections. More infections occurred among females than males. Table 3.28 shows the relevant estimates.

*Table 3.28: HIV incidence by age and sex, South Africa, 2017*

| Age group (years) | Sex | Incidence % (95% CI) | Number[b] of new infections (95% CI) |
|---|---|---|---|
| 2 and older | **Total** | **0.48 (0.42–0.54)** | **231 100 (211 900–260 400)** |
| | Male | 0.46 (0.39–0.51) | 109 200 (92 600–121 100) |
| | Female | 0.51 (0.43–0.59) | 121 900 (102 800–141 000) |
| 2–14[a] | **Total** | **0.13 (0.03–0.23)** | **18 200 (4 200–32 200)** |
| | Male | – | – |
| | Female | – | – |
| 15–24 | **Total** | **1.0 (0.86–1.15)** | **88 400 (76 000–101 600)** |
| | Male | 0.49 (0.27–0.71) | 22 200 (19 400–29 500) |
| | Female | 1.51 (1.31–1.71) | 66 200 (57 500–75 000) |
| 25 and older | **Total** | **0.48 (0.40–0.59)** | **124 600 (103 800–153 100)** |
| | Male | 0.54 (0.48–0.60) | 70 200 (62 400–78 000) |
| | Female | 0.45 (0.39–0.51) | 54 400 (47 100–61 600) |
| 15–49 | **Total** | **0.79 (0.67–0.91)** | **199 700 (169 300–230 000)** |
| | Male | 0.69 (0.60–0.76) | 92 400 (80 300–104 400) |
| | Female | 0.93 (0.71–1.11) | 107 300 (86 500–120 100) |

a Sample size too small for reliable estimates by sex.
b Rounded off to the nearest 100.

Table 3.29 shows the incidence estimates for 2017, compared to recalculated estimates for 2012. The annualised rates for 2012 were recalculated using the 2017 parameters (MDRI of 161 days; FRR of 0.06%; see Section 2.9.4 in Laboratory methods). The overall HIV incidence declined from 0.85% in 2012 to 0.48% in 2017, with the estimated number of new infections dropping from 378 700 to 231 100, representing a decline of 39%. Among the youth, incidence declining from 1.20% to 1.00%, translating to a drop of 21% in the number of new infections. The number of new infections in women aged 15–24 years decreased by 27% from 91 200 to 66 200. A 42% relative decrease in HIV incidence was noted among people of reproductive age (aged 15–49 years), and the number of new infections in this population decreased from 320 000 to approximately 200 000.

*Table 3.29: HIV incidence across age groups: comparison between 2012 and 2017, South Africa*

| Age group (years) | | 2012 (recalculated using 2017 parameters) | | 2017 | |
|---|---|---|---|---|---|
| | | HIV incidence % (95% CI) | Estimated number of new infections per year *n* (95% CI) | HIV incidence % (95% CI) | Estimated number of new infections *n* (95% CI) |
| 2 and older | Total | 0.85 (0.75–0.95) | 378 700 (334 200–423 600) | 0.48 (0.42–0.54) | 231 100 (211 900–260 400) |
| 15–24 | Total[a] | 1.20 (1.06–1.36) | 112 400 (99 300–125 500) | 1.0 (0.86–1.15) | 88 400 (76 000–101 600) |
| | Females | 2.04 (1.80–2.28) | 91 200 (80 500–102 000) | 1.51 (1.31–1.71) | 66 200 (57 500–75 000) |
| 15–49 | Total | 1.36 (1.20–1.52) | 320 000 (281 300–357 600) | 0.79 (0.67–0.91) | 199 700 (169 300–230 000) |

a sample too small for reliable estimates for males

Table 3.30 shows the estimated HIV incidence by race and locality type for all people aged 2 years and older. The number of recent infections at the provincial level was insufficient to provide reliable incidence estimates. HIV incidence among black Africans was far higher than in the other race groups, with nearly all new infections occurring among black Africans. HIV incidence in black Africans was approximately 6 times higher than in the other race groups (combined), at 0.59% and 0.10% respectively. People living in urban areas had a higher incidence rate (0.58%) than those living in rural areas (0.23%).

Table 3.31 shows the relationship between HIV incidence and selected sociodemographic and behavioural variables in the population aged 15–49 years. Individuals who were married had the lowest HIV incidence at 0.61%, whereas single people had the highest incidence at 1.07%. Individuals who reported having had only one sexual partner in the past year had an HIV incidence of 1.14%, whereas those reporting more than one partner had an incidence of 1.03%.

Black African females aged 20–34 years had the highest HIV incidence among all analysed population subgroups, at 1.59%. Incidence among black African males aged 25–49 years was 0.97%.

*Table 3.30: HIV incidence by race and locality type among people aged 2 years and older, South Africa, 2017*

| Demographic variable | | Incidence % (95% CI) | Number of new infections *n* (95% CI) |
|---|---|---|---|
| Race | Black African | 0.59 (0.55–0.63) | 220 500 (190 600–250 400) |
| | Other races | 0.10 (0.07–0.13) | 10 600 (7 500–13 800) |
| Locality | Urban | 0.58 (0.54–0.62) | 191 600 (178 400–204 800) |
| | Rural[a] | 0.23 (0.19–0.27) | 39 500 (32 600–46 400) |

a Includes farms and traditional (tribal) areas.

*Table 3.31: HIV incidence: behavioural and sociodemographic variables among people aged 15–49 years, South Africa, 2017*

| Variable | | Incidence % ( 95% CI) |
|---|---|---|
| Behaviour (relationship type) | Married | 0.61 (0.51–0.71) |
| | Going steady/living together | 0.96 (0.86–1.06) |
| | Single | 1.07 (0.95–1.19) |
| | One partner in the last 12 months | 1.14 (1.00–1.28) |
| | More than one partner in the last 12 months | 1.03 (0.91–1.15) |
| Demographics (race, sex) | Black females 20–34 | 1.59 (1.41–1.77) |
| | Black males 25–49 | 0.97 (0.85–1.09) |

## 3.6 Viral load suppression

HIV viral load suppression, defined as a VL threshold of <1 000 copies HIV RNA/mL, is a measure of the efficacy of ARV therapy. It is also a proxy indicator for adherence to treatment and HIV transmission risk (UNAIDS 2015).

In this survey, of the 2 994 people who tested HIV-positive, 2 946 (98.4%) had a VL result. Among them, 62.3% (95% CI: 59.5–65.0) were virally suppressed. These figures provide the estimated VL suppression for the population. Essentially, 37.7% of people living with HIV are not virally suppressed and are thus relatively likely to transmit HIV if they have unprotected sexual intercourse. Figure 3.5 shows the rates of VL suppression across sex and age groups. VL suppression was highest (76.4%) among men aged 50 years and older and was lowest (41.5%) in men aged 25–34 years. Among women, VL suppression was highest in the 45–49 age group (74.6%) and lowest (47.1%) in the 15–24 age group.

Table 3.32 presents a breakdown of VL suppression by sex, race, age, locality type and province. Viral load suppression was higher among women than men, and higher among black Africans than any other race groups. Viral load suppression was highest among older adults (50 and older). It was higher among people living in rural informal (tribal) areas than among people living in urban areas and on farms. The provincial results showed that VL suppression was highest in the Eastern Cape (68%), KwaZulu-Natal (67.5%) and Free State (66.2%) and lowest in Northern Cape (52.8%) and Western Cape (54.7%).

*Figure 3.5: Viral load suppression by age and sex, South Africa, 2017*

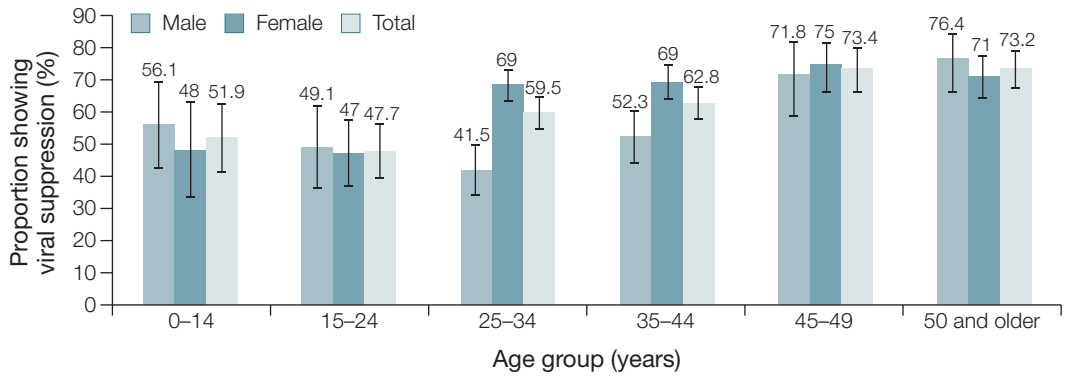


*Table 3.32: Viral load suppression by age, sex, race, locality type and province, South Africa, 2017*

| | *n*[a] | % of subgroup showing VL suppression | 95% CI |
|---|---|---|---|
| **Total** | **2 946** | **62.3** | **59.5–65.0** |
| **Sex** | | | |
| Males | 876 | 55.0 | 50.1–59.9 |
| Females | 2 070 | 66.5 | 63.5–69.3 |
| **Race** | | | |
| Black African | 2 695 | 62.6 | 59.8–65.3 |
| Other | 251 | 54.8 | 42.3–66.7 |
| **Age categories (years)** | | | |
| 0–14 | 157 | 51.9 | 41.1–62.5 |
| 15–24 | 333 | 47.7 | 39.5–56.1 |
| 25–49 | 1 940 | 62.8 | 59.3–66.1 |
| 50 and older | 516 | 73.2 | 67.2–78.5 |
| 15–49 | 2 273 | 61.0 | 58.0–63.9 |
| **Locality type** | | | |
| Urban | 1 558 | 59.7 | 56.1–63.3 |
| Rural informal (tribal areas) | 962 | 67.3 | 62.7–71.5 |
| Rural (farms) | 426 | 62.0 | 54.5–68.9 |
| **Province** | | | |
| Western Cape | 229 | 54.7 | 43.2–65.6 |
| Eastern Cape | 347 | 68.0 | 60.4–74.8 |
| Northern Cape | 188 | 52.8 | 40.0–65.3 |
| Free State | 288 | 66.2 | 57.5–74.0 |
| KwaZulu-Natal | 673 | 67.5 | 62.2–72.4 |
| North West | 301 | 57.9 | 51.3–64.3 |
| Gauteng | 325 | 56.9 | 50.1–63.3 |
| Mpumalanga | 368 | 61.3 | 53.1–69.0 |
| Limpopo | 227 | 61.9 | 54.9–68.4 |

a Column *n* totals contain missing demographic information.

### 3.6.1 Viral load suppression among people living with HIV receiving ART

This section presents the results for VL suppression of people receiving ART. This measure reflects the efficacy of ART and indicates compliance with treatment. It also indicates a person's risk of transmitting HIV (UNAIDS 2015). To gain a sense of the impact of ART on VL suppression, the levels of VL suppression among all people living with HIV and among those receiving ART are discussed in this section.

VL suppression and exposure to ARVs were tested in all HIV-positive samples collected as part of the survey. Overall, VL suppression was 87.3% among people living with HIV who were on ART, across all age groups. This is higher than the 62.3% reported for the general population. In most age, sex, locality-type and provincial subgroups, the level of VL suppression among people living with HIV was above 85%. The lowest VL suppression levels in ART users were among males (82.4%), children aged 14 years and younger (81.9%), people living on farms (82.6%) and people residing in Mpumalanga (82.9%).

### 3.6.2 90–90–90 indicators

The 90–90–90 indicators are defined as follows:

1. First 90 – the proportion of people living with HIV who know their HIV-positive status. In this study, people were classified as knowing their HIV-positive status if they tested HIV positive and reported that they knew their HIV status; or their blood sample (for this study) was confirmed as positive for ARV by a laboratory.
2. Second 90 – the proportion of people who were receiving ART, as a subgroup of those who knew their HIV-positive status. Receiving ART was defined as having ARVs detected in the blood specimen.
3. Third 90 – among people who were aware of their HIV status and were receiving ART, the percentage who were virally suppressed.

Almost 85% (first 90) of people living with HIV aged 15–64 years knew their HIV status at the time of the survey (see Table 3.33). Among those aware of their HIV status, 70.6% (second 90) were on ART; among this second group on ART, 87.5% (third 90) showed suppressed VLs. Females were more likely to be aware of their HIV status than males (88.9% vs 78%). They were also more likely to be on ART (72.2% vs 67.4%) and a larger proportion of females were virally suppressed (89.9% vs 82.1%).

Interestingly, there were relatively more males than females on ART in the following age groups: 15–24 (58.8% males, 49.1% females) and 50–64 (87.5% males, 80.2% females). People living on farms had poorer results for the 90–90–90 indicators than people in urban areas or traditional rural areas. The only provinces that reported a percentage lower than 80% for the first 90 (people with HIV who knew their status) were Northern Cape (73.8%), Limpopo (75.9%) and North West (77.6%). ART coverage (second 90) was highest in KwaZulu-Natal (79.3%), followed by the Eastern Cape (76.7%), and was lowest in Gauteng (60.9%) and North West (64.8%). VL suppression, the third 90, was above 85% in all provinces except Mpumalanga (83%).

The 90–90–90 cascade is presented in Figure 3.6, showing the data for males and females separately. The orange blocks indicate the gaps that still need to be closed before the 90–90–90 targets are attained.

*Figure 3.6: 90–90–90 indicators for people living with HIV aged 15–64 years, South Africa, 2017*

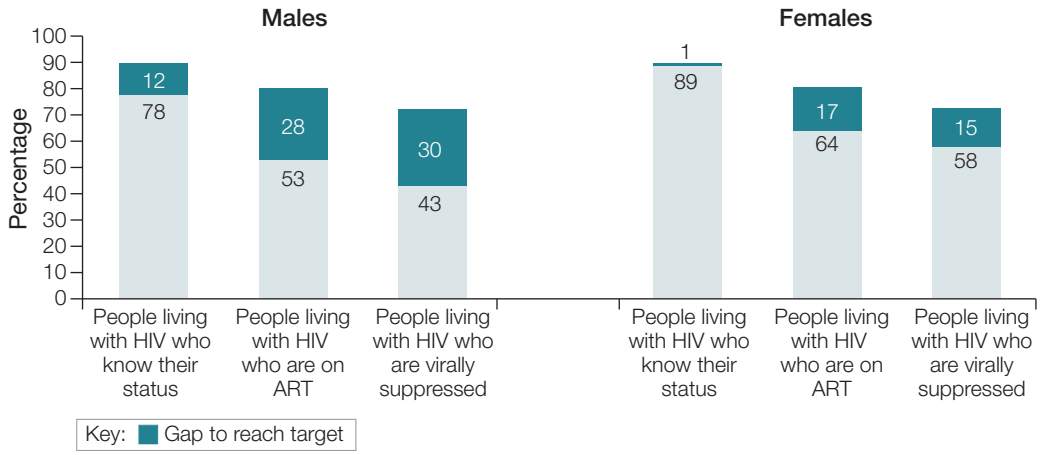


*Table 3.33: 90–90–90 indicators for people aged 15–64 yeras living with HIV, South Africa, 2017*

| | Diagnosed (First 90) | | | On ART (Second 90) | | | Virally suppressed (Third 90) | | |
|---|---|---|---|---|---|---|---|---|---|
| | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n*[a] |
| **Total** | **84.9** | **81.7–87.7** | **2 756** | **70.6** | **67.4–73.6** | **2 197** | **87.5** | **84.9–89.7** | **1 548** |
| **Sex** | | | | | | | | | |
| Male | 78.0 | 72.1–82.9 | 785 | 67.4 | 61.9–72.4 | 546 | 82.1 | 76.5–86.6 | 369 |
| Female | 88.9 | 85.9-–91.4 | 1 971 | 72.2 | 68.8–75.3 | 1 651 | 89.9 | 87.1–92.2 | 1 179 |
| **Age groups** | | | | | | | | | |
| 15–24 | 74.0 | 63.7–82.2 | 336 | 51.7 | 43.2–60.0 | 240 | 85.2 | 77.3–90.6 | 131 |
| 25–49 | 85.8 | 82.2–88.8 | 1 959 | 70.5 | 66.9–73.9 | 1 576 | 87.2 | 84.3–89.7 | 1 111 |
| 50–64 | 88.1 | 81.7-92.5 | 461 | 82.9 | 77.1–87.4 | 381 | 89.5 | 83.3–93.6 | 306 |
| **Sex and age subgroups** | | | | | | | | | |
| Male 15–24 | 68.3 | 55.4–78.9 | 87 | 58.8 | 41.1-74.6 | 50 | 80.6 | 63.2–91.0 | 32 |
| Female 15–24 | 76.4 | 62.2–86.5 | 249 | 49.1 | 40.5–57.7 | 190 | 87.1 | 77.7–92.9 | 99 |
| Male 25–49 | 77.6 | 70.6–83.3 | 558 | 64.2 | 57.7–70.1 | 393 | 81.6 | 74.5–87.0 | 249 |
| Female 25–49 | 90.6 | 87.0-93.4 | 1 401 | 73.7 | 69.9–77.2 | 1 183 | 89.7 | 86.5–92.1 | 862 |
| Male 50–64 | 85.6 | 74.7-–92.2 | 140 | 87.5 | 77.2–93.5 | 103 | 84.6 | 73.5–91.6 | 88 |
| Female 50–64 | 89.8 | 83.4–93.9 | 321 | 80.2 | 72.8–86.0 | 278 | 92.7 | 87.0–96.0 | 218 |
| **Race groups** | | | | | | | | | |
| Black African | 85.4 | 82.2–88.2 | 2 515 | 70.7 | 67.4–73.8 | 2 040 | 87.3 | 84.6–89.6 | 1 456 |
| Other race groups | 73.0 | 53.8–86.2 | 241 | 67.6 | 53.4–79.2 | 157 | 92.5 | 84.3–96.6 | 92 |
| **Locality** | | | | | | | | | |
| Urban area | 87.8 | 84.6–90.4 | 1 475 | 66.3 | 62.5–70.0 | 1 259 | 87.2 | 83.8–90.0 | 856 |
| Rural informal (tribal areas) | 85.8 | 80.2–90.0 | 871 | 79.7 | 74.7–83.9 | 761 | 88.6 | 83.8–92.1 | 582 |
| Rural formal (farms) | 56.1 | 37.5-73.1 | 410 | 68.0 | 55.2–78.6 | 177 | 81.3 | 71.3–88.4 | 110 |
| **Province** | | | | | | | | | |
| Western Cape | 80.9 | 71.9–87.5 | 222 | 67.1 | 57.9–75.1 | 162 | 89.0 | 77.7–94.9 | 99 |
| Eastern Cape | 89.5 | 83.4–93.5 | 319 | 76.7 | 64.9–85.4 | 277 | 90.5 | 81.7–95.3 | 203 |
| Northern Cape | 73.8 | 60.4–83.8 | 179 | 72.2 | 58.4–82.7 | 127 | 87.1 | 74.4–94.0 | 87 |
| Free State | 91.8 | 86.5–95.1 | 264 | 68.2 | 57.5–77.3 | 188 | 89.8 | 81.0–94.8 | 128 |
| KwaZulu-Natal | 86.2 | 79.1–91.1 | 626 | 79.3 | 74.3–83.6 | 511 | 85.7 | 79.8–90.1 | 403 |
| North West | 77.6 | 58.7–89.4 | 284 | 64.8 | 57.8–71.2 | 229 | 90.8 | 85.2–94.5 | 146 |
| Gauteng | 86.9 | 80.8–91.2 | 319 | 60.9 | 53.5–67.8 | 270 | 87.6 | 80.8–92.3 | 169 |
| Mpumalanga | 84.3 | 71.2–92.1 | 330 | 73.1 | 65.6–79.5 | 274 | 83.0 | 75.3–88.7 | 203 |
| Limpopo | 75.9 | 54.5–89.2 | 213 | 67.8 | 57.3–76.8 | 159 | 87.6 | 80.7–92.2 | 110 |

a Column totals include missing demographic information

## 3.7 HIV drug resistance in South Africa, 2017

The current public-sector ART programme in South Africa, in which an estimated 4 402 000 people with HIV are receiving treatment, is the world's largest HIV treatment programme. With the expanding roll-out of ART, it is crucial to understand the levels of HIV drug resistance (HIVDR) among people on treatment.

In this section, we report on HIVDR among people living with HIV who were virally unsuppressed (VL ≥1 000 copies/mL) and whose specimens were successfully genotyped. HIVDR testing was included for the first time in this survey of the series, and the results are unique in presenting HIVDR data from a population-based household survey.

Of the 1 107 HIV-positive specimens that were virally unsuppressed, 697 were successfully amplified. Table 3.34 shows the profile of HIVDR by drug class among these survey respondents. Drug resistant mutations (DRMs) – defined here as any DRM – were identified in 27.4% (95% CI 22.8–32.6) of people, as follows: 18.9% had resistance to non-nucleoside reverse transcriptase inhibitors (NNRTIs) only, 7.8% had dual resistance to NNRTIs and nucleoside reverse transcriptase inhibitors (NRTIs), and 0.5% had resistance to second-line regimens that included protease inhibitors (PIs) (NNRTI, NRTI and PI). The number of specimens with DRMs among those that were classified as recently infected with HIV was too low for reliable estimates of the prevalence of transmitted drug resistance (TDR).

Table 3.35 (page 74) shows HIVDR by ART status, sex, age and locality type. Among people on ART, 55.7% displayed DRM, compared to 22.8% of people not taking ART ($p$<0.001). By drug class, 14.3% of people on ART and 20% of people not on ART had resistance to NNRTIs only. Dual NNRTI and NRTI resistance was estimated at 40% among people on ART and at 2.1% among people who were not on treatment. Among those who tested negative for ARVs but had self-reported taking ARVs daily (ARV defaulters), 75.6% had DRM; in this subgroup, 56.4% had resistance to NNRTIs only and 14.3% had dual NNRTI and NRTI resistance.

*Table 3.34: HIV drug resistance by drug class, South Africa, 2017 (n=697)*

| Drug class | % of specimens showing resistance | 95% CI |
|---|---|---|
| **Total** | **27.4** | **22.8–32.6** |
| NNRTI | 18.9 | 14.8–23.8 |
| NRTI | 0.2 | 0.1–0.6 |
| NNRTI + NRTI | 7.8 | 5.6–10.9 |
| PI + NNRTI + NRTI | 0.5 | 0.1–2.1 |

*Note:* NNRTI: non-nucleoside reverse transcriptase inhibitor; NRTI: nucleoside reverse transcriptase inhibitor; PI: protease inhibitor

*Table 3.35: HIV drug resistance by ART exposure, age, sex and locality type, South Africa, 2017*

| Variable | *n* | Any DRM % | 95% CI | NNRTI % | 95% CI | NNRTI & NRTI % | 95% CI |
|---|---|---|---|---|---|---|---|
| **ARV status** | | | | | | | |
| ARV +ve | 102 | 55.7 | 42.6–67.9 | 14.3 | 7.5–25.6 | 40.4 | 29.6–52.2 |
| ARV –ve | 517 | 22.8 | 17.7–28.7 | 20.0 | 15.4–25.7 | 2.1 | 0.6–6.8 |
| ARV –ve, but on ART by self-report | 41 | 75.9 | 59.2–87.3 | 56.4 | 34.4–76.2 | 14.3 | 2.5–52.1 |
| **Sex** | | | | | | | |
| Male | 252 | 29.4 | 22.5–37.4 | 19.6 | 13.5–27.7 | 9.7 | 5.8–15.7 |
| Female | 445 | 25.8 | 19.8–32.8 | 18.3 | 13.2–24.8 | 6.3 | 4.2–9.5 |
| **Age (years)** | | | | | | | |
| 0–14 | 26 | 33.7 | 17.6–54.7 | 17.7 | 7.2–37.4 | 14.9 | 5.3–35.2 |
| 15–24 | 98 | 30.5 | 18.7–45.5 | 22.1 | 12.6–35.9 | 5.7 | 1.7–16.8 |
| 25 and older | 573 | 26.6 | 21.7–32.2 | 18.4 | 14.0–23.8 | 7.9 | 5.4–11.4 |
| 15–49 | 568 | 27.5 | 22.5–33.2 | 19.2 | 14.8–24.4 | 7.8 | 5.3–11.3 |
| 50 and older | 103 | 24.1 | 14.8–36.7 | 17.0 | 8.9–30.0 | 5.7 | 2.5–12.8 |
| **Locality type** | | | | | | | |
| Urban | 388 | 29.5 | 23.5–36.4 | 21.0 | 15.6–27.6 | 7.6 | 4.8–11.9 |
| Rural informal (tribal areas) | 188 | 20.9 | 14.8–28.7 | 12.0 | 7.5–18.7 | 8.7 | 5.1–14.5 |
| Rural formal (farms) | 121 | 30.8 | 20.6–43.2 | 23.3 | 13.0–38.2 | 7.0 | 3.2–14.6 |

*Notes:* DRM, drug resistant mutations; NNRTI, non-nucleoside reverse transcriptase inhibitors; NRTI, non-nucleoside reverse transcriptase inhibitors; PIs, protease inhibitors; ARV –ve, but on ART by self-report: respondents who reported taking ARVs daily but tested negative for ARVs (they are a subgroup of those who tested ARV -ve).

Overall, among both males and females, more than a quarter of people had DRMs: 29.9% among males and 25.8% among females. The level of dual resistance was 9.7% among males and 6.3% among females. Younger people had higher levels of HIVDR than older people but the proportions were not statistically different. A third (33.7%) of people aged 14 years and younger and 30.5% of youth aged 15–24 years had DRMs, compared to 26.6% among people aged 25 years and older, and 24.1% among people aged 50 years and older. Resistance to NNRTIs alone ranged from 17% among people aged 50 years and older to 22.1% among youth aged 15–24 years. By age category, dual resistance levels were higher among people aged 0–14 years and lowest among the youth, at 5.7%. The sample of children aged 0–14 years was small and the relevant estimates should be interpreted with caution.

The levels of HIVDR were estimated at 30.8% and 29.5% among people living on farms and in urban areas, respectively, and at 20.9% among people living in rural traditional (tribal) areas (Table 3.35). Levels of resistance to NNRTIs among people living in urban areas and on farms were more than 1.5-fold the levels among people living in tribal areas. Dual resistance was below 10% in all locality types.

## 3.8 Male circumcision

It is now widely accepted that voluntary medical male circumcision (VMMC) can significantly reduce the risk of HIV transmission (UNAIDS 2017a). Thus VMMC is one of the evidence-based interventions that has been implemented aggressively in South Africa as part of a combination HIV-prevention package for males since 2010. This section reports on the proportion of males who reported that they had been circumcised and the various types of circumcision that had been performed. It also indicates the demand for circumcision among those who are not yet circumcised.

### 3.8.1 Circumcision history

Table 3.36 shows the results for adult males aged years 15 and older who reported that they had been circumcised, according the various demographic characteristics. Overall, 61.6% of males in the survey reported having been circumcised. Males aged 15–24 years reported the highest rate of circumcision, followed by men aged 25–49 years and then men aged 50 years and older. Regarding the comparison of race groups, more than two-thirds (68.9%) of black Africans reported that they had been circumcised, compared with just under a third among the three minority groups (whites, coloured and Indians/Asians).

*Table 3.36: Males aged 15 years and older who reported having been circumcised, demographic characteristics, South Africa, 2017*

| Variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **7 525** | **61.6** | **59.3–63.9** |
| **Age group (years)** | | | |
| 15-24 | 1 422 | 70.2 | 66.8–73.4 |
| 25-49 | 3 940 | 61.8 | 59.1–64.4 |
| 50 and older | 2 163 | 54.0 | 50.6–57.3 |
| **Race** | | | |
| Black African | 5 037 | 68.9 | 66.4–71.2 |
| White | 592 | 32.5 | 27.4–37.9 |
| Coloured | 1 182 | 31.9 | 27.5–36.8 |
| Indian/Asian | 714 | 26.3 | 19.5–34.5 |
| **Locality type** | | | |
| Urban | 4 864 | 61.9 | 59.0–64.7 |
| Rural informal (tribal areas) | 1 513 | 65.0 | 60.4–69.4 |
| Rural formal (farms) | 1 148 | 45.4 | 38.2–52.8 |
| **Province** | | | |
| Western Cape | 839 | 53.0 | 45.0–60.9 |
| Eastern Cape | 798 | 79.9 | 74.8–84.2 |
| Northern Cape | 761 | 39.4 | 32.1–47.3 |
| Free State | 589 | 57.8 | 51.0–64.4 |
| KwaZulu-Natal | 1 537 | 38.0 | 33.8–42.3 |
| North West | 627 | 51.2 | 46.6–55.9 |
| Gauteng | 1 048 | 69.3 | 64.5–73.7 |
| Mpumalanga | 757 | 65.2 | 57.8–72.0 |
| Limpopo | 569 | 80.1 | 74.9–84.4 |

With regard to locality type, males in both rural informal (tribal) areas (65%) and urban areas (61.9%) reported substantially higher rates of circumcision than their counterparts in rural formal (farm) areas (45.5%). In terms of provinces, males from Limpopo (80.1%) and Eastern Cape (79.9%) had the highest rates of circumcision, whereas Northern Cape (39.4%) and KwaZulu-Natal (38%) reported the lowest rates.

### 3.8.2 Circumcision settings

Table 3.37 shows the settings in which circumcisions had been performed. Roughly half (51.2%) occurred in a medical setting, with fewer (44.8%) occurring in traditional settings. Young males aged 15–2 years 4 (62.6%) and men aged 25–49 years (51.5%) reported that

*Table 3.37: Self-reported circumcision settings and demographic breakdown among men aged 15 years and older, South Africa, 2017*

| | | At home | | Medical | | Traditional | | Other | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | *n* | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **3 940** | **1.3** | **0.9–2.0** | **51.2** | **48.0-54.4** | **44.8** | **41.5–48.1** | **2.7** | **2.1–3.5** |
| **Age group (years)** | | | | | | | | | |
| 15–24 | 851 | 0.4 | 0.1–2.1 | 62.6 | 57.3–67.7 | 33.2 | 28.2–38.6 | 3.7 | 2.3–5.9 |
| 25–49 | 2 075 | 1.3 | 0.7–2.3 | 51.5 | 47.6–55.4 | 44.8 | 40.9–48.8 | 2.4 | 1.7–3.5 |
| 50 and older | 1 014 | 2.5 | 1.4-4.2 | 37.8 | 33.3–42.6 | 57.1 | 52.3–61.8 | 2.6 | 1.6–4.1 |
| **Race** | | | | | | | | | |
| Black African | 3 162 | 1.3 | 0.8–2.1 | 47.0 | 43.6–50.5 | 49.4 | 45.8–52.9 | 2.3 | 1.6–3.2 |
| White | 212 | 0.5 | 0.1–3.1 | 94.0 | 89.1–96.7 | 0.7 | 0.2–2.6 | 4.9 | 2.4–9.9 |
| Coloured | 339 | 1.1 | 0.4–2.8 | 85.9 | 80.5–90.0 | 3.9 | 1.9–7.8 | 9.2 | 5.8–14.1 |
| Indian/Asian | 227 | 6.0 | 3.4–10.2 | 88.1 | 81.9–92.4 | 0.0 | – | 5.9 | 3.1–10.9 |
| **Locality type** | | | | | | | | | |
| Urban area | 2 481 | 1.4 | 0.9–2.4 | 55.6 | 51.4–59.8 | 40.4 | 36.1–44.8 | 2.6 | 1.8–3.6 |
| Rural informal (tribal areas) | 961 | 0.6 | 0.3–1.4 | 40.5 | 34.9–46.4 | 55.6 | 49.7–61.2 | 3.3 | 2.1–5.3 |
| Rural formal (farms) | 498 | 3.4 | 1.4–8.3 | 39.7 | 32.2–47.8 | 55.2 | 46.9–63.3 | 1.6 | 0.6–4.4 |
| **Province** | | | | | | | | | |
| Western Cape | 396 | 1.5 | 0.5–4.3 | 34.9 | 25.5–45.7 | 58.8 | 47.5–69.2 | 4.8 | 2.8–8.0 |
| Eastern Cape | 571 | 1.2 | 0.4–3.6 | 17.8 | 13.4–23.3 | 78.3 | 72.4–83.3 | 2.6 | 1.4–4.9 |
| Northern Cape | 285 | 2.5 | 1.1–5.5 | 60.0 | 45.1–73.2 | 37.3 | 24.0–52.9 | 0.2 | 0.0–1.6 |
| Free State | 286 | 4.2 | 1.7–10.1 | 64.3 | 58.6–69.6 | 30.6 | 25.5–36.2 | 0.9 | 0.3–3.1 |
| KwaZulu-Natal | 500 | 1.5 | 0.7–3.0 | 80.5 | 74.8–85.1 | 16.6 | 11.9–22.6 | 1.5 | 0.7–3.3 |
| North West | 309 | 0.8 | 0.2–3.5 | 55.6 | 47.7–63.2 | 41.6 | 34.7–48.9 | 2.0 | 0.9–4.6 |
| Gauteng | 687 | 1.1 | 0.4–3.2 | 64.3 | 57.7–70.4 | 32.2 | 25.7–39.3 | 2.5 | 1.3–4.7 |
| Mpumalanga | 488 | 1.6 | 0.6–4.1 | 57.3 | 47.7–66.4 | 38.8 | 30.0–48.5 | 2.2 | 1.1–4.4 |
| Limpopo | 418 | 0.5 | 0.1–2.1 | 34.0 | 26.7–42.1 | 61.2 | 53.3–68.6 | 4.2 | 2.3–7.7 |

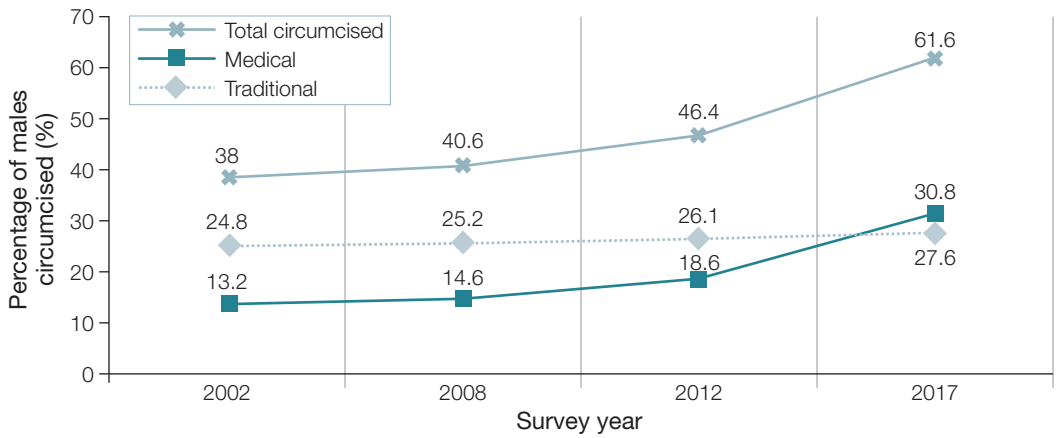
they had been circumcised in a medical setting, whereas most of the men aged 50 years and older (57.1%) reported that they had undergone circumcision in a traditional setting. Regarding race, most whites (94%), Indians/Asians (88.1%) and coloureds (85.9%) had been circumcised in medical settings, whereas just under half of the black Africans (47%) reported that they had been circumcised medically.

In terms of locality type, most men living in urban areas (55.6%) had undergone circumcision in medical settings, compared to 40.5% who lived in rural informal (tribal) areas and 39.7% who lived in rural formal (farm) areas. Regarding the provincial breakdown, most males in six of the nine provinces reported that they had undergone circumcision in medical settings, with KwaZulu-Natal having the highest rate at 80.5%. As previously observed, most males in the Eastern Cape and Limpopo reported that they had been circumcised in traditional settings. In the Western Cape, circumcision in traditional settings had increased considerably, to almost 60%.

Figure 3.7 shows trends in male circumcisions during the period 2002, 2008, 2012 and 2017.[1] Overall, there has been a significant increase in male circumcision since 2002 ($p$<0.001). The graph shows that the rate of traditional circumcision was consistently higher than that of medical circumcision during the three previous surveys, however the rate has remained stable in 2017. The rates of medical circumcision have been steadily increasing such that in 2017, the number of medical circumcisions surpassed that of traditional circumcision for the first time.

The pattern of change for circumcision in medical settings mirrors that of the overall rate of male circumcision. The cumulative total of men aged 15 years or older who were circumcised in medical settings increased from 1 582 000 in 2002 to 2 269 000 in 2008 and to 3 301 000 in 2012 and to 4 330 000 in 2017. Circumcision in traditional settings has remained rather stable during the period 2002–2017.

*Figure 3.7: Trends in male circumcision by type among males aged 15 years and older, South Africa, 2002, 2008, 2012 and 2017*




1 In 2005, population-based data on male circumcision were not collected.

### 3.8.3 Male circumcision among children

Table 3.38 shows the percentage of male circumcision among children aged 11 years and younger, as reported by their parents or guardians. Circumcision among boys aged 12–14 years was self-reported. Overall, 13.6% of boys aged below 15 years were circumcised, but the percentage varied across the age groups. Over a third (37.4%) of boys aged 12–14 years had been circumcised, compared with 11.4% of boys aged 5–11 years and 3.9% of boys younger than 5 years.

Table 3.39 shows the settings in which circumcision had occurred among children aged 0–14 years. The vast majority (88.7%) of circumcisions were conducted in medical settings, in all three age groups (range: 81.8% to 95.5%). The data shown in Table 3.39 were reported by the parents or guardians of boys aged 11 years and younger and were self-reported by boys aged 12–14 years.

*Table 3.38: Percentage of circumcision among boys aged 14 years and younger, South Africa, 2017*

| Age group (years) | *n* | % circumcised | 95% CI |
|---|---|---|---|
| **Total** | **5 407** | **13.6** | **12.1–15.2** |
| 0–4 | 1 706 | 3.9 | 2.8–5.3 |
| 5–11 | 2 665 | 11.4 | 9.7–13.3 |
| 12–14 | 1 036 | 37.4 | 32.9–42.2 |

*Table 3.39: Settings of circumcision among boys aged 14 years and younger, South Africa, 2017*

| Age group (years) | *n* | Home | | Hospital/clinic | | Traditional | | Other | |
|---|---|---|---|---|---|---|---|---|---|
| | | % circumcised | 95% CI | % circumcised | 95% CI | % circumcised | 95% CI | % circumcised | 95% CI |
| **Total** | **699** | **0.7** | **0.2–2.6** | **88.7** | **84.8–91.8** | **4.4** | **2.5–7.5** | **6.1** | **4.0–9.4** |
| 0–4 | 87 | 2.2 | 0.5–8.9 | 95.5 | 85.6–98.7 | 2.3 | 0.3–14.7 | 0.0 | – |
| 5–11 | 307 | 1.2 | 0.3–4.7 | 95.0 | 90.5–97.5 | 2.6 | 1.1–6.0 | 1.2 | 0.2–6.2 |
| 12–14 | 305 | 0.0 | – | 81.8 | 75.6-86.7 | 6.4 | 3.5-11.6 | 11.8 | 7.8–17.3 |

### 3.8.4 Demand for male circumcision among those not circumcised

Table 3.40 shows the percentage of uncircumcised males aged 15 years and older who indicated that they would like to be circumcised, broken down by demographic characteristics. The overall figure in this regard was 38.9% of all uncircumcised males. Almost half of black Africans (46.1%) and well over a third of coloureds (40.3%) indicated that they would like to be circumcised, whereas the percentage among Indian/Asians and whites was considerably lower (26.3% and 10.6% respectively). Two-thirds of males aged 15–24 years (67.8%) and 42.5% of men aged 25–49 years indicated that they would like to be circumcised, compared to 14.2% of men aged 50 years and older.

Regarding locality type, more males who lived in rural informal (tribal) areas indicated that they would like to be circumcised than men living elsewhere, although urban males had a similar percentage. Provincially, the proportions of men who were not circumcised but indicated their intention to be circumcised were highest in Free State, Mpumalanga and KwaZulu-Natal.

