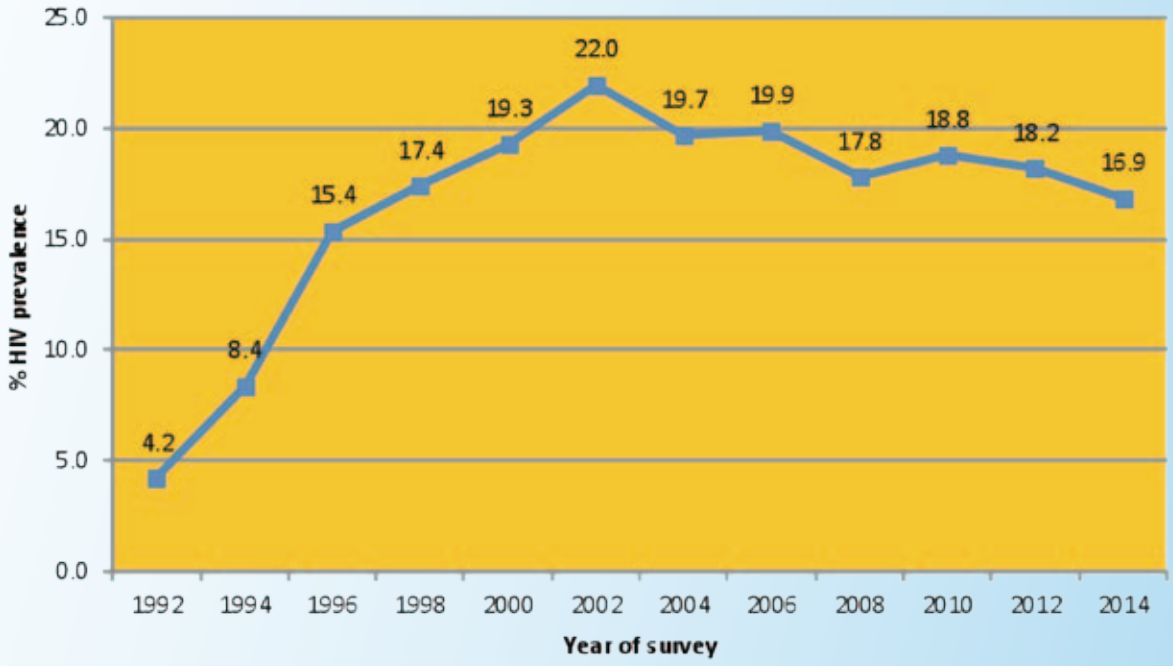
Republic of Namibia

Ministry of Health and Social Services

SURVEILLANCE REPORT OF THE 2014 NATIONAL HIV SENTINEL SURVEY

Surveillance Trends in HIV Prevalence among Pregnant Women Receiving Antenatal Care in Namibia, 1992-2014



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Surveillance Report of the 2014 National HIV Sentinel Survey

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FOREWORD

The Ministry of Health and Social Services is committed to providing routine and periodic data for informed decisions. These data place the country in a better position to track the progress made toward the goals and targets that we set for ourselves. The progress made helps the country to better understand the epidemic as well as to identify achievements, challenges and also to come up with targeted interventions.

The 2014 National HIV Sentinel Survey is the twelfth such study completed since Namibia's independence. For better representation, the study has been expanded to all health districts in the country since 2008. Releasing the HIV Sentinel Survey report once again attests to the willingness and commitment of the Ministry in its quest for data driven decision-making that will contribute to improved quality of health care for our people. With all confidence, we believe that the information contained in this report will be useful to people at different levels of society.

The MOHSS is thankful for the political commitment that the Government of Namibia has shown in giving the fight against HIV/AIDS a top priority in all its undertakings. It is this support and commitment that create a favorable environment that has enabled the Ministry to achieve all the accomplishments it has achieved so far. We will be failing in our duty if we don't acknowledge the tremendous contributions by our partners. The MOHSS appreciates the contribution done by our development and bilateral partners, and everyone that contributed to the success of this report in any kind.