*Table 3.40: Uncircumcised males aged 15 years and older who indicated that they would like to be circumcised, demographic characteristics, South Africa, 2017*

| Demographic variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **3 458** | **38.9** | **36.3–41.5** |
| **Race** | | | |
| Black African | 1 779 | 46.1 | 42.9–49.3 |
| White | 374 | 10.6 | 7.2–15.2 |
| Coloured | 823 | 40.3 | 36.2–44.6 |
| Indian/Asian | 482 | 26.3 | 19.7–34.1 |
| **Age group (years)** | | | |
| 15–24 | 544 | 67.8 | 62.4–72.9 |
| 25–49 | 1 794 | 42.5 | 39.1–46.1 |
| 50 and older | 1 120 | 14.2 | 11.3–17.8 |
| **Locality type** | | | |
| Urban | 2 304 | 38.5 | 35.3–41.7 |
| Rural informal (tribal areas) | 522 | 42.1 | 36.3–48.1 |
| Rural formal (farms) | 632 | 34.4 | 28.5–40.8 |
| **Province** | | | |
| Western Cape | 436 | 33.6 | 28.1–39.5 |
| Eastern Cape | 211 | 37.6 | 29.4–46.5 |
| Northern Cape | 464 | 36.6 | 29.5–44.2 |
| Free State | 292 | 49.0 | 40.2–57.9 |
| KwaZulu-Natal | 1 008 | 44.2 | 39.0–49.5 |
| North West | 313 | 38.0 | 31.1–45.5 |
| Gauteng | 349 | 35.0 | 28.5–42.1 |
| Mpumalanga | 250 | 44.7 | 37.0–52.6 |
| Limpopo | 135 | 27.3 | 18.0–39.1 |

## 3.9 Behavioural determinants of HIV

Several behaviours are considered key drivers for the HIV epidemic in South Africa. The risk behaviours presented in this section include sexual debut, age-disparate relationships among younger and older people, multiple sexual partnerships, and condom use among sexually active people of various ages.

### 3.9.1 Sexual debut

Early sexual debut, defined in this study as having sex before reaching the age of 15 years, is an important risk factor in the transmission of HIV in young women (Stöckl 2012). Table 3.41 shows the proportion of youth aged 15–24 years who had had sex for the first time before age 15, with the results broken down by sex, race, locality type and province. Overall, 13.6% of youth reported having had sex before the age of 15 years. A fifth (19.5%) of males between the ages of 15 and 24 reported having had an early sexual debut, compared to 7.6% of females who reported the same. In terms of race, early sexual debut was about equal among black Africans (13.7%), whites (13.7%) and coloureds (13.4%). Youth in urban areas reported higher rates of early sexual debut (15.1%) than those residing in rural informal (tribal) (10.8%) and rural formal (farm) (9.1%) areas. Youth in Gauteng and Eastern Cape reported the highest percentages of early sexual debut (16.5% and 15.6% respectively) whereas KwaZulu-Natal youth reported the lowest proportion (8.3%).

Figure 3.8 shows the trends in early sexual debut among males and females aged 15–24 years, who reported having engaged in their first sexual experience before the age of 15 years. The overall trend was stable between 2002 and 2008, at less than 9%, followed by a steady increase from 10.7% in 2008 to 13.6% in 2017. The rate of early sexual debut among females was lower in the previous four surveys than in 2017, at 5.9% or less, increasing to 7.6% in 2017. The rate among males has consistently been higher than among females, but declined from 13.1% in 2002 to 11.3% in 2008. However, it rose sharply again in 2012, to 16.7%, and to 19.5% in 2017.

*Figure 3.8: Early sexual debut reported by youth aged 15–24 years by sex, South Africa, 2002, 2005, 2008, 2012 and 2017*

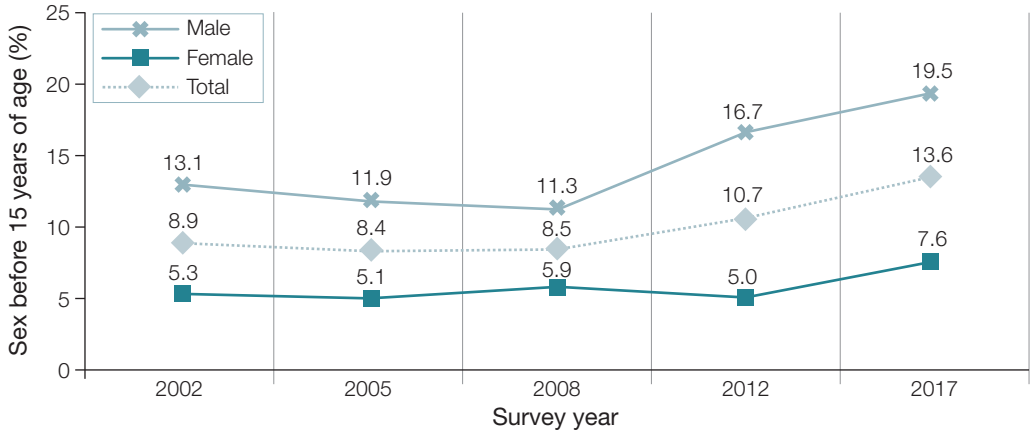


*Table 3.41: Early sexual debut reported by youth aged 15–24 years, demographic characteristics, South Africa, 2017*

| Demographic variable | *n* | Percentage reporting early debut (before the age of 15) | 95% CI | Percentage reporting later debut (after the age of 15) | 95% CI |
|---|---|---|---|---|---|
| **Total** | **3 192** | **13.6** | **12.1–15.3** | **86.4** | **84.7–87.9** |
| **Sex** | | | | | |
| Male | 1 475 | 19.5 | 17.0–22.3 | 80.5 | 77.7–83.0 |
| Female | 1 717 | 7.6 | 6.1–9.4 | 92.4 | 90.6–93.9 |
| **Race** | | | | | |
| Black African | 2 456 | 13.7 | 12.0–15.5 | 86.3 | 84.5–88.0 |
| White | 92 | 13.7 | 5.9–28.9 | 86.3 | 71.1–94.1 |
| Coloured | 526 | 13.4 | 9.9–18.0 | 86.6 | 82.0–90.1 |
| Indian/Asian | 118 | 11.0 | 4.7–23.4 | 89.0 | 76.6–95.3 |
| **Locality type** | | | | | |
| Urban | 1 943 | 15.1 | 13.1–17.4 | 84.9 | 82.6–86.9 |
| Rural informal (tribal area) | 881 | 10.8 | 8.6–13.6 | 89.2 | 86.4–91.4 |
| Rural formal (farms) | 368 | 9.1 | 4.6–17.2 | 90.9 | 82.8–95.4 |
| **Province** | | | | | |
| Western Cape | 321 | 14.4 | 10.2–20.1 | 85.6 | 79.9–89.8 |
| Eastern Cape | 312 | 15.6 | 11.5–20.8 | 84.4 | 79.2–88.5 |
| Northern Cape | 316 | 11.4 | 7.6–16.9 | 88.6 | 83.1–92.4 |
| Free State | 237 | 13.8 | 9.8–19.1 | 86.2 | 80.9–90.2 |
| KwaZulu-Natal | 591 | 8.3 | 5.7–12.1 | 91.7 | 87.9–94.3 |
| North West | 333 | 13.0 | 9.2–18.0 | 87.0 | 82.0–90.8 |
| Gauteng | 445 | 16.5 | 12.8–21.1 | 83.5 | 78.9–87.2 |
| Mpumalanga | 349 | 13.7 | 10.0–18.3 | 86.3 | 81.7–90.0 |
| Limpopo | 288 | 13.6 | 9.6–18.8 | 86.4 | 81.2–90.4 |

Table 3.42 indicates the provincial rates of early sexual debut across all five surveys. Gauteng had the highest proportion of early debut for 2017, at 16.5%, an increase of 7 percentage points over the 2012 rate and an overall increase of 10.2 percentage points since 2002. Eastern Cape reported the second highest proportion for 2017, at 15.6%, marking a slight decrease since 2012. Western Cape reported the third highest proportion at 14.4%, a marginal increase (0.2 percentage points) from 2012. In Free State, there has been a steady increase from 0.9% in 2002 to 13.8% in 2017, representing an overall increase of 13 percentage points since 2002. This is higher than the national average increase of 8.6 percentage points from 2002 to 2017. In Mpumalanga, early sexual debut almost doubled from 7.7% in 2012 to 13.7% in 2017.

*Table 3.42: Sexual debut before the age of 15 years among youth aged 15–24 years, by province, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **1 327** | **5.0** | **3.8–6.5** | **2 910** | **8.4** | **7.2–9.9** | **2 348** | **8.5** | **7.1–10.1** | **3 911** | **10.7** | **9.1–12.6** | **3 192** | **13.6** | **12.1–15.3** |
| Western Cape | 201 | 6.0 | 3.3–10.8 | 341 | 10.4 | 7.3–14.6 | 324 | 9.3 | 6.1–13.9 | 475 | 14.2 | 8.5–22.8 | 321 | 14.4 | 10.2–20.1 |
| Eastern Cape | 225 | 7.7 | 4.0–14.4 | 495 | 6.7 | 4.5–9.9 | 333 | 7.8 | 5.2–11.5 | 558 | 16.8 | 11.6–23.6 | 312 | 15.6 | 11.5–20.8 |
| Northern Cape | 79 | 3.6 | 1.5–8.6 | 156 | 4.6 | 2.4–8.9 | 180 | 7.3 | 4.6–11.4 | 286 | 10.1 | 6.3–15.6 | 316 | 11.4 | 7.6–16.9 |
| Free State | 97 | 0.9 | 0.2–3.5 | 200 | 7.8 | 4.5–13.0 | 166 | 9.6 | 4.9–17.8 | 295 | 10.3 | 7.2–14.5 | 237 | 13.8 | 9.8–19.1 |
| KwaZulu-Natal | 228 | 4.9 | 2.3–10.3 | 535 | 4.5 | 2.7–7.4 | 391 | 4.9 | 2.8–8.3 | 852 | 7.6 | 4.6–12.4 | 591 | 8.3 | 5.7–12.1 |
| North West | 104 | 2.5 | 1.3–4.8 | 227 | 12.7 | 8.4–18.8 | 197 | 8.5 | 4.8–14.7 | 303 | 9.8 | 6.6–14.5 | 333 | 13.0 | 9.2–18.0 |
| Gauteng | 199 | 6.3 | 3.2–12.1 | 411 | 10.2 | 6.8–15.1 | 364 | 7.8 | 4.6–12.9 | 480 | 9.5 | 6.7–13.1 | 445 | 16.5 | 12.8–21.1 |
| Mpumalanga | 71 | 4.9 | 2.4–9.6 | 232 | 10.1 | 6.5–15.4 | 160 | 15.0 | 9.6–22.9 | 319 | 7.7 | 4.1–14.0 | 349 | 13.7 | 10.0–18.3 |
| Limpopo | 123 | 5.5 | 3.1–9.7 | 313 | 10.1 | 6.4–15.6 | 233 | 11.2 | 7.3–16.9 | 343 | 11.8 | 7.8–17.5 | 288 | 13.6 | 9.6–18.8 |

### 3.9.2 Age-disparate relationships

The term 'age-disparate relationships' generally refers to relationships in which the age gap between sexual partners is five years or more (LeClerc-Madlala 2008). In general, irrespective of one's own sex, an age-disparate relationships with an older partner is a risk factor for HIV. As in the previous surveys, in this survey we examined the age differentials between sexual partners among adolescents aged 15–19 years.

Table 3.43 shows the prevalence of age-disparate relationships among adolescents aged 15–19 years. Overall, most participants (82%; 95% CI: 78.2–85.2) had sexual partners within five years of their own age. Almost all males (98.2%; 95% CI: 96.1–99.2) had same-age partners, as did almost two-thirds of females (64%; 95% CI: 57.7–70.3). Overall, 17.9% (95% CI: 14.6–21.7) of adolescents aged 15–19 years had sexual partners who were at least five years older than themselves. More than a third (35.8%) of females (95% CI: 29.7–42.3) reported this, compared to only 1.5% of males (95% CI: 0.6–3.6). Data on age mixing for females with partners who were five years younger is not presented because the sample was too small for reliable estimates.

Figure 3.9 shows the trend in age-disparate relationship for adolescents aged 15–19 years who had sexual partners who were at least five years older than themselves, from 2002 to 2017. This figure shows that overall, following an initial drop from 2002 to 2005, there was an increase from 2005 to 2012, followed by a slight decrease between 2012 and 2017. Furthermore, much larger proportions of female adolescents were involved in age-disparate relationships during all the past five surveys compared to their male counterparts. The pattern that was observed for all participants was also observed among female adolescents from 2002 to 2012; however, there was a slight increase from 2012 to 2017.

*Table 3.43: Age-disparate relationships among adolescent males and females aged 15–19 years, South Africa, 2017*

| | | Partner aged within 5 years | | Partner younger by 5 years | | Partner older by 5 years | |
|---|---|---|---|---|---|---|---|
| Sex | Total | % | 95% CI | % | 95% CI | % | 95% CI |
| Male | 355 | 98.2 | 96.1–99.2 | 0.3 | 0.0–2.0 | 1.5 | 0.6–3.6 |
| Female | 348 | 64.2 | 57.7–70.3 | – | – | 35.8 | 29.7–42.3 |
| **Total** | **703** | **82.0** | **78.2–85.2** | **0.1** | **0.0–1.0** | **17.9** | **14.6–21.7** |

*Figure 3.9 Age-disparate relationships among adolescent males and females aged 15–19 years, South Africa, 2002–2017*

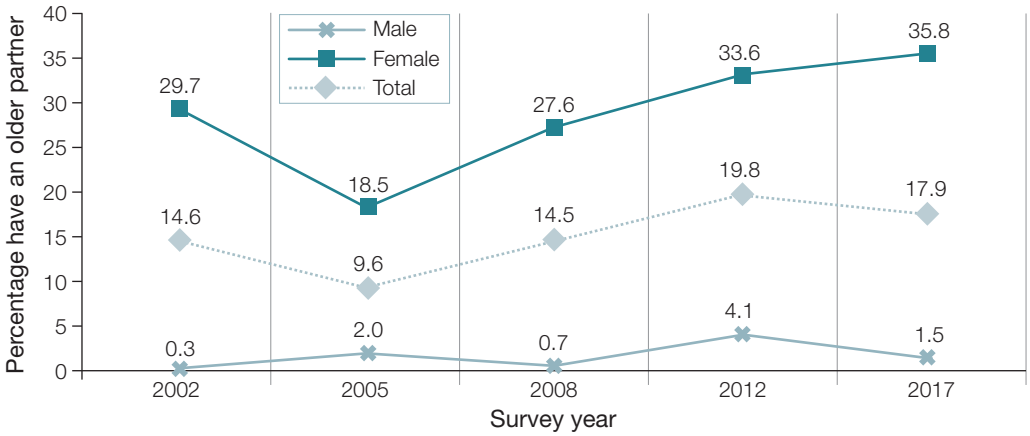


*Table 3.44: HIV prevalence and age discrepancy in sexual relationships in the 15–19 age group, South Africa, 2017*

| Age discrepancy | All respondents | | | Females | | | Males | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **571** | **7.5** | **4.8–11.4** | **294** | **11.7** | **7.9–16.9** | **277** | **3.7** | **1.4–9.5** |
| Within 5 years | 450 | 5.4 | 3.2–9.1 | 179 | 9.3 | 5.5–15.5 | 271 | 3.2 | 1.1–9.4 |
| Older than 5 years | 120 | 16.5 | 9.6–26.8 | 115 | 15.7 | 9.0–26.1 | –[a] | – | – |

a The sample for males was too small to report on.

The table shows HIV prevalence among adolescents in age-matched (within 5 years) and age-disparate sexual relationships with an older partner. Overall, the prevalence of HIV was 7.5% (95% CI: 4.8–11.4) among all adolescents who reported being in age-matched (within 5 years) and older age-disparate (older than 5 years) sexual relationships, with females having a higher prevalence (11.7%, 95% CI 7.9–16.9) than males (3.7%, 95% CI: 1.4–9.5). HIV prevalence was higher among respondents aged 15–19 years who reported having a partner more than five years older than themselves (16.5%; 95% CI: 9.6–26.8) than those whose partners were aged within five years (5.4%; 95% CI: 3.2–9.1). A similar pattern was observed among females, with an HIV prevalence of 15.7% among those with partners older by at least 5 years and 9.3% among females with age-matched partners. The corresponding numbers for males were too small for reliable estimates.

### 3.9.3 Multiple sexual partners

Having more than one sexual partner is a risk factor for HIV infection because it increases the risk of having a sexual partner who is living with HIV (see Morris & Kretzschmar 1997). This section presents the results regarding the number of sexual partners that respondents reported having had within the previous year.

Table 3.45 shows the results for people aged 15 years and older who reported having had more than one sexual partner in the past 12 months. Overall, 10.6% of people reported having had more than one sexual partner in the last year, with males being more likely to report multiple partnerships (15.4%) than females (5.3%). A higher proportion of youths aged 15–24 years (17.4%) reported having had multiple sexual partners (MSPs) than in the older age groups. With regard to race, black Africans reported the most MSPs (12%). By province, the Free State (13%) and Limpopo (12.9%) reported the highest proportions of MSPs during the past 12 months.

*Table 3.45: Percentage of people aged 15 years and older who reported having multiple sexual partners in the past year by age, sex, race, locality and province, South Africa, 2017*

| Demographic variable | | Two and more partners | |
|---|---|---|---|
| | *n* | % | 95% CI |
| **Total** | **12 031** | **10.6** | **9.7–11.6** |
| **Sex** | | | |
| Male | 5 553 | 15.4 | 13.9 –17.0 |
| Female | 6 478 | 5.3 | 4.5–6.3 |
| **Age (years)** | | | |
| 15 to 24 | 2 439 | 17.4 | 15.2–19.7 |
| 25 to 49 | 7 402 | 10.2 | 9.2–11.3 |
| 50 and older | 2 190 | 3.6 | 2.7–4.8 |

| Demographic variable | n | Two and more partners | |
|---|---|---|---|
| | | % | 95% CI |
| **Race** | | | |
| Black African | 8 102 | 12.0 | 10.9–13.2 |
| White | 908 | 2.6 | 1.5–4.2 |
| Coloured | 2 052 | 7.3 | 6.0–9.0 |
| Indian/Asian | 969 | 5.5 | 3.1–9.6 |
| **Locality type** | | | |
| Urban | 8 047 | 11.1 | 9.9–12.3 |
| Rural informal (tribal areas) | 2 551 | 10.1 | 8.7–11.8 |
| Rural formal (farms) | 1 433 | 6.3 | 4.6–8.6 |
| **Province** | | | |
| Western Cape | 1 447 | 7.7 | 6.1–9.7 |
| Eastern Cape | 1 048 | 10.4 | 8.1–13.3 |
| Northern Cape | 981 | 11.2 | 8.3–14.9 |
| Free State | 992 | 13.0 | 10.1–16.6 |
| KwaZulu-Natal | 2 462 | 9.7 | 8.1–11.6 |
| North West | 1 151 | 10.8 | 8.3–14.0 |
| Gauteng | 1 895 | 11.6 | 9.5–14.2 |
| Mpumalanga | 1 111 | 8.8 | 6.5–11.9 |
| Limpopo | 944 | 12.9 | 10.5–15.8 |

Figure 3.10 shows the proportions of MSPs reported among high-risk groups for the past 12 months. The highest reported proportion was that of hazardous drinkers (22.4%), followed by recreational drug users (18.2%), black African men aged 25–49 years (16.3%) and disabled people (12.1%). Unmarried people living together aged 15–49 years (8.6%) and black African women aged 20–34 years (7.1%) reported the lowest proportions of MSPs in the past year.

*Figure 3.10: Percentage of people in high-risk groups who reported more than one sexual partner in the past year, South Africa, 2017*

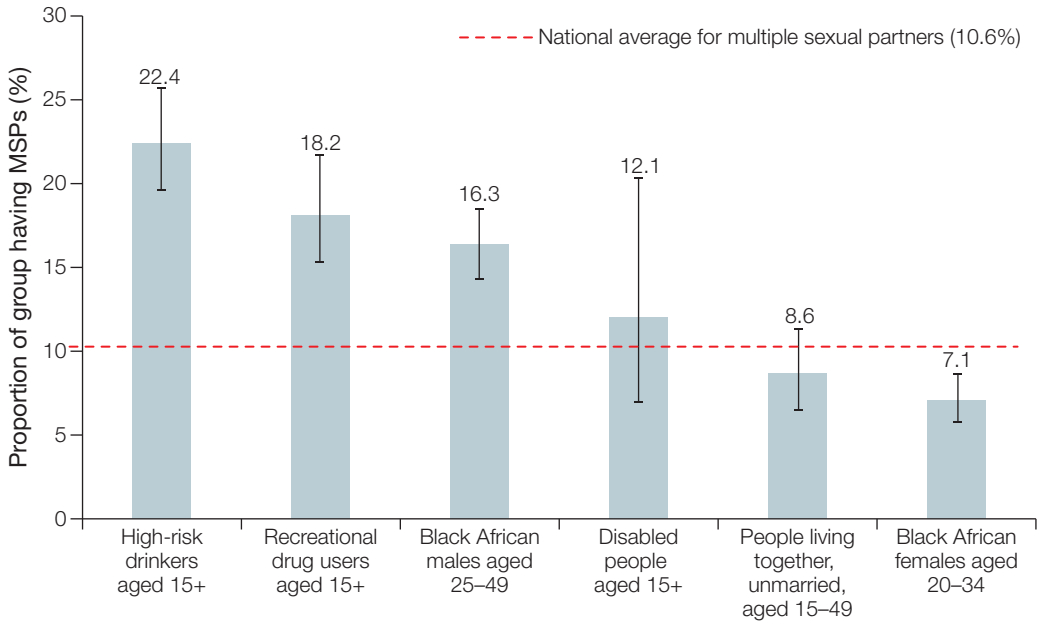
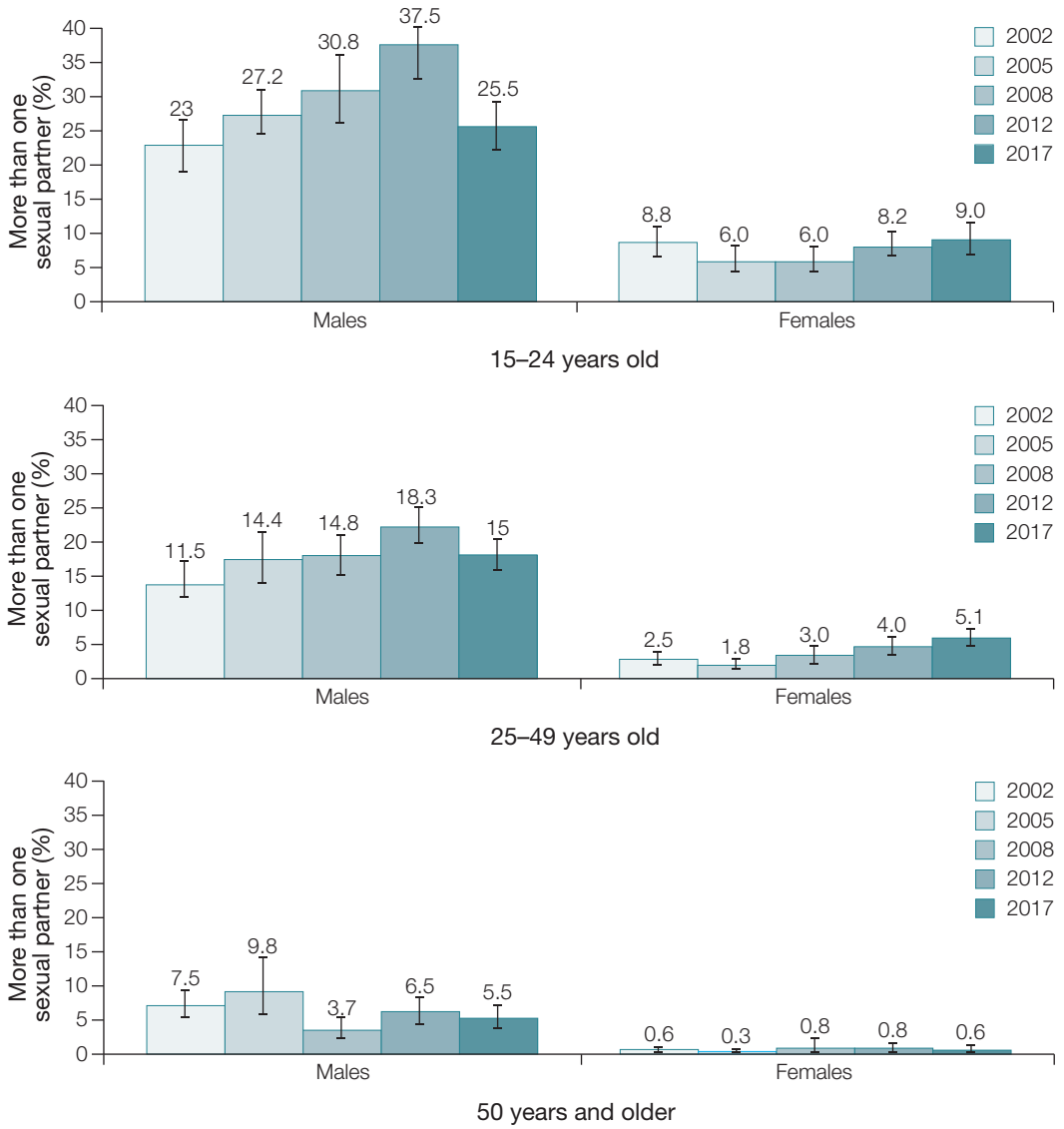


Figure 3.11 illustrates the trends for adults in three age groups who reported having more than one sexual partner in the last year. Males consistently reported significantly more sexual partners than females, across all age groups. Both men and women showed a decreasing trend of MSPs as they aged, which meant that older adults were generally less likely than younger adults to have MSPs.

*Figure 3.11: Sexually active people aged 15 years and older who reported having more than one sexual partner in the last year, South Africa, 2002, 2005, 2008, 2012 and 2017*




### 3.9.4 Condom use

Laboratory and epidemiological studies have shown that consistent and correct usage of male and female latex condoms reduces the risk of acquiring sexually transmitted diseases, including HIV (Giannou et al. 2015; SANAC 2017). This section presents the findings regarding condom use at the most recent sexual encounter or with the most recent partner. The consistency of condom usage over the previous year is also discussed.

### *Condom use at last sexual encounter*

Table 3.46 shows the results for self-reported condom use at the last sexual encounter, among respondents aged 15 years and older, broken down by selected demographic characteristics. Overall, 38.9% of people indicated that they had used a condom during their most recent sexual intercourse. As observed in all previous surveys in the series, a significantly higher proportion of males (41.3%) than females (36.2%) reported condom use at the last sexual encounter ($p<0.0001$). Condom use during the most recent sexual intercourse was significantly higher among youth aged 15–24 years (58.8%) than in the older age groups ($p<0.0001$). Reported condom use was also significantly higher among black Africans (44.1%) than the other three race groups ($p<0.0001$).

With regard to locality type, reported condom use at the last sexual encounter was higher among people living in rural informal (tribal) areas (46.1%) than other areas. Condom use at last sexual intercourse was lower than 50% in all provinces, ranging from 28.6% in the Western Cape to 46.3% in Mpumalanga.

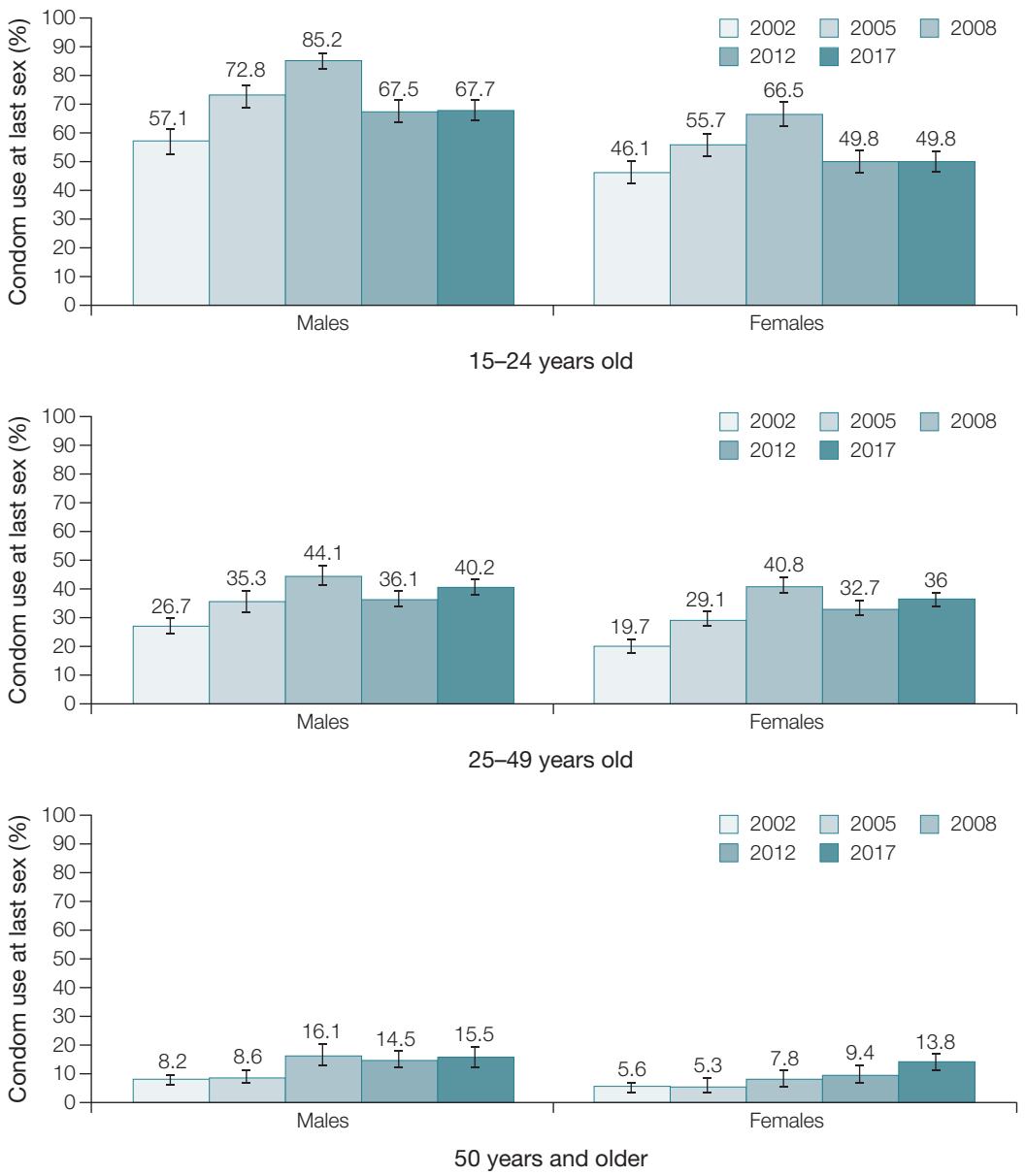
*Table 3.46: Condom use during most recent sexual encounter among people aged 15 years and older, demographic characteristics, South Africa, 2017*

| Demographic variable | *n*[a] | % | 95% CI |
|---|---|---|---|
| **Total** | **11 943** | **38.9** | **37.3–40.5** |
| **Sex** | | | |
| Male | 5 524 | 41.3 | 39.2–43.4 |
| Female | 6 419 | 36.2 | 34.5–38.0 |
| **Age group (year)** | | | |
| 15–24 | 2 418 | 58.8 | 56.2–61.4 |
| 25–49 | 7 360 | 38.2 | 36.2–40.1 |
| 50 and older | 2 149 | 14.8 | 12.6–17.4 |
| **Race** | | | |
| Black African | 8 073 | 44.1 | 42.4–45.8 |
| White | 891 | 12.5 | 9.9–15.7 |
| Coloured | 2 030 | 20.7 | 18.2–23.4 |
| Indian/Asian | 949 | 20.8 | 13.7–30.2 |
| **Locality type** | | | |
| Urban areas | 7 964 | 37.3 | 35.3–39.4 |
| Rural informal (tribal areas) | 2 552 | 46.1 | 43.4–48.8 |
| Rural formal (farms) | 1 427 | 28.5 | 23.7–33.9 |
| **Province** | | | |
| Western Cape | 1417 | 28.6 | 23.5–34.2 |
| Eastern Cape | 1 051 | 38.4 | 34.3–42.7 |
| Northern Cape | 971 | 37.0 | 32.8–41.5 |
| Free State | 993 | 41.0 | 36.8–45.3 |
| KwaZulu-Natal | 2439 | 42.6 | 38.7–46.6 |
| North West | 1 142 | 43.6 | 38.9–48.4 |
| Gauteng | 1 890 | 36.9 | 33.2–40.7 |
| Mpumalanga | 1 105 | 46.3 | 42.0–50.7 |
| Limpopo | 935 | 41.2 | 37.4–45.1 |

a Column totals contain missing demographic information.

Figure 3.12 shows the trends in condom use at the last incident of sexual intercourse among people of different age groups, broken down by sex, across the survey series (2002–2017). Reported condom use was higher among males than females across all age groups. The rate of condom use at the last sexual intercourse for the age group 15–24 was consistently higher than among older groups. Condom use peaked in 2008 for males and females of all ages, followed by a decline in 2012. Compared with 2012, the results for 2017 showed no significant change for youth aged 15–24 years. In all other age groups, condom use has increased since 2012, although the levels did not attain the 2008 levels among men aged 25 years and older or among women aged 25–49 years. Among women aged 50 years and older, since 2002 (5.6%) there has been a fairly steady increase in condom use at the last sexual intercourse until 2017 (13.8%).

*Figure 3.12: Condom use at last sex by age and sex, South Africa, 2002, 2005, 2008, 2012 and 2017*



### *Consistency of condom use*

Consistent condom use is important to reduce the risk of contracting HIV. In this section, 'consistent condom use' is defined as using a condom with the most recent or current sexual partner on all occasions.

Table 3.47 shows the results for consistent condom use among respondents aged 15 years and older, by demographic characteristics. Nearly a third (28.1%) of people reported having used condoms every time with their most recent sexual partner. A slightly higher proportion of males (29.7%) than females (26.3%) reported the consistent use of condoms.

*Table 3.47: Consistency of recent condom use among people aged 15 years and older, by demographic characteristics, South Africa, 2017*

| Demographic variable | *n* | Every time | | Almost every time | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **11 822** | **28.1** | **26.8–29.5** | **5.7** | **5.0–6.5** | **19.9** | **18.7–21.2** | **46.3** | **44.5–48.1** |
| **Sex** | | | | | | | | | |
| Male | 5 465 | 29.7 | 27.8–31.6 | 6.0 | 5.0–7.1 | 19.1 | 17.6–20.7 | 45.3 | 42.9–47.6 |
| Female | 6 357 | 26.3 | 24.8–27.9 | 5.5 | 4.7–6.4 | 20.8 | 19.3-–22.4 | 47.4 | 45.4–49.3 |
| **Age group (years)** | | | | | | | | | |
| 15-24 | 2 406 | 44.8 | 42.3–47.4 | 7.1 | 5.9–8.5 | 23.5 | 21.5–25.7 | 24.6 | 22.4–26.9 |
| 25-49 | 7 289 | 26.8 | 25.2–28.5 | 5.8 | 4.9–6.8 | 21.3 | 19.8–22.8 | 46.1 | 44.1–48.2 |
| 50 and older | 2 127 | 11.3 | 9.3–13.7 | 3.6 | 2.6–5.0 | 8.3 | 6.6–10.4 | 76.8 | 73.7–79.6 |
| **Race** | | | | | | | | | |
| Black African | 7 992 | 31.5 | 30.0–33.0 | 6.4 | 5.5–7.4 | 22.7 | 21.3–24.2 | 39.4 | 37.6–41.3 |
| White | 884 | 10.6 | 8.3–13.5 | 3.3 | 2.2–5.1 | 4.5 | 3.1–6.7 | 81.5 | 77.7–84.7 |
| Coloured | 2 004 | 17.1 | 15.0–19.5 | 2.8 | 1.9–4.0 | 11.1 | 8.7–14.1 | 69.0 | 65.5–72.2 |
| Indian/Asian | 942 | 15.0 | 11.4–19.5 | 2.2 | 1.3–3.7 | 10.6 | 4.3–24.0 | 72.2 | 63.8–79.3 |
| **Locality type** | | | | | | | | | |
| Urban area | 7 888 | 27.4 | 25.7–29.1 | 5.5 | 4.7–6.6 | 18.5 | 17.0–20.0 | 48.6 | 46.4–50.9 |
| Rural informal (tribal areas) | 2 517 | 32.3 | 30.0–34.6 | 6.4 | 5.2–7.9 | 25.5 | 23.2-27.9 | 35.8 | 32.9–38.8 |
| Rural formal (farms) | 1 417 | 19.8 | 16.4–23.6 | 5.4 | 3.9–7.4 | 14.8 | 11.5-19.0 | 60.0 | 53.1–66.4 |
| **Province** | | | | | | | | | |
| Western Cape | 1 411 | 19.9 | 17.0–23.2 | 5.2 | 3.7–7.4 | 15 | 11.6–19.2 | 59.9 | 53.6–65.9 |
| Eastern Cape | 1 020 | 26.5 | 23.0–30.4 | 5.2 | 3.6–7.4 | 23.3 | 20.1–26.9 | 45.0 | 40.5–49.5 |
| Northern Cape | 942 | 30.3 | 26.0–34.9 | 3.4 | 2.2–5.3 | 16.3 | 13.3–19.9 | 50.0 | 44.5–55.4 |
| Free State | 987 | 33.7 | 29.2–38.4 | 3.9 | 2.5–6.1 | 13.6 | 11.1–16.6 | 48.8 | 43.8–53.9 |
| KwaZulu-Natal | 2 424 | 30.0 | 27.2–33.0 | 7.5 | 6.0–9.5 | 18.4 | 15.9–21.3 | 44.5 | 39.4–48.7 |
| North West | 1 135 | 28.7 | 25.1–32.6 | 6.7 | 4.8–9.3 | 23.1 | 19.8–26.6 | 41.5 | 37.1–46.1 |
| Gauteng | 1 877 | 29.2 | 26.1–32.6 | 4.1 | 2.9–5.7 | 18.0 | 15.4–20.9 | 48.7 | 44.6–52.9 |
| Mpumalanga | 1 100 | 30.9 | 26.9–35.3 | 10.7 | 7.2–15.6 | 24.5 | 20.9–28.5 | 33.9 | 30.2–37.7 |
| Limpopo | 926 | 26.1 | 23.0–29.6 | 5.5 | 4.0–7.6 | 29.3 | 25.9–32.8 | 39.1 | 34.7–43.6 |

The differences between the proportion of youth aged 15–24 years who used condoms consistently (44.8%) and the proportion among those aged 25–49 and 50 years and older (26.8% and 11.3% respectively) were statistically significant ($p<0.001$). About a quarter (24.6%) of people aged 15–24 years had never used a condom with their most recent sexual partner – a significantly smaller proportion than among older adults ($p<0.001$).

Black Africans reported a higher proportion (31.5%) of condom use every time with their most recent partner, compared with people of other races ($p<0.001$). Notably, most whites (81.5%) reported that they had never used a condom with their most recent partner. With regard to locality type, people in rural formal (farm) areas reported the lowest rate of consistent condom use (19.8%). The highest rate occurred among people living in rural informal (tribal) areas (32.3%). Regarding the provinces, the highest rate of consistent condom use was recorded for Free State (33.7%), with the Western Cape having the lowest rate (19.9%).

Table 3.48 presents the results for condom use among people aged 15 years and older, broken down by respondents' marital status and age. Married respondents reported lower rates of consistent condom use than any other relationship group, across all ages.

*Table 3.48: Condom use at most recent sexual encounter by marital status and age, South Africa, 2017*

| | 15–24 years | | | 25–49 years | | | 50 and older | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| Married | 24 | 12.0 | 2.8–39.4 | 1 283 | 19.7 | 16.7–23.1 | 952 | 11.2 | 8.5–14.8 |
| Never married | 1 103 | 68.2 | 64.7–71.6 | 1 838 | 51.0 | 47.7–54.4 | 138 | 30.2 | 20.6–42.0 |
| Divorced or separated | –[a] | – | – | 82 | 56.4 | 42.8–69.1 | 56 | 36.6 | 22.0–54.3 |
| Widower/widow | – | – | – | 8 | 76.8 | 40.2–94.2 | 31 | 34.4 | 15.9–59.4 |

a The sample was too small to report on.

Table 3.49 shows trends in condom use at the last sexual encounter among people aged 15 years and older, broken down by province, for the five surveys (2002–2017). In 2012, the results showed that condom-use rates at the last sexual encounter had declined across all provinces. The decrease was significant in eight of the nine provinces.

Overall, the findings of the current survey show a slight increase in condom use at last sexual intercourse (from 36.2% in 2012 to 38.9% in 2017). However, the 2017 results – for all provinces except Northern Cape and Mpumalanga – did not differ significantly from the 2012 survey. As in the previous four surveys, condom use at last sexual encounter was highest in Mpumalanga (46.3%) and lowest in the Western Cape (28.6%).

*Table 3.49: Condom use at last sexual encounter, by province among people aged 15 years and older, South Africa, 2002, 2005, 2008, 2012 and 2017*

| Province | 2002 | | | 2005 | | | 2008 | | | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **4 555** | **27.3** | **26.0–28.6** | **9 256** | **35.4** | **33.4–37.3** | **8 588** | **45.1** | **43.3–47.0** | **15 439** | **36.2** | **34.5–37.9** | **11 927** | **38.9** | **37.3–40.5** |
| Western Cape | 615 | 21.3 | 18.2–24.8 | 1 209 | 22.5 | 17.6–28.4 | 1 138 | 34.8 | 29.8–40.2 | 2 065 | 24.3 | 19.5–30.0 | 1 417 | 28.6 | 23.5–34.2 |
| Eastern Cape | 571 | 31.5 | 27.7–35.5 | 1 267 | 35.8 | 30.1–41.9 | 1 114 | 47.9 | 42.4–53.4 | 1 842 | 37.9 | 34.3–41.7 | 1045 | 38.3 | 34.2–42.6 |
| Northern Cape | 332 | 16.9 | 13.1–21.5 | 469 | 19.1 | 14.7–24.6 | 714 | 30.3 | 24.5–36.9 | 1 235 | 26.9 | 21.1–33.6 | 970 | 37.1 | 32.9–41.6 |
| Free State | 336 | 35.1 | 30.1–40.5 | 590 | 30.7 | 22.8–40.0 | 555 | 47.4 | 41.2–53.8 | 1 217 | 40.7 | 33.5–48.2 | 992 | 40.9 | 36.7–45.3 |
| KwaZulu-Natal | 898 | 26.7 | 23.9–29.8 | 1 805 | 36.3 | 32.2–40.7 | 1 508 | 47.4 | 42.7–52.1 | 3 550 | 39.6 | 35.7–43.7 | 2 438 | 42.6 | 38.7–46.6 |
| North West | 376 | 26.6 | 22.3–31.4 | 726 | 37.3 | 31.7–43.3 | 691 | 48.0 | 43.0–53.1 | 1 085 | 40.8 | 35.6–46.3 | 1 140 | 43.6 | 38.8–48.4 |
| Gauteng | 806 | 31.6 | 28.4–35.0 | 1 613 | 37.7 | 33.2–42.4 | 1 405 | 42.1 | 38.1–46.3 | 2 139 | 35.7 | 31.7–40.0 | 1 887 | 36.8 | 33.2–40.6 |
| Mpumalanga | 240 | 24.2 | 19.0–30.2 | 721 | 36.1 | 31.6–40.8 | 706 | 51.7 | 46.4–57.1 | 1 116 | 39.4 | 35.0–44.0 | 1 104 | 46.3 | 42.0–50.7 |
| Limpopo | 381 | 27.6 | 23.2–32.4 | 856 | 44.7 | 39.7–49.7 | 757 | 52.6 | 47.0–58.2 | 1 190 | 39.3 | 34.9–43.9 | 934 | 41.1 | 37.3–45.0 |

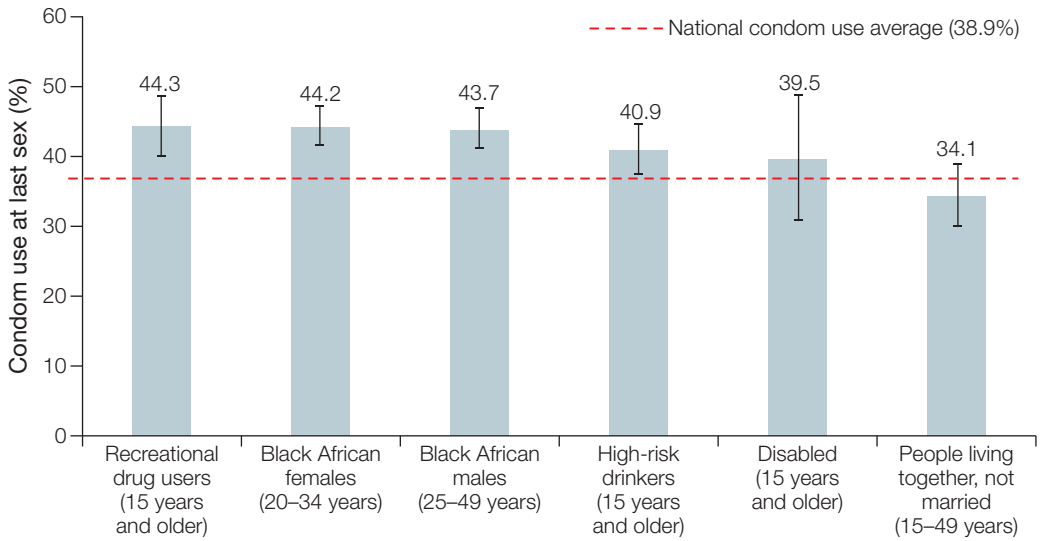
### *Condom use in high-risk groups*

This section presents the results regarding the consistency of condom use in the past year among high-risk groups (see Table 3.50 and Figure 3.13). More than a third of black African men aged 25–49 years (37.5%) and black African women aged 20–34 years (35.6%) reported consistent condom use. People aged 15–49 years who cohabited with a partner reported the least consistent condom use during sex (15.4%), across the high-risk groups. The highest proportion of people who reported never having used a condom were those aged 15–49 years who lived with a partner (62.7%), followed by disabled people aged 15 years and older (48.3%).

*Table 3.50: Consistency of condom use with most recent partner among high-risk groups, South Africa, 2017*

| | | Every time | | Almost every time | | Sometimes | | Never | |
|---|---|---|---|---|---|---|---|---|---|
| Demographic group | *n* | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| Black African women aged 20–34 years | 1 403 | 35.6 | 32.7–38.7 | 8.0 | 6.5–9.9 | 29.0 | 25.9–32.4 | 27.3 | 24.4–30.4 |
| Black African men aged 25–49 years | 831 | 37.5 | 33.1–42.1 | 8.1 | 5.8–11.3 | 25.0 | 21.5–28.8 | 29.4 | 25.4–33.7 |
| Living together with partner aged 15–49 years | 3 421 | 15.4 | 13.4–17.5 | 4.0 | 3.1–5.1 | 17.9 | 15.9–20.0 | 62.7 | 59.8–65.6 |
| High and hazardous risk drinkers aged 15 years and older | 1 077 | 29.1 | 25.2–33.3 | 5.5 | 3.7–8.3 | 21.9 | 18.5–25.7 | 43.5 | 39.3–47.9 |
| Recreational drug users aged 15 years and older | 1 078 | 32.1 | 28.2–36.2 | 7.3 | 5.4–9.7 | 19.5 | 16.2–23.3 | 41.2 | 37.0–45.4 |
| Disabled people aged 15 years and older | 255 | 28.2 | 21.1–36.4 | 1.4 | 0.5–3.7 | 22.3 | 15.2–31.4 | 48.2 | 39.6–56.8 |

*Figure 3.13 Condom use at last sexual encounter among high-risk groups, South Africa, 2017*



## 3.10 Awareness of HIV status

Awareness of one's HIV status (through HIV tests) is pivotal in accessing prevention, care services and ARV treatment. In turn, such care and treatment can mitigate the impact of HIV. In this section, the findings for HIV-testing history and awareness of HIV status during the year preceding the survey are presented.

### 3.10.1 Awareness of HIV-testing sites

One of the crucial factors in increasing the uptake of HIV-testing services (HTS) is to make HIV-testing sites accessible. Table 3.51 presents data about people's awareness of a nearby testing site, cross-tabulated with demographic characteristics among respondents aged 15 years and older. Respondents were asked whether or not they knew of a place near their homes where they could be tested for HIV. The vast majority of people (94.6%) indicated that they were aware of a nearby HTS. This high awareness remained consistent when the data were stratified by demographic variables such as sex, race and locality, suggesting that HIV counselling and testing services were perceived as being accessible.

*Table 3.51: Awareness of HIV-testing sites among people aged 15 years and older, demographic variables, South Africa, 2017*

| Demographic variable | Awareness of HIV-testing site | | |
|---|---|---|---|
| | *n* | % | 95% CI |
| **Total** | **23 416** | **94.6** | **94.0–95.1** |
| **Race** | | | |
| Black African | 15 431 | 94.7 | 94.0–95.3 |
| White | 1 652 | 92.2 | 90.0–94.0 |
| Coloured | 4 214 | 95.8 | 94.8–96.6 |
| Indian/Asian | 2 119 | 93.7 | 91.0–95.6 |
| **Sex** | | | |
| Male | 9 839 | 94.1 | 93.3–94.7 |
| Female | 13 577 | 95.0 | 94.3–95.6 |
| **Age (years)** | | | |
| 15-24 | 5 935 | 92.5 | 91.4–93.5 |
| 25–49 | 10 808 | 96.5 | 95.9–97.1 |
| 50 and older | 6 673 | 92.1 | 91.1–93.0 |
| **Locality type** | | | |
| Urban area | 15 239 | 95.2 | 94.6–95.8 |
| Rural informal (tribal areas) | 5 453 | 93.4 | 92.1–94.6 |
| Rural formal (farms) | 2 724 | 90.9 | 86.5–94.0 |

| Demographic variable | Awareness of HIV-testing site | | |
|---|---|---|---|
| | *n* | % | 95% CI |
| **Province** | | | |
| Western Cape | 2 830 | 93.6 | 91.2–95.3 |
| Eastern Cape | 2 488 | 93.4 | 91.9–94.6 |
| Northern Cape | 2 009 | 95.5 | 94.1–96.6 |
| The Free State | 1 750 | 97.0 | 95.7–97.9 |
| KwaZulu-Natal | 5 224 | 93.7 | 91.7–95.2 |
| North West | 1 969 | 96.7 | 95.6–97.5 |
| Gauteng | 3 283 | 95.5 | 94.4–96.3 |
| Mpumalanga | 2 176 | 95.3 | 93.5–96.7 |
| Limpopo | 1 687 | 92.6 | 90.8–94.0 |

### 3.10.2 History of HIV-testing

Table 3.52 presents data on the uptake of HIV-testing. Most of the respondents had been tested for HIV (75.2%). A significantly higher proportion of females (79.3%) than males (70.9%) reported that they had ever been tested ($p<0.001$). The highest testing rate was reported among adults aged 25–49 years (85.0%), followed by adults aged 50 years and older (69.7%), with the difference being significant ($p<0.001$). Among youth aged 15–24 years, only 58.8% reported that they had ever been tested.

Analysis by race showed that black Africans (76.5%) and coloureds (73.8%) were more likely than whites (69.4%) and Indians/Asians (61.8%) to report that they had ever been tested for HIV. All three locality types were associated with relatively high levels (>70%) of HIV-testing, although people in urban areas were more likely to have been tested (77.4%) than people in areas under tribal or traditional authority (70.3%). Across all provinces, the level of HIV-testing was at least 70%, with Free State reporting the highest rate at 83.2%.

*Table 3.52: HIV-testing among people aged 15 years and older, demographic characteristics, South Africa, 2017*

| | Tested for HIV | | |
|---|---|---|---|
| Variable | *n* | % | 95% CI |
| **Total** | **23 190** | **75.2** | **74.0–76.4** |
| **Sex** | | | |
| Male | 9 762 | 70.9 | 69.2–72.5 |
| Female | 13 428 | 79.3 | 78.0–80.5 |

| Variable | Tested for HIV | | |
|---|---|---|---|
| | *n* | % | 95% CI |
| **Age (years)** | | | |
| 15–24 | 5921 | 58.8 | 56.6–61.1 |
| 25–49 | 10 674 | 85.0 | 83.6–86.2 |
| 50 and older | 6 595 | 69.7 | 68.0–71.4 |
| **Race** | | | |
| Black African | 15 255 | 76.5 | 75.1–77.9 |
| White | 1 634 | 69.4 | 65.9–72.8 |
| Coloured | 4 182 | 73.8 | 71.7–75.7 |
| Indian/Asian | 2 119 | 61.8 | 56.7–66.7 |
| **Locality type** | | | |
| Urban area | 15 082 | 77.4 | 76.0–78.7 |
| Rural informal (tribal areas) | 5 432 | 70.3 | 68.0–72.4 |
| Rural formal (farms) | 2 676 | 71.2 | 67.2–74.9 |
| **Province** | | | |
| Western Cape | 2 752 | 73.3 | 70.8–75.7 |
| Eastern Cape | 2 469 | 70.2 | 67.6–72.7 |
| Northern Cape | 1 967 | 74.7 | 71.3-–77.8 |
| Free State | 1 738 | 83.2 | 80.8–85.4 |
| KwaZulu-Natal | 5 211 | 70.3 | 66.7–73.7 |
| North West | 1 955 | 80.4 | 77.0–83.4 |
| Gauteng | 3 271 | 79.3 | 76.8–81.6 |
| Mpumalanga | 2 144 | 78.1 | 75.5–80.4 |
| Limpopo | 1 683 | 70.7 | 67.4–73.8 |

### 3.10.3 Recent HIV-testing

The survey also measured people's testing history. The results suggested that only 27.5% of the respondents had been tested in the last 3 months, and a further 17.0% in the 4–6 months before the study. However, two-thirds of people (66.8%) reported having been tested within the past year. Table 3.53 summarises the reported testing rates for 2008, 2012 and 2017. Overall, the number of people who were tested within the past year had increased significantly between 2008 (49.1%) and 2017 (66.8%) ($p$<0.001), although the increase since 2012 (66.2%) was minimal. The proportion of self-reported testing was similar among people who indicated they had been tested 1–2 years earlier and those who were tested 3 or more years earlier.

*Table 3.53: Period of last HIV test among people aged 15 years and older, South Africa, 2008, 2012 and 2017*

| | 2008 | | | | | | 2012 | | | | | | 2017 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | | Male | | Female | | Total | |
| | *n*=2 202 | | *n*=4 136 | | *n*=6 338 | | *n*= 6 536 | | *n*=10 042 | | *n*=16 578 | | *n*= 6 667 | | *n*=10 302 | | *n*=16 969 | |
| Period | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| Less than a year ago | 51.5 | 48.3–54.8 | 47.4 | 45.2–49.6 | 49.1 | 47.1–51.1 | 64.6 | 62.3–66.8 | 67.5 | 65.7–69.2 | 66.2 | 64.7–67.7 | 66.2 | 64.4–68.0 | 67.3 | 65.7–68.8 | 66.8 | 65.4–68.2 |
| 1–2 years ago | 25.9 | 23.2–28.8 | 27.8 | 25.8–29.8 | 27.0 | 25.4–28.7 | 17.3 | 15.5–19.4 | 14.9 | 13.7–16.2 | 15.9 | 14.9–17.1 | 12.6 | 11.4–13.8 | 11.6 | 10.9–12.5 | 12.1 | 11.3–12.9 |
| 2–3 years ago | 11.1 | 8.9–13.8 | 10.4 | 9.2–11.7 | 10.7 | 9.5–12.0 | 8.2 | 7.2–9.3 | 6.5 | 5.8–7.3 | 7.2 | 6.6–7.9 | 8.0 | 7.1–9.0 | 7.8 | 7.0–8.6 | 7.9 | 7.2–8.5 |
| 3 or more years ago | 11.5 | 9.6–13.6 | 14.5 | 12.9–16.1 | 13.2 | 12.0–14.6 | 9.9 | 8.6–11.3 | 11.1 | 10.1–12.2 | 10.6 | 9.8–11.5 | 13.2 | 12.1–14.5 | 13.3 | 12.3–14.5 | 13.3 | 12.4–14.3 |

### 3.10.4 Testing site for the most recent HIV test

Respondents who reported having been tested were asked to indicate where they had accessed their last HIV test. Table 3.54 shows that most people accessed HTS at public health facilities, such as hospitals, clinics and doctors in the public sector. Half of the respondents (50.4%) obtained their most recent test from a public clinic or doctor, followed by a public hospital (22.6%). Stratification by sex showed that more females (54.0%) than males (46.0%) had accessed public primary healthcare settings for their most recent HIV test. Only 6.4% of respondents indicated that they had been tested at a private facility, marking a substantial drop from the 17.0% reported in the 2012 survey.

*Table 3.54: HIV-testing sites accessed by people aged 15 years and older, South Africa, 2017*

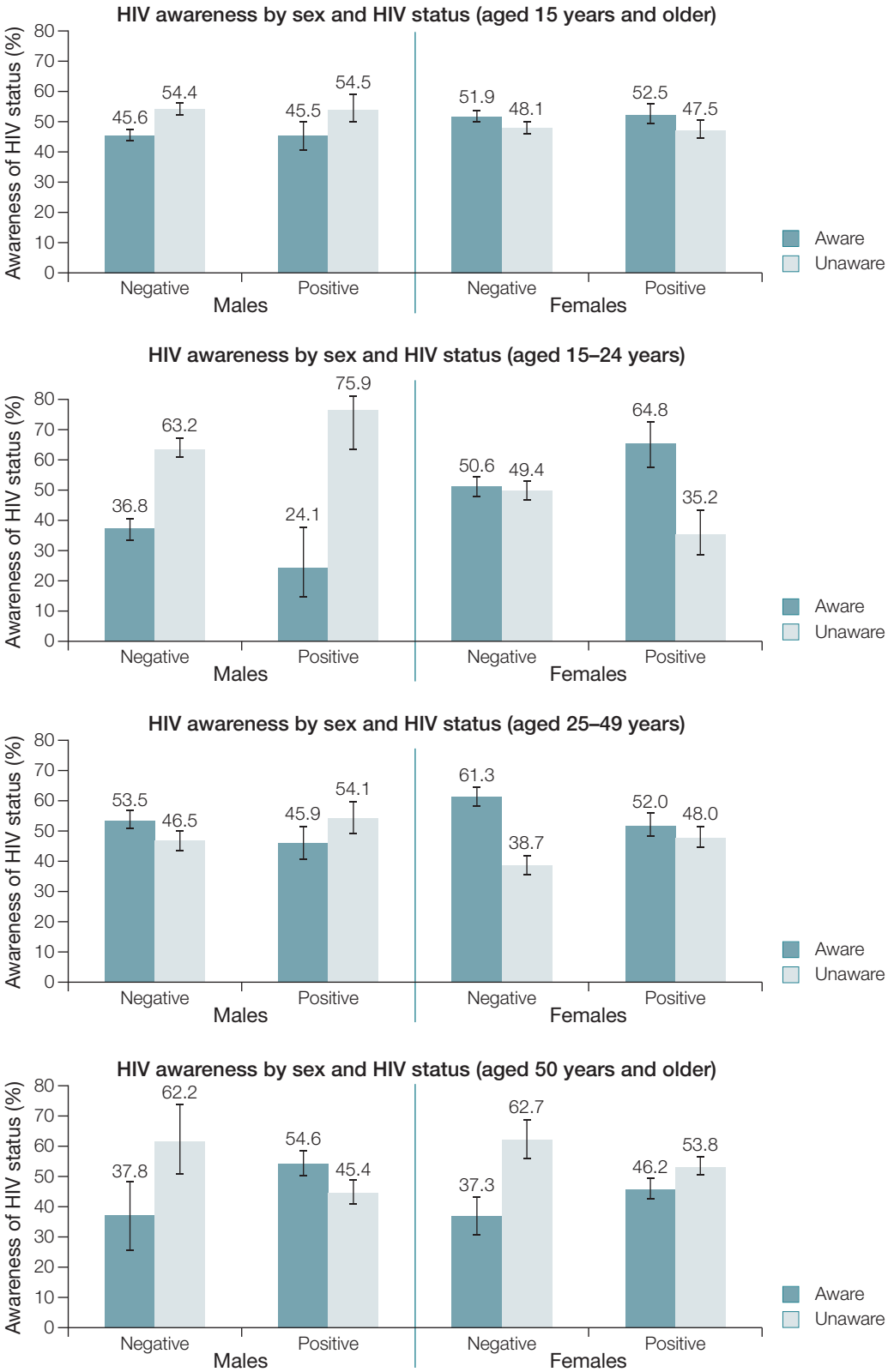
| | Male (*n*=6 676) | | Female (*n*=10 312) | | Total (*n*=16 988) | |
|---|---|---|---|---|---|---|
| Testing site | % | 95% CI | % | 95% CI | % | 95% CI |
| Public hospital | 22.1 | 20.2–24.1 | 23.0 | 21.3–24.9 | 22.6 | 20.9–24.3 |
| Private hospital | 6.9 | 6.0–8.0 | 6.0 | 5.3–6.9 | 6.4 | 5.7–7.3 |
| Public clinic or doctor | 46.0 | 43.5–48.5 | 54.0 | 51.8–56.2 | 50.4 | 48.3–52.5 |
| Private clinic or doctor | 7.9 | 6.8–9.0 | 6.9 | 6.1–7.9 | 7.3 | 6.5–8.3 |
| Mine hospital | 0.8 | 0.5–1.2 | 0.1 | 0.1–0.3 | 0.4 | 0.3–0.7 |
| Traditional healer | 0.0 | 0.0–0.2 | 0.0 | 0.0–0.2 | 0.0 | 0.0–0.1 |
| loveLife clinic | 0.6 | 0.3–1.0 | 0.3 | 0.2–0.5 | 0.4 | 0.3–0.6 |
| Youth centre | 0.4 | 0.2–0.6 | 0.3 | 0.2–0.5 | 0.3 | 0.2–0.5 |
| HIV-testing centre | 3.5 | 2.9–4.4 | 2.8 | 2.3–3.5 | 3.2 | 2.7–3.7 |
| Workplace | 7.2 | 6.3–8.2 | 2.5 | 2.1–3.1 | 4.7 | 4.1–5.3 |
| Other | 1.3 | 1.0–1.8 | 1.0 | 0.7–1.4 | 1.1 | 0.9–1.5 |

Although effort has been made to promote HIV prevention and care programmes in the workplace, only 4.7% of the respondents reported having been tested in the workplace. As observed in 2012, males were more likely than females to have been tested in the workplace. Traditional healers were the least likely among healthcare providers to be consulted for HIV-testing. Special-purpose centres, such as youth centres, loveLife's youth-friendly clinics, and HIV-testing centres not based at clinics or mobile clinics were utilised far less than the public health facilities.

### 3.10.5 Awareness of HIV status and HIV prevalence

In general, males aged 15 years and older were less aware of their HIV status than their female counterparts. More females aged 15–24 years and 25–49 living with HIV were aware of their status than males in the same subgroups. Among people aged 50 years and older, men living with HIV were more aware of their status than their female counterparts. Figure 3.14 presents the results regarding respondents' awareness of their HIV status.

*Figure 3.14: Awareness of HIV status in the past 12 months among people aged 15 years and older, South Africa, 2017*



## 3.11 Perceived susceptibility to HIV infection

According to behavioural change theories, such as the health belief model (Rosenstock, Strecher & Becker 1994), a person's ability to perceive their own susceptibility is a crucial first step in achieving behavioural change. In the current survey, people were asked to rate their susceptibility to HIV infection using a 4-point Likert scale. This section presents the results for people aged 15 years and older.

### 3.11.1 Perceived risk of being infected with HIV

Table 3.55 shows the perceived risk of becoming infected with HIV. About half of the respondents (49.4%) indicated that they would definitely not become infected, whereas only 3% indicated that they would definitely become infected with HIV. Results are presented under these two categories formed by collapsing the four presented in the table. The percentages for the two categories 'I will definitely not get infected' and 'I probably won't get infected with HIV' were combined, yielding a total of 83.5% who believed they were unlikely to become infected. Similarly, the categories 'I am probably going to get infected with HIV' and 'I am definitely going to get infected with HIV' were combined, yielding a total of 16.6% who believed they were at risk.

*Table 3.55: Perceived risk of becoming infected with HIV, people aged 15 years and older, by background characteristics, South Africa, 2017*

| Demographic variable | *n* | I will definitely not get infected with HIV | | I probably won't get infected with HIV | | I am probably going to get infected with HIV | | I am definitely going to get infected with HIV | |
|---|---|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **21 614** | **49.4** | **47.5–51.2** | **34.1** | **32.2–36.0** | **13.6** | **12.6–14.6** | **3.0** | **2.6–3.4** |
| **Sex** | | | | | | | | | |
| Male | 9 345 | 47.8 | 45.8–49.9 | 35.5 | 33.4–37.7 | 13.8 | 12.6–15.1 | 2.8 | 2.3–3.4 |
| Female | 12 269 | 50.9 | 48.9–52.9 | 32.6 | 30.6–34.6 | 13.4 | 12.4–14.5 | 3.1 | 2.6–3.7 |
| **Race** | | | | | | | | | |
| Black African | 13 809 | 42.8 | 40.8–44.8 | 37.6 | 35.4–39.8 | 16.2 | 15.0–17.4 | 3.5 | 3.0–40 |
| White | 1 635 | 73.5 | 68.0–78.3 | 23.3 | 18.6 – 28.9 | 2.3 | 1.6–3.4 | 0.8 | 0.4–1.6 |
| Coloured | 4 052 | 70.4 | 67.2–73.4 | 20.8 | 18.3–23.5 | 7.0 | 5.6–8.7 | 1.8 | 1.2–2.6 |
| Indian/Asian | 2 118 | 70.5 | 70.0–79.4 | 20.1 | 16.5–24.3 | 3.9 | 1.4–10.0 | 1.1 | 0.3–3.8 |
| **Age group (years)** | | | | | | | | | |
| 15–24 | 5 760 | 52.3 | 49.8–54.7 | 32.9 | 30.8–35.1 | 12.1 | 10.8–13.5 | 2.7 | 2.2–3.4 |
| 25–49 | 9 578 | 41.3 | 39.2–43.5 | 37.7 | 35.3–40.1 | 17.5 | 16.0–19.1 | 3.5 | 2.9–4.2 |
| 50 and older | 6 276 | 64.2 | 61.7–66.7 | 27.2 | 25.0–29.5 | 6.5 | 5.6–7.5 | 2.0 | 1.5–2.7 |
| **Locality type** | | | | | | | | | |
| Urban | 14 241 | 51.3 | 48.8–53.7 | 33.6 | 31.1–36.2 | 12.4 | 11.2–13.8 | 2.7 | 2.2–3.3 |
| Rural informal (tribal areas) | 4 880 | 43.5 | 40.8–46.3 | 36.1 | 33.5–38.9 | 16.5 | 14.8–18.5 | 3.8 | 3.1–4.8 |
| Rural formal (farms) | 2 493 | 52.9 | 46.7–59.1 | 30.0 | 24.7–35.9 | 15.0 | 12.2–18.3 | 2.1 | 1.5–3.0 |

| Demographic variable | n | I will definitely not get infected with HIV | | I probably won't get infected with HIV | | I am probably going to get infected with HIV | | I am definitely going to get infected with HIV | |
|---|---|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Province** | | | | | | | | | |
| Western Cape | 2 683 | 65.1 | 59.9–70.0 | 24.4 | 21.0–28.3 | 9.4 | 7.1–12.2 | 1.1 | 0.6–2.1 |
| Eastern Cape | 2 221 | 49.0 | 44.9–53.2 | 31.2 | 27.5–35.2 | 16.1 | 13.1–19.6 | 3.6 | 2.4–5.5 |
| Northern Cape | 1 895 | 62.3 | 53.7–70.2 | 23.6 | 18.5–29.6 | 12.1 | 9.2–15.9 | 1.9 | 1.1–3.2 |
| Free State | 1 557 | 42.5 | 35.9–49.5 | 40.2 | 35.5–45.2 | 15.6 | 11.7–20.5 | 1.6 | 1.0–2.5 |
| KwaZulu-Natal | 4 821 | 52.7 | 48.9–56.5 | 31.8 | 28.1–35.7 | 13.2 | 10.9–15.8 | 2.3 | 1.6–3.4 |
| North West | 1 803 | 36.7 | 32.0–41.7 | 44.6 | 40.3–49.0 | 14.8 | 12.2–17.8 | 3.9 | 2.8–5.4 |
| Gauteng | 3 098 | 48.2 | 43.6–53.0 | 37.3 | 32.1–42.9 | 11.2 | 9.3–13.5 | 3.2 | 2.3–4.3 |
| Mpumalanga | 1 982 | 32.5 | 27.6–37.9 | 44.3 | 39.6–49.0 | 18.6 | 14.4–23.6 | 4.6 | 3.0–7.1 |
| Limpopo | 1 554 | 49.9 | 46.8–52.9 | 27.5 | 24.9–30.3 | 18.4 | 15.8–21.3 | 4.3 | 3.1–5.8 |

No difference was found in the perception of risk between males and females. In terms of racial differences, black Africans (19.7%) had a higher risk perception than the other races. Regarding the age groups, more than a fifth of people aged 25–49 years (21.0%) believed they were likely to become infected with HIV. Regarding locality type, inhabitants in rural informal (tribal) areas (20.3%) had the highest proportion of risk perception, and urban dwellers had the lowest (15.1%). Mpumalanga (23.2%) had the highest proportion of HIV-risk perception whereas the Western Cape had the lowest (10.5%).

### 3.11.2 Reasons for believing one would not become infected with HIV

Table 3.56 shows the reasons why people thought they would not become infected with HIV. The main reasons provided included faithfulness to their partner (27.6%), trust in their partner (18.2%) and abstention from sex (15.4%).

*Table 3.56: Reasons given for why they believed they would not become infected by HIV among people aged 15 years and older, South Africa, 2017*

| Reasons for belief one would not contract HIV | % | 95% CI |
|---|---|---|
| I am faithful to my partner | 27.6 | 27.1–28.1 |
| I trust my partner | 18.2 | 17.8–18.7 |
| I abstain from sex | 15.4 | 15.0–15.8 |
| I use condoms | 13.1 | 12.7–13.5 |
| I have never had sex before | 8.0 | 7.7–8.3 |
| I know my HIV status | 6.3 | 6.1–6.6 |
| I am not at risk for HIV | 3.9 | 3.6–4.1 |
| I know the status of my partner | 3.5 | 3.2–3.7 |
| I do not have sex with sex workers/prostitutes | 1.6 | 1.4–1.7 |
| Other | 1.5 | 1.4–1.7 |
| God protects me | 0.7 | 0.6–0.8 |
| My ancestors protect me | 0.2 | 0.2–0.3 |

### 3.11.3 Reasons for believing one would become infected with HIV

Table 3.57 outlines the reasons provided by people (aged 15 years and older) for their belief that they would become infected with HIV. More than a third of respondents (36.9%) indicated that it was because they were sexually active, followed by lack of condom use (16.3%) or not using condoms consistently (15.7%). Not trusting their partner (7.9%) was another reason for believing they were at risk of HIV infection.

*Table 3.57: Reasons given by people aged 15 years and older who believed they would become infected with HIV, South Africa, 2017*

| Reasons for belief one would contract HIV | % | 95% CI |
|---|---|---|
| Sexually active | 36.9 | 35.5–38.3 |
| Don't use condoms | 16.3 | 15.2–17.3 |
| Don't always use condoms | 15.7 | 14.7–16.8 |
| Other | 10.1 | 9.2–11.0 |
| Don't trust the partner | 7.9 | 7.2–8.8 |
| Had many sexual partners | 7.3 | 6.5–8.0 |
| Had an accident/cuts | 3.4 | 2.9–4.0 |
| My partner is sick | 1.1 | 0.8–1.4 |
| I am sick | 0.6 | 0.4–0.9 |
| I am HIV-positive | 0.4 | 0.2–0.6 |
| My partner died of AIDS | 0.3 | 0.1–0.5 |

### 3.11.4 Perceived personal risk of HIV infection among high-risk groups

As shown in Figure 3.15, most people in all the high-risk groups (73% to 90.6%) perceived themselves not be at personal risk for HIV infection. Among people with disabilities, the vast majority of respondents (90.6%) held this belief.

*Figure 3.15: Portion of high-risk groups that perceived themselves to be at low risk for HIV infection among people aged 15 years and older, South Africa, 2017*

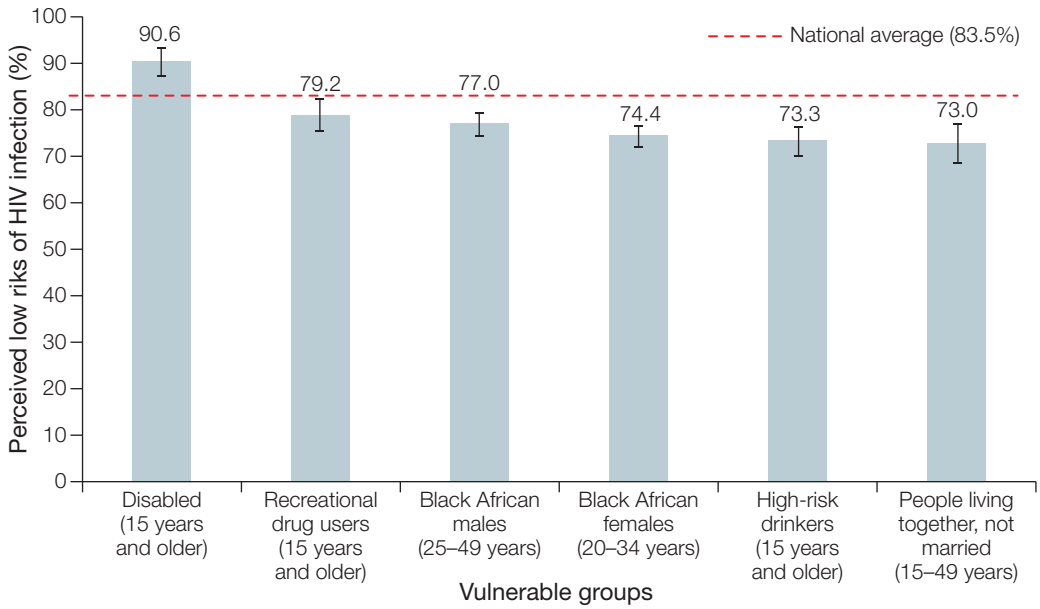


Table 3.58 lists the reasons given by people in high-risk groups for perceiving themselves to be at low risk for HIV infection. The main reasons were faithfulness to their partner (30.2%), trust in their partner (19.7%) and the use of condoms (17.5%).

*Table 3.58: Reasons given by groups at high risk of HIV exposure for believing they would not become infected with HIV, South Africa, 2017*

| Reasons for belief one would not contract HIV | % | 95% CI |
|---|---|---|
| I am faithful to my partner | 30.2 | 29.4–31.0 |
| I trust my partner | 19.7 | 19.0–20.4 |
| I use condoms | 17.5 | 16.8–18.2 |
| I abstain from sex | 11.0 | 10.4–11.5 |
| I know my HIV status | 7.3 | 6.8–7.8 |
| I have never had sex before | 4.0 | 3.6–4.3 |
| I know the status of my partner | 3.9 | 3.5–4.2 |
| I am not at risk for HIV | 2.9 | 2.6–3.2 |
| I do not have sex with sex workers/prostitutes | 1.6 | 1.4–1.8 |
| Other | 1.3 | 1.1–1.5 |
| God protects me | 0.6 | 0.5–0.7 |
| My ancestors protect me | 0.2 | 0.1–0.3 |

Table 3.59 shows the main reasons why some members of high-risk groups perceived themselves to be at risk for HIV infection. The main reasons were being sexually active (38.7%), not using a condom (17.1%) and inconsistent condom use (17.0%).

*Table 3.59: Reasons given by groups at high risk of HIV exposure for believing they would become infected with HIV, South Africa, 2017*

| Reasons for belief one would contract HIV | % | 95% CI |
|---|---|---|
| I am sexually active | 38.7 | 36.9–40.5 |
| I don't use condoms. | 17.1 | 15.8–18.5 |
| I don't always use condoms | 17.0 | 15.6–18.4 |
| I have had many sexual partners | 8.1 | 7.2–9.2 |
| I don't trust my partner | 8.2 | 7.3–9.3 |
| Other | 6.6 | 5.7–7.6 |
| I had an accident/have cuts | 2.7 | 2.1–3.3 |
| My partner is sick | 0.8 | 0.5–1.1 |
| I am sick | 0.5 | 0.3–0.8 |
| My partner died of AIDS | 0.1 | 0.04–0.3 |
| I am HIV-positive | 0.1 | 0.04–0.3 |

### 3.11.5 Perceived risk among people living with HIV

Table 3.60 shows the perceived risk of infection among people aged 15 years and older, broken down by HIV status. Those who perceived themselves to be at high risk of contracting HIV had a significantly higher prevalence of HIV than those who perceived themselves to be at low risk. Females who perceived themselves to be at high risk for HIV infection were twice as likely to be HIV-positive than those who perceived themselves to be at low risk. Analysis by sex showed that females were more likely than males to consider themselves at risk for HIV infection.

*Table 3.60: Perceived risk of HIV infection among people aged 15 years and older by sex and HIV status, South Africa, 2017*

| Sex | Perception of low risk | | | Perception of high risk | | |
|---|---|---|---|---|---|---|
| | *n* | HIV + % | 95% CI | *n* | HIV + % | 95% CI |
| **Total** | **13 673** | **10.0** | **9.1–11.0** | **2 310** | **17.2** | **15.3–19.3** |
| Male | 5 720 | 8.8 | 7.7–10.0 | 974 | 11.2 | 8.8–14.2 |
| Female | 7 953 | 11.2 | 10.0–12.5 | 1 336 | 23.3 | 20.5–26.3 |

## 3.12 Knowledge of HIV transmission

A person's degree of accurate knowledge about HIV transmission is a prerequisite for their engaging in HIV-prevention practices. However, such knowledge does not necessarily result in behavioural change or an effort to prevent HIV infection. In this survey, a composite measure of accurate knowledge was used, with the first part assessing knowledge about the sexual transmission of HIV and the second part probing the rejection of misconceptions about HIV transmission. The approach was described in Chapter 2 on methodology.

### 3.12.1 Knowledge of HIV transmission and prevention

Table 3.61 shows the extent of accurate knowledge about the sexual transmission of HIV and the rejection of misconceptions about HIV transmission, among people aged 15 years and older. Overall, respondents displayed low levels of accurate knowledge about HIV transmission.

Just over a third of people (36.3%) aged 15 years or older displayed accurate knowledge about the sexual transmission of HIV, with no difference between males and females. Younger age groups were substantially more knowledgeable about the transmission of HIV than adults aged 50 years and older (15–24 years: 36.1%; 25–49 years: 38.7%; 50 years and older, 30.8%). Regarding the racial breakdown, among people aged 15 years and older, whites (50.2%) had the highest proportion of accurate knowledge, followed by Indians/Asians (42.8%). Coloureds (38.8%) and black Africans (34.2%) had fairly similar levels of accurate knowledge.

Regarding locality type, people aged 15 years and older who lived in urban areas had higher proportions of accurate knowledge (37.9%) than people living on farms or in areas under tribal authority. Finally, with regard to the provinces, accurate knowledge of HIV transmission was below 47% overall. The highest proportion of accurate knowledge occurred in the Western Cape (46.4%) and the lowest in North West (24.5%).

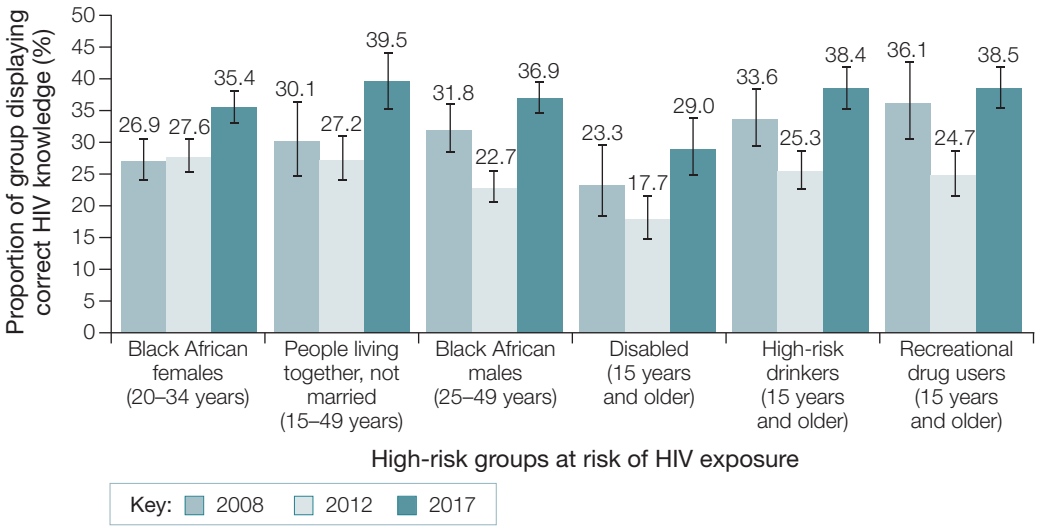
*Table 3.61: Accurate knowledge among people aged 15 years and older about the sexual transmission of HIV and rejection of major misconceptions about HIV, South Africa, 2017*

| Demographic variable | *n* | % | 95% CI |
|---|---|---|---|
| **Total** | **23 668** | **36.3** | **34.9–37.7** |
| **Sex** | | | |
| Male | 10 004 | 36.4 | 34.8–38.1 |
| Female | 13 664 | 36.2 | 34.6–37.8 |
| **Age (years)** | | | |
| 15–24 | 6 019 | 36.1 | 34.0–38.2 |
| 25–49 | 10 921 | 38.7 | 37.0–40.5 |
| 50 and older | 6 728 | 30.8 | 28.9–32.7 |
| **Race** | | | |
| Black African | 15 598 | 34.2 | 32.6–35.9 |
| White | 1 673 | 50.2 | 46.2–54.2 |
| Coloured | 4 253 | 38.8 | 36.0–41.6 |
| Indian/Asian | 2 144 | 42.8 | 38.0–47.8 |
| **Locality type** | | | |
| Urban | 15 386 | 37.9 | 36.2–39.8 |
| Rural informal (tribal areas) | 5 520 | 32.3 | 29.9–34.8 |
| Rural formal (farms) | 2 762 | 34.2 | 30.0–38.7 |
| **Province** | | | |
| Western Cape | 2 855 | 46.4 | 42.1–50.8 |
| Eastern Cape | 2 518 | 38.0 | 34.8–41.4 |
| Northern Cape | 2 026 | 37.5 | 32.1–43.2 |
| Free State | 1 763 | 36.2 | 32.7–40.0 |
| KwaZulu-Natal | 5 292 | 38.4 | 34.6–42.3 |
| North West | 1 979 | 24.5 | 20.4–29.0 |
| Gauteng | 3 311 | 35.1 | 32.3–38.0 |
| Mpumalanga | 2 209 | 34.9 | 31.9–38.0 |
| Limpopo | 1 715 | 30.1 | 26.9–33.4 |

### 3.12.2 Accurate knowledge of HIV among high-risk groups

Figure 3.16 shows the extent of accurate knowledge about preventing the sexual transmission of HIV among members of the six identified high-risk groups. The findings were similar to those reported in 2008 and 2012. The results showed that the level of accurate HIV knowledge among all high-risk groups decreased from 2008 to 2012 but improved again between 2012 to 2017. A substantial improvement was noted for accurate HIV knowledge among black African women aged 20–34 years. The level of accurate HIV knowledge was lowest among people with disabilities. As was reported for the general population above, knowledge about the sexual transmission of HIV has generally improved among high-risk groups. The knowledge level in 2017 was higher than that reported in any other years including 2008. However, despite this improvement, accurate knowledge among high-risk groups remains low.

*Figure 3.16: Accurate knowledge of preventing the sexual transmission of HIV and rejection of misconceptions about HIV transmission among high-risk groups, South Africa, 2008, 2012, 2017*




## 3.13 Social and behaviour change communication programmes

One of the main national responses to the HIV epidemic has been the development of social and behaviour change communication (SBCC) programmes on HIV. These programmes are disseminated through various media – including radio, television, the internet and social media. The level of people's access to such media was examined before we assessed the communication of HIV-prevention messages. Table 3.62 presents the results for this aspect of the survey.

Most people watched television (83.9%) or listened to the radio (66.6%) at least once a week, and more than half accessed social media (59%). Radio listenership was slightly higher among older than younger people, and slightly greater among people in urban areas than in rural or farming areas. Higher TV viewership was recorded in urban areas (87.7%) than in rural areas (77.8%) or farms (63.2%).

Different levels of accessing the internet were noted among the age groups. The highest access was reported by the 20–24-year cohort (47%) and the lowest among people aged 50–55 years (23.7%). The use of social media platforms such as Facebook, Twitter, Instagram and WhatsApp by people of different ages followed the same trend. Internet access and the use of social media were predictably higher in urban areas (43.6% and 66.1%, respectively) than in rural areas (23.9% and 46.5%) or farming communities (19.8% and 38.5%). The most commonly used social media application was WhatsApp (56.2%) and the least used was Twitter (13.1%) (not shown in Table 3.62).

*Table 3.62: Respondent access to one of these media platforms at least once a week*

| Demographic variable | *n* | Radio | | TV | | Magazine | | Newspaper | | Leaflets or booklets | | Internet | | Social media[a] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **21 765** | **66.6** | **64.9–68.2** | **83.9** | **82.3–85.4** | **42.8** | **41.0–44.7** | **48.9** | **47.0–50.8** | **28.3** | **26.8–30.0** | **33.9** | **32.2–35.7** | **59.7** | **57.8–61.5** |
| **Age (years)** | | | | | | | | | | | | | | | |
| 15–19 | 3 505 | 60.4 | 57.5–63.2 | 87.2 | 84.9–89.2 | 45.6 | 42.7–48.6 | 42.5 | 39.7–45.5 | 30.2 | 37.4–43.4 | 40.4 | 27.6–32.8 | 65.2 | 62.0–68.3 |
| 20–24 | 3 349 | 62.8 | 60.2–65.4 | 83.4 | 81.0–85.5 | 42.3 | 39.6–45.0 | 47 | 44.3–49.8 | 31.1 | 44.3–50.5 | 47.4 | 28.5–34.0 | 74.6 | 72.1–76.9 |
| 25–34 | 5 898 | 66.3 | 64.1–68.5 | 83.9 | 82.0–85.7 | 44.0 | 41.4–46.6 | 50.6 | 48.0–53.3 | 32 | 39.0–44.4 | 41.7 | 29.6–34.5 | 67.1 | 64.8–69.4 |
| 35–49 | 6 709 | 70.3 | 68.1–72.4 | 82.9 | 80.9–84.7 | 42.1 | 39.7–44.6 | 51.6 | 49.0–54.2 | 28.7 | 28.1–33.0 | 30.5 | 26.6–30.9 | 49.6 | 46.9–52.3 |
| 50–55 | 2 304 | 70.0 | 66.8–73.0 | 83.3 | 80.6–85.7 | 37.5 | 34.3–40.7 | 45.8 | 42.2–49.4 | 25.7 | 20.4–27.3 | 23.7 | 22.9–28.8 | 33.1 | 29.4–37.1 |
| **Locality type** | | | | | | | | | | | | | | | |
| Urban | 14 392 | 68.6 | 66.5–70.5 | 87.7 | 86.0–89.3 | 48.5 | 46.4–50.7 | 55.5 | 53.4–57.7 | 34.7 | 41.2–46.1 | 43.6 | 32.6–36.8 | 66.1 | 63.8–68.4 |
| Rural informal (tribal areas) | 4 705 | 61.7 | 58.0–65.3 | 77.8 | 74.6–80.7 | 31.2 | 28.1–34.5 | 35.1 | 31.4–38.9 | 20.9 | 21.4–26.7 | 23.9 | 18.2–24.0 | 46.5 | 43.9–49.1 |
| Rural formal (farms) | 2 668 | 63.6 | 58.6–68.4 | 63.2 | 56.3–69.7 | 23.8 | 20.2–27.7 | 28.2 | 24.1–32.8 | 14.0 | 15.7–24.7 | 19.8 | 10.9–17.7 | 38.5 | 32.4–45.0 |
| **Total** | **21 765** | **66.6** | **64.9–68.2** | **83.9** | **82.3–85.4** | **42.8** | **41.0–44.7** | **48.9** | **47.0–50.8** | **28.0** | **26.5–29.5** | **33.5** | **31.8–35.2** | **59.7** | **57.8–61.5** |

a Social media includes Facebook, Twitter, WhatsApp and Instagram.

### 3.13.1 SBCC programmes' exposure and reach

Among the SBCC programmes offered by the Centre for Communication Impact (CCI), the best-recognised among respondents were the Brothers for Life logo (49.0%), the 'granny and girl at the clinic' advertisement (27.8%) and the Zing advertisement (23.7%) (see Table 3.63). The estimated population reached by the Brothers for Life programme was 16.5 million people. The 'granny and girl at the clinic' advertisement and the Zing advertisement were estimated to reach 9.3 million and 8 million people aged 15 years and older respectively in the general population. Siyayinqoba programmes were also fairly popular, with approximately 18% of people having heard about the programme.

Slightly more males (51.5%) than females (46.6%) recognised the Brothers for Life logo, whereas more females (26.4%) than males (21.0%) reported having seen the Zing advertisement. More females (33.0%) than males (22.5%) recognised the 'granny and girl' advertisement. Generally, exposure to these three most recognised programmes decreased as respondents' age increased. Table 3.63 shows the programmes' estimated reach, broken down by respondents' sex, for 2017.

*Table 3.63: Individual exposure to progammes offered by CCI in the past 12 months, by sex, among people aged 15–55 years*

| | | Males | | Females | | Total | |
|---|---|---|---|---|---|---|---|
| | Total | Programme reach | | Programme reach | | Programme reach | |
| Programmes | (*n*) | % | 95% CI | % | 95% CI | % | 95% CI |
| Had seen Brothers for Life logo | 8 896 | 51.5 | 49.3–53.7 | 46.6 | 44.5–48.8 | 49.0 | 47.1–51.0 |
| Had seen ZING advert on TV | 3 945 | 21.0 | 19.2–22.8 | 26.4 | 24.5–28.3 | 23.7 | 22.1–25.4 |
| Had seen ZAZI logo | 3 360 | 17.8 | 16.2–19.4 | 21.4 | 19.7–23.3 | 19.6 | 18.2–21.1 |
| Had seen Zonke with the girls on TV | 1 492 | 7.4 | 6.4–8.6 | 11.2 | 10.0–12.5 | 9.3 | 8.3–10.4 |
| Had seen 'granny and girl at the clinic' advert on TV | 4 804 | 22.5 | 20.6–24.6 | 33.0 | 30.8–35.3 | 27.8 | 25.9–29.7 |
| Had heard of Siyayinqoba Beat It | 2 376 | 14.8 | 13.1–16.5 | 18.4 | 16.7–20.2 | 16.6 | 15.1–18.2 |
| Watched Siyayinqoba Beat It on TV | 519 | 3.0 | 2.4–3.8 | 4.6 | 4.0–5.4 | 3.8 | 3.3–4.4 |
| Listened to Siyayinqoba Beat It on radio | 230 | 1.6 | 1.3–2.1 | 1.7 | 1.4–2.2 | 1.7 | 1.4–2.0 |
| Had seen Siyayinqoba logo | 2 939 | 17.9 | 16.1–19.8 | 19.9 | 18.1–21.8 | 18.9 | 17.3–20.6 |
| Had seen Siyayinqoba Beat It newspaper banner | 930 | 5.4 | 4.5–6.4 | 5.7 | 4.9–6.7 | 5.6 | 4.9–6.3 |
| Had seen Siyayinqoba Beat It condom holders | 3 192 | 20.2 | 18.4–22.2 | 17.1 | 15.4–18.9 | 18.6 | 17.1–20.3 |
| Had seen Siyayinqoba Beat It pamphlets | 1 948 | 8.8 | 7.7–10.2 | 13.3 | 11.9–14.9 | 11.1 | 10.0–12.3 |
| Had seen Inside Story picture | 479 | 2.8 | 2.3–3.4 | 2.1 | 1.7–2.5 | 2.4 | 2.1–2.8 |

Table 3.64 shows individuals aged 15–55 years who were exposed to programmes offered by CCI in the last year. The loveLife logo was seen by an estimated 12.6 million people (37.4% of respondents) and an estimated 1.9 million people (5.5%) had listened to the loveLife talk show on radio.

The most recognised Soul City programmes were Soul City TV (14%), with an estimated population reach of 4.8 million people. Nearly 12% of respondents (approximately 4 million people) reported that they had read the *Circumcision for Life* booklet, and 9% (approximately 3 million people) had read the free HIV booklet. Slightly more females (10.6%) than males (7.3%) had read the free HIV babies booklet, but there was little difference between the number of males (11.7%) and females (12%) who had read *Circumcision for Life*.

Table 3.65 (page 109) shows individuals aged 15–55 years who were exposed to programmes offered by Soul City in the last year.

Approximately 5.7 million people (16.8% of respondents) indicated that they had heard, seen, watched or participated in 16 or more of the 43 programmes that were listed and assessed in the survey. This group was classified as having high exposure. Approximately 15.7 million people (46.6%) were exposed to between 5 and 15 SBCC programmes (moderate exposure).

*Table 3.64: Individual exposure to programmes offered by CCI in the past 12 months, by sex, among respondents aged 15–55 years*

| | | Males | | Females | | Total | |
|---|---|---|---|---|---|---|---|
| | Total | Programme reach | | Programme reach | | Programme reach | |
| Programme | (*n*) | % | 95% CI | % | 95% CI | % | 95% CI |
| Had watched Soul City TV | 2 238 | 12.6 | 11.1–14.4 | 16.0 | 14.3–17.8 | 14.3 | 12.9–15.9 |
| Had seen Rise Young Women's Clubs logo | 1 201 | 5.9 | 5.0–7.0 | 9.5 | 8.3–10.8 | 7.7 | 6.9–8.7 |
| Had read *Phuza Wise* booklets | 844 | 5.7 | 4.9–6.5 | 4.8 | 4.0–5.7 | 5.2 | 4.6–5.9 |
| Had read *Dual Protection* booklet | 939 | 5.0 | 4.2–6.0 | 6.3 | 5.5–7.2 | 5.7 | 5.0–6.4 |
| Had read *Soul Sex* booklet | 1 323 | 7.3 | 6.4–8.4 | 9.1 | 8.1–10.1 | 8.2 | 7.4–9.1 |
| Had read free *HIV Babies* booklet | 1 450 | 7.3 | 6.5–8.3 | 10.6 | 9.5–11.9 | 9.0 | 8.1–9.9 |
| Had read *Alcohol and You* booklet | 1 108 | 6.2 | 5.5–7.1 | 7.0 | 6.2–7.9 | 6.6 | 6.0–7.4 |
| Had read *Parenting and Alcohol* booklet | 1 184 | 5.8 | 5.0–6.7 | 8.4 | 7.5–9.5 | 7.1 | 6.4–7.9 |
| Had read *Circumcision for Life* booklet | 1 842 | 11.7 | 10.3–13.2 | 12.0 | 10.8–13.4 | 11.9 | 10.7–13.1 |
| Had read *Rise Magazine* (any edition) | 498 | 2.6 | 2.1–3.2 | 3.2 | 2.7–3.8 | 2.9 | 2.5–3.4 |
| Had read *HeartBeat* booklet | 467 | 2.4 | 1.9–2.9 | 2.8 | 2.3–3.4 | 2.6 | 2.2–3.0 |
| Had read *OneLove* | 930 | 5.2 | 4.5–6.1 | 5.9 | 5.2–6.8 | 5.6 | 4.9–6.3 |
| Had read *Positive Living* (any edition) | 455 | 2.3 | 1.9–2.8 | 2.9 | 2.4–3.4 | 2.6 | 2.2–3.0 |

*Table 3.65: Individual exposure to progammes offered by Soul City in the past 12 months, by sex, people aged 15–55 years*

| Programme | Total (*n*) | Males | | Females | | Total | |
|---|---|---|---|---|---|---|---|
| | | Programme reach | | Programme reach | | Programme reach | |
| | | % | 95% CI | % | 95% CI | % | 95% CI |
| Seen loveLife logo | 6 860 | 36.1 | 33.8–38.5 | 38.7 | 36.5–40.9 | 37.4 | 35.4–39.5 |
| Read any editions of UNCUT in the last 12 months | 298 | 1.7 | 1.3–2.3 | 1.4 | 1.1–1.8 | 1.6 | 1.3–1.9 |
| Listened to a loveLife talk show on the radio | 836 | 5.5 | 4.7–6.5 | 5.5 | 4.7–6.4 | 5.5 | 4.8–6.3 |
| Heard about the loveLife groundBREAKER or Mpintshi programmes | 599 | 3.1 | 2.4–3.8 | 3.6 | 3.0–4.4 | 3.3 | 2.8–4.0 |

The levels of exposure for this composite indicator were similar for males and females. Among respondents, 18.5% of males and 23.5% of females had participated in face-to-face SBCC programmes – such as community meetings, community dialogues or other meetings related to HIV – during the past year.

### 3.13.2 SBCC exposure and behavioural outcomes

Table 3.66 (page 110) shows that among people who had the highest exposure to SBCC programmes (16 programmes or more), 92.5% had been tested for HIV, 78.7% had been tested for HIV within the last year, 15.4% reported having had two or more sexual partners in the last year, and 68.5% rejected myths about HIV. Notably, several subgroups of respondents had not been exposed to any of the 43 SBCC programmes assessed in the survey. These were 11% of people aged 15–24 years who reported an early sexual debut (at age 15 or younger), 32.7% of those reporting condom use at the most recent sexual encounter, and 22.2% of people who reported consistent condom use. Among males who reported having been circumcised, the levels of exposure to SBCC campaigns were as follows (not shown in Table 3.65): 26.0%, high exposure; 25.5%, moderate exposure; 38.5%, low exposure; and 48.6%, no exposure at all. Among males reporting that they had been medically circumcised, the levels were 55.6%, high exposure; 53.8%, moderate exposure; 51.0%, low exposure; and 45.0%, no exposure.

## 3.14 Attitudes towards people living with HIV

Stigma and discrimination against people living with HIV continue to be at the forefront of the national HIV-reduction initiative. Negative attitudes toward people living with HIV remain a barrier to the effective delivery of care and treatment. This section presents the results by age for HIV-related stigma towards people living with HIV, among people aged 15 years and older.

Overall, of the six questions relating to stigma, five yielded results that indicated most respondents (85.8%–91.7%) held positive attitudes toward people living with HIV. The question relating to the willingness to care for a family member with AIDS showed the highest proportion of favourable responses. Two-thirds of people (66.7%) indicated that they were willing to maintain confidentiality about the HIV-positive status of a family member. When compared across the three age groups and the nine provinces, all six questions relating to stigma listed in Tables 3.67 and 3.68 (page 111 and 112) were endorsed as discussed above.

*Table 3.66: Behaviour-change communication exposure and selected behavioural and other outcomes*

| Behavioural outcomes | Level of exposure to behaviour change communication | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | | | Low | | | Moderate | | | High | | |
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **Have you ever been tested for HIV, and if tested, were you given your results?** | | | | | | | | | | | | |
| Yes | 3 703 | 66.6 | 64.5–68.6 | 5 607 | 73.0 | 71.1–74.9 | 3 834 | 82.1 | 80.4–83.7 | 393 | 92.5 | 88.9–95.0 |
| No | 167 | 3.3 | 2.7–4.0 | 208 | 2.5 | 2.0–3.1 | 97 | 2.1 | 1.6–2.7 | 4 | 0.6 | 0.2–2.2 |
| Never tested for HIV before | 1 730 | 30.1 | 28.1–32.3 | 2 022 | 24.5 | 22.7–26.4 | 813 | 15.8 | 14.3–17.4 | 34 | 6.9 | 4.6–10.3 |
| **How far back was your last HIV test?** | | | | | | | | | | | | |
| Less than a year ago | 2 466 | 64.9 | 62.1–67.6 | 3 841 | 67.1 | 65.1–69.0 | 2 796 | 71.3 | 68.8–73.6 | 311 | 78.7 | 72.1–84.0 |
| More than a year ago | 1 409 | 35.1 | 32.4–37.9 | 1 974 | 32.9 | 31.0–34.9 | 1 143 | 28.7 | 26.4–31.2 | 86 | 21.3 | 16.0–27.9 |
| **Age at sexual debut** | | | | | | | | | | | | |
| Aged 15 years or younger | 174 | 11.0 | 8.9–13.4 | 368 | 15.2 | 13.2–17.4 | 262 | 18.2 | 15.9–20.8 | 17 | 18.0 | 10.9–28.4 |
| Aged 16 years or older | 2 204 | 89.0 | 86.6–91.1 | 2 300 | 84.8 | 82.6–86.8 | 1 413 | 81.8 | 79.2–84.1 | 95 | 82.0 | 71.6–89.1 |
| **Number of sexual partners in the last 12 months** | | | | | | | | | | | | |
| One partner | 2 592 | 93.4 | 92.1–94.5 | 4 153 | 88.8 | 87.3–90.2 | 2 814 | 86.3 | 84.3–88.1 | 287 | 84.6 | 78.3–89.3 |
| Two and more partners | 162 | 6.6 | 5.5–7.9 | 433 | 11.2 | 9.8–12.7 | 387 | 13.7 | 11.9–15.7 | 44 | 15.4 | 10.7–21.7 |
| **Used a condom during last sexual act** | | | | | | | | | | | | |
| No | 1 894 | 67.3 | 64.3–70.2 | 2 953 | 61.0 | 58.8–63.2 | 1 697 | 52.2 | 49.5–54.9 | 157 | 46.9 | 39.8–54.1 |
| Yes | 825 | 32.7 | 29.8–35.7 | 1 606 | 39.0 | 36.8–41.2 | 1 485 | 47.8 | 45.1–50.5 | 171 | 53.1 | 45.9–60.2 |
| **Consistent condom use** | | | | | | | | | | | | |
| No | 2 132 | 77.8 | 75.4–80.1 | 3 413 | 73.7 | 71.6–75.6 | 2 073 | 65.5 | 63.1–67.8 | 211 | 62.6 | 55.5–69.2 |
| Yes | 555 | 22.2 | 19.9–24.6 | 1 112 | 26.3 | 24.4–28.4 | 1 081 | 34.5 | 32.2–36.9 | 118 | 37.4 | 30.8–44.5 |
| **Rejection of myths associated with HIV** | | | | | | | | | | | | |
| Believe myths | 2 935 | 51.7 | 48.9–54.5 | 3 235 | 40.4 | 38.6–42.3 | 1 707 | 35.5 | 33.4–37.6 | 141 | 31.5 | 25.5–38.2 |
| Reject myths | 2 808 | 48.3 | 45.5–51.1 | 4 692 | 59.6 | 57.7–61.4 | 3 063 | 64.5 | 62.4–66.6 | 295 | 68.5 | 61.8–74.5 |

*Note*: Percentages reflect proportions of the survey population

*Table 3.67: Perception of HIV-related stigma, comparison by ages, South Africa, 2017*

| Questions relating to stigma | Age group (years) | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 15–24 | | 25–49 | | 50 and older | | | |
| | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| If you knew that a shopkeeper or food seller had HIV, would you buy food from them? | 84.1 | 82.7–85.5 | 89.5 | 88.5–90.3 | 79.0 | 77.4–80.5 | 85.8 | 84.9–86.7 |
| Would you be willing to care for a family member with AIDS? | 90.6 | 89.5–91.7 | 93.7 | 92.9–94.4 | 88.4 | 87.2–89.5 | 91.7 | 91.1–92.4 |
| If a teacher has HIV but is not sick, he or she should be allowed to continue to teach? | 89.9 | 88.7–90.9 | 92.8 | 92.0–93.6 | 85.4 | 84.0–86.6 | 90.4 | 89.7–91.1 |
| Is it a waste of money to train or give a promotion to someone with HIV/AIDS?[a] | 85.4 | 84.0–86.7 | 86.6 | 85.5–87.7 | 85.2 | 83.9–86.5 | 86.0 | 85.1–86.9 |
| Would you want to keep the HIV-positive status of a family member a secret? | 70.4 | 68.4–72.2 | 67.9 | 66.2–69.5 | 59.8 | 57.8–61.7 | 66.7 | 65.3–68.0 |
| Are you comfortable talking to at least one member of your family about HIV/AIDS? | 83.8 | 82.4–85.1 | 90.4 | 89.5–91.2 | 83.9 | 82.3–85.3 | 87.3 | 86.5–88.1 |

a The correct response here is 'no'.

*Table 3.68: Percentage of people aged 15 years and older, by province, who agreed with individual statements about people living with HIV and AIDS, South Africa, 2017*

| Question pertaining to stigma | WC | | EC | | NC | | FS | | KZN | |
|---|---|---|---|---|---|---|---|---|---|---|
| | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| If you knew that a shopkeeper or food seller had HIV, would you buy food from them? | 78.8 | 75.4–81.9 | 85.2 | 82.8–87.3 | 80.2 | 76.9–83.1 | 84.9 | 82.5–87.0 | 88.8 | 86.6–90.8 |
| Would you be willing to care for a family member with AIDS? | 88.5 | 86.3–90.4 | 90.0 | 88.0–91.6 | 86.9 | 84.4–89.0 | 92.3 | 90.3–94.0 | 91.9 | 89.9–93.5 |
| If a teacher has HIV but is not sick, he or she should be allowed to continue to teach? | 86.4 | 83.9–88.6 | 87.8 | 85.2–89.9 | 84.7 | 81.6–87.4 | 90.8 | 89.1–92.3 | 92.1 | 90.1–93.8 |
| It is a waste of money to train or give a promotion to someone with HIV/AIDS? | 85.2 | 83.0–87.2 | 85.6 | 83.3–87.6 | 87.1 | 82.9–90.3 | 79.6 | 75.8–83.0 | 86.4 | 84.0–88.5 |
| Would you want to keep the HIV-positive status of a family member a secret? | 58.6 | 54.4–62.6 | 61.6 | 58.4–64.7 | 64.2 | 59.3–68.9 | 61.2 | 56.5–65.7 | 75.7 | 72.1–79.0 |
| Are you comfortable talking to at least one member of your family about HIV and AIDS? | 88.7 | 86.8–90.4 | 82.9 | 80.4–85.1 | 84.1 | 79.8–87.7 | 83.5 | 80.4–86.2 | 89.5 | 87.3–91.4 |
| | NW | | GP | | MP | | LP | | Total | |
| If you knew that a shopkeeper or food seller had HIV, would you buy food from them? | 84.7 | 81.1–87.7 | 89.6 | 88.2–91.0 | 88.4 | 86.4–90.2 | 79.0 | 75.8–81.9 | 85.8 | 84.9–86.7 |
| Would you be willing to care for a family member with AIDS? | 90.5 | 87.1–93.1 | 95.9 | 94.9–96.7 | 89.2 | 86.7–91.3 | 89.5 | 87.4–91.3 | 91.7 | 91.1–92.4 |
| If a teacher has HIV but is not sick, he or she should be allowed to continue to teach? | 89.7 | 87.1–91.9 | 94.9 | 93.8–95.8 | 88.6 | 85.9–90.9 | 85.6 | 83.1–87.8 | 90.4 | 89.7–91.1 |
| It is a waste of money to train or give a promotion to someone with HIV/AIDS? | 83.6 | 80.2–86.4 | 89.1 | 86.8–91.0 | 85.9 | 83.3–88.1 | 83.2 | 80.2–85.8 | 86.0 | 85.1–86.9 |
| Would you want to keep the HIV-positive status of a family member a secret? | 75.4 | 72.3–78.3 | 65.3 | 62.5–68.0 | 69.4 | 65.0–73.4 | 63.8 | 60.6–66.8 | 66.7 | 65.3–68.0 |
| Are you comfortable talking to at least one member of your family about HIV and AIDS? | 85.2 | 81.7–88.1 | 91.3 | 89.7–92.6 | 85.4 | 82.8–87.7 | 81.0 | 78.3–83.4 | 87.3 | 86.5–88.1 |

Table 3.69 shows the trends across the survey series, broken down by age categories (ages 15 and older), regarding the accurate endorsement of the six statements about people living with HIV. Overall, the responses to four of the six items have remained fairly stable, depicting an ongoing low level of stigma. Responses to the first item (*'If you knew that a shopkeeper or food seller had HIV, would you buy food from them?'*) have shown a gradual reduction in the perception of stigma. The fifth item (*'Would you want to keep the HIV-positive status of a family member a secret?'*) has seen a large increase in 'yes' responses to the question, indicating that people are more aware of the individual's right to disclose their own status.

*Table 3.69: People aged 15 years and older who agreed with individual statements about people living with HIV and AIDS, by age group, South Africa, 2005, 2008, 2012 and 2017*

| | 2005 | | 2008 | | 2012 | | 2017 | |
|---|---|---|---|---|---|---|---|---|
| Statement | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| If you knew that a shopkeeper or food seller had HIV, would you buy food from them? | 71.1 | 69.6–72.6 | 72.5 | 71.0–73.9 | 79.0 | 77.7–80.3 | 85.8 | 84.9–86.7 |
| Would you be willing to care for a family member with AIDS? | 90.7 | 89.7–91.7 | 92.1 | 91.3–92.9 | 91.6 | 90.6–92.5 | 91.7 | 91.1–92.4 |
| If a teacher has HIV but is not sick, he or she should be allowed to continue to teach? | – | | 82.8 | 81.6–84.0 | 83.0 | 81.8–84.2 | 90.4 | 89.7–91.1 |
| Is it a waste of money to train or give a promotion to someone with HIV/AIDS? | 85.1 | 83.9–86.2 | 84.2 | 83.0–85.4 | 83.4 | 82.3–84.5 | 86.0 | 85.1–86.9 |
| Would you want to keep the status of a family member a secret? | 30.5 | 28.9–32.1 | 39.9 | 38.4–41.5 | 50.1 | 48.4–51.8 | 66.7 | 65.3–68.0 |
| Are you comfortable talking to at least one member of your family about HIV/AIDS? | – | | 88.9 | 88.0–89.7 | 86.0 | 85.1–87.0 | 87.3 | 86.5–88.1 |

## 3.15 Experiences of intimate partner violence

Previous research has shown intimate partner violence (IPV) to be a predictor of HIV infection. This section presents results for the prevalence of IPV and its relationship with HIV infection. According to the WHO (2001) ethical and safety recommendations for research on domestic violence, only one adult per household was selected, randomly, to respond to questions about IPV.

Table 3.70 shows the experiences of IPV reported by both sexes in the current study. The most commonly reported acts of IPV among both sexes included being pushed or shaken or having an object thrown at them (all a single response category; 12.9%) and being slapped (12.9%). More females experienced IPV than males for all but one of the categories.

*Table 3.70: Experiences of intimate partner violence reported by both sexes, South Africa, 2017*

| A partner did the following things to you: | Male | | | Female | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| Pushed you, shook you, or threw something at you | 2 245 | 10.8 | 9.1–12.7 | 3 057 | 15.1 | 13.4–17.0 | 5 302 | 12.9 | 11.7–14.3 |
| Slapped you | 2 246 | 9.8 | 8.0–11.8 | 3 056 | 16.0 | 14.2–18.0 | 5 302 | 12.9 | 11.6–14.3 |
| Twisted your arm or pulled your hair | 2 245 | 2.8 | 2.0–3.8 | 3 053 | 7.4 | 6.2–8.8 | 5 298 | 5.1 | 4.3–6.0 |
| Punched you with his fist or with something | 2 246 | 4.7 | 3.6–6.1 | 3 056 | 7.9 | 6.7–9.3 | 5 302 | 6.3 | 5.5–7.3 |
| Kicked you, dragged you, or beat you up | 2 245 | 2.9 | 2.1–4.0 | 3 053 | 8.5 | 7.1–10.1 | 5 298 | 5.7 | 4.8–6.7 |
| Tried to choke you or burnt you on purpose | 2 246 | 2.5 | 1.7–3.5 | 3 052 | 3.2 | 2.4–4.3 | 5 298 | 2.8 | 2.2–3.5 |
| Threatened or attacked you with a knife, gun, or other weapon | 2 247 | 3.7 | 2.7–4.9 | 3 054 | 3.2 | 2.4–4.2 | 5 301 | 3.4 | 2.8–4.1 |
| Physically forced you to have sexual intercourse with him/her when you did not want to | 2 247 | 1.4 | 1.0–2.2 | 3 055 | 3.5 | 2.7–4.5 | 5 302 | 2.5 | 2.0–3.0 |
| Physically forced you to perform any other sexual acts you did not want to | 2 247 | 1.5 | 0.9–2.5 | 3 055 | 2.7 | 2.0–3.6 | 5 302 | 2.1 | 1.6–2.7 |
| Forced you with threats or in any other way | 2 245 | 2.4 | 1.7–3.4 | 3 055 | 3.6 | 2.7–4.7 | 5 300 | 3.0 | 2.4–3.7 |
| Performed sexual acts you did not want to | 2 242 | 1.5 | 0.9–2.6 | 3 054 | 2.6 | 1.9–3.5 | 5 296 | 2.1 | 1.6–2.7 |

Females reported more experiences of having their arms twisted or hair pulled (7.4% vs 2.8%); being kicked, dragged or beaten up (8.5% vs 2.9%) and having been forced to have sex against their will (3.5% vs 1.4%) compared to their male counterparts. The exception was violence involving the threat of a weapon or its actual use (being threatened or attacked with a knife, gun or other weapon). Both sexes reported experiencing this equally (3.7% for males and 3.2% for females).

Table 3.71 shows the injuries sustained by people due to experiences of IPV. Cuts, bruises or aches were the main injury and were experienced by both men (3.2%) and women (5.5%). Women were more likely to have experienced all of the injury types, including severe injuries.

*Table 3.71: Injuries experienced as a result of intimate partner violence, South Africa, 2017*

| | Male | | | Female | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| Injury type | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| Had cuts, bruises, or aches | 2 242 | 3.2 | 2.4–4.3 | 3 054 | 5.5 | 4.6–6.7 | 5 296 | 4.3 | 3.7–5.1 |
| Had eye injuries, sprains, dislocations, or burns | 2 242 | 1.2 | 0.7–2.0 | 3 052 | 4.2 | 3.3–5.2 | 5 294 | 2.7 | 2.1–3.3 |
| Had deep wounds, broken bones, broken teeth | 2 241 | 1.2 | 0.7–1.9 | 3 052 | 2.1 | 1.6–2.9 | 5 293 | 1.7 | 1.3–2.2 |
| Other serious injury | 2 229 | 0.9 | 0.5–1.5 | 3 036 | 1.4 | 1.0–2.1 | 5 265 | 1.1 | 0.8–1.6 |

To determine the frequency of experiences of physical violence, we asked respondents to indicate how often this had happened in the last year. As shown in Table 3.72, most respondents (72.1%) indicated that they had not experienced any physical violence in the past year, whereas about a quarter (26.5%) had experienced violence 'only sometimes'. Less than 2% indicated that physical violence occurred 'often', with a slightly higher proportion of females (1.6%) than males (1.1%) reporting this.

*Table 3.72: Frequency of physical violence in the past year, South Africa, 2017*

| | Total | Often | | Only sometimes | | Not at all | |
|---|---|---|---|---|---|---|---|
| Sex | *n* | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **5 248** | **1.3** | **0.9–1.9** | **26.5** | **24.3–28.8** | **72.1** | **69.8–74.3** |
| Male | 2 233 | 1.1 | 0.6–1.9 | 26.9 | 24.0–30.1 | 72.0 | 68.8–75.0 |
| Female | 3 015 | 1.6 | 1.1–2.4 | 26.1 | 23.6–28.8 | 72.3 | 69.5–74.9 |

Table 3.73 (page 116) shows the HIV status among people who experienced IPV. The results show that HIV prevalence was higher in both men and women who reported experiences of being pushed, shaken or having objects thrown at them or being slapped, compared to people who did not experience any IPV. Further analysis showed that there were no significant differences between males and females in this regard. However, men

who reported being pushed, shaken or having something thrown at them included a relatively high proportion of individuals living with HIV.

*Table 3.73: IPV among individuals living with HIV, South Africa, 2017*

| Type of violence | Males living with HIV | | | Females living with HIV | | |
|---|---|---|---|---|---|---|
| | *n* | (%) | 95% CI | *n* | (%) | 95% CI |
| **Pushed you, shook you, or threw something at you** | | | | | | |
| Yes, experienced | 159 | 26.6 | 17.3–38.5 | 329 | 26.7 | 21.1–33.3 |
| No, did not experience | 1 335 | 14.2 | 11.6–17.3 | 1 827 | 25.2 | 22.4–28.2 |
| **Slapped you** | | | | | | |
| Yes, experienced | 149 | 21.8 | 13.4–33.6 | 343 | 28.0 | 22.2–34.7 |
| No, did not experience | 1 346 | 14.9 | 12.2–18.0 | 1 813 | 24.9 | 22.1–27.9 |

The analysis in Table 3.74 shows the results for people who reported that they had acted violently towards their intimate partners. The results are broken down by sex. More men and women who reported perpetrating IPV had an HIV-positive status, compared to people who were not violent towards their partners. Among males, the difference was significant ($p$=0.001).

*Table 3.74: IPV by HIV status by sex, South Africa, 2017*

| | Males | | | Females | | |
|---|---|---|---|---|---|---|
| Perpetration of IPV | *n* | % | 95% CI | *n* | % | 95% CI |
| Yes | 159 | 28.6 | 19.5–39.8 | 160 | 27.7 | 19.4–37.8 |
| No | 1 331 | 14.1 | 11.5–17.3 | 1 984 | 25.2 | 22.5–28.1 |

## 3.16 Orphanhood status

The prevalence of orphanhood among children has been exacerbated by deaths associated with AIDS and TB, especially in countries like South Africa with a high prevalence of both diseases. The survey did not distinguish between children who were orphaned as a result of AIDS versus other causes. Table 3.75 (page 117) shows the current status of orphanhood in South Africa for children aged 18 years and younger.

The prevalence of orphanhood in 2017 was 11.5% of all children (down from 16.9% in 2012). The largest subgroup of orphans were paternal orphans. There were no differences by sex. A significantly higher percentage of orphans were black Africans (12.4%) than any other race ($p$<0.001).

As observed previously, the percentage of orphans increased with age, ranging from 2.9% among children aged 4 years or younger to 23.3% among teens aged 15–18 years. The 15–18-year age group had a higher percentage of paternal orphans (13.2%) than other age groups. The percentage of orphans was highest in rural informal (tribal) areas (12.6%), followed by urban areas. With regard to provinces, Free State had the most orphans (17.1%) and the Western Cape had the fewest (7.4%).

*Table 3.75: Orphanhood among children aged 18 years and younger, South Africa, 2017*

| Demographic variable | *n* | Orphan | | Maternal | | Paternal | | Double orphan | | Not orphan | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | CI | % | CI | % | CI | % | CI | % | CI |
| **Total** | **12 845** | **11.5** | **10.6–12.4** | **3.0** | **2.6–3.5** | **6.4** | **5.8–7.0** | **2.1** | **1.7–2.5** | **88.5** | **87.6–89.4** |
| **Sex** | | | | | | | | | | | |
| Male | 6 366 | 11.3 | 10.2–12.5 | 3.0 | 2.5–3.7 | 6.2 | 5.4–7.1 | 2.1 | 1.7–2.6 | 88.7 | 87.5–89.8 |
| Female | 6 479 | 11.6 | 10.5–12.8 | 3.0 | 2.4–3.7 | 6.5 | 5.7–7.4 | 2.1 | 1.6–2.7 | 88.4 | 87.2–89.5 |
| **Race** | | | | | | | | | | | |
| Black African | 9 270 | 12.4 | 11.4–13.5 | 3.3 | 2.7–3.9 | 6.8 | 6.1–7.5 | 2.4 | 1.9–2.8 | 87.6 | 86.5–88.6 |
| White | 526 | 5.2 | 3.1–8.6 | 1.5 | 0.6–3.7 | 3.7 | 1.9–6.9 | 0.1 | 0.0–0.2 | 94.8 | 91.4–96.9 |
| Coloured | 2 337 | 7.3 | 6.1–8.8 | 2.0 | 1.4–2.8 | 4.6 | 3.6–5.8 | 0.8 | 0.4–1.3 | 92.7 | 91.2–93.9 |
| Indian/Asian | 712 | 5.7 | 3.3–9.5 | 0.5 | 0.2–1.4 | 4.1 | 2.2–7.3 | 1.1 | 0.2–4.6 | 94.3 | 90.5–96.7 |
| **Age (years)** | | | | | | | | | | | |
| 0–4 | 3 358 | 2.9 | 2.3–3.8 | 0.8 | 0.5–1.3 | 1.9 | 1.4–2.6 | 0.2 | 0.1–0.7 | 97.1 | 96.2–97.7 |
| 5–9 | 3 640 | 7.8 | 6.7–9.1 | 2.5 | 1.8–3.4 | 4.3 | 3.5–5.2 | 1.0 | 0.7–1.5 | 92.2 | 90.9–93.3 |
| 10–11 | 3 414 | 16.2 | 14.4–18.2 | 4.8 | 3.8–6.0 | 8.6 | 7.4–9.9 | 2.8 | 2.1–3.7 | 83.8 | 81.8–85.6 |
| 15–18 | 2 433 | 23.3 | 21.0–25.8 | 4.6 | 3.6–5.8 | 13.2 | 11.4–15.3 | 5.5 | 4.4–6.9 | 76.7 | 74.2–79.0 |
| **Province** | | | | | | | | | | | |
| Western Cape | 1 333 | 7.4 | 5.4–9.9 | 1.2 | 0.7–2.0 | 4.9 | 3.4–6.9 | 1.3 | 0.7–2.6 | 92.6 | 90.1–94.6 |
| Eastern Cape | 1 376 | 14.4 | 12.0–17.3 | 3.5 | 2.4–4.9 | 8.8 | 6.9–11.2 | 2.2 | 1.2–3.7 | 85.6 | 82.7–88.0 |
| Northern Cape | 1 063 | 15.7 | 13.4–18.4 | 5.4 | 3.9–7.2 | 7.9 | 6.5–9.6 | 2.5 | 1.3–4.6 | 84.3 | 81.6–86.6 |
| Free State | 941 | 17.1 | 12.8–22.4 | 4.2 | 2.8–6.3 | 10.9 | 8.1–14.4 | 2.0 | 1.0–3.9 | 82.9 | 77.6–87.2 |
| KwaZulu-Natal | 3 008 | 12.1 | 10.1–14.4 | 2.6 | 1.9–3.6 | 6.6 | 5.3–8.3 | 2.8 | 1.9–3.9 | 87.9 | 85.6–89.9 |
| North West | 1 147 | 14.0 | 11.4–17.0 | 3.4 | 2.1–5.3 | 7.2 | 5.3–9.6 | 3.4 | 2.3–5.0 | 86.0 | 83.0–88.6 |
| Gauteng | 1 619 | 9.9 | 7.9–12.4 | 3.2 | 1.9–5.2 | 5.0 | 3.8–6.5 | 1.8 | 1.0–3.0 | 90.1 | 87.6–92.1 |
| Mpumalanga | 1 267 | 11.8 | 9.3–14.7 | 3.4 | 2.4–4.7 | 6.5 | 4.9–8.7 | 1.9 | 1.3–2.8 | 88.2 | 85.3–90.7 |
| Limpopo | 1 091 | 9.1 | 7.2–11.3 | 3.1 | 2.0–4.6 | 4.8 | 3.5–6.5 | 1.2 | 0.6–2.4 | 90.9 | 88.7–92.8 |
| **Locality** | | | | | | | | | | | |
| Urban area | 7 644 | 11.0 | 9.8–12.2 | 2.9 | 2.3–3.7 | 6.2 | 5.4–7.1 | 1.9 | 1.5–2.4 | 89.0 | 87.8–90.2 |
| Rural informal (tribal areas) | 3 992 | 12.6 | 11.1–14.3 | 3.3 | 2.6–4.1 | 6.9 | 5.9–8.0 | 2.4 | 1.8–3.2 | 87.4 | 85.7–88.9 |
| Rural formal (farms) | 1 209 | 8.3 | 6.0–11.5 | 2.4 | 1.6–3.4 | 4.0 | 2.3–6.9 | 2.0 | 1.1–3.6 | 91.7 | 88.5–94.0 |

Figure 3.17 presents a trend analysis and shows a comparison of the rates of orphanhood between 2008 and 2017. There was a slight increase between 2008 and 2012 (3 032 000 orphans in 2008 vs 3 132 000 in 2012). However, a decrease was observed for 2017, with the number of orphans declining to 2 135 000.

A comparison with the orphanhood estimates from the 2012 survey, stratified by province, showed that overall a significant decline has occurred in the number of reported orphans since 2012 (16.9% in 2012 vs 11.5% in 2017, $p<0.001$) (see Table 3.76 below). Since the previous study, noteworthy changes have also occurred at the provincial level. The province with the most orphans is no longer KwaZulu-Natal but is now Free State (17.1%), followed by Northern Cape (15.7%). The observed changes between 2012 and 2017 regarding the number of orphans residing in KwaZulu-Natal and Mpumalanga were significant ($p<0.001$).

*Figure 3.17: Comparison of orphanhood status, South Africa, 2008, 2012 and 2017*

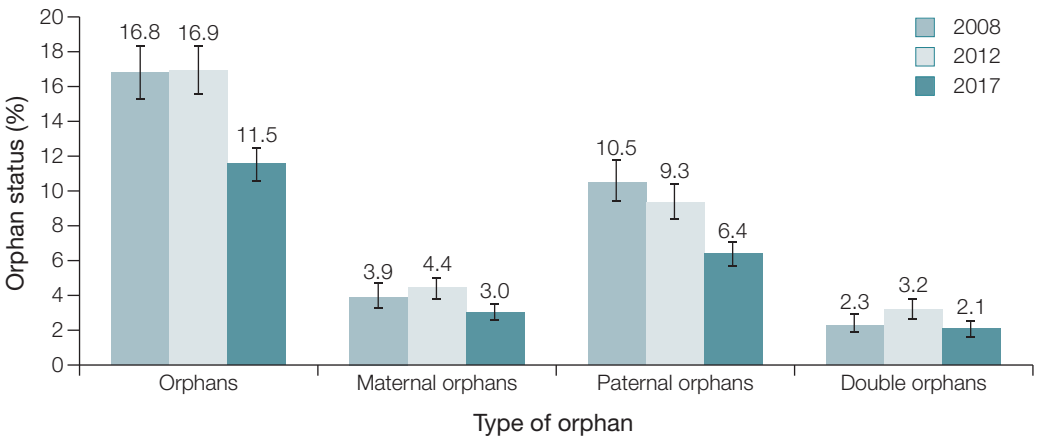



*Table 3.76: Estimated percentage of orphans aged 18 years and younger, by province, South Africa, 2012 and 2017*

| Province | 2012 | | | 2017 | | |
|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI |
| **Total** | **13 554** | **16.9** | **10.2–16.4** | **12 845** | **11.5** | **10.6–12.4** |
| Western Cape | 1 380 | 7.5 | 5.8–9.61 | 1 333 | 7.4 | 5.4–9.9 |
| Eastern Cape | 1 907 | 17.3 | 14.6–20.4 | 1 376 | 14.4 | 12.0–17.3 |
| Northern Cape | 1 068 | 14.6 | 11.0–19.0 | 1 063 | 15.7 | 13.4–18.4 |
| Free State | 932 | 22.8 | 19.3–26.7 | 941 | 17.1 | 12.8–22.4 |
| KwaZulu-Natal | 3 183 | 23.1 | 19.4–27.3 | 3 008 | 12.1 | 10.1–14.4 |
| North West | 1 001 | 16.3 | 12.8–20.6 | 1 147 | 14.0 | 11.4–17.0 |
| Gauteng | 1 605 | 13.5 | 10.8–16.7 | 1 619 | 9.9 | 7.9–12.4 |
| Mpumalanga | 1 132 | 21.3 | 17.8–25.2 | 1 267 | 11.8 | 9.3–14.7 |
| Limpopo | 1 346 | 13.0 | 10.2–16.4 | 1 109 | 9.1 | 7.2–11.3 |

## 3.17 Knowledge of tuberculosis

This section of the report presents findings related to people's knowledge about tuberculosis (TB) transmission and treatment; perceptions about TB and HIV comorbidity; self-reported history of a TB diagnosis; self-reported testing for HIV among people diagnosed with TB; stigmatisation of TB; and attitudes towards the disease.

### 3.17.1 Knowledge about transmission and treatment of TB

The vast majority of people were aware that TB is an airborne disease. Consistently high levels of accurate knowledge about the transmission and treatment of TB were evident among more than 90% of the respondents. Analysis by sociodemographic variables of age, sex, locality type and province showed that the level of knowledge was not influenced by these variables.

### 3.17.2 Perceptions about TB and HIV comorbidity

Respondents were asked whether people with TB were also HIV-positive. Overall, 14.8% of respondents believed that people who have TB are always HIV-positive. Perceptions differed among the race groups, locality types and provinces. Relatively few whites (7.3%) and coloureds (6.2%) endorsed this misperception, compared to the other race groups. The largest proportions of people who held this misperception about TB and HIV comorbidity were in Mpumalanga (19.1%) and Northern Cape (18.1%), whereas the highest proportion of people who were unsure were in Limpopo (25.6%). Slightly more people living in tribal and farm areas (16.6% and 16.2% respectively) held this perception than people in urban areas (13.7%). A relatively high proportion of people living in farming areas (17.5%) were unsure. Table 3.77 shows the results for people's perceptions about HIV and TB comorbidity.

*Table 3.77: Misperception that people with TB are always HIV-positive: breakdown by sex, age, race, locality type and province (among respondents aged 15 years and older), South Africa, 2017*

| Demographic variable | *n* | Yes (TB is always linked to HIV) | | No (TB is not always linked to HIV) | | Don't know | |
|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **23 621** | **14.6** | **13.7–15.6** | **74.4** | **73.1–75.7** | **11.0** | **10.1–11.9** |
| **Sex** | | | | | | | |
| Male | 9 983 | 14.2 | 13.1–15.4 | 74.7 | 73.2–76.2 | 11.0 | 10.0–12.2 |
| Female | 13 638 | 14.9 | 13.9–16 | 74.2 | 72.7–75.6 | 10.9 | 10.0–11.9 |
| **Race** | | | | | | | |
| Black African | 15 564 | 15.8 | 14.7–16.9 | 72.9 | 71.3–74.4 | 11.3 | 10.3–12.4 |
| White | 1 667 | 7.3 | 5.6–9.4 | 85.6 | 82.4–88.3 | 7.1 | 5.3–9.5 |
| Coloured | 4 249 | 14.1 | 12.2–16.1 | 73.9 | 71.3–76.3 | 12.1 | 9.9–14.7 |
| Indian/Asian | 2 141 | 6.2 | 4.4–8.6 | 84.4 | 80.2–87.9 | 9.4 | 6.3–13.8 |
| **Age (years)** | | | | | | | |
| 15–24 | 6 000 | 14.7 | 13.5–16.1 | 74 | 72.2–75.7 | 11.3 | 10.1–12.6 |
| 25–49 | 10 896 | 14.9 | 13.8–16.1 | 77.3 | 75.8–78.7 | 7.8 | 6.9–8.7 |
| 50 and older | 6 725 | 13.6 | 12.4–14.9 | 68.2 | 66.1–70.2 | 18.2 | 16.6–19.9 |
| **Locality type** | | | | | | | |
| Urban | 15 346 | 13.7 | 12.6–14.9 | 77.8 | 76.2–79.3 | 8.5 | 7.6–9.5 |
| Rural informal (tribal areas) | 5 510 | 16.6 | 14.9–18.4 | 67.2 | 64.6–69.6 | 16.2 | 14.1–18.6 |
| Rural formal (farms) | 2 765 | 16.2 | 13.3–19.5 | 66.3 | 62.1–70.2 | 17.5 | 14.4–21.2 |

| Demographic variable | n | Yes (TB is always linked to HIV) % | 95% CI | No (TB is not always linked to HIV) % | 95% CI | Don't know % | 95% CI |
|---|---|---|---|---|---|---|---|
| **Province** | | | | | | | |
| Western Cape | 2 857 | 13.3 | 10.4–16.8 | 76.8 | 72.9–80.2 | 10.0 | 8.2–12.1 |
| Eastern Cape | 2 513 | 11.6 | 9.6–14.0 | 76.5 | 73.3–79.4 | 11.9 | 10.0–14.1 |
| Northern Cape | 2 011 | 18.1 | 15.2–21.4 | 65.0 | 59.1–70.6 | 16.9 | 12.2–23.0 |
| Free State | 1 756 | 15.5 | 12.8–18.7 | 74.9 | 70.7–78.7 | 9.6 | 7.3–12.5 |
| KwaZulu-Natal | 5 283 | 15.9 | 13.7–18.4 | 75.8 | 72.9–78.5 | 8.3 | 6.6–10.3 |
| North West | 1 977 | 16.9 | 14.1–20.1 | 71.8 | 68.1–75.2 | 11.3 | 8.6–14.8 |
| Gauteng | 3 307 | 13.1 | 11.3–15.2 | 80.4 | 77.4–83.0 | 6.5 | 5.0–8.4 |
| Mpumalanga | 2 205 | 19.1 | 15.4–23.5 | 66.5 | 61.7–71.0 | 14.4 | 12.2–16.8 |
| Limpopo | 1 712 | 14.6 | 12.8–16.6 | 59.8 | 55.8–63.7 | 25.6 | 22.0–29.6 |

### 3.17.3 History of TB diagnosis

A small proportion of people reported having been diagnosed with TB in the past (5.6%), with similar percentages for both males (5.8%) and females (5.4%). Black Africans (6.1%) and coloureds (7.4%) were more likely to report having been diagnosed with TB in the past than whites (0.8%) or Indians/Asians (1.2%). The Eastern Cape had the highest percentage of people with a history of TB diagnosis (9.9%) and Limpopo had the lowest (3.4%). Table 3.78 shows the percentages of respondents who had been diagnosed with TB in the past.

*Table 3.78: History of TB diagnosis by sex, race and locality type among respondents aged 15 years and older, South Africa, 2017*

| Demographic variable | n | Yes % | 95% CI | No % | 95% CI | Don't know % | 95% CI |
|---|---|---|---|---|---|---|---|
| **Total** | **23 486** | **5.6** | **5.1–6.0** | **93.6** | **93.1–94.1** | **0.8** | **0.7–1.0** |
| **Sex** | | | | | | | |
| Male | 9 935 | 5.8 | 5.2–6.5 | 93.3 | 92.6–94.0 | 0.9 | 0.7–1.2 |
| Female | 13 551 | 5.4 | 4.9–5.9 | 93.9 | 93.3–94.4 | 0.8 | 0.6–1.0 |
| **Race** | | | | | | | |
| Black African | 15 500 | 6.1 | 5.6–6.6 | 93.0 | 92.5–93.6 | 0.9 | 0.7–1.1 |
| White | 1 652 | 0.8 | 0.4–1.3 | 98.9 | 98.3–99.3 | 0.3 | 0.1–0.9 |
| Coloured | 4 220 | 7.4 | 6.1–9.0 | 91.6 | 89.7–93.2 | 1.0 | 0.4–2.3 |
| Indian/Asian | 2 114 | 1.2 | 0.8–1.8 | 98.6 | 97.9–99.0 | 0.2 | 0.1–0.5 |
| **Age (years)** | | | | | | | |
| 15–24 | 5 964 | 1.7 | 1.4–2.2 | 97.3 | 96.6–97.8 | 1.0 | 0.7–1.4 |
| 25–49 | 10 833 | 6.6 | 6.0–7.3 | 92.9 | 92.1–93.5 | 0.6 | 0.4–0.8 |
| 50 and older | 6 689 | 7.3 | 6.4–8.4 | 91.5 | 90.4–92.5 | 1.2 | 0.9–1.6 |
| **Locality type** | | | | | | | |
| Urban | 15 242 | 5.7 | 5.2–6.3 | 93.8 | 93.2–94.3 | 0.5 | 0.4–0.7 |
| Rural informal (tribal areas) | 5 494 | 5.3 | 4.6–6.2 | 93.2 | 92.3–94.1 | 1.4 | 1.1–1.9 |
| Rural formal (farms) | 2 750 | 4.8 | 3.6–6.5 | 93.2 | 90.4–95.2 | 2.0 | 0.9–4.3 |
| **Province** | | | | | | | |
| Western Cape | 2 847 | 6.4 | 5.3–7.8 | 92.6 | 90.9–94.0 | 1.0 | 0.5–2.1 |
| Eastern Cape | 2 510 | 9.9 | 8.4–11.8 | 89.3 | 87.4–90.9 | 0.8 | 0.4–1.3 |
| Northern Cape | 2 009 | 6.8 | 5.3–8.6 | 92.6 | 90.7–94.1 | 0.7 | 0.3–1.4 |
| Free State | 1 756 | 7.5 | 6.1–9.3 | 91.8 | 90.0–93.3 | 0.6 | 0.3–1.5 |

| Demographic variable | n | Yes | | No | | Don't know | |
|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI |
| KwaZulu-Natal | 5 204 | 5.6 | 4.5–6.9 | 93.7 | 92.4–94.8 | 0.6 | 0.4–1.1 |
| North West | 1 970 | 6.6 | 5.2–8.2 | 92.4 | 90.6–93.9 | 1.0 | 0.5–2.3 |
| Gauteng | 3 287 | 4.0 | 3.3–4.9 | 95.5 | 94.5–96.3 | 0.5 | 0.3–0.9 |
| Mpumalanga | 2 193 | 3.8 | 2.8–5.2 | 95.0 | 93.5–96.2 | 1.2 | 0.7–1.9 |
| Limpopo | 1 710 | 3.4 | 2.5–4.6 | 95.1 | 93.8–96.1 | 1.5 | 1.0–2.3 |

### 3.17.4 Testing for HIV at time of TB diagnosis

Most people (80.7%) with a history of having been diagnosed with TB reported that they had also been tested for HIV at the time of their diagnosis. Older adults were less likely have been tested for HIV at the time of a TB diagnosis. Testing did not differ by locality type. With regard to the provinces, the level of testing among people diagnosed with TB was relatively low in the Eastern Cape (69.4%) but otherwise ranged between 77.2% and 88.6%. Table 3.79 presents the results for HIV-testing at the time of a TB diagnosis.

*Table 3.79: Testing for HIV at the time of TB diagnosis: breakdown by sex, race, locality type and province among respondents aged 15 years and older, South Africa, 2017*

| Demographic variable | n | Yes | | No | | Don't know | |
|---|---|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI | % | 95% CI |
| **Total** | **1 256** | **80.7** | **77.6–83.5** | **16.5** | **13.9–19.6** | **2.8** | **2.0–3.9** |
| **Sex** | | | | | | | |
| Male | 556 | 82.3 | 78.2–85.8 | 14.9 | 11.7–18.8 | 2.8 | 1.7–4.6 |
| Female | 700 | 79.1 | 74.6–82.9 | 18.2 | 14.5–22.5 | 2.7 | 1.7–4.3 |
| **Race[a]** | | | | | | | |
| Black African | 921 | 81.3 | 77.8–84.4 | 16.5 | 13.6–20.0 | 2.2 | 1.4–3.3 |
| White | – | – | – | – | – | – | – |
| Coloured | 274 | 81.6 | 75.4–86.5 | 13.3 | 8.8–19.5 | 5.2 | 2.7–9.8 |
| Indian/Asian | – | – | – | – | – | – | – |
| **Age (years)** | | | | | | | |
| 15–24 | 113 | 79.3 | 67.6–87.6 | 15.7 | 8.4–27.5 | 4.9 | 1.7–13.4 |
| 25–49 | 699 | 86.9 | 83.3–89.8 | 11.9 | 9.1–15.4 | 1.2 | 0.6–2.5 |
| 50 and older | 444 | 67.8 | 62.2–73.0 | 26.6 | 21.7–32.1 | 5.5 | 3.7–8.3 |
| **Locality type** | | | | | | | |
| Urban | 803 | 80.5 | 76.4–84.0 | 17.0 | 13.6–21.0 | 2.6 | 1.7–3.8 |
| Rural informal (tribal areas) | 307 | 80.8 | 75.5–85.2 | 16.8 | 12.8–21.7 | 2.4 | 1.0–5.5 |
| Rural formal (farms) | 146 | 83.7 | 74.0–90.3 | 8.2 | 4.0–16.2 | 8.1 | 3.5–17.6 |
| **Province** | | | | | | | |
| Western Cape | 185 | 83.6 | 75.2–89.6 | 10.6 | 6.0–18.1 | 5.7 | 3.0–10.6 |
| Eastern Cape | 215 | 69.4 | 61.1–76.5 | 28.7 | 21.8–36.8 | 1.9 | 0.7–5.3 |
| Northern Cape | 130 | 84.4 | 76.0–90.3 | 14.5 | 8.8–23.0 | 1.1 | 0.3–3.7 |
| Free State | 121 | 77.2 | 69.6–83.4 | 14.6 | 8.7–23.6 | 8.2 | 4.2–15.4 |
| KwaZulu-Natal | 234 | 85.9 | 80.0–90.2 | 12.2 | 7.9–18.2 | 2.0 | 0.9–4.3 |
| North West | 124 | 88.6 | 81.5–93.2 | 10.6 | 6.2–17.7 | 0.8 | 0.1–5.2 |
| Gauteng | 116 | 82.3 | 71.7–89.5 | 17.5 | 10.3–28.2 | 0.2 | 0.0–0.7 |
| Mpumalanga | 76 | 83.0 | 68.6–91.7 | 14.2 | 6.6–27.9 | 2.7 | 0.8–9.3 |
| Limpopo | 55 | 78.1 | 65.4–87.0 | 15.3 | 8.6–25.7 | 6.6 | 2.1–18.9 |

a Some sample sizes were too small to report reliably.

### 3.17.5 Stigma about TB

The experience of external stigma and internalised stigma among respondents who had a history of TB diagnosis were also assessed. Table 3.80 shows the prevalence of stigma among respondents aged 15 years and older who reported having been diagnosed with TB in the past. Nearly 14% of people in this subgroup reported having been insulted by others because they had TB and 19.9% had been gossiped about. A similar percentage (13.3%) of people reported having felt unclean at the time they were diagnosed with TB. About half (52.7%) of all people diagnosed with TB did not disclose the diagnosis to anyone.

*Table 3.80: Stigma among respondents aged 15 years and older diagnosed with TB, South Africa, 2017*

| | | Experienced stigma | |
|---|---|---|---|
| Variable | *n* | % | 95% CI |
| Insulted | 1 221 | 13.8 | 11.3–16.8 |
| Gossiped about | 1 215 | 19.9 | 16.8–23.3 |
| Felt unclean when diagnosed with TB | 1 213 | 13.3 | 10.8–16.3 |
| Told anyone about TB diagnosis | 1 232 | 47.3 | 43.4–51.1 |

# PART B: ANALYSIS IN 16 SELECTED DISTRICTS

This section presents the results from the additional 16 selected districts. The results cover both the biomedical and the main behavioural determinants of HIV.

## 3.18 Response rate in the selected districts

Sixteen districts were identified and additional samples were collected in these districts for further analysis (see Section 2). Of the 44 353 individuals who were eligible to participate in the 16 districts, 41 842 (94.3%) agreed to be interviewed; among this group, 61.2% agreed also to provide a blood specimen for HIV-testing. The testing was anonymously linked to their questionnaires.

Table 3.81 presents the 2017 HIV-testing coverage and non-responses in the selected districts. The categories of non-response were as follows: 33.4% of individuals were interviewed but refused to provide a blood sample; 3.4% of individuals refused to be interviewed or to provide a blood sample; and 2.1% of individuals were absent from the household or were classified as 'missing data'. Participation in HIV-testing for the survey varied by district. Sekhukhune in Limpopo had the highest HIV-testing response, followed by OR Tambo in Eastern Cape. The response rate was lowest in eThekwini in KwaZulu-Natal.

*Table 3.81: Testing coverage in 16 selected districts by demographic characteristics: percentage distribution among people for HIV testing by testing status, South Africa, 2017*

| District | Interviewed and tested | Interviewed but not tested | Refused interview and test | Absent or missing data | *n* |
|---|---|---|---|---|---|
| **Total** | **61.2** | **33.4** | **3.4** | **2.1** | **44 353** |
| Ehlanzeni (Mpumalanga) | 61.7 | 35.1 | 2.3 | 0.9 | 2 939 |
| Gert Sibande (Mpumalanga) | 57.8 | 40.6 | 0.6 | 1.0 | 3 893 |
| OR Tambo (Eastern Cape) | 76.6 | 21.0 | 1.3 | 1.1 | 1 667 |
| iLembe (KwaZulu-Natal) | 66.3 | 31.0 | 2.0 | 0.7 | 3 939 |
| Umzinyathi (KwaZulu-Natal) | 64.5 | 34.3 | 0.8 | 0.3 | 3 489 |
| Uthukela (KwaZulu-Natal) | 64.2 | 34.0 | 0.8 | 0.9 | 4 011 |
| Uthungulu (KwaZulu-Natal) | 56.9 | 41.6 | 1.0 | 0.5 | 4 134 |
| eThekwini (KwaZulu-Natal) | 47.5 | 36.8 | 12.6 | 3.2 | 3 768 |
| Sekhukhune (Limpopo) | 83.6 | 10.6 | 2.8 | 3.0 | 1 478 |
| Ekurhuleni (Gauteng) | 56.2 | 33.7 | 5.0 | 5.0 | 2 139 |
| Sedibeng (Gauteng) | 63.5 | 28.1 | 3.1 | 5.3 | 3 053 |
| City of Tshwane (Gauteng) | 58.0 | 33.6 | 5.3 | 3.1 | 1 715 |
| West Rand (Gauteng) | 62.9 | 28.7 | 4.1 | 4.3 | 1 300 |
| City of Johannesburg (Gauteng) | 54.9 | 33.5 | 8.8 | 2.8 | 1 923 |
| Bojanala Platinum (North West) | 62.7 | 35.4 | 0.7 | 1.2 | 2 312 |
| City of Cape Town (Western Cape) | 58.6 | 31.2 | 5.9 | 4.3 | 2 593 |

Percentages in each row refer to the proportion of *n* in the final column.

### 3.18.1 HIV prevalence in selected districts

Given the heterogeneity of HIV distribution in South Africa, it is essential to understand the prevalence of HIV at the district level in addition to national and provincial levels. In this survey (see Methodology Section), additional respondents were included to provide statistically valid estimates of HIV for the 16 districts (including metros). Table 3.82 presents the HIV prevalence in the selected districts. HIV prevalence was highest in Gert Sibande district in Mpumalanga at 22.9% closely followed by Uthukela (22.4%) and Uthungulu (20.4%) – both in KwaZulu-Natal. The Greater Sekhukhune district in Limpopo had the lowest prevalence at 7.5%. In the districts included, eThekwini, had the highest HIV prevalence estimate at 16.7%, followed by Ekurhuleni with a prevalence estimate of 15%.

*Table 3.82: HIV prevalence in 16 selected districts, South Africa, 2017*

| Districts | *n* | % | 95% CI |
|---|---|---|---|
| **National average estimate** | **23 826** | **14.0** | **13.1–15.0** |
| Ehlanzeni (Mpumalanga) | 1 809 | 20.0 | 17.5–22.8 |
| Gert Sibande (Mpumalanga) | 2 246 | 22.9 | 19.9–26.1 |
| OR Tambo (Eastern Cape) | 1 274 | 17.3 | 14.4–20.7 |
| iLembe (KwaZulu-Natal) | 2 609 | 19.4 | 17.0–21.9 |
| Umzinyathi (KwaZulu-Natal) | 2 249 | 14.7 | 12.7–16.8 |
| Uthukela (KwaZulu-Natal) | 2 576 | 22.4 | 19.5–25.6 |
| Uthungulu (KwaZulu-Natal) | 2 351 | 20.4 | 18.0–23.0 |
| eThekwini (KwaZulu-Natal) | 1 786 | 16.7 | 12.6–22.0 |
| Sekhukhune (Limpopo) | 1 235 | 7.5 | 5.9–9.5 |
| Ekurhuleni (Gauteng) | 1 203 | 15.0 | 11.9–18.6 |
| Sedibeng (Gauteng) | 1 938 | 12.8 | 10.1–16.1 |
| City of Tshwane (Gauteng) | 993 | 10.5 | 7.7–14.1 |
| West Rand (Gauteng) | 797 | 12.3 | 8.0–18.5 |
| City of Johannesburg (Gauteng) | 1 054 | 12.9 | 9.6–17.2 |
| Bojanala Platinum (North West) | 1 446 | 16.0 | 13.8–18.6 |
| City of Cape Town (Western Cape) | 1 517 | 9.5 | 6.8–13.1 |

### 3.18.2 District-level ART coverage among people living with HIV

Among people living with HIV in the additional sample, who were interviewed and provided blood specimens for testing, 62.3% were on ART (see Table 3.83). ART coverage in Uthungulu was the highest (77.4%), whereas the lowest coverage was in Tshwane (49.3%).

*Table 3.83: Exposure to ART among individuals living with HIV in 16 selected districts, South Africa, 2017*

| Districts | Estimated number of people on ART (*n*) | Proportion of people with HIV on ART % (95% CI ) |
|---|---|---|
| **National average estimate** | **4 401 872** | **62.3 (59.2–65.2)** |
| Ehlanzeni (Mpumalanga) | 220 111 | 67.2 (60.5–73.4) |
| Gert Sibande (Mpumalanga) | 159 161 | 67.4 (61.5–72.8) |
| OR Tambo (Eastern Cape) | 144 315 | 65.6 (57.9–72.5) |
| iLembe (KwaZulu-Natal) | 70 813 | 61.0 (48.8–72.0) |
| Umzinyathi (KwaZulu-Natal) | 45 134 | 66.7 (43.9–83.7) |
| Uthukela (KwaZulu-Natal) | 102 487 | 68.0 (61.7–73.6) |
| Uthungulu (KwaZulu-Natal) | 130 006 | 77.4 (72.7–81.5) |
| eThekwini (KwaZulu-Natal) | 450 238 | 72.3 (61.5–81.0) |
| Sekhukhune (Limpopo) | 47 047 | 59.6 (48.3–70.0) |
| Ekurhuleni (Gauteng) | 260 975 | 52.5 (45.1–59.9) |
| Sedibeng (Gauteng) | 64 007 | 58.0 (47.4–67.8) |
| City of Tshwane (Gauteng) | 141 436 | 49.3 (32.5–66.3) |
| West Rand (Gauteng) | 65 605 | 65.8 (54.4–75.6) |
| City of Johannesburg (Gauteng) | 384 698 | 60.7 (42.3–76.4) |
| Bojanala Platinum (North West) | 168 365 | 60.9 (51.7–69.4) |
| City of Cape Town (Western Cape) | 229 631 | 61.1 (45.7–74.6) |

### 3.18.3 Viral load suppression in selected districts

Table 3.84 (page 126) shows the results for VL suppression in the 16 selected districts. Among the 4 303 people living with HIV from these districts, 60.6% (95% CI: 56.9–64.2) were virally suppressed. VL suppression among all people living with HIV – not necessarily receiving ART – was highest in Uthungulu (71.2%) in KwaZulu-Natal and lowest in the City of Tshwane (52.8%), Ekurhuleni (54.2%) in Gauteng, and in Greater Sekhukhune in Limpopo (54.3%). By contrast, the percentage of HIV-positive people receiving ART who were virally suppressed was high. Only three districts recorded VL-suppression rates of less than 80%: Ehlanzeni in Mpumalanga (65.3%), Gert Sibande in Mpumalanga (77.4%) and eThekwini in KwaZulu-Natal (78.3%). Viral load suppression reached levels above 90% in the following districts: the City of Cape Town, Sedibeng, Umzinyathi, Uthungulu and West Rand.

*Table 3.84: Viral load suppression in 16 selected districts, South Africa, 2017*

| | Among all people living with HIV | | | Among people on ART | | |
|---|---|---|---|---|---|---|
| Districts | *n* | % | 95% CI | *n* | % | 95% CI |
| Ehlanzeni (Mpumalanga) | 367 | 65.3 | 58.2–71.8 | 236 | 65.3 | 58.2–71.8 |
| Gert Sibande (Mpumalanga) | 478 | 60.1 | 52.6–67.1 | 274 | 77.4 | 67.3–85.1 |
| OR Tambo (Eastern Cape) | 204 | 61.0 | 52.8–68.7 | 136 | 82.0 | 70.8–89.5 |
| iLembe (KwaZulu-Natal) | 498 | 61.9 | 53.7–69.4 | 281 | 80.9 | 65.1–90.6 |
| Umzinyathi (KwaZulu-Natal) | 328 | 66.5 | 51.7–78.6 | 223 | 90.3 | 82.7–94.8 |
| Uthukela (KwaZulu-Natal) | 532 | 62.7 | 54.5–70.3 | 346 | 84.5 | 76.2–90.3 |
| Uthungulu (KwaZulu-Natal) | 541 | 71.2 | 65.1–76.6 | 354 | 90.0 | 84.8–93.6 |
| eThekwini (KwaZulu-Natal) | 140 | 65.3 | 57.0–72.8 | 84 | 78.3 | 67.7–86.1 |
| Sekhukhune (Limpopo) | 83 | 54.3 | 43.9–64.4 | 46 | 81.1 | 68.6–89.4 |
| Ekurhuleni (Gauteng) | 169 | 54.2 | 45.3–62.9 | 91 | 88.1 | 78.4–93.8 |
| Sedibeng (Gauteng) | 312 | 59.8 | 52.2–67.0 | 192 | 92.5 | 84.0–96.6 |
| City of Tshwane (Gauteng) | 105 | 52.8 | 31.5–73.2 | 56 | 89.7 | 75.4–96.1 |
| West Rand (Gauteng) | 120 | 66.2 | 56.2–75.0 | 64 | 91.7 | 74.9–97.6 |
| City of Johannesburg (Gauteng) | 87 | 59.7 | 44.4–73.3 | 49 | 89.1 | 76.7–95.3 |
| Bojanala Platinum (North West) | 230 | 58.1 | 49.4–66.4 | 144 | 87.0 | 79.1–92.3 |
| City of Cape Town (Western Cape) | 109 | 60.5 | 45.4–73.8 | 61 | 92.3 | 79.0–97.4 |

### 3.18.4 90–90–90 indicators in selected districts

People living with HIV who were aware of their HIV-positive status (first 90) was generally high across all selected districts (see Table 3.85 on page 127). The districts achieving levels of 90% or higher for the first 90 included Ehlanzeni (90.6%), OR Tambo (94.1%), Uthukela (92.7%), West Rand (93.6%) and eThekwini (96.7%). Districts with levels below 80% for the first-90 indicator were iLembe (72.1%) and the City of Tshwane (77.4%).

The highest coverage of ART among people aware of their HIV-positive status was recorded for iLembe (82.7%), Uthungulu (81.8%) and Gert Sibande (81.2%). The two districts with the lowest coverage were the City of Tshwane (55.1%) and Ekurhuleni (59.8%); these were the only districts with ART coverage below 60%. Viral load suppression among people receiving ART (third 90) was generally high, above 80% for all districts except Gert Sibande (77.0%) and eThekwini (77.4%). The following districts had all achieved at least 90% for the third-90 indicator: the City of Cape Town, the City of Tshwane, Sedibeng, Umzinyathi and West Rand.

*Table 3.85: 90–90–90 indicators for people aged 15–64 years in selected districts, South Africa, 2017*

| | Diagnosed (first 90) | | | ART coverage (second 90) | | | Virally suppressed (third 90) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | 95% CI | *n* | % | 95% CI | *n* | % | 95% CI |
| **National average estimate** | **2 756** | **84.9** | **81.7–87.7** | **2 197** | **70.6** | **67.4–73.6** | **1 548** | **87.5** | **84.9–89.7** |
| **District** | | | | | | | | | |
| Ehlanzeni (Mpumalanga) | 319 | 90.6 | 85.7–93.9 | 282 | 73.2 | 66.4–79.1 | 206 | 84.9 | 78.5–89.6 |
| Gert Sibande (Mpumalanga) | 433 | 81.2 | 74.2–86.7 | 334 | 81.2 | 73.5–87.1 | 250 | 77.0 | 66.9–84.7 |
| OR Tambo (Eastern Cape) | 184 | 94.1 | 89.8–96.7 | 173 | 69.0 | 60.0–76.8 | 127 | 82.5 | 71.3–89.9 |
| iLembe (KwaZulu-Natal) | 471 | 72.1 | 56.4–83.7 | 331 | 82.7 | 73.0–89.4 | 269 | 80.8 | 64.6–90.6 |
| Umzinyathi (KwaZulu-Natal) | 298 | 84.4 | 75.1–90.7 | 250 | 76.6 | 54.9–89.8 | 211 | 90.1 | 82.1–94.7 |
| Uthukela (KwaZulu-Natal) | 471 | 92.7 | 87.9–95.7 | 410 | 76.4 | 68.3–82.9 | 316 | 87.3 | 75.7–93.8 |
| Uthungulu (KwaZulu-Natal) | 508 | 89.4 | 82.0–94.0 | 407 | 81.8 | 76.9–85.9 | 333 | 89.6 | 83.9–93.5 |
| eThekwini (KwaZulu-Natal) | 132 | 96.7 | 93.4–98.4 | 115 | 76.6 | 65.4–84.9 | 81 | 77.4 | 66.3–85.6 |
| Sekhukhune (Limpopo) | 78 | 88.6 | 75.1–95.2 | 69 | 67.6 | 56.3–77.1 | 45 | 80.6 | 67.5–89.2 |
| Ekurhuleni (Gauteng) | 163 | 89.0 | 83.7–92.7 | 139 | 59.8 | 51.0–68.0 | 86 | 88.9 | 78.8–94.5 |
| Sedibeng (Gauteng) | 297 | 81.8 | 65.1–91.6 | 256 | 67.2 | 56.1–76.6 | 181 | 92.5 | 83.7–96.7 |
| City of Tshwane (Gauteng) | 101 | 77.4 | 47.8–92.8 | 82 | 55.1 | 36.2–72.6 | 52 | 91.1 | 74.2–97.3 |
| West Rand (Gauteng) | 119 | 93.6 | 84.2–97.6 | 98 | 69.4 | 55.8–80.3 | 62 | 92.0 | 74.3–97.8 |
| City of Johannesburg (Gauteng) | 87 | 81.3 | 62.4–91.9 | 76 | 67.2 | 49.5–81.1 | 47 | 88.8 | 76.4–95.1 |
| Bojanala Platinum (North West) | 214 | 87.7 | 80.0–92.7 | 193 | 69.5 | 60.9–76.8 | 134 | 86.2 | 78.0–91.7 |
| City of Cape Town (Western Cape) | 105 | 87.8 | 79.5–93.1 | 82 | 76.2 | 68.6–82.5 | 58 | 92.4 | 78.4–97.6 |

### 3.18.5 Medical male circumcision

Table 3.86 shows the results for the 16 districts regarding medical circumcision among males aged 15 years and older. Gauteng had the highest rates, with four of its five districts recording proportions of 40% of more; the exception was Ekurhuleni at 33.6%. The City of Johannesburg had the highest rate among all 16 districts, at 50.2%. Sekhukhune (8.7%), OR Tambo (11.2%) and the City of Cape Town (18.5%) had the lowest proportions of men who had been medically circumcised.

*Table 3.86: Medical circumcision among males aged 15 years and older in 16 selected districts, South Africa, 2017*

| | | Medically circumcised | |
|---|---|---|---|
| Districts | *n* | % | 95% CI |
| **Total** | **7 620** | **33.9** | **31.3–36.6** |
| Ehlanzeni (Mpumalanga) | 528 | 38.0 | 33.2–43.0 |
| Gert Sibande (Mpumalanga) | 763 | 38.3 | 32.4–44.5 |
| OR Tambo (Eastern Cape) | 245 | 11.2 | 6.1–19.8 |
| iLembe (KwaZulu-Natal) | 568 | 30.4 | 25.4–35.9 |
| Umzinyathi (KwaZulu-Natal) | 462 | 30.0 | 21.9–39.5 |
| Uthukela (KwaZulu-Natal) | 537 | 30.8 | 25.8–36.4 |
| Uthungulu (KwaZulu-Natal) | 630 | 35.5 | 31.4–39.7 |
| Sekhukhune (Limpopo) | 213 | 8.7 | 4.9–14.9 |
| Ekurhuleni (Gauteng) | 402 | 33.6 | 28.2–39.5 |
| Sedibeng (Gauteng) | 587 | 46.6 | 40.0–53.4 |
| City of Tshwane (Gauteng) | 360 | 40.6 | 32.6–49.1 |
| West Rand (Gauteng) | 300 | 40.2 | 30.6–50.6 |
| Bojanala Platinum (North West) | 471 | 25.2 | 20.1–31.0 |
| City of Cape Town (Western Cape) | 459 | 18.5 | 13.1–25.4 |
| eThekwini (KwaZulu-Natal) | 737 | 31.5 | 25.6–38.1 |
| City of Johannesburg (Gauteng) | 358 | 50.2 | 41.9–58.4 |

### 3.18.6 Behavioural determinants of HIV at district level

This section considers behavioural determinants, namely, condom use, multiple sex partners, awareness of HIV, knowledge of HIV, and orphanhood.

#### *Condom use in 16 selected districts*

Table 3.87 (page 129) shows the results for self-reported condom use at the last sexual encounter among respondents aged 15 years and older in the selected districts. Overall, 39.2% of people indicated that in the past year they had used condoms at the last sexual encounter. Districts where the highest number of people reported having used a condom were Uthungulu (50.0%), Sedibeng (49.6%) and Gert Sibande (49.3%). The cities of Tshwane, Cape Town and Johannesburg had the lowest reported condom use in the last year.

*Table 3.87: Percentage of people aged 15 years and older in 16 selected districts who used a condom at the last sexual encounter, South Africa, 2017*

| District | *n* | Used a condom | |
|---|---|---|---|
| | | % | 95% CI |
| **National average estimate** | **11 943** | **38.9** | **37.3–40.5** |
| Ehlanzeni (Mpumalanga) | 868 | 46.8 | 42.5–51.2 |
| Gert Sibande (Mpumalanga) | 1 116 | 49.3 | 45.1–53.5 |
| OR Tambo (Eastern Cape) | 353 | 42.3 | 37.6–47.2 |
| iLembe (KwaZulu-Natal) | 952 | 45.0 | 38.4–51.7 |
| Umzinyathi (KwaZulu-Natal) | 753 | 41.1 | 31.9–50.9 |
| Uthukela (KwaZulu-Natal) | 1 007 | 47.4 | 41.0–53.8 |
| Uthungulu (KwaZulu-Natal) | 1 157 | 50.0 | 45.5–54.5 |
| eThekwini (KwaZulu-Natal) | 1 177 | 46.2 | 39.8–52.7 |
| Sekhukhune (Limpopo) | 452 | 39.9 | 33.8–6.4 |
| Ekurhuleni (Gauteng) | 798 | 38.6 | 34.6–42.7 |
| Sedibeng (Gauteng) | 1 060 | 49.6 | 42.7–56.6 |
| City of Tshwane (Gauteng) | 665 | 32.2 | 26.8–38.1 |
| West Rand (Gauteng) | 520 | 40.1 | 34.6–45.9 |
| City of Johannesburg (Gauteng) | 620 | 33.1 | 26.8–40.1 |
| Bojanala Platinum (North West) | 811 | 41.6 | 36.7–46.7 |
| City of Cape Town (Western Cape) | 829 | 35.3 | 28.4–42.9 |

### *Multiple sexual partners*

Table 3.88 presents the percentage of people aged 15 years or older with MSPs in the past year among the 16 selected districts. Overall, 10.6% of people reported having had two or more sexual partners in the last 12 months. eThekwini and West Rand had the highest reported number of MSPs at 14.8%, closely followed by Ekurhuleni (14.5%). Gert Sibande (5.6%) had the lowest reported number of MSPs.

*Table 3.88: Percentage of people aged 15 years and older in 16 selected districts who reported having multiple sexual partners in the past year, South Africa, 2017*

| District | *n* | One partner | | Two and more partners | |
|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI |
| **National average estimate** | **12 031** | **89.4** | **88.4–90.3** | **10.6** | **9.7–11.6** |
| Ehlanzeni (Mpumalanga) | 877 | 92.3 | 89.7–94.3 | 7.7 | 5.7–10.3 |
| Gert Sibande (Mpumalanga) | 1 132 | 94.4 | 91.9–96.2 | 5.6 | 3.8–8.1 |
| OR Tambo (Eastern Cape) | 354 | 87.6 | 81.5–91.9 | 12.4 | 8.1–18.5 |
| iLembe (KwaZulu-Natal) | 962 | 90.1 | 87.1–92.4 | 9.9 | 7.6–12.9 |
| Umzinyathi (KwaZulu-Natal) | 755 | 91.7 | 87.3–94.6 | 8.3 | 5.4–12.7 |
| Uthukela (KwaZulu-Natal) | 998 | 91.5 | 88.5–93.8 | 8.5 | 6.2–11.5 |
| Uthungulu (KwaZulu-Natal) | 1 149 | 91.7 | 89.5–93.4 | 8.3 | 6.6–10.5 |
| eThekwini (KwaZulu-Natal) | 1 194 | 85.2 | 81.2–88.5 | 14.8 | 11.5–18.8 |

| District | n | One partner | | Two and more partners | |
|---|---|---|---|---|---|
| | | % | 95% CI | % | 95% CI |
| Sekhukhune (Limpopo) | 447 | 89.0 | 83.8–92.6 | 11.0 | 7.4–16.2 |
| Ekurhuleni (Gauteng) | 800 | 85.5 | 82.3–88.2 | 14.5 | 11.8–17.7 |
| Sedibeng (Gauteng) | 1 064 | 86.6 | 82.3–90.1 | 13.4 | 9.9–17.7 |
| City of Tshwane (Gauteng) | 668 | 88.6 | 81.3–93.2 | 11.4 | 6.8–18.7 |
| West Rand (Gauteng) | 521 | 85.2 | 78.8–89.9 | 14.8 | 10.1–21.2 |
| City of Johannesburg (Gauteng) | 627 | 86.6 | 81.5–90.5 | 13.4 | 9.5–18.5 |
| Bojanala Platinum (North West) | 815 | 89.2 | 85.4–92.1 | 10.8 | 7.9–14.6 |
| City of Cape Town (Western Cape) | 840 | 91.6 | 89.0–93.7 | 8.4 | 6.3–11.0 |

### *Awareness of HIV status*

Table 3.89 presents data at the district level for self-reported awareness of HIV status among people aged 15 years and older in the 16 selected districts. The estimated average across all districts was 50%. Bojanala Platinum (59.6%) and West Rand (59.5%) displayed the highest levels of awareness of HIV status. The City of Cape Town (40.3%) and Uthukela (40.7%) displayed the lowest awareness levels.

*Table 3.89: Self-reported awareness of HIV status among people aged 15 years and older in 16 selected districts, South Africa, 2017*

| District | n | Awareness of HIV status | |
|---|---|---|---|
| | | % | 95% CI |
| **Total** | **25 909** | **50.0** | **48.251.7 ??** |
| Ehlanzeni (Mpumalanga) | 1 718 | 51.5 | 48.6–54.3 |
| Gert Sibande (Mpumalanga) | 2 302 | 56.3 | 52.5–60.0 |
| OR Tambo (Eastern Cape) | 849 | 45.2 | 40.5–50.0 |
| iLembe (KwaZulu-Natal) | 2 211 | 42.2 | 37.7–46.9 |
| Umzinyathi (KwaZulu-Natal) | 1 947 | 44.1 | 40.3–48.0 |
| Uthukela (KwaZulu-Natal) | 2 290 | 40.7 | 36.7–44.8 |
| Uthungulu (KwaZulu-Natal) | 2 449 | 51.2 | 44.7–57.8 |
| Sekhukhune (Limpopo) | 790 | 52.1 | 47.4–56.7 |
| Ekurhuleni (Gauteng) | 1 291 | 55.0 | 50.3–59.6 |
| Sedibeng (Gauteng) | 1 837 | 55.0 | 47.9–61.9 |
| City of Tshwane (Gauteng) | 1 095 | 49.1 | 42.0–56.3 |
| West Rand (Gauteng) | 780 | 59.5 | 53.3–65.4 |
| Bojanala Platinum (North West) | 1 459 | 59.6 | 56.2–62.8 |
| City of Cape Town (Western Cape) | 1 512 | 40.3 | 35.7–45.0 |
| eThekwini (KwaZulu-Natal) | 2 257 | 48.8 | 42.9–54.7 |
| City of Johannesburg (Gauteng) | 1 122 | 50.4 | 45.5–55.3 |

### *Knowledge of HIV transmission*

Table 3.90 presents the levels of accurate knowledge and rejection of myths about HIV among people aged 15 years or older in the 16 selected districts. Overall, 36.3% of people had accurate knowledge of HIV across the districts. Respondents in the City of Cape Town (47.2%), iLembe (40.0%) and eThekwini district (39.6%) displayed the highest levels of accurate HIV knowledge. Respondents in Sekhukhune (24.6%), West Rand (27.5%) and Bojanala Platinum (27.4%) had the lowest levels of accurate knowledge in the selected districts.

*Table 3.90: Accurate knowledge about HIV among people aged 15 years and older in 16 selected districts, South Africa, 2017*

| | | Correct knowledge of HIV transmission | |
|---|---|---|---|
| District | *n* | % | 95% CI |
| **National average estimate** | **23 668** | **36.3** | **34.9–37.7** |
| Ehlanzeni (Mpumalanga) | 1 755 | 30.7 | 26.9–34.8 |
| Gert Sibande (Mpumalanga) | 2 453 | 34.5 | 31.7–37.3 |
| OR Tambo (Eastern Cape) | 860 | 33.8 | 29.6–38.2 |
| iLembe (KwaZulu-Natal) | 2 262 | 40.0 | 34.6–45.6 |
| Umzinyathi (KwaZulu-Natal) | 1 997 | 31.9 | 27.0–37.1 |
| Uthukela (KwaZulu-Natal) | 2 334 | 35.5 | 29.9–41.5 |
| Uthungulu (KwaZulu-Natal) | 2 487 | 34.0 | 26.4–42.5 |
| Sekhukhune (Limpopo) | 784 | 24.6 | 20.2–29.7 |
| Ekurhuleni (Gauteng) | 1 309 | 32.6 | 28.5–37.0 |
| Sedibeng (Gauteng) | 1 853 | 36.9 | 30.1–44.3 |
| City of Tshwane (Gauteng) | 1 106 | 35.5 | 31.1–40.2 |
| West Rand (Gauteng) | 791 | 27.5 | 21.9–33.8 |
| Bojanala Platinum (North West) | 1 478 | 27.4 | 23.2–32.0 |
| City of Cape Town (Western Cape) | 1 554 | 47.2 | 40.8–53.8 |
| eThekwini (KwaZulu-Natal) | 2 292 | 39.6 | 35.1–44.2 |
| City of Johannesburg (Gauteng) | 1 137 | 36.9 | 31.4–42.6 |

### *Orphanhood*

Table 3.91 (page 132) shows the current status of orphanhood in the 16 districts in South Africa among children aged 18 years and younger. Across these districts, the highest percentage of orphans was paternal orphans (6.4%). The highest number of paternal orphans lived in OR Tambo (11.8%) and eThekwini (11.0%) while the lowest percentage was found in the City of Tshwane (3.9%). The proportion of maternal (3.0%) and double orphans (2.1%) remained low across the 16 districts. The highest percentage of maternal orphans was found in Sekhukhune (4.6%) and the lowest percentage in the City of Cape Town (0.7%). The highest proportion of double orphans lived in iLembe (3.8%) and the lowest in West Rand (0.4%).

*Table 3.91: Orphanhood status among children aged 18 years and younger in 16 selected districts, South Africa, 2017*

| | | Maternal | | Paternal | | Double orphan | | Not orphan | |
|---|---|---|---|---|---|---|---|---|---|
| District | *n* | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| **National average estimate** | **12 845** | **3.0** | **2.6–3.5** | **6.4** | **5.8–7.0** | **2.1** | **1.7–2.5** | **88.5** | **87.6–89.4** |
| Ehlanzeni (Mpumalanga) | 1 188 | 3.5 | 2.5–4.9 | 7.9 | 6.1–10.3 | 1.8 | 1.2–2.9 | 86.8 | 83.9–89.2 |
| Gert Sibande (Mpumalanga) | 1459 | 2.7 | 1.8–4.0 | 5.5 | 4.1–7.4 | 1.4 | 0.9–2.2 | 90.4 | 87.9–92.4 |
| OR Tambo (Eastern Cape) | 659 | 4.3 | 2.7–6.8 | 11.8 | 9.1–15.0 | 2.7 | 1.5–4.9 | 81.2 | 76.7–85.0 |
| iLembe (KwaZulu-Natal) | 1 641 | 2.2 | 1.1–4.4 | 4.4 | 2.9–6.8 | 3.8 | 2.5–5.9 | 89.5 | 86.0–92.3 |
| Umzinyathi (KwaZulu-Natal) | 1 627 | 3.2 | 2.2–4.5 | 6.0 | 4.8–7.4 | 2.1 | 1.3–3.4 | 88.8 | 86.9–90.5 |
| Uthukela (KwaZulu-Natal) | 1 820 | 2.1 | 1.4–3.3 | 7.4 | 5.7–9.5 | 3.7 | 1.9–7.2 | 86.7 | 83.1–89.7 |
| Uthungulu (KwaZulu-Natal) | 1 818 | 1.7 | 0.9–3.0 | 5.7 | 3.9–8.1 | 1.8 | 1.2–2.6 | 90.9 | 87.2–93.6 |
| Sekhukhune (Limpopo) | 633 | 4.6 | 2.6–7.9 | 7.8 | 5.5–10.8 | 1.9 | 0.8–4.5 | 85.8 | 81.8–89.0 |
| Ekurhuleni (Gauteng) | 683 | 3.9 | 2.0–7.6 | 8.5 | 5.4–13.2 | 1.4 | 0.6–3.1 | 86.2 | 81.1–90.1 |
| Sedibeng (Gauteng) | 1 002 | 3.5 | 2.0–6.0 | 6.3 | 4.1–9.6 | 3.0 | 1.4–6.3 | 87.3 | 83.8–90.1 |
| City of Tshwane (Gauteng) | 505 | 0.9 | 0.2–3.6 | 3.9 | 2.4–6.3 | 0.5 | 0.1–2.1 | 94.6 | 91.7–96.6 |
| West Rand (Gauteng) | 345 | 1.2 | 0.5–3.1 | 9.1 | 6.2–13.4 | 0.4 | 0.1–2.0 | 89.2 | 84.4–92.6 |
| Bojanala Platinum (North West) | 860 | 3.6 | 2.4–5.4 | 7.8 | 5.8–10.3 | 1.7 | 0.9–3.3 | 86.9 | 83.8–89.5 |
| City of Cape Town (Western Cape) | 772 | 0.7 | 0.2–2.0 | 6.1 | 3.7–9.7 | 2.2 | 1.1–4.4 | 91.1 | 86.8–94.1 |
| eThekwini (KwaZulu-Natal) | 920 | 4.2 | 2.5–7.0 | 11.0 | 7.4–16.1 | 2.8 | 1.5–5.2 | 81.9 | 76.0–86.6 |
| City of Johannesburg | 565 | 2.0 | 1.0–3.7 | 4.6 | 2.6–8.1 | 1.9 | 0.8–4.6 | 91.5 | 86.5–94.7 |

# Discussion

## 4.1 HIV prevalence

This section considers HIV prevalence among adults, youth and children; by province, metro, and district; among race groups; among locality types; and in populations at high risk for HIV exposure.

### 4.1.1 HIV prevalence among adults, youth and children

The estimated national HIV prevalence in 2017 was 14% – higher than the 12.2% estimate reported in 2012. The 2017 estimate translates to 7.9 million people living with HIV, which is an increase of approximately 1.6 million over the past five years. This increase in the number of people living with HIV is likely the result of a combination of new infections and the expanded ART programme in the country (Johnson et al. 2017). The ART programme has impacted HIV-related mortality. Life expectancy in South Africa has increased from 63.6 years in 2012 to 66.7 years in 2017 (StatsSA 2017a).

Increased life expectancy has led to an increase in HIV prevalence among older populations over the last five years, with prevalence peaking in the 35–39 age group in 2017. In 2012, it peaked among the same cohort, which was then the 30–34 age group. In 2017, prevalence peaked in the 35–39 age group among females and in the 45–49 age group among males. High prevalence estimates among women were observed across several age groups. This high prevalence in females can be partly attributed to the implementation of the ART programme, as more women than men are receiving ART. The implementation of ART has resulted in faster declines in HIV and AIDS-related mortality among women than men (Bor et al. 2015). However, women's biological susceptibility to HIV and their socioeconomic circumstances also increase the risk of infection among females. The noteworthy features of the prevalence curves are as follows:

1. Closing of the gender gap between adolescents aged 15–19 years. HIV prevalence in adolescent boys is approaching the prevalence among adolescent girls.
2. The gender gap for ages 20–24 is narrower than it was in 2012.
3. The gender gap in the 30–34 and 35–39 age groups has widened substantially compared to the 2012 figures.
4. Overall, people living with HIV are aging. HIV prevalence has risen sharply among women aged 60 years and older, whereas among men the figures have remained fairly constant.

HIV prevalence in children aged 5 years and younger has decreased over the past five years, although not significantly. However, an increase in the prevalence estimate for children younger than 12 months is noted, up from 1.3% in 2012 to 2.7% in 2017 (not statistically significant). Overall, the trend data show that progress has been made in reducing mother-to-child transmission (MTCT) of HIV in South Africa. The focus is shifting to the elimination of MTCT and the remaining challenges are addressed in the Last Mile Plan for the elimination of MTCT (2016–2021). Although HIV prevalence in children aged 2–14 years has increased over the past five years, the estimated prevalence for 2017 is not significantly different from the 2012 figures. HIV prevalence in children has generally remained stable since 2012, suggesting the success of the transmission of HIV (PMTCT) programme and increased survival as a result of early access to ART under the expanded HIV programme for children living with HIV.

HIV prevalence among youth aged 15–24 years years has also remained stable since 2012. The estimate for males has increased, whereas that for females has decreased, but these changes were not statistically significant. Between 2012 and 2017, HIV prevalence remained stable among females aged 15–19 years (5.7% vs 5.9%). In contrast, during the same period, HIV prevalence increased almost 7-fold among males in this age group, from 0.7% to 4.7%. This increase has exacerbated HIV prevalence in the overall age group, from 3.2% to 5.2%. In 2012, HIV prevalence among males aged 14 years and younger was 2.3%, hence the increase in the 15–19-year age group (males) was not entirely attributable to the aging of the cohort. Male youths have been shown to have earlier sexual debut than females. Previous surveys and this one have also shown that males aged 15–24 years often have multiple sexual partners (MSPs). Hence the increased HIV prevalence among males aged 15–19 years in 2017 is likely to be attributable partly to new infections.

There was no significant change in the prevalence estimates for people in the reproductive age range. A disproportionately higher HIV prevalence was noted among women, as was the case in previous years.

The prevalence of HIV in older adults (50 years and older) was high, at 12.5%, compared to 7.1% in 2012. In this age group, women had a higher prevalence than males although the difference was not statistically significant.

### 4.1.2 HIV prevalence by province, metros and districts

No striking changes have been noted among the provinces since 2008. The highest HIV prevalence estimates for 2017 were found in KwaZulu-Natal, Free State and Mpumalanga, with KwaZulu-Natal reporting the highest level from 2008 to 2017. An increase in HIV prevalence in the 2017 survey occurred across almost all provinces and the ranking of provinces according to prevalence estimates has changed. Eastern Cape ranked the fourth highest (sixth in 2012), with a prevalence higher than that of Gauteng or North West. The Western Cape displayed a 1.7-fold increase in prevalence and currently ranks second lowest, ahead of the Northern Cape, which has the lowest provincial estimate.

These changes indicate success in the rollout of ART as well as the impact of new infections. Among the metropolitan municipalities included in this survey, eThekwini and Ekurhuleni had the highest prevalence estimates – higher than the national estimate. There was a general increase in prevalence across all metros except Tshwane, where a slight decrease relative to 2012 was noted. HIV prevalence in the City of Cape Town increased by 4 percentage points from 5.2% in 2012 to 9.7% in 2017. These findings indicate that the risk factors associated with living in the metros remain relevant, as reported in 2012.

Among the other districts included in this survey, prevalence was high. Up to a fifth of the population in Gert Sibande, Uthukela, Uthungulu and Ehlanzeni were living with HIV.

### 4.1.3 HIV prevalence among race groups

As shown in previous surveys, HIV prevalence varies by race. In 2017, black Africans bore the largest burden of HIV infection. Coloureds had the second highest prevalence. Although HIV prevalence among whites has increased over the past five years, it remains low; the prevalence level has also remained consistently low in the Indian/Asian group. The racial variation is largely consistent with differences in people's socioeconomic status. Black Africans, especially black women, tend to occupy the lowest socioeconomic quintile.

### 4.1.4 HIV prevalence among locality types

In this survey, prevalence data were stratified by three locality types. HIV prevalence was highest in farming areas, followed by tribal areas, with urban areas displaying the lowest estimates. By contrast, in 2012 the prevalence was highest in urban informal areas. The lower 2017 estimate for urban areas may result from methodological changes, namely the combining of different urban populations – people living in both formal and informal areas – and the higher refusal rate in urban areas than other locality types. Additional reasons for the higher HIV burden on farms could be poor or limited access to healthcare and other services, compared to urban areas. People in rural areas have been shown to receive a lower quality of care than those in urban areas (Gaede & Versteeg 2011).

### 4.1.5 HIV prevalence in populations at high risk for HIV exposure

The findings of the 2017 survey confirm that sections of the population continue to experience a higher risk of infection and have a higher HIV prevalence than the general population. Tracking populations at high risk for HIV exposure is an important part of monitoring the epidemic in South Africa. The high-risk populations identified in this survey were the same as in 2012. HIV prevalence among black African women aged 20–34 years, cohabiting individuals, and black African men has decreased since 2012 (not statistically significant). HIV prevalence among high-risk alcohol drinkers and disabled people aged 15 years and older has increased.

## 4.2 Antiretroviral coverage

The findings showed that just under two-thirds of people living with HIV have received ART, representing an overall increase in ART uptake in South Africa. The 62.5% estimate for ART coverage reported in the 2017 survey, which engaged a nationally representative sample, is higher than the estimates reported by other studies. The figure is on par with progress made by other southern African countries, namely Botswana, Malawi and Rwanda (Johnson et al. 2017).

Encouragingly, KwaZulu-Natal, which carries the highest burden of HIV, had the most people on ART, at 69.8% of people living with HIV in this province. Overall our data indicated that there is room for improvement in all provinces regarding the uptake of treatment. The profiles of people living with HIV who show relatively low levels of ART coverage include youth aged 15–24 years, males, and people residing in urban and farming areas. These groups are important targets for interventions to maximise ART access and uptake among people living with HIV. Although we found improvements in HIV-testing rates among males, this does not appear to have translated into their uptake of ART.

## 4.3 HIV incidence

Incidence estimates of HIV are important because they provide insight into recent dynamics of the epidemic. The HIV-incidence analysis in this survey was based on direct HIV-incidence measures that use a laboratory-based testing algorithm. The algorithm parameters are aligned to the most recent guidelines for such estimations. To enable a meaningful comparison of the current HIV-incidence estimates with those from 2012, the 2012 figures were recalculated using the 2017 parameters.

Overall there were 231 100 new HIV infections in South Africa in 2017. This indicates a decline in HIV incidence between 2012 and 2017, with the annual incidence declining from 0.85% to 0.48%. This translates to a decrease of nearly 39% in the number of new HIV infections. This decrease suggests the success of the prevention and treatment programmes that have been implemented in the country. Since 2012, ART guidelines have changed substantially in South Africa, increasing access for more people living with HIV. The initiation of more people onto ART may have helped to reduce HIV transmission. As reported in Section 4.2, ART exposure was 62% – nearly double the 2012 rate of 31.2% (Shisana et al. 2014). The current survey found the percentage of people living with HIV who receive ART and have achieved VL suppression to be 87.3%. This high figure suggests the impact of ART on HIV transmission; a feature which may have been absent in 2012.

The different HIV-transmission dynamics between males and females are reflected in the HIV incidence profiles, with generally higher rates among females than males. Among youth aged 15–24 years, the number of new infections was approximately twice as high for females as males. The incidence rates among young females remain of concern. When considering the potential transmission dynamics, VL suppression was lowest among males aged 25–34 years and females aged 15–24 years, suggesting the impact of age-disparate relationships in the transmission of HIV. Nearly two-fifths of all new HIV infections occurred in young females aged 15–24 years. In 2012, new infections were also highest among females aged 15–24 years, with nearly a quarter of all new infections occurring in that age group.

As in 2012, HIV incidence among black Africans has remained roughly six times higher than in the other race groups. For the purpose of this analysis, the three race groups with smaller numbers of participants (white, coloured and Indian/Asian) were combined so that the total could be compared with the figure for black Africans. In 2012, the HIV-incidence figures were 1.3% for black Africans and 0.2% for the other races; in 2017, they were 0.59% for black Africans and 0.10% for other races. Black African women aged 20–34 years had the highest incidence of HIV in the population subgroups, similar to the 2012 findings. The incidence results broken down by locality type showed that most new HIV infections among people aged 2 years and older occurred in urban areas. Thus urban areas remain a critical factor for risk of HIV infection.

Married people had a considerably lower HIV incidence (0.61%) than people who were cohabiting with a sexual partner (0.96%) or single people (1.97%). As reported in 2012, this remains an important target area for ongoing interventions focused on prevention. It is notable that in 2017, HIV incidence among people with a single partner in the past year was similar to the incidence among people having multiple partners in the past year. While this finding is difficult to explain, it could be due to the use of condoms with non-regular partners. Previous studies have reported that people often tend to use condoms with non-regular partners (Shisana et al. 2009, 2014; Smith et al. 2014).

The decline in HIV incidence is consistent with the current modelling estimates (Thembisa model 4.1) and is both reassuring and encouraging. However, there is a need to remain focused on interventions to reduce new infections further, to achieve the target of less than 100 000 new infections by 2022 – as stated in the current National Strategic Plan for HIV, TB and STIs 2017–2022 (SANAC 2017b). Further efforts are needed through initiatives to decrease HIV incidence among specific groups, including youth aged 15–24 years, black women aged 20–34 years and single individuals.

## 4.4 HIV serodiscordance among couples and mother-child pairs

HIV serodiscordance among couples more often involves the female being HIV-positive and the male HIV-negative rather than the other way around. This finding was as expected. The higher proportion of couples having female index cases is consistent with the higher HIV prevalence among females. However, the figure was lower than previously reported in some areas of South Africa (Lingappa et al. 2008).

It is of concern that some people living with HIV are unaware of their status, as discussed in the sections on awareness of HIV status (see Section 4.7.5). This is consistent with the findings of Matthews et al. (2014) that most South Africans who have had a recent pregnancy rarely know their partner's HIV serostatus.

The findings regarding mothers living with HIV with HIV-negative children clearly show the effectiveness of the PMTCT programme in reducing the vertical transmission of HIV. Among such mothers, 90.2% of those whose children were aged 2 years or younger had HIV-negative children. Among mothers living with HIV with children under 10 years of age, 93.6% of the mothers had HIV-negative children. These findings were consistent with those reported for PMTCT in previous studies (Goga, Dinh & Jackson 2012; SANAC 2017a).

There were only eight cases in which a child was living with HIV and the mother was HIV-negative; one of these cases concerned an infant. As in previous surveys (see Shisana & Simbayi 2002; Shisana et al. 2005, 2014), these infections might have been the result of horizontal transmission rather than vertical mother-to-child transmission. A possible cause is wet nursing – that is, a child being breastfed by another woman. Researchers at Stellenbosch University reported similar findings that suggested the horizontal transmission of HIV (Hiemstra et al. 2004). They explained that this could also be the result of nosocomial (hospital-acquired) transmission in clinical settings. However, the main cause of HIV infection in children whose mothers are HIV-negative remains unknown. Child abuse cannot be excluded as another possible cause.

## 4.5 HIV drug resistance

With increasing ART coverage and longer duration of treatment, it is important to monitor the levels of HIVDR. HIVDR could jeopardize the success of ART programmes and the attainment of 90–90–90 targets. People with NNRTI resistance are less likely to achieve VL suppression, and are thus more likely to have poor outcomes, namely discontinuation of treatment, development of new mutations, virologic failure and death (WHO 2017a).

Data on HIV drug resistance (HIVDR) estimates are important for monitoring the HIV epidemic and informing policies about treatment regimens. The WHO report on HIVDR (WHO 2017a) showed an increase in the prevalence of HIVDR among individuals who initiated first-line ART since 2001, mostly in southern and eastern Africa. These data were derived from HIVDR surveys and from systematic reviews, which in turn utilised data from health facilities that served people living with HIV. The HIVDR estimates presented in this report are included for the first time in this survey series; they are unique as they are based on household-level data, unlike the conventional HIVDR assessments that are health-facility based.

Overall, drug-resistant mutations (DRMs) were identified in 27.4% of people who were virally unsuppressed and had samples that were successfully genotyped. This percentage represents a combination of transmitted, pre-treatment and acquired HIVDR. Most people

in this survey had NNRTI resistance, as reported by other studies. Dual resistance occurred among less than 10% of people receiving ART, and resistance to second-line drugs was less than 1%.

HIVDR occurred among 55.7% of people taking ARVs, which is much lower than generally found in health-facility settings in South Africa (Hunt et al. 2017; Manasa et al. 2013; Murphy et al. 2010). However, this figure probably suggests that many people developed HIVDR because of poor adherence to ARVs. As expected, resistance among those who had defaulted from ART – that is, respondents who said they took ARVs daily but whose blood specimens tested ARV-negative – was extremely high (75.9%). This finding is consistent with reports that pre-treatment drug resistance is higher among people starting first-line ART who have prior ARV drug exposure than among ARV-naïve individuals (Gupta et al. 2017; WHO 2017b).

Resistance levels were higher among males, children and youth compared to older people and females. Data from the PanAfrican Studies to Evaluate Resistance Monitoring (PASER-M) and Monitoring Antiretroviral Resistance in Children (MARCH) cohorts found that children have higher virologic failure rates on NNRTI-based first-line ART than adults (Boender et al. 2015). Those findings relate to sub-Saharan Africa. High levels of HIVDR among the youth could arise through poor adherence to treatment, limited ART coverage and transmission of resistant strains. Overall, youth show the highest HIV prevalence and incidence rates coupled with low ART coverage. Other reasons for high levels of resistance among children and youth include limited paediatric formulation options, poor palatability of medications, and inadequate dosing due to weight change (IAS 2011; Kanthula et al. 2017).

## 4.6 Male circumcision

Five main findings were identified in this survey. For the first time in this survey, most males – over 60% – reported that they had been circumcised. This picture emerged across all age groups, among black Africans, in urban and rural informal (tribal) areas, and in seven of the nine provinces. As observed in previous surveys, male circumcision was more widespread among black Africans than other race groups. Because this finding held true across most of the provinces, South Africa has officially become a nation where male circumcision is commonly practised. It is thus one of a few countries in southern Africa to have achieved this status. Previously, South Africa was classified as a country with low to moderate levels of male circumcision, like many other countries in the region that had high HIV prevalence (see SANAC 2017b; Shisana & Simbayi 2002; Shisana et al. 2005b, 2009, 2014; UNAIDS 2017a; WHO 2015).

Second, most males reported having been circumcised in medical settings. This was true across all race groups except black Africans, and in all age groups except men aged 50 years and older. It was also true for those living in formal urban areas, and for six of the nine provinces. The exceptions were Eastern Cape, Limpopo and Western Cape; most circumcisions in these three provinces were traditional rather than medical. In the Western Cape, circumcision in traditional settings had increased considerably in 2017, to almost 60%. These findings are surprising as they were not evident in the last survey (see Shisana et al. 2014). In 2017, among black Africans traditional circumcision was still practised as often as medical circumcision. Traditional circumcision remained predominant among men aged 50 years and older and among males living in both types of rural areas.

Third, the trend analysis showed that male circumcision performed in medical settings has been increasing during the period in which the five surveys were conducted. In 2002, medical circumcisions were less commonplace than traditional circumcisions. Indeed, during all other previous national HIV surveys conducted by our team (Shisana & Simbayi 2002; Shisana et al. 2005c, 2009, 2014), traditional male circumcision was more common nationally than medical circumcision. By contrast, in 2017, medical circumcisions exceeded the procedures performed in any other settings, including traditional settings.

It seems possible that the surge in circumcision rates may be partly attributed to the voluntary medical male circumcision (VMMC) programme implemented in 2010 as well as HIV communication campaigns that promote VMMC. This point is especially relevant in provinces that do not typically conduct traditional circumcision. Surprisingly, the Western Cape had a fairly large proportion of males who had undergone traditional circumcision. This finding might be explained partly by migration into the province (StatsSA 2017a) but that hypothesis needs further investigation.

These results come at an opportune time, as the nation is currently busy with the aggressive implementation of the national VMMC programme, especially in high-prevalence districts (SANAC 2017b). The 2017 survey provides evidence that such efforts are showing dividends.

In the 2012 survey, VMMC was more common among youth aged 15–24 years only. In 2017, the cohort had aged and a cohort effect was evident, as some of the males who were youths in 2012 would now have been part of the 25–49-year age group. However, this would not account fully for the finding that VMMC was more common among men throughout the 25–49 age range in 2017. These figures suggest success in the implementation of the national VMMC programme.

Fourth, it is worth noting that in 2017, nearly all circumcisions in boys aged 14 years and younger were conducted in medical settings. While the rate of male circumcision among boys under five years nearly doubled in 2017 relative to 2012, the rate among boys under 10 quadrupled (see Shisana et al. 2014). This finding suggests that more neonatal circumcisions are being performed in boys under five and more circumcisions are generally being performed among boys under the age of 10 years.

Finally, nearly 40% of males who reported that they had not been circumcised indicated that they would like to be. Among males who were uncircumcised, most black Africans and youth aged 15–24 years as well as a large percentage of coloured males indicated that they would like to be circumcised. A large proportion of males living in rural informal (tribal) areas, and in the Free State, Mpumalanga and KwaZulu-Natal also indicated a wish to be circumcised. A small percentage of uncircumcised males in Limpopo indicated that they would like to be circumcised. The finding of differences in the demand for circumcision by the different groups is not surprising. Similar findings have been reported in many other African countries (see SANAC 2017b; Shisana et al. 2014; WHO 2015).

## 4.7 Behavioural determinants of HIV infection

This section considers perceived susceptibility to HIV infection; sexual debut before the age of 15 years; age-disparate relationships; multiple sexual partnerships; awareness of HIV status and HIV-testing; condom use; attitudes towards people living with HIV; and knowledge of HIV transmission and prevention.

### 4.7.1 Perceived susceptibility to HIV infection

The concept of HIV risk perception can be applied to justify and understand HIV-related behaviours and to develop HIV research and interventions. In theory, a perception of increased risk of HIV infection should encourage individuals to engage in protective behaviours or to completely refrain from risky sexual behaviours (Tsui, Lau, Xiang, Gu and Wang 2012).

The findings of this study revealed that a large proportion of people did not perceive themselves to be at risk for contracting HIV. This was true even in the six high-risk groups investigated in the study. In addition, 10% of people who perceived themselves to be at low risk for HIV infection were in fact already HIV-positive. The previous survey reported a similar finding among both males and females (Shisana et al. 2014). People continue to believe that 'others' are more susceptible for contracting HIV (Davids, Simbayi & Van Wyk 2015; Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2012).

The reasons why people believed they would not contract HIV have not changed since 2002. The main reasons cited were faithfulness to one's partner and the trustworthiness of one's partner; this was true for both the general population and high-risk groups. Similar findings were reported in the previous surveys (Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014). By contrast, people who perceived themselves as being at risk for HIV infection indicated that they were at risk because they were sexually active and used condoms inconsistently – again similar to the previous findings (Mabaso et al. 2018; Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014; Zuma et al. 2016). Although similar reasons were reported in the previous surveys (Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014), the 2017 study noted a slight increase in the proportion of people who perceived themselves to be at low risk for contracting HIV. It is unclear why such a perception exists when the HIV epidemic is still as problematic as it was in the past decade.

In recent years, ARV treatment has become more widely available and accessible. Such treatment commences immediately after diagnosis as part of the new test-and-treat strategy (SANAC 2017a). An inaccurate perception of the risk of HIV may undermine the effort to prevent HIV infection and to test and treat individuals who are living with HIV (Maughan-Brown & Venkataramani 2018). HIV-risk perception is thus critical for HIV prevention initiatives, including the promotion of condom use by individuals living with HIV.

### 4.7.2 Sexual debut before the age of 15 years

The steady overall increase in sexual debut among youth aged 15–24 years, from 5% in 2002 to 13.6% in 2017, is a cause for great concern. More individuals than ever before are having sexual intercourse for the first time before the age of 15 years. The current findings are comparable in the PHIAs (population-based surveys) of Zambia and Malawi (Zambia Ministry of Health 2017; Malawi Ministry of Health 2017). Hence, the problem of early sexual debut is not an exclusively South African problem but is common in other sub-Saharan countries too. It is possible that similar sociocultural pressures regarding sexual and reproductive health are experienced by adolescents and youth across southern African countries, including South Africa.

There was a large disparity between males and females in this regard, with almost three times as many males reporting an early sexual debut compared to females. The higher proportion of males appears to be a common occurrence; the same pattern is reported

in the PHIAs of Zambia, Malawi and Zimbabwe (Zambia Ministry of Health 2017; Malawi Ministry of Health 2017; Zimbabwe Ministry of Health and Child Care 2017) and in all previous South African National HIV surveys (Shisana & Simbayi 2002; Shisana et al. 2005, 2009, 2014). As in the 2012 survey study, the gender disparity may be explained by sociocultural factors – including the popular media culture (see Shisana et al. 2014). Indeed, there are similar HIV SBCC intervention programmes throughout many countries in southern Africa, supported by both PEPFAR and the Global Fund to Fight AIDS, Tuberculosis and Malaria. For the most part, these programmes target adolescent girls and young women. Few interventions target adolescent boys and young men, except for the VMMC programmes.

Early sexual debut in the 2017 survey showed roughly the same rates among black African, white and coloured populations. This marks a change from the 2012 study, where the highest proportions were among black Africans, followed by coloureds and whites (Shisana et al. 2014). In the Indian/Asian population, there has been an increase in early sexual debut from 3% in 2012 (Shisana et al. 2005) to 11% in 2017. Youth residing in urban areas had higher rates of early sexual debut than rural youth. Unfortunately, the current results cannot be compared to those from previous surveys, as the definitions of geographical locality type changed in the 2017 methodology.

In 2017, early sexual debut was highest in Gauteng and Eastern Cape, and lowest in KwaZulu-Natal. In terms of change over time, Free State has experienced the largest proportional increase since 2002, followed by North West and Gauteng. In Mpumalanga, early sexual debut almost doubled between 2012 and 2017, whereas in Eastern Cape the rate has reduced slightly. The observation that early sexual debut was lowest in KwaZulu-Natal is interesting and encouraging. It suggests that young people who reside in this province have understood – and internalised – the fact that their province bears the heaviest burden of HIV; hence, people who live here, especially the youth, may be changing their behaviour by abstaining from sex. A similar trend was noted in 2012 (see Shisana et al. 2014).

In Mpumalanga, by contrast, a pattern of increase in youth who have their sexual debut before the age of 15 years was evident in 2017. This finding is disturbing, as the province bears the second largest burden of HIV in the country. Other provincial disparities in sexual debut require further analysis.

### 4.7.3 Age-disparate relationships

Young women who engage in sexual relationships with men who are five or more years older than themselves are at relatively high risk for contracting HIV (Evans et al. 2017). Hence the role of age-disparate relationships in HIV transmission is an ongoing and serious concern. Although a strong link is debated (Harling et al. 2014), our finding that HIV prevalence was higher among people who engage in age-disparate relationships than those whose partners are in their own age group is corroborated by previous findings (Gouws & Williams 2017; Oliveira et al. 2017). Similarly, the finding that more women than men have partners who are older than themselves is congruent with reports from the four previous national surveys (Evans et al. 2016; Shisana et al. 2014).

Several behavioural factors may be relevant to these findings. Specific factors are the historical and cultural norm towards intergenerational intimacy, and the role of economic and gender power imbalances – which influence inconsistent condom usage and people's inability to negotiate sexual activities and their frequency (Beauclair, Delva & Dushoff

2018; Brouard & Crewe 2012; Ritchwood et al. 2016). In addition, male partners who engage in sexual relations with older women (age-disparate relationships) have been shown to be relatively likely to have other concurrent relationships, which increases the risk of HIV through sexual network dynamics (Maughan-Brown, Evans & George 2016).

It is important to highlight that the vulnerability of young girls is not due to socio-behavioural and structural factors only. Recent research has identified a biological vulnerability that predisposes females, especially those of African descent, to HIV infection through the presence of genital bacteria, the cervicovaginal microbiome, and raised inflammatory cytokine concentrations (Gosmann et al. 2017; Kaul, Ball & Hirbod 2011; Lennard et al. 2018; Masson et al. 2015). Bacterial vaginosis and sexually transmitted diseases such as chlamydia and herpes simplex virus type 2 were identified as risk factors for HIV infection (Francis et al. 2018). Nevertheless, this finding adds to the need for interventions to empower women through education and economic opportunities, while creating awareness of the impact of age-disparate relationships as a contributor to the high prevalence of HIV among females.

### 4.7.4 Multiple sexual partnerships

This study found that a significant decrease has occurred in MSPs among people aged 15 years and older, from 12.6% in 2012 (Shisana et al. 2012) to 10.6% in 2017. Over the past five surveys, a downward trend has been observed in the number of MSPs reported by males, especially in the 15–24 and 25–49 age groups. However, the reported proportions are still much higher than their female counterparts. The discrepancy may be attributed to the acceptability of sexual activity among males in most societies and the economic dependence of females on their male partners (Leclerc-Madlala, Simbayi & Cloete 2009). With regard to females, there has been a steady increase in MSPs, especially in the 15–24 and 25–49 age groups.

The finding that black Africans continue to have a higher reported proportion of MSPs than other race groups, and therefore have larger sexual networks, is concerning. This finding confirms those of previous studies in South Africa which reported high rates of MSPs among males and black Africans (Kenyon 2016; Onoya et al. 2014). This scenario increases the risk of HIV infection for black African females, as their partners tend to have many sexual partners and larger networks.

Nonetheless, the overall decrease in MSPs since the last survey is most welcome as this has the potential to reduce the risk of HIV infection in the relevant groups (WHO 2018). The decline observed may partly be attributed to changes in sexual behaviour as a result of greater awareness about the role of risky behaviour in HIV infection.

### 4.7.5 Awareness of HIV status and HIV-testing

South Africa has made substantial progress in expanding people's access to HIV-testing services (HTSs) (Johnson et al. 2017). However, the percentage of people who were tested for HIV in the year preceding the 2017 survey had not increased compared to 2012. When the data were stratified by sex, approximately the same proportion of males had been tested in the preceding year as in the last survey. The results also showed that male testing rates (66.2%) were almost the same as female testing rates (67.3%) in 2017. This finding could mark a turning point in the access challenges for men, as previous evidence has shown that men are less likely than women to access HIV-testing (Johnson, Dorrington & Moolla et al. 2017; UNAIDS 2017a). No difference in testing rates for females were noted

between the 2012 and 2017 surveys. The levelling off of the testing rates among females is a concern, as girls and young women remain the highest risk group for contracting HIV. In addition, women should (in theory) have more opportunities to test for HIV as part of the PMTCT programme.

Overall, the sustained moderately high rates of HIV-testing may be attributed partly to the ongoing HTS campaigns that SANAC and NDoH have provided since 2010 (SANAC 2017b). Although there is no real increase in testing rates between 2012 and 2017, Johnson et al. (2015) analysed data from the 2012 survey and concluded that if South Africa maintained its 2012 testing rates, it could reach the target of 90% of adults living with HIV being diagnosed by 2020.

The study also revealed the facilities where people were most likely to go for HIV-testing. Findings suggest that the public sector remains accessible to the general population. Only 6.4% of respondents indicated that they had been tested at a private facility; this figure is a decrease from 17% in the 2012 survey. Although there has been a move to promote HIV prevention and care programmes in the workplace, only 4.7% of survey respondents had undergone testing in the workplace. As observed in 2012, males were more likely than females to have been tested at a workplace. Traditional healers were least likely to be consulted for HIV-testing. Special-purpose centres, such as youth centres, loveLife's youth-friendly clinics, and HIV-testing centres not based at clinics or mobile clinics were utilised far less than public health facilities. This finding suggests that even when such facilities are situated within communities, they may not be the preferred option.

### 4.7.6 Condom use

South Africa has done well with regard to the availability, distribution and affordability of condoms (SANAC 2017b). However, while condom distribution has improved, evidence suggests that actual condom use has declined (UNAIDS 2016). The Durex Global Sex Survey, conducted in 36 countries including South Africa, found that more than half (54%) of youth aged 18–24 years had risked having unprotected sex (Durex 2017). The same survey revealed that between 2011 and 2017, there has been a 7% decrease in condom use in the 18–24-year age group in South Africa.

Despite the low rates of condom use at the last sexual encounter, the current survey showed that these rates have improved slightly. Between 2005 and 2008, an increase in condom use was noted, especially among individuals aged 15–24 years. In 2012, this trend was reversed as condom use reverted to the 2005 levels among both males and females in all age groups (Shisana et al. 2014). In the current survey, there has been a slight improvement in the overall rates of condom use at the last sexual encounter, from 36.2% in 2012 to 38.9% in 2017.

The gender differences observed in previous studies (Shisana et al. 2005, 2009, 2014) have continued. When the 2017 survey data were stratified by age and sex, males aged 15–24 years still had the highest reported rates of condom use at the last sexual encounter (67.5% in 2012 and 67.7% in 2017). The rates of condom use at the last sexual encounter have typically been lower for females, but have not changed between 2012 and 2017; the reported rate was 49.8% in both surveys.

The rates of consistent condom use remain low in South Africa, with only 28.1% of people in the 2017 survey reporting that they used a condom consistently. This is a marginal increase from the 2012 rate of 27.4%. The gap between male condom use at the last

sexual encounter versus consistent use is influenced by several factors and by gender; social norms that are informed by gender scripts are of central importance in this regard (Beksinska, Smit & Mantel et al. 2012; Hauck 2015). Condom use – specifically consistent use – has been a challenge in general and more so among older age groups (Shisana et al. 2014).

Trust and other interpersonal factors influence protective behaviour. The Durex study reported that 41% of people aged 18–24 years admitted that they do not use condoms because they are in a trusted relationship. This is despite the fact that 10% of people in relationships indicated that they had another sexual partner (Durex 2017). However, it is encouraging to note that in the 2017 survey, individuals who had two or more partners also had the highest reported condom use at the last sexual encounter.

In 2017, the proportion of people who indicated that they had never used a condom with their most recent sexual partner decreased from 52.9% (in 2012) to 46.3%. This was despite the marginal increase in reported condom use overall. In addition, the inconsistent use of condoms among people who lived with a partner (15 years and older) has increased from 56.4% in 2012 to 62.7% in 2017. This finding is disquieting due to the high rate of MSPs among cohabiting partners, which increases their risk of contracting HIV (Shisana et al. 2014).

Ideally, condom use should be the norm in each act of sexual intercourse, even among married couples, due to the risk of HIV infection. The exception would be when people wish to conceive. The high rates of inconsistent condom use and total lack of condom use among people who cohabit with a partner provide clear evidence that the social environment can affect people's perception of their HIV risk. That is, social conditioning – such as living together and personal familiarity – can lower the perception of the risk of contracting HIV. Similar sentiments have been reported in other studies, where the use of condoms had declined among cohabiting individuals. According to Allen, Emmers-Soomer and Crowell, partners (2002, cited in Shisana et al. 2014), partners develop commitment, monogamy and trust, and to suggest the use of a condom could imply infidelity (Beksinska, Smit & Mantell 2012; Shisana et al. 2014).

The continued low levels of reported consistency in condom use and condom use at the last sexual encounter may reflect the impact of risk compensation. Risk compensation can potentially increase risk behaviour in sexual relations – such as decreased condom use and MSPs. This reversal in protective behaviour is often attributed to the wide availability and accessibility of ART (Cassell et al. 2006; Obermeyer et al. 2009). However, a recent study found no evidence of risk compensation (Risher et al. 2016), and the current findings may perhaps be attributed to simple complacency (Troung et al. 2006).

The slight change in trends regarding condom use is encouraging but more work needs to be done to increase the levels of condom use in the general population. The decline in condom use since 2008 has mirrored the decline in promotional campaigns and advertising. The UNAIDS *Prevention Gap Report* (2016) showed that HIV prevention efforts must be re-invigorated if the world is to halt the AIDS epidemic by 2030. To achieve the target of reducing the number of new HIV infections, the UN has called for greater political commitment and increased investment in HIV prevention, including condom promotion. Prioritising condom use to achieve 90% usage by people at risk (who have sex with a non-regular partner) would avert a large number of new HIV infections by 2020. It would also have an important impact on preventing other sexually transmitted infections and unintended pregnancies.

Compared to the 2012 results, in 2017 fewer high or hazardous risk drinkers (aged 15 years and older), recreational drug users (aged 15 years and older), and disabled people (aged 15 years and older) reported using a condom consistently with a sexual partner (Shisana et al. 2012). This is despite these groups remaining vulnerable, particularly disabled people (due to the common myth that disabled people cannot be sexually active). Disabled people face all the risk factors associated with HIV because they are often discriminated against and neglected in HIV policies and interventions (UNAIDS 2014b).

### 4.7.7 Attitudes towards people living with HIV

From the results presented in this section, it is evident that most people reported positive attitudes toward people living with HIV. This was true across the age groups and provinces. Overall, the responses to four of the six items related to stigma remained unchanged since 2012, and indicated low levels of stigmatisation.

Responses to the first item (*'If you knew that a shopkeeper or food seller had HIV, would you buy food from them?'*) have shown a gradual reduction of stigma over the years. The fifth item (*'Would you want to keep the HIV-positive status of a family member a secret?'*) has seen a large increase in the number of respondents who said they would keep this secret. Up to two-thirds of people would hesitate to disclose the HIV-positive status of a family member, suggesting an affirmation of human rights and respect towards the family member to ensure their dignity. It is up to the person living with HIV to decide whether to disclose such information, and to whom. Similar hesitation was reported in previous surveys (Shisana et al. 2005, 2009, 2014). People also showed overwhelming support for caring for a family member with HIV, which may indicate their concern for the welfare and dignity of relatives living with HIV.

The current survey showed that Gauteng enjoyed a relatively low overall perception of stigma compared to the other provinces. Western Cape, Northern Cape and Limpopo displayed somewhat less tolerance towards people living with HIV. Although this finding may be influenced by other factors, the relatively low HIV prevalence among these three provinces may have influenced the moderate intolerance towards people living with HIV. Programming and intervention strategies have always been prioritised for the provinces with high HIV prevalence, especially Gauteng and KwaZulu-Natal.

### 4.7.8 Accurate knowledge of HIV transmission and prevention

Results from the 2017 survey regarding the accurate knowledge of HIV and rejection of myths showed a slight improvement relative to the findings of the 2012 survey. In 2012, a general decline in HIV knowledge was evident. However, the overall 2017 results were still poor; fewer than half of respondents had accurate knowledge of HIV or rejected the main myths. The same pattern of results was found for high-risk groups. A similar pattern was observed for males, and those results match the findings from population-based surveys conducted between 2009 and 2015 in various sub-Saharan African countries. (See Shisana et al. 2014)

The recent South African Health Demographic Survey (2016) reported relatively high accuracy and comprehensive knowledge about HIV among males aged 15–24 years and 15–49 years, respectively (StatsSA 2017c; UNAIDS 2016). However, survey data from 35 countries showed that only 36% of young men and 30% of young women could accurately identify ways of preventing HIV transmission during sexual intercourse, and rejected

misconceptions about HIV transmission (Stover et al. 2013). Our findings were consistent with those results. By contrast, UNAIDS (2014a) reported that knowledge of HIV among the youth is almost at 60%. The discrepancy might reflect differences in how knowledge about HIV was measured in the two studies.

Communication of HIV prevention, treatment and care has obviously impacted positively on South African citizens as was expected. The HIV Testing Services were revitalised in 2013 to focus on persuading people from diverse settings, including farms, to undergo HIV-testing (SANAC 2015). Other initiatives have involved multi-media, school-based and broader community mobilisation activities (UNAIDS 2016) and civil organisations providing HIV information and services have flourished (UNAIDS 2014a). These efforts have resulted in more than 10 million people in South Africa being tested for HIV every year (NDoH 2017). All these factors have no doubt contributed towards the increase in HIV knowledge observed in the current survey.

## 4.8 Social and behavioural change communication programmes about HIV

Overall, of the 43 potential communication programmes reviewed, nearly half of South Africans (46.6%) self-reported that they had heard, watched or participated in between 5 and 15 SBCC programmes (which was defined as low to moderate exposure), while 16.8% had a high level of exposure (which was defined as 16 or more programmes). The most reach was by programmes offered by CCI, followed by those from Soul City, and then loveLife. Exposure to SBCC programmes has had positive associations with HIV-testing and frequency of testing. Exposure to SBCC programmes was associated with high levels of testing for HIV and having been tested for HIV in the previous year.

Exposure to SBCC programmes was associated with the rejection of myths about HIV but not with accurate knowledge of HIV-prevention methods. Roughly 60% of survey respondents displayed accurate knowledge about HIV prevention. When accurate HIV-prevention knowledge was combined with rejection of myths associated with HIV, the percentages of people displaying both types of knowledge were rather low, ranging from 34.9% to 39.7%. Individually, the proportions related to each of the two components were fairly high, but when combined, the percentages were lower. This means there is little overlap between accurate HIV-prevention knowledge and the rejection of major myths about HIV infection.

In males, higher SBCC exposure was associated with higher levels of male circumcision in general and medical circumcision in particular. Although the desired levels of male circumcision have not yet been realised, especially in districts where traditional circumcision is not the norm, it is encouraging that males with higher SBCC exposure show higher levels of VMMC. More nuanced analysis exploring specific SBCC programmes that promote VMCC is planned. Such research should provide a deeper understanding of who is undergoing VMCC, and how the programmes can be improved to encourage a higher uptake of VMCC, especially among younger people.

People who were exposed to higher levels of SBCC programmes reported having more sexual partners than those who had less SBCC exposure. However, it was encouraging to note that the same individuals were also more likely to report using a condom with their last sexual partner. They also reported higher levels of consistent condom use. Higher SBCC exposure was associated with higher levels of substance abuse and excessive

drinking, two factors that are extensively cited as associated with poor HIV outcomes. Further analysis through examining the relationships is needed to understand the profile of people who use condoms and the partners with whom they use them. Because of the cross-sectional nature of the study, these results imply mere association; that is, no causality is implied in these relationships. It is possible that individuals exhibiting certain behaviours are likely to seek HIV information differently, thus the seeming negative association.

## 4.9 Experiences of intimate partner violence

Acts of intimate partner violence (IPV) for both men and women presented in many different forms: being pushed, shaken, having an object thrown at one, and being slapped were most frequent. When looking specifically at gender differences, more women experience IPV than men. The results are comparable to the existing literature on IPV, as women continue to be the main victims of violence at the hands of their intimate partners (Dhairyawan et al. 2013; Gass et al. 2011; Mthembu et al. 2016; Stover & Morgos 2013; Williams, Ghandour & Kub 2008). Gass and colleagues (2011) predicted that close to 50% of South African women will fall victim to IPV during their lifetimes (Gass et al. 2011). Furthermore, women are likely to report more severe injuries inflicted by their male partners during IPV (Mthembu et al. 2016; Stover & Morgos 2013; Williams, Ghandour & Kub 2008) – a point that was evident in our findings. The low prevalence reported in this survey should be considered with caution. Although study protocol adhered to the WHO (2001) recommendations for IPV research, victims of IPV might have been less forthcoming with disclosure, because the survey interview was conducted in their household. Future research should take this issue into account.

The current data provide a national sample of both males and females among which the prevalence of IPV perpetrated by female partners is demonstrated. Thus, although female-perpetrated IPV is less common, males reported having experienced IPV. For this analysis we did not establish whether the victim was involved in a relationship with a partner of the same sex. The likelihood of males perpetrating violence against their female partners was only assumed. However, IPV among same-sex couples is not uncommon. Recent literature has shown that it occurs at rates similar to those observed in heterosexual couples (Edwards, Sylaska & Neal 2015; Reuter et al. 2017; Walters, Chen & Breiding 2013).

## 4.10 Orphanhood

Overall, there was a significant decrease in the estimated number of orphans, from 3 032 000 in 2008 and 3 132 000 in 2012 to 2 135 000 in this survey. This could be that fewer parents are dying prematurely due to the effectiveness of the ARV treatment programme in the country. Orphans continue to be more vulnerable to HIV than children who are not orphans. The greatest vulnerability was noted for young children and teenagers who had lost their mothers or both parents. Orphaned children are considered a vulnerable group because of the loss of parental guidance and protection. This loss profoundly affects their basic needs (Skinner et al. 2004). Orphaned children are more likely to be abused and exploited, both physically and sexually, than their non-orphaned counterparts. Many households decline into poverty after the loss of one or both parents. Early sexual debut, coercion or rape, and transactional sex are some of the events that have been observed in this high-risk group. The loss of a parent or caregiver can also translate into other losses, such as the loss of access to social grants, education and healthcare; all of these events would increase a child's vulnerability to HIV infection.

## 4.11 Strengths and limitations of the survey

This section discusses the strengths and limitations of the survey.

### 4.11.1 Strengths

The 2017 survey, like its predecessors in 2002, 2005, 2008 and 2012, was based on a sampling approach that ensured that the sample represented the South African population. The survey used a multi-stage stratified cluster sampling approach to draw SALs, making the results generalisable to the whole population. The stratification levels used were provinces, locality types, age groups, race groups and sexes. The survey data can be utilised by South African policy-makers, planners, NGOs and the public. Interested parties will have access to information on the HIV prevalence among people of different races and for those living in urban areas, rural formal (farm) areas and rural informal (tribal) areas, regardless of whether the dwelling is formal or informal (Shisana, Rehle, Simbayi et al. 2014).

The current survey is the largest that the HSRC and its consortium of partners have undertaken. As in the previous survey, the samples were large enough to allow for meaningful analysis of the data to enable the generalisation of results, extrapolated to the whole South African population (Shisana et al. 2009). In addition to the 1 000 SALs that formed a nationally representative sample – which also replicated those of the previous four surveys, a further 457 SALs were sampled in 13 districts. This second sampling and surveying enabled us to estimate HIV prevalence at district level for the selected districts, and in three metro areas, namely Johannesburg (Gauteng), Cape Town (Western Cape) and eThekwini (Durban) (in KwaZulu-Natal). This increased the sample size by about 20 000 respondents, bringing the total projected sample size to 60 000. All five districts in Gauteng and five in KwaZulu-Natal were represented. This yielded a total of 16 districts for which the country now has representative data, which can facilitate better tracking and monitoring at the district level.

As in previous surveys, the 2017 study achieved an impressive response rate. Of the 39 132 eligible individuals, 36 609 (93.6%) agreed to be interviewed. Among them, 23 923 (61.1% of the original 39 132) agreed to provide a blood specimen for HIV-testing, which they were told would be anonymously linked to their questionnaires. These response rates are an improvement on the 2012 survey, in which the household response rate was 84.7% and the response rate for individual questionnaires was 89.5%. However, the response rate for HIV-testing was higher in 2012, at 67.5%.

As this is the fifth survey in a series, the study now provides five data points. As in the previous surveys, in 2017 the sample size for trend analysis satisfied the following two requirements:

1. The requirement for measuring change over time so as to detect a change in HIV prevalence of 5 percentage points in each of the main reporting domains: sex, age, race, locality type and province (5% level of significance, 80% power, two-sided test).
2. The requirement for acceptable precision in estimates per reporting domain, to enable estimating HIV prevalence in each of the main reporting domains. The precision level was required to be less than ±5%, which is equivalent to the expected width of the 95% confidence interval (CI) – that is, the z-scores at a 95% level for a two-sided test.

As in the four previous surveys, the 2017 survey used a master sample. This allows for repeated surveys to track changes in the behaviour of the population, their exposure to information on preventing HIV, and their HIV status (Shisana, Rehle, Simbayi et al. 2009). This is the third national population-based HIV survey that has included HIV-incidence measures obtained directly through laboratory testing. For the first time, the 2017 survey included a laboratory test for VL suppression. These data clearly add to the empirical evidence required by government and NGOs, as well as donors, to determine the levels of new HIV infections and people's exposure to ART and their VL suppression levels. This information is needed to track the 90–90–90 targets. It will be crucial in assessing the effectiveness of the national response in reducing new HIV infections.

The 2017 survey retained the same four questionnaires and various modules used in the previous surveys. New additions strengthened the survey, including a module to tap people's knowledge, attitudes and perceptions about TB. As in the 2008 survey, there was a module on the media, which was expanded to include several submodules. These examined the respondents' exposure to the various HIV communication campaigns; the same aspect was assessed in previous national HIV communication surveys (see 2012 survey report by Johnson et al. 2013). A modified module on migration, based on the Kenya AIDS Impact Survey (National AIDS and STI Control Programme, Ministry of Health, Kenya 2013) was also added. Finally, the focus of the module on violence was changed from violence in the community to violence between intimate partners. The IPV scale that was used in the survey measures both the experience and perpetration of violence among men and women.

The HSRC has developed capacity to conduct large-scale surveys over the last 15 years. The organisation has also conducted several other large-scale surveys since the HIV and AIDS Prevalence Among South African Health Workers 2002 survey (Shisana et al. 2003) and among educators (Shisana et al. 2005b). Another survey was the *South African National Health and Nutrition Examination Survey, SANHANES-1* (Shisana et al. 2013). A more recent study was that of the Health of Educators in Public Schools in South Africa (Zuma et al. 2017).

Apart from the experience gained and confidence in the methodology applied, the fact that this was the fourth follow-up survey is important in its own right. The data collected in 2017 will allow the changes in trends – in both HIV prevalence and behavioural risks – to be investigated, as well as the impact of communication, relative to the findings from the four earlier surveys (Shisana & Simbayi 2002; Shisana et al. 2005c, 2009, 2012). This is a main strength of these repeated household surveys.

### 4.11.2 Limitations

As in the four previous surveys, this study had two main limitations, which are inherent in all cross-sectional socio-behavioural studies. In all cross-sectional studies, exposure and outcome are measured at the same time, hence a correlational rather than causal model must be used (Shisana et al. 2009, 2014). The difficulties in determining the temporal sequence of HIV infection and its potential risk factors are exacerbated by estimating prevalence rather than counting the actual cases of HIV incidence. Some infections might have occurred up to 30 years previously, whereas the questionnaires focus on current risk behaviours. For various reasons, individuals may have changed their behaviour since becoming HIV-positive, and such changes may or may not be related to HIV status (Shisana et al. 2009, 2014). Including HIV incidence rates and triangulating these data with data on sexual behaviour helped to address this problem. Such data contributed to

understanding the relationship between people's behaviour and HIV acquisition (Shisana et al. 2009, 2014).

Another limitation, again common to nearly all surveys about knowledge, attitudes, beliefs and behaviours related to HIV and AIDS, is the self-report approach. This methodology relies on the accuracy of self-reporting by respondents (Shisana et al. 2009). Self-reports may be affected by several factors, including recall bias and social-desirability bias. Behaviours in the sphere of individual private lives, such as sexual or addictive behaviours, might not be honestly reported because of people's desire to be socially accepted. Respondents tend to provide the answers they think are socially acceptable. However, the questions we used to probe intimate or socially stigmatised behaviours had been validated in other scientific surveys that dealt with similar issues (see Shisana et al. 2009, 2014).

A further limitation of the survey relates to the exclusion of people who do not live in regular homes (Shisana et al. 2014). This issue is common to most surveys conducted in the general population using a household survey design. The survey sample excluded people living in institutions and hostels as well as homeless people who live on the streets or in shelters. The design of the sample purposefully excluded people confined to institutions, such as soldiers or prisoners, and students residing at boarding schools, colleges and universities (Shisana et al. 2009). Some of these groups may have higher HIV prevalence rates than the general community (Shisana et al. 2009). For this reason, the survey results are generalisable only to people who usually live at home.

With regard to HIV drug-resistance testing, we could not genotype samples of all respondents who were not virally suppressed. Hence, the DRM analysis did not include all virally unsuppressed respondents. Our population-level data cannot distinctly report pre-treatment and acquired HIVDR, and are thus not comparable to conventional data on HIVDR that distinguishes these subgroups. Although transmitted resistance could be estimated from incidence cases, the sample was too small for reliable estimates.

Finally, the design of this household survey was conceived to allow for detailed analysis of the main population groups of South Africa. We used oversampling when necessary, to allow for meaningful comparisons – for example, between different races within the broader South African population. However, this design and the objective of ensuring national representativeness imply that certain groups which may be of interest for understanding the epidemic might not have been represented in sufficient numbers. Examples include individuals who exercise homosexual and bisexual practices, drug users who use injectables, and sex workers (Shisana et al. 2009, 2014). Some of these groups may have a higher prevalence of HIV than the general community (Shisana et al. 2009). Similar limitations are encountered in other countries in all surveys relating to sexual and HIV-related risk behaviours, where the survey is based on general population samples (Shisana et al. 2009, 2014).

### 4.11.3 Other limitations specific to this survey

Although our researchers and fieldworkers made every attempt to encourage participation, as they did in the four previous surveys (2002, 2005, 2008 and 2012), specific groups may have declined to participate widely in the HIV-testing offered by this survey. This scenario may have biased the HIV-prevalence estimates for some subpopulations (Shisana et al. 2009). Although the overall participation rates were good for the 2017 survey, participation among Indians/Asians and whites remained a challenge. The overall response rate for

HIV-testing was 61.1%, lower than the 67.5% and 67% achieved in 2008 and 2012. When data on testing response rates were disaggregated by race, we noted that black Africans and coloureds were more likely to agree to be tested, whereas Indians/Asians and whites were less likely to agree to be tested. This was despite a communication campaign and matching the race of fieldworkers with respondents in an attempt to reach these two minority race groups.

The low rates of participation among Indians/Asians and whites has been observed in previous studies in South Africa, including the four previous HIV surveys (see Shisana et al. 2009, 2014). The perception that HIV is not a problem in their particular communities plays a role in the refusal by these groups to participate in HIV surveys (Shisana et al. 2009, 2014). Another concern is access to these groups, with many individuals refusing to open their doors to fieldworkers because of security concerns. The same challenge was experienced in all affluent areas. People living in such areas often have homes with high walls or live in security complexes, which do not allow easy access for fieldworkers (Shisana et al. 2009, 2014).

As mentioned in the 2008 and 2012 survey reports, in 2017, respondents from the Indian/Asian and white groups were also more likely to view incentives or benefits for themselves as the motivation for HIV-testing. They cited access to private medical practitioners and awareness of their HIV status as a reason for refusing to be tested for HIV (see Shisana et al. 2009, 2014). Perceived direct or indirect benefits from government services were also cited as reasons for refusals among these minority race groups. They believed that they are not the beneficiaries of government services and programmes, hence their contribution to the study would offer them no direct benefit.

In the future, greater effort is required to increase the interest and participation among these groups; the current data gathered from them on HIV-testing cannot be interpreted with confidence. Indeed, the lack of participation by these groups may increase the perception that they are seldom affected by HIV and AIDS and therefore do not need targeted interventions. This creates a false sense of security. While the notion may be fairly realistic at present, it could become dangerous in the near future as new communities could find themselves bearing a heavy burden of HIV and AIDS. In the early 1990s, this was the case for the black African majority (Shisana et al. 2009, 2014).

It would have been useful to be able to compare the results of the 2017 survey to those of the 2016 SADHS and the 2017 survey of pregnant women in antenatal clinics. The two previous HSRC surveys on HIV followed that approach. However, neither of these survey reports were available when this report was being compiled. Finally, with regard to determining serodiscordancy, not all mother-and-child pairs or heterosexual couples could be matched easily. The numbers were low and therefore the findings should be interpreted with caution.

# Conclusions and recommendations

## 5.1 Conclusions

This chapter highlights the conclusions and recommendations emanating from the 2017 survey.

### 5.1.1 HIV incidence continues to decrease

The number of new infections has decreased by nearly 39% since 2012. Less than 250 000 new infections were estimated to have occurred among people aged 2 years and older in South Africa by 2017. In the reproductive age range, there was a relative decline in incidence of 42%. These findings indicate the impact of the HIV prevention and treatment intervention programmes that have been implemented in the country. HIV incidence has remained highest among the youth, black South Africans and females; these findings continue to be a concern.

### 5.1.2 Exposure to antiretrovirals has doubled

The number of people living with HIV who are receiving ARVs has doubled since 2012. The estimate for 2017 was 62.3%, compared to 31.2% in 2012. This increase reflects the expansion of the ART programme over the past five years, culminating in the implementation of the universal test treatment approach from September 2016.

### 5.1.3 Medical male circumcision has increased

The 2017 findings showed that there was an increase in both neonatal circumcision and medical male circumcision, which is most encouraging. Over two-thirds of males aged 15–24 years had been circumcised, and more than half of these were medical circumcisions.

### 5.1.4 Awareness of HIV status and HIV-testing has improved

Generally, two-thirds of people indicated that they had been tested during the previous 12 months. This result was consistent with the 2012 study and suggests that HIV-testing campaigns are sustaining the testing rates. Interestingly, male testing rates are now almost equal to those of females.

Generally, the provincial estimates showed that levels of people having been tested for HIV at any time were relatively high. This all-time HIV-testing rate was higher among females aged 25 years and older and among black Africans and coloureds. The rate for all-time testing was also higher among people residing in urban areas than their rural counterparts.

### 5.1.5 HIV communication campaigns are reaching South Africans

Some of the social and behavioural change communication (SBCC) campaigns offered by CCI, Soul City and loveLife have had a relatively wide reach. Most importantly, exposure to them was shown to be associated with some behaviours such as HIV testing, undergoing VMCC and the use of condoms, but not others such as accurate HIV knowledge and the number of sexual partners. However, it is important to note that further analysis is necessary to understand how exposure to these programmes might translate to changes in people's behaviour and their rates of HIV infection.

### 5.1.6 Progress towards UNAIDS 90–90–90 targets

Substantial progress has been made towards achieving the UNAIDS 90–90–90 targets. Overall, 85% of respondents living with HIV knew their HIV status, 71% of these were on treatment, and 86% of them were virally suppressed. Females living with HIV were closer to the targets than males.

### 5.1.7 Multiple sexual partnerships declined but gender differences remain

There was an overall decline in the occurrence of multiple sexual partnerships (MSPs) – measured as a risk behaviour – among people aged 15 years and older. Closer inspection of the trend over time, since the first national survey, showed that despite the decline in the number of MSPs among males, especially in the 15–24 and 25–49-year age groups, gender differences remain evident. As before, males engaged in many more MSPs than did females. With regard to females overall, a steady increase was noted in reported multiple partnerships, especially among women aged 15–25 and 25–49 years. In addition, black Africans continue to have the highest reported proportion of MSPs than the other race groups.

### 5.1.8 Attitudes towards people living with HIV were generally positive

The results showed that most respondents held positive attitudes toward people who live with HIV, consistent with the low level of stigma (according to people living with HIV Stigma Index) measured during the survey series. Changes have been observed for the responses to two statements related to stigma. For the first item, *'If you knew that a shopkeeper or food seller had HIV, would you buy food from them?'* a gradual reduction in stigma over time has been noted since 2002.

For the second item, *'Would you want to keep the HIV-positive status of a family member a secret?'*, over two-thirds of respondents indicated that they would keep this secret. This result represents a further decrease in the stigma over the five waves of this survey, suggesting an affirmation of respect for the human rights of family members to ensure their dignity by leaving it up to the person living with HIV to decide whether or not to disclose their HIV-positive status.

### 5.1.9 Orphanhood is declining in South Africa

The results showed that orphanhood is declining in South Africa, with the overall number declining from 3 132 000 in 2012 to 2 135 000 in 2017. The highest percentage of orphans were paternal orphans. There were no differences by sex. A significantly higher percentage of orphans occurred among black Africans than other race groups.

As observed previously, the percentage of orphanhood increases with age – it is lower among children aged 4 years and younger and higher among teens aged 15–18 years. The 15–18-year age group also had a higher percentage of paternal orphans than any other age group. The percentage of orphans was higher in rural informal (tribal) areas, followed by urban areas. With regard to the provinces, Free State had the highest percentage of orphans, while the lowest percentage was found in the Western Cape.

### 5.1.10 HIV prevalence continues to increase

Overall, HIV prevalence has increased from 6.4 million people living with HIV in South Africa in 2012 to approximately 7.9 million people in 2017. This represents an increase of roughly 1.5 million more people living with HIV since the 2012 survey. Possible reasons

for this continued upward trajectory are, first, that new infections continue to spread to previously uninfected individuals. Second, the rollout of the nationwide ART programme has greatly reduced HIV and AIDS-related mortality (SANAC 2017; Thembisa 2017), resulting in more people currently living with HIV and managing the infection medically.

### *Epidemiological curve shifts to the right as people living with HIV are ageing*

The national epidemiological curve has shifted further to the right again in 2017, as it has since 2012. Generally, in 2017 the HIV prevalence peaked among the 35–39-year age group. This was also at a higher rate compared to the peak observed among adults aged 30–34 years in 2012.

### *Consistent gender differences*

The results showed that gender differences occurred regarding the peaks in HIV prevalence, which is consistent with historical trends. The 2017 peaks also occurred at higher levels than those observed in 2012. Females aged 35–39 years were noted to bear the brunt of the HIV burden; the prevalence in this group was higher than the national average and the rate observed in males. In males, the peak HIV prevalence has shifted to older men (aged 45–49 years). However, a concomitant increase in HIV prevalence among younger males (aged 15–24 years) suggests that the gender differential may be narrowing.

### *HIV among children is stable but areas of concern remain*

HIV prevalence has notably remained rather stable in children. Although not significant, a decline was noted for prevalence in young children under the age of 5 years. An increase was noted for infants younger than 12 months and children aged 2–14 years. The latter findings suggest that although substantial progress has been made in reducing mother-to-child transmission in South Africa, challenges remain as we work towards eliminating vertical transmission.

### *HIV prevalence stratified by macro- and micro geographic levels*

At the provincial level, increases were noted in the numbers of people living with HIV (HIV prevalence). Closer inspection showed that the individual provincial burdens of HIV have shifted somewhat, resulting in changes to the ranking of certain provinces since 2012. The Western Cape and Northern Cape showed the lowest HIV prevalence rates nationally. However, a 1.7-fold increase was noted for HIV prevalence in the Western Cape since 2012. The Eastern Cape has shifted from having the sixth highest HIV prevalence to the fourth highest, now ranking higher than Gauteng and North West.

As in the 2012 survey, data were presented for selected metros. Furthermore, HIV prevalence and behavioural data for the additional selected districts were presented for the first time, yielding 16 districts in total. Most metros have shown an increase over time in the number of people living with HIV. In these metros, HIV prevalence remains highest in eThekwini in KwaZulu-Natal and Ekurhuleni in Gauteng. In the other districts included in this survey, where HIV prevalence was high, up to a fifth of people living with HIV were concentrated in four districts in two provinces, namely Gert Sibande and Ehlanzeni in Mpumalanga, and Uthukela and Uthungulu in KwaZulu-Natal. Prevalence in Greater Sekhukhune district (Limpopo) was lower than the national average.

Farm areas currently bear the brunt of the HIV burden, whereas urban areas carry the lowest burden. There was no significant difference in prevalence between farm and tribal localities. The relatively lower HIV burden newly observed in urban areas (compared to the 2012 survey) might be partly attributable to a methodological change, namely,

our combining two urban locality types as StatsSA now do. Previously these were distinguished as formal and informal urban areas. However, these locality differences in people living with HIV may still reflect historical socioeconomic disparities.

*Race*

HIV prevalence continues to vary by racial demographics. The highest HIV-prevalence rate was noted for the black African majority, followed by coloureds. The high HIV prevalence in these groups may be attributed to multifaceted sociocultural and economic factors.

### 5.1.11 Overall viral load suppression is below 65%

The current survey includes novel data on viral load suppression, added in 2017 for the first time. This measure thus represents a baseline for the national viral load (VL). Overall, VL suppression detected in the laboratory tests was below 65% for all people living with HIV, irrespective of whether they were on treatment or not. Among the subgroup of people who were on treatment, 87.3% had achieved VL suppression. VL suppression was higher among older people of both sexes. VL suppression also varied by province and selected priority districts. Furthermore, poorer VL suppression was observed in young adult males (aged 25–34 years), adolescent girls and young women (aged 15–25 years) compared to other subgroups.

### 5.1.12 HIV drug resistance

HIV drug resistance (HIVDR) estimates from this survey are unique as they are based on population-level data. Therefore, the data included people who were not accessing care and would thus be excluded from conventional facility-based HIVDR surveys.

The findings suggest that most virally unsuppressed people living with HIV who have developed drug-resistant mutations had poor adherence to ART. The findings also showed high levels of HIVDR among people who are lost from care. We were not able to explore transmitted HIV drug resistance due to the small number of recently infected cases that also showed HIVDR.

### 5.1.13 Early sexual debut among male youths is unchecked

The steady overall increase, over time, in early sexual debut (as a high-risk behaviour) among youth aged 15–24 years is alarming. More individuals are having sexual intercourse for the first time before the age of 15 years than ever before. Furthermore, there are striking differences based on gender, race and locality for this high-risk behaviour. Nearly three times as many young males as females reported having had an early sexual debut. Also, since 2012, there has been a nearly 3.5-fold increase in this risk behaviour in the Indian/Asian population group, suggesting the need to target interventions for this population subgroup.

People residing in urban areas were noted to have higher rates of early sexual debut than people living in other areas. At the provincial level, in 2017, early sexual debut was most frequent in Gauteng and Eastern Cape and lowest in KwaZulu-Natal. Since 2002, Free State has shown the highest proportional increase for this risk behaviour, followed by North West and Gauteng. In Mpumalanga, the province with the second highest HIV prevalence rate, early sexual debut has almost doubled since 2012. In contrast, this risk behaviour appears to have reduced slightly in Eastern Cape.

### 5.1.14 Condom use is moderately high but inconsistent

Overall, condom usage was moderately high among the youth but was mostly inconsistent across all age groups. Although reported condom use among youth has been stable over time, some improvements were noted in usage among older adults.

*Condom use at last sexual encounter*

As previously observed, condom use differed by sex, age and race. The results showed a slight improvement over time in condom use at the most recent sexual encounter. Since 2002, across all five waves of this survey, reported condom use was higher among males than females and was consistent across all age groups. A significant decline in condom use associated with advancing age of the respondent was noted across the age groups.

Nationally, condom use peaked in 2008 for both sexes in all age groups, followed by a decline in 2012. Compared to 2012, the 2017 results showed no significant changes in condom use among people aged 15–24 years. However, there has been an increase in usage among all other age groups, with males aged 25–49 years reportedly having the highest rates of condom use at the last sexual encounter. Furthermore, since 2002 there has been a consistent increase in condom use at the last sexual intercourse by women aged 50 years and older, although the rate for this subgroup remains extremely low.

A surprising finding was that condom use at the last sexual encounter was higher in rural informal (tribal) areas than other localities. Across all provinces, the rate of condom use at the last sexual encounter was less than 50%, with the lowest usage reported in Western Cape and the highest usage reported in Mpumalanga.

*Consistency of condom use*

Consistency in condom use refers to the use of a condom at every sexual encounter rather than just on selected occasions. The rates of consistent condom use remained low in South Africa in 2017, with less than a third of people reporting having used condoms consistently. The same finding emerged in the 2012 survey. Furthermore, just under half of all respondents stated that they had never used condoms with their most recent sexual partner.

Surprisingly, consistent condom use was similar for both sexes, but was significantly higher among youth aged 15–24 years than the older age groups.

### 5.1.15 South Africans believe they are at low risk for HIV infection

The vast majority of people believed that they are at low risk for contracting HIV. This finding was consistent even in the high-risk groups and was similar to the results observed in previous surveys. It is interesting to note that groups who did perceive themselves to be at high risk for contracting HIV also had significantly higher HIV prevalence than people who perceived themselves to be at low risk – who had a correspondingly low HIV prevalence. Within these two groups of high and low risk perception related to possible HIV infection, females had a consistently more realistic perception of their HIV status than did males. Furthermore, according to the laboratory results from the survey, 10% of people who believed they were not at risk for HIV infection were in fact HIV-positive.

### 5.1.16 Improvements in knowledge of HIV transmission were noted

Although still poor overall, people's knowledge about the sexual transmission of HIV and how to prevent the spread of HIV were noted to have improved in the 2017 survey.

Similarly, respondents' rejection of misconceptions about HIV transmission had improved since the observed decline in 2012. The knowledge levels increased from 2012 to 2017 to a degree that was higher than that observed in 2008. This trend was consistent both for the general population and among high-risk groups.

### 5.1.17 Intimate partner violence is widespread

The study found that IPV was common, although the prevalence of IPV was lower than that found in a comparable representative survey (DHS 2016). The link between IPV and HIV has long been established (Dunkle & Decker 2013; Rahman et al. 2013). The current findings confirm claims that men living with HIV who perpetrate IPV pose a serious risk for HIV transmission to their victims (Gass et al. 2011; Rahman et al. 2013).

## 5.2 Recommendations

As was recommended in 2012, both prevention and treatment must be promoted to achieve a successful impact on the HIV epidemic. Based on the above findings, all key stakeholders – including SANAC, government departments, civil society, labour, business, donors, traditional leaders and individuals – should acknowledge the need for a focused response to HIV in South Africa. This response needs to be targeted and comprehensive, multisectoral, and evidence-based, and should focus on halting the HIV and AIDS epidemic. The following specific measures are recommended.

### 5.2.1 Towards reaching the UNAIDS 90–90–90 targets

Goal 2 in the National Strategic Plan (NSP) 2017–2022 calls for achieving the UNAIDS 90–90–90 targets by 2022 (SANAC 2017b). For South Africa to meet these goals, interventions should focus on upscaling the diagnosis of HIV, increasing the number of people living with HIV receiving ART, and achieving better VL suppression among all those individuals living with HIV.

Specifically, greater focus on interventions for males is required – for all men, male youths aged 15–24 years, men residing on farms, and men living in the Western Cape, Eastern Cape, Northern Cape, Limpopo and North West. Specific districts, such as Gert Sibande and Ehlanzeni in Mpumalanga and in Uthukela and Uthungulu in KwaZulu-Natal, also require more effective interventions for men.

While the trend is moving towards achieving the 90–90–90 targets, it is imperative for the momentum to be maximised in the coming years so as to achieve those targets. In light of this need, the 2017 survey supports the NSP 2017–2022 objectives for upscaling HIV treatment and care through the use of the universal test-and-treat strategy.

### 5.2.2 Stakeholders should strengthen prevention strategies to curb new HIV infections

This section considers strategy prevention strategies to curb new HIV infections.

*Strengthen, expand and support the ART programme*

Several measures demonstrate the success of South Africa's ART programme. The first is the growing number of people who are living longer with HIV and are receiving ART; another is the level of VL suppression among people on treatment, and a third indicator is the reduction in HIV incidence. However, our analysis shows that about a third of people living with HIV are not receiving ART and there were over 200 000 new HIV infections

in 2017. Special focus should be placed on reaching males and the younger population. Stakeholder support for the expansion and strengthening of ART programmes, and the combining of such programmes, should continue. These programmes can maintain the decline in new HIV infections. It is heartening, therefore, that the NDoH is planning to increase the number of people who receive ART after HIV-diagnosis.

The ART programme should support and strengthen interventions to ensure treatment adherence and to retain patients in care. Other early warning indicators of HIVDR must also be addressed by interventions (WHO 2017b). There is a need to support timely switching from first-line to second-line drugs where virologic failure is identified (Meintjes et al. 2017). There is also a need to strengthen first-line ART regimens by including and expanding the use of integrase strand transfer inhibitors (INSTIs) as a part of the first-line ART. Our findings thus support the move to include Dolutegravir as part of first-line ART.

***Revitalise and strengthen behaviour-change interventions***

The behavioural factors associated with a high risk of becoming infected with HIV, especially among young women in South Africa, have remained largely unchanged since 2012. The 2017 survey thus shows the need to revitalise, strengthen and provide support for behaviour-change interventions that target the reduction of new infections. Behavioural aspects include the consistent use of condoms, discouraging age-disparate sexual relationships (between older men and younger women), and discouraging people from having MSPs.

The above findings also suggest the need for interventions that target male youths to achieve impacts similar to those achieved through recent interventions and campaigns targeted at young women. Examples of women-focused interventions are DREAMS and She Conquers (SANAC 2017a). Furthermore, prevention programmes at schools need to be upscaled or reintroduced to reach adolescent girls and boys. Interventions focusing on vulnerable groups, such as high-risk drinkers, to increase awareness and encourage preventative behaviour to curtail HIV and STI infections must be developed. This could include the use of locally developed evidence-based behavioural interventions, such as Phaphama, aimed at reducing both alcohol abuse and risky behaviour. Such interventions can be delivered in either clinical or community settings (see Kalichman et al. 2007, 2008; Simbayi et al. 2004).

***Continue promoting medical male circumcision***

Men who do not want to be circumcised must also be targeted. Such an intervention has been developed by Steve Weiss and his colleagues in Zambia, known as Spear and Shield/Zambia Project (Weiss et al. 2015). Other interventions have been developed to address the issue of behavioural disinhibition or risk compensation among men who have undergone voluntary medical male circumcision (VMMC). Believing that they now have a low risk of HIV infection because they have been circumcised, some men reduce their use of condoms and increase the number of their sexual partners (see Peltzer et al. 2012). Performing post-pubertal circumcision – as currently recommended by the NSP – may actually increase the risk of HIV infection among some adolescents, as a sizable proportion of adolescents have sexual intercourse before they reach puberty (see Connolly et al. 2008; Shisana et al. 2003).

The 2017 results show that there has been an increase in both neonatal circumcision and circumcision in boys younger than 10 years; these findings are most encouraging. Both neonatal and male child circumcision should be considered for inclusion in the VMMC

programme. Indeed, such developments appear already to be widely accepted practice in the country. Male circumcision should be extended to include boys aged 10–14 years, as the impact of VMMC would be even greater among adolescent males before their sexual debut (Kripke et al. 2016). Performing post-pubertal circumcisions only – as currently recommended by the NSP – misses a critical entry point for HIV prevention before sexual debut.

Finally, a serious issue that continues to be marginalised even in the NSP is the intersection between traditional and medical male circumcision. VMMC programmes should continue to be implemented in all provinces, including Eastern Cape, Limpopo (see Connolly et al. 2008) and the Western Cape – in which traditional circumcision is widely practised. There is a need to strengthen the integration of traditional circumcision and VMMC, especially in these three provinces. Several interventions combine the two traditions, which should be rolled out in these three provinces (see Peltzer et al. 2008a, 2008b).

***Intensify efforts to eliminate mother-to-child transmission of HIV***

All children born in South Africa should be born HIV-free and remain HIV-free. The same target was first achieved in Cuba and subsequently in Belarus, Armenia and Thailand. The elimination of mother-to-child transmission is thus achievable. In South Africa, it requires intensifying efforts at each step of the prevention of mother-to-child transmission (PMTC) cascade and programmes targeting maternal health. In turn, this requires a multifaceted approach that would include the following aspects: i) identifying challenges for women at family planning level; ii) identifying support for adherence to PMTCT programmes and access to these (Moyo et al. 2018); iii) increasing early ANC attendance, by 14 weeks gestation (Barron et al. 2013); iv) encouraging male partners' involvement (Cucoa et al. 2015; Wettstein et al. 2012); and v) understanding breastfeeding practices. The SADHS (StatsSA 2017c) found that exclusive breastfeeding of infant younger than 6 months had increased to 32% in 2016. This finding is encouraging, as exclusive breastfeeding of infants up to 6 months is the best option for babies, regardless of maternal HIV status. Furthermore, it is important to understand the dynamics in implementing PMTCT in different settings, particularly among under-resourced and rural areas (Rodriguez et al. 2017).

### 5.2.3 Stakeholders should support widespread HIV-testing and linkage to care

While it is encouraging that HIV-testing rates did not decline between the 2012 and 2017 surveys, there is a need to increase testing overall. In addition, groups that currently display low testing rates should be targeted. Key stakeholders should support the targeted implementation of HIV-testing campaigns and timely linkage to a care programme. The HIV-testing service needs to be strengthened and made more visible and innovative.

***The campaign should encourage the general population to test annually***

People should know their status to reduce undiagnosed HIV infections among the general population. The public should be encouraged to undergo testing at least once ('ever tested') and individuals and groups who are at high risk should be tested at least once a year. Individuals at high risk for HIV include people who have had more than one sexual partner since their last HIV test; people infected with other sexually transmitted infections (STIs), hepatitis or tuberculosis; gay and bisexual men; and people who have shared needles to inject drugs.

*HIV-testing services should target groups with low testing rates*

Groups that should be targeted include males in general and older men specifically. The survey results show that a quarter of males in South Africa have not accessed HTSs, as only 75% of males have ever been tested for HIV. The Department of Health should review the current HTS delivery models and introduce innovations. Possibilities include encouraging self-testing, and providing mobile and male-friendly HTSs while integrating other health measures into the service – like screening for STIs and prostate problems. The services should be private and located in areas easily accessed or frequented by men.

Another group that must be targeted is youth aged 18–24 years. In collaboration with researchers and SBCC partners, the South African government and key stakeholders should investigate different ways that are innovative and appealing to reach this group. Youth aged 18–24 years have the lowest HIV-testing rates among all adults and among males in general. The country must implement innovative youth-friendly HIV-testing services, using technology to reach youth. This service could be integrated with other reproductive health services, such as access to contraceptives, STI screening and treatment options.

HIV-testing services should also target youth in rural communities, especially on farms. Youth classified as 'Not in Education, Employment, or Training' should also be targeted, as they are no longer in the education system and are not working or being trained for work. HIV-testing services for youth must be mobile, accessible and private. They should be available at convenient times and located in places typically frequented by young people. Such venues can include institutions of learning, workplaces, sports events, entertainment venues and commuting hubs. Mobile units could be used to target the latter.

*Marketing and promotion of HIV-testing*

The NDoH in collaboration with SBCC partners and donors should review the evidence regarding what kind of campaigns have worked in the past. This knowledge could inform strategies to increase the uptake and understand the gaps in HTS. The country has previously invested in SBCC campaigns implemented by the government and NGOs, such as loveLife and Soul City. The existing evidence should be used to inform new and more innovative SBCC campaigns.

*Strengthen established methods for delivering HIV-testing services*

The NDoH and HTS partners should continue to support and strengthen the use of mobile clinics as well as provider-initiated and home-based testing, to deliver HTS and to increase the uptake of the service. A new era of innovation to promote self-testing should begin (van Rooyen et al. 2015). Home-based and even self-testing mobile clinics have been shown to increase the extent of HIV-testing among males, who generally dislike seeking health services from public healthcare facilities (NDoH 2015; Van Rooyen et al., 2013).

*Streamline HIV-testing and linkage to care*

The 2017 survey results show that although testing levels are high and the number of individuals living with HIV receiving ART has doubled, much remains to be done to achieve the UNAIDS 90–90–90 targets. Testing remains the critical entry point for care. Within the context of 'test and treat', the country needs to strengthen its system for linking, tracking and supporting patients living with HIV. The NDoH-proposed unique identities in the health sector may assist in monitoring the uptake of ART by patients who access HTS and are found to be HIV-positive.

### 5.2.4 Address the gaps in risk perception

In light of the low levels of risk perception, we recommend that health education interventions be tailored to individuals and the communities in which they reside. The message that everyone in South Africa is still at risk for HIV must be communicated more effectively. Educational interventions should include information about specific risk factors for each target population.

### 5.2.5 Social and behavioural change communication campaigns can foster correct HIV knowledge

Social and behavioural change communication campaigns should be informed by the 2017 results regarding the slight improvement in correct HIV knowledge and people's increasing ability to reject myths about HIV. This point is especially relevant to SBCC campaigns that are based on social media and other information and communication technology platforms. They have a central role to play in the wide dissemination of comprehensive information about HIV. Media campaigns can enhance knowledge among older adults, black Africans, people living in rural areas, and in high-burden provinces like KwaZulu-Natal and Mpumalanga.

The same principles apply both to the general population and to vulnerable groups. For example, peer-led and outreach approaches that increase knowledge, develop skills and empower crucial population subgroups to use condoms consistently should be implemented (WHO 2018). Knowledge about preventing HIV transmission should be prioritised. In addition, comprehensive programmes aimed at vulnerable populations should be based on human rights. This approach would address obstacles such stigma and discrimination, homophobia and gender inequality, all of which undermine progress towards reducing HIV transmission (UNPFA 2016). Modelling the behavioural outcomes and communication exposure to account for potential confounding variables (such as age, sex, race and geographical region) should be undertaken

### 5.2.6 Address intimate partner violence

In view of the findings on IPV, the following intervention is suggested. Couples should be targeted through interventions to facilitate their understanding of IPV, and to help them develop skills to manage the triggers that can escalate into domestic violence. When implemented, this recommendation should be complemented by the relevant health and legal services to ensure the safety of the victim and eliminate further trauma. Kalichman et al. (2008) in their Phaphama Men study proposed that programmes to counter IPV should intervene at the individual and structural levels to foster sustained behaviour change. The aim is to influence the context in which peer norms and social beliefs are maintained. A culturally congruent IPV intervention is recommended because it would provide the most effective avenue for sustained behaviour change.

There is a link between IPV and HIV. Mthembu et al. (2016) found that men who perpetrate IPV also tend to engage in risky sexual behaviours. To disrupt this link, many interventions provide information that decreases both IPV and HIV risk behaviour; however, such interventions mainly focus on the empowerment of women and do not address the male partners (see the IMAGE, and SHAZ! Projects). The Stepping Stones intervention has shown promise, as it aims to transform gendered norms in partner violence and the risky sexual behaviours of men and women (Jewkes et al. 2008). The development and implementation of complementary gender and norms change interventions for both men and women is in its infancy and warrants further exploration.

Intimate partner violence interventions should promote healthy intimate relationships. Constructs to include are those that focus on transforming gender norms, exploring sexuality and curbing risk behaviours related to HIV and STIs.

# Appendix 1: Validity of HIV-prevalence estimates

The estimation of the HIV prevalence accounted for the complex design of the sample. We used the Stata survey command and produced statistics for the standard error, coefficient of relative variation, design effect and standard error of complex sampling. These are defined by Rosier (2000) as follows:

$$\text{deff} = \frac{(\text{standard error of sampling for complex sample})^2}{(\text{standard error of sampling for srs})^2}$$

where srs is simple random sampling

$$\text{deft} = \frac{(\text{standard error of sampling for complex sample})}{(\text{standard error of sampling for srs})}$$

The table below shows the results for HIV prevalence among children and adults and includes socio-demographic characteristics, the coefficient of variation (CV), and the design effect (DEFF). The results are based on StatsSA 2017 mid-year estimates.

*Statistics pertaining to HIV-prevalence estimates*

| | Eligible | Tested (%) | HIV-positive (%) | Std. Err. SRS | Std. Err. Complex | CV (%) | Design effects (DEFT) | Square root of the design effect (DEFF) |
|---|---|---|---|---|---|---|---|---|
| **Sex** | | | | | | | | |
| Male | 17 683 | 57.7 | 10.6 | 0.003 | 0.005 | 4.9 | 1.8 | 3.3 |
| Female | 21 273 | 64.3 | 17.3 | 0.003 | 0.006 | 3.6 | 1.8 | 3.3 |
| **Age (years)** | | | | | | | | |
| 0–14 | 11 828 | 56 | 2.7 | 0.002 | 0.003 | 11.0 | 1.5 | 2.4 |
| 15–24 | 6 854 | 66.9 | 7.9 | 0.004 | 0.006 | 7.5 | 1.4 | 2.0 |
| 25–49 | 12 607 | 61.5 | 26.4 | 0.005 | 0.009 | 3.5 | 2.0 | 4.0 |
| 50 and older | 7 685 | 64.4 | 12.5 | 0.005 | 0.009 | 7.1 | 1.7 | 2.7 |
| 25 and older | 20 292 | 62.6 | 22.2 | 0.004 | 0.008 | 3.6 | 2.2 | 4.7 |
| 15–49 | 19 461 | 63.4 | 20.6 | 0.004 | 0.007 | 3.5 | 2.0 | 3.9 |
| **Race** | | | | | | | | |
| Black African | 25 837 | 65.4 | 16.6 | 0.003 | 0.005 | 3.1 | 1.9 | 3.8 |
| White | 2 555 | 42.3 | 1.1 | 0.002 | 0.007 | 61.9 | 2.8 | 7.9 |
| Coloured | 7 197 | 61.7 | 5.3 | 0.005 | 0.007 | 13.3 | 1.4 | 2.1 |
| Indian/Asian | 3 369 | 42.6 | 0.8 | 0.004 | 0.003 | 41.6 | 0.9 | 0.9 |
| **Locality** | | | | | | | | |
| Urban | 25 199 | 57.3 | 13.2 | 0.003 | 0.006 | 4.4 | 2.1 | 4.6 |
| Rural/traditional | 9 735 | 69.3 | 15.2 | 0.004 | 0.009 | 6.0 | 2.1 | 4.5 |
| Farms | 4 198 | 65.1 | 17.4 | 0.010 | 0.016 | 9.4 | 1.6 | 2.5 |

| | Eligible | Tested (%) | HIV-positive (%) | Std. Err. | | CV (%) | Design effects (DEFT) | Square root of the design effect (DEFF) |
|---|---|---|---|---|---|---|---|---|
| | | | | SRS | Complex | | | |
| **Province** | | | | | | | | |
| Western Cape | 4 619 | 63.2 | 8.9 | 0.005 | 0.012 | 13.4 | 2.2 | 4.8 |
| Eastern Cape | 4 321 | 63.8 | 15.3 | 0.007 | 0.019 | 12.3 | 2.7 | 7.5 |
| Northern Cape | 3 422 | 62.7 | 8.3 | 0.012 | 0.007 | 9.1 | 0.6 | 0.4 |
| Free State | 2 859 | 67.6 | 17.1 | 0.011 | 0.012 | 7.2 | 1.1 | 1.3 |
| KwaZulu-Natal | 8 897 | 53.1 | 18.2 | 0.006 | 0.010 | 5.6 | 1.8 | 3.3 |
| North West | 3 213 | 65.9 | 14.5 | 0.009 | 0.010 | 7.2 | 1.2 | 1.4 |
| Gauteng | 5 341 | 57.6 | 12.5 | 0.004 | 0.010 | 8.1 | 2.4 | 5.6 |
| Mpumalanga | 3 521 | 60.8 | 17.4 | 0.009 | 0.017 | 10.0 | 2.0 | 3.9 |
| Limpopo | 2 939 | 72.1 | 10.9 | 0.006 | 0.010 | 9.5 | 1.6 | 2.7 |

# Appendix 2

HIV IMPACT ASSESSMENT SUMMARY JULY 2018

## THE FIFTH SOUTH AFRICAN NATIONAL HIV PREVALENCE, INCIDENCE, BEHAVIOUR AND COMMUNICATION SURVEY, 2017 (SABSSM V[1])


The Fifth South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, (SABSSM V), a population-based cross-sectional survey of households in South Africa, was designed to assess the prevalence and trends of key HIV–related indicators. The survey was conducted between January and December 2017 by the Human Sciences Research Council (HSRC) and provides information on national and sub-national progress toward HIV epidemic control in the country. This report summarizes the HIV epidemic and impact of South Africa's national HIV response. HSRC has a long history of undertaking population-based surveys on HIV, starting with the 2002 Nelson Mandela/HSRC survey on HIV/AIDS, followed by the 2005, 2008, 2012 surveys. The 2017 survey is the fifth wave of the survey.

### KEY FINDINGS

| HIV Indicator | | Females | 95% CI[2] | Males | 95% CI | Total | 95% CI |
|---|---|---|---|---|---|---|---|
| Annual Incidence (%)[3] | | | | | | | |
| Age | 15-24 years | 1.51 | 1.31-1.71 | 0.49 | 0.27-0.71 | 1.00 | 0.86-1.15 |
| | 15-49 years | 0.93 | 0.71-1.11 | 0.69 | 0.60-0.76 | 0.79 | 0.67-0.91 |
| | 15-64 years | 0.82 | 0.70-0.94 | 0.58 | 0.50-0.66 | 0.69 | 0.61-0.77 |
| HIV Prevalence (%) | | | | | | | |
| Age | 0-14 years | 3.0 | 2.3-3.9 | 2.4 | 1.8-3.2 | 2.7 | 2.2-3.3 |
| | 15-49 years | 26.3 | 24.5-28.2 | 14.8 | 13.3-16.5 | 20.6 | 19.2-22.0 |
| | 50-64 years | 18.7 | 15.7-22.0 | 15.3 | 12.2-19.2 | 17.2 | 14.9-19.8 |
| | 15-64 years | 25.0 | 23.2-26.8 | 14.9 | 13.5-16.4 | 20.0 | 18.7-21.4 |
| Race[4] | Black African | 20.6 | 19.3-22.0 | 12.5 | 11.4-13.7 | 16.6 | 15.6-17.7 |
| | White | 0.9 | 0.2-3.3 | 1.3 | 0.3-4.7 | 1.1 | 0.3-3.6 |
| | Coloured | 5.8 | 4.2-8.1 | 4.7 | 3.2-6.8 | 5.3 | 4.0-6.8 |
| | Indian/Asian | 1.3 | 0.4-3.7 | 0.4 | 0.2-1.1 | 0.8 | 0.4-1.9 |
| Viral load suppression (VLS) Prevalence[5] (%) | | | | | | | |
| Age | 0-14 years | 48.2 | 33.6-63.2 | 56.1 | 42.4-68.9 | 51.9 | 41.1-62.5 |
| | 15-49 years | 66.7 | 63.4-69.8 | 50.8 | 45.1-56.4 | 61.0 | 58.0-63.9 |
| | 50-64 years | 73.6 | 65.7-80.2 | 76.9 | 66.1-85.0 | 74.9 | 68.5-80.4 |
| | 15-64 years | 67.6 | 64.6-70.4 | 54.8 | 49.6-59.9 | 62.9 | 60.1-65.7 |

Approximately 7.9 million people of all ages (0+ years) were living with HIV (PLHIV) in South Africa in 2017. HIV prevalence among adults aged 15 to 49 years in South Africa is 20.6 percent; 26.3 percent among females and 14.8 percent among males.

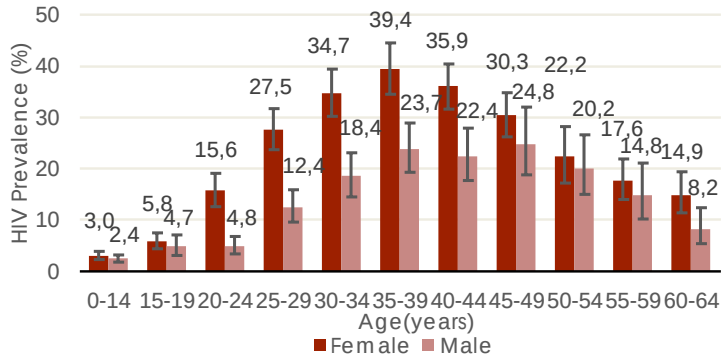
1 Originally, the survey was titled the South African HIV Behavioural, Sero-status and Media Impact Survey, hence the abbreviation SABSSM.
2 95% CI (confidence interval) indicates the interval within which the true population parameter is expected to fall 95% of the time from repeated surveys with same design and based on same sampling frame
3 Testing algorithm used a Limiting-Antigen (LAg) Avidity Enzyme immunoassay in combination with ART exposure and HIV viral load, incorporating recommendations from the UNAIDS Global HIV strategic information working group and the WHO Working Group on HIV incidence measurement and data use.
4 Prevalence by race includes all age groups (0+ years)
5 VLS is defined as HIV RNA <1,000 copies/mL on dried blood spots using the Abbott m2000 HIV Real-Time System (Abbott Molecular Inc., Des Plaines, Illinois, USA).

HIV prevalence among Black Africans is 16.6 percent; followed by Coloureds (5.3 percent); Whites (1.1 percent); and Indian/Asian (0.8 percent).
HIV annual incidence among adults aged 15 to 49 years in South Africa is 0.79 percent; 0.93 percent among females and 0.69 percent among males. This corresponds to approximately 199,700 people newly infected with HIV aged 15 to 49 years in 2017. Annual incidence in children aged 2 to 14 years is 0.13 (95% CI: 0.03-0.23).
Viral load suppression (VLS) prevalence among PLHIV aged 15 to 49 years in South Africa is 61.0 percent: 66.7 percent among females and 50.8 percent among males. Based on point estimates, VLS prevalence is lowest among 0-14 year olds at 51.9 percent.

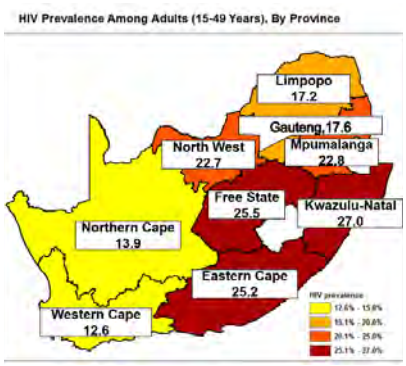
## HIV PREVALENCE, BY AGE AND SEX

Based on point estimates, overall HIV peak prevalence occurs in 35 to 39 year-olds at 31.5 percent (females at 39.4 percent and males at 23.7 percent) but differs by sex, peaking at an older age among males (45 to 49 years) at 24.8 percent compared to females (35 to 39 years).

This disparity in HIV prevalence by sex is most pronounced among young adults: HIV prevalence among 20 to 24 year-olds is three times higher among females (15.6 percent) than males (4.8 percent).




## HIV PREVALENCE AMONG ADULTS, BY PROVINCE



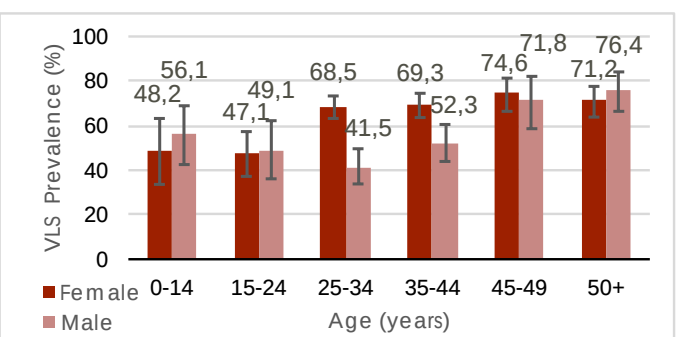

| Province | Total | |
|---|---|---|
| | HIV+%* | 95% CI |
| Eastern Cape | 25.2 | 19.8-31.5 |
| Free State | 25.5 | 21.7-29.7 |
| Gauteng | 17.6 | 14.8-20.7 |
| KwaZulu-Natal | 27.0 | 23.9-30.4 |
| Limpopo | 17.2 | 14.5-20.1 |
| Mpumalanga | 22.8 | 18.1-28.4 |
| Northern Cape | 13.9 | 11.4-16.8 |
| North West | 22.7 | 19.6-26.2 |
| Western Cape | 12.6 | 9.7-16.1 |

*HIV+% = HIV Prevalence*

Among adults aged 15 to 49 years, HIV prevalence varies geographically across South Africa, ranging from 12.6 percent in Western Cape to 27.0 percent in KwaZulu-Natal.

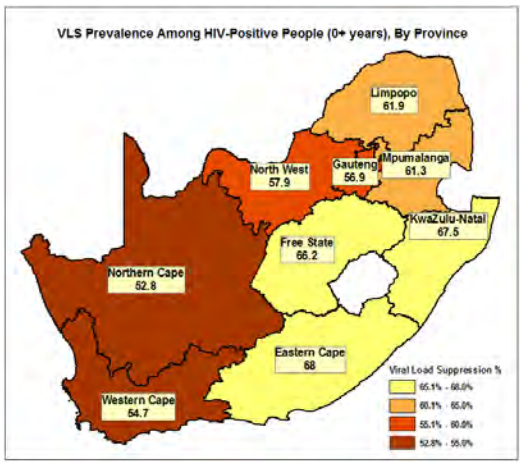
## VLS PREVALENCE AMONG ALL HIV-POSITIVE PEOPLE, BY AGE AND SEX

VLS prevalence among PLHIV in South Africa is highest among older adults: 74.6 percent among HIV positive females aged 45 to 49 years and 76.4 percent among HIV-positive males aged 50 years or older. In contrast, VLS prevalence is distinctly lower in younger adults: among PLHIV aged 15-24 years, females are lowest at 47.1 percent (males 49.1 percent), and among PLHIV aged 25-34 years males are lowest at 41.5 percent (females 68.5 percent).



## VLS PREVALENCE AMONG ALL HIV-POSITIVE PEOPLE[6], BY PROVINCE

The VLS geographic pattern is quite similar to HIV prevalence with the lowest VLS prevalence among PLHIV at 52.8 percent (95% CI: 40.0-65.2) in Northern Cape and the highest VLS prevalence among PLHIV at 68.0 percent (95% CI: 60.5-74.7) in Eastern Cape in the second lowest HIV prevalence and second highest HIV prevalence provinces, respectively.




## ATTAINMENT OF THE 90-90-90 TARGETS (AMONG HIV-POSITIVE ADULTS[7]) BY SEX

90–90–90: UNAIDS set targets that by 2020, 90 percent of all PLHIV will know their HIV status; 90 percent of all people with diagnosed HIV infection will receive sustained antiretroviral therapy (ART); and 90 percent of all people receiving ART will have viral suppression.

### DIAGNOSED[9]

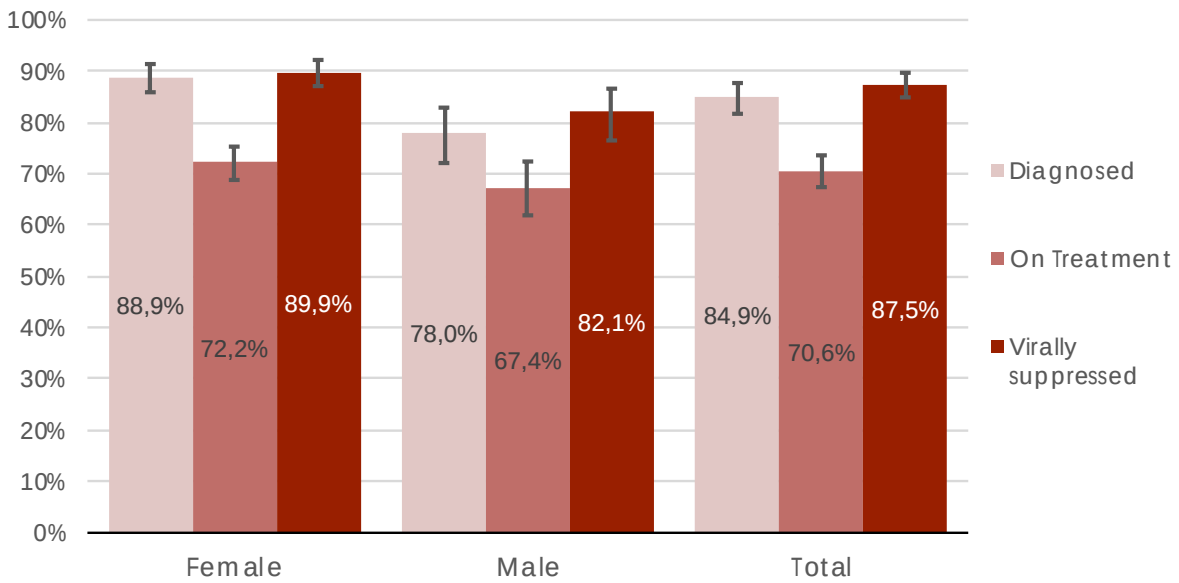
In South Africa, 84.9 percent of PLHIV aged 15 to 64 years know their HIV status: 88.9 percent of HIV-positive females and 78.0 percent of HIV-positive males know their status.

### ON TREATMENT

Among PLHIV aged 15 to 64 years who know their HIV status, 70.6 percent are on ART: 72.2 percent of HIV-positive females and 67.4 percent of HIV-positive males who know their HIV status are on ART[8].

### VIRALLY SUPPRESSED

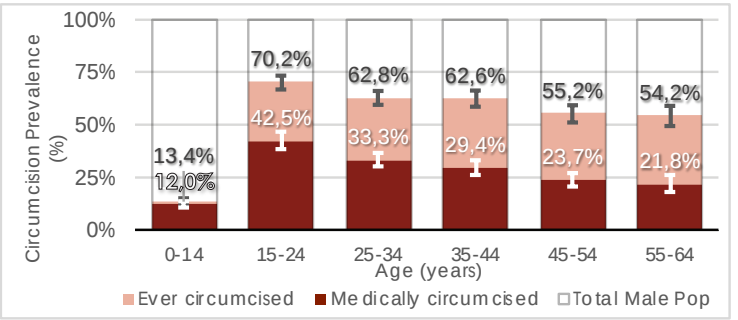
Among PLHIV aged 15 to 64 years currently on ART, 87.5 percent are virally suppressed: 89.9 percent of HIV-positive females and 82.1 percent of HIV-positive males who are on ART are virally suppressed.



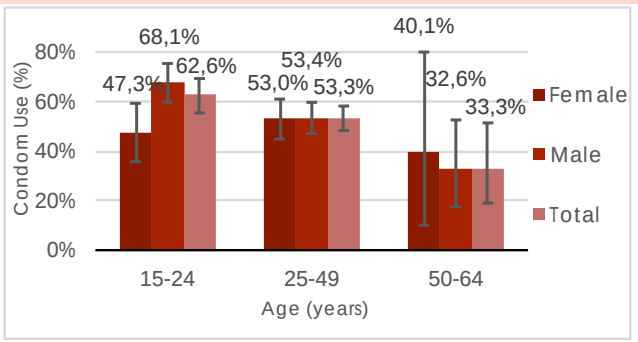

6 All PLHIV ages 0+ years
7 PLHIV aged 15-64 years
8 On ART is defined as having laboratory detected ART metabolites and does not include self-reporting treatment
9 Individuals self-reporting HIV-positive status and/or individuals with detectable ART metabolites among all PLHIV (antibody test)

## MALE CIRCUMCISION PREVALENCE BY AGE

Overall, 31.8 percent of males aged 15-64 years old reported being medically circumcised. Forty-three percent of males 15-24 were medically circumcised while males 0-14 and 55-64 years had the lowest prevalence of medical circumcision at 12.0 and 21.8 percent, respectively. Of 13.4% of circumcised males aged 0-14 years, 89.9% were medically circumcised.




## CONDOM USE AT LAST SEX, AMONG THOSE WITH MORE THAN ONE PARTNER IN THE LAST YEAR




Among individuals aged 15-64 years with two or more sexual partners in the last year, 55.6% self-reported condom use at last sex. Of those aged 25-49 years, both males (53.0%) and females (53.4%) had similar proportions of condom use. Sixty-eight percent of young males (15-24 years) with multiple partners reported condom use at last sex compared to 47.3% of females of the same age. Only 33.3 percent of older adults (50-64) years with multiple partners used condoms at last sex.

## CONCLUSIONS

- Progress is being made towards the UNAIDS 90-90-90 targets. By 2017, South Africa had attained 85-71-86, emphasising the need to get more PLHIV on treatment.
- The burden of HIV continues to disproportionately affect different geographical regions and high risk groups, especially Black Africans, adolescent girls and young women.
- HIV incidence has decreased from the 2012 estimates, yet remains high, particularly among female youth aged 15-24 years.
- Over two-thirds of males aged 15-24 years are circumcised, over half of these are medical circumcisions.
- Further analyses on additional key drivers of the epidemic including the impact of HIV communications programmes will be available in subsequent reports.

## RESPONSE RATES AND HIV TESTING

Of 11,743 valid households, 82.2 percent completed a household interview. Of 13,669 eligible women, aged 15-64 years, 94.3 percent were interviewed and 67.7 percent provided blood for HIV and additional testing. Of 10,801 eligible men, aged 15-64 years, 89.5 percent were interviewed and 58.4 percent provided blood for HIV and additional testing. Of 11,845 eligible children aged 0 to 14 years, 56.0 percent were tested for HIV.

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# Appendix 3: Field staff

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Mr TT Dlamini
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Mr MO Lucas
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Ms MR Mabitsela
Mr MA Maboyi
Mr KLG Mabuela
Ms DN Madela
Mr NE Madela
Ms LR Madingoane
Mr MC Maditsi
Mr MT Maditsi
Mr LJ Magadla
Ms M Magocoba
Ms V Maharaj
Mr MK Mahlangu
Ms NH Mahlangu
Ms PF Mahlangu
Mr TA Maleka
Ms C Malibe
Ms PN Malotana
Mr R Maluleke
Ms BB Malumane
Mr VL Malunga
Ms MG Mandalain
Ms ND Mangena
Mr JB Mangope
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Mr T Maphumulo
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Mr MT Masango
Ms S Mashaba
Ms M Mashego
Ms L Mashigo
Mr FT Mathebula
Ms S Mathebula
Mr L Mathiba
Mr DT Matlala
Mr MM Matlala
Mr PT Matsobane
Ms RC Maunye
Ms NR Mavasa
Mr CT Mayeki
Ms SP Mbathane
Mr BI Mbilana
Ms V Mbokazi
Ms N Mbonambi
Ms M Mbonane
Mr AM Mditshwa
Ms BG Mekwa
Mr KN Memela
Ms NL Mhlango
Mr LE Mhlongo
Ms NN Mhlongo

Ms NL Mjadu
Ms EE Mkhatshwa
Ms NG Mkhatshwa
Ms VP Mkhiva
Ms NP Mkhize
Mr SOP Mkhize
Ms NP Mkhonza
Ms T Mkhwanazi
Ms PN Mkhwane
Ms MPA Mncadi
Ms BL Mnyandu
Ms MB Modila
Ms MF Moeng
Ms MT Mogoasa
Mr MZ Mogorosi
Mr LI Mohitlhi
Ms BM Mokhachane
Ms TV Mokoena
Ms MJ Mokomatsili
Ms MG Mokotedi
Mr AR Mokubung
Ms LI Moloi
Ms K Moodley
Ms TK Moroane
Ms L Moses
Ms SO Moshia
Mr BR Mosweu
Ms NV Moticoe
Ms LM Motlhabani
Ms KT Motsoeneng
Ms Z Mthembu
Ms LN Mthethwa
Ms MS Mtshali
Ms E Munasmy
Mr CCA Murison
Mr NA Muthwa
Ms IL Mvelase
Ms LA Myeza
Ms LN Naicker
Ms D Naidoo
Ms H Naidoo
Mr M Naidoo
Ms V Naidu
Mr EM Nangambe
Mr SZZ Ncetani
Ms N Ndaba
Mr S Ndaba
Mr O Ndhlovu
Mr CI Ndinisa
Mr BJ Ndlovu
Mr NI Ndlovu
Mr D Nebulane
Ms WL Neer
Mr LP Ngcobo
Mr MA Ngcobo
Ms DT Ngobeni
Ms FF Ngozo
Mr GB Ngwenya
Ms AQ Ngwenyama
Ms EN Nkambule
Ms S Nkenkana
Mr C Nkonde
Mr JS Nkosi
Mr MF Nkosi
Ms SC Nkosi
Mr LR Novata
Ms NC Ntsele
Ms HN Ntsepe
Ms IT Nxumalo
Mr ST Nxumalo
Mr HC Nyalungu
Ms CG Paile
Mr K Pather
Ms P Pather
Mr Y Pather
Ms B Pekana
Mr AAFR Perumal
Ms MT Petlele
Ms P Phenuka
Mr MD Phetha
Mr SE Phetha
Mr XS Plaatjie
Mr P Radebe
Ms P Ramdayal
Ms ZB Ramuse
Mr ST Ranowa
Ms J Reddy
Mr J Roskruge
Ms TA Rudolph
Mr BK Saber
Ms JB Saber
Ms TM Saber
Mr X Salukazana
Ms L Sandragasan
Mr A Saran
Mr RH Sephiri
Mr TG Setshubi
Ms EN Shabangu
Ms SN Shabangu
Mr SN Shobede
Mr NS Sibanyoni
Mr M Sibeko
Mr KM Sibiya
Ms OC Sigenu
Ms TL Singh
Mr MK Sityo
Ms PG Sityo
Mr CW Sprout
Ms JP Sthole
Ms MS Swarts
Ms FM Swartz
Ms KM Takalani
Ms N Taljaard
Mr PA Taljaard
Ms AF Thambo
Ms J Thompson
Ms ZC Thwala
Ms JK Tlhoro
Ms TM Tonyane
Mr DD Van
Mr NRP Veeragavaloo
Ms ZL Vilakazi
Ms HS Visser
Ms IC Wiesner
Ms NE Xakaxa
Ms TE Xulu
Mr DC Xulu
Ms ES Zimela
Mr K Zondo
Ms CA Zulu
Mr MS Zulu
Mr SC Zulu
Ms SS Zulu

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Entries in *italics* refer to diagrams.

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