Ministry of Health and Social Services
Office of the Minister

Dr. Richard N. Kamwi, M.P.
Minister of Health and Social Services

PREFACE

The National HIV Sentinel Survey (NHSS) is conducted every second year in order to determine the HIV prevalence among pregnant women attending antenatal care (ANC) clinics at public facilities throughout the country. In addition, the data from this survey is used to estimate the HIV prevalence in the general population and for programming purposes. However, as Namibia is keeping up with new scientific developments, the results will be triangulated with the Demographic and Health Survey Plus (DHS+) report.

This study uses a standardized methodology recommended by the World Health Organization (WHO) as the most suitable way for countries to monitor the trend of HIV infection in different geographical areas and age groups. This methodology is embedded in the routinely conducted activities at different facilities. It provides a feasible method of data collection that is easy to collect as well as cost effective. This methodology uses anonymous unlinked data whereby the HIV testing is completed on blood samples collected from pregnant women during routine ANC services. In order to prevent the HIV status of a woman becoming known during this process, blood samples are stripped of any personal identifying information prior to HIV testing. It is essential however to mention that every woman is offered the opportunity to know her HIV status during ANC visit. This is complemented by the high coverage of HIV Counselling and Testing (HCT) services within the country. Adherence to high ethical standards to ensure confidentiality is clearly articulated and ensured throughout the survey implementation.

Results from the 2014 NHSS suggest that Namibia's epidemic remains in a period of stabilization with slow yet sustained decreases in HIV prevalence among pregnant women since 2002. This is due to concerted efforts by government and various stakeholders. It is further evident from this report, that HIV prevalence trends vary by site, and that the distribution of infection is not uniform across the country. In a limited number of sites, the 2014 NHSS provide evidence that prevalence is decreasing among younger women and slightly increasing in the older age group.

Data use is the primary reason why studies and surveillance are conducted. This report is packaged in a user friendly manner so that it can be easily interpreted by all people at the different levels of operation. I therefore encourage all stakeholders to familiarise themselves with the information and utilise it for planning and programmatic interventions.

Mr. Andrew Ndishishi
Permanent Secretary, MoHSS

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ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Clinic
ART	Anti-retroviral Therapy
CMO	Chief Medical Officer
DHS+	Demographic and Health Survey Plus
DSP	Directorate of Special Programmes
ELISA	Enzyme linked immunosorbent assay
GRN	Government of the Republic of Namibia
HAART	Highly Active Anti-retroviral Therapy
HIS	Health information System
HIV	Human Immunodeficiency Virus
NHSS	National HIV Sentinel Surveillance
ISF	Individual Survey Form
MoHSS	Ministry of Health and Social Services
MTP	Medium Term Plan
NACP	National AIDS Control Programme
NHSS	National HIV Sentinel Survey
NIP	Namibia Institute of Pathology
NSF	National Strategic Framework
PHC	Primary Health Care
PMO	Principal Medical Officer
PMTCT	Prevention of Mother to Child Transmission
QC	Quality Control
RM&E	Response Monitoring and Evaluation
SHPA	Senior Health Program Administrator
RPR	Rapid Plasma Reagent
STI	Sexually Transmitted Infection
TWG	Technical Working Group
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

DEFINITION OF KEY TERMS

Adult age group: women age 25-49 years.

Behavioral data: data that are collected about a study population's attitudes, behaviors, or habits as they relate to a defined health outcome. No behavioral data is collected in the Namibia HIV sentinel survey.

Biological data: data related to medical testing performed on specimens collected from study participants. The HIV test result is an example of biological data.

Consecutive sampling: sampling method in which all patients/clients are chosen on a strict "first-come, first-chosen" basis. All persons who meet the eligibility criteria should be included, one after another, until the time that the target sample size is reached.

Epidemic: a widespread occurrence of an infectious disease in a community at a particular time and this disease tends to affect a disproportionately large number of individuals within such a population, community, or region at the same time. Epidemic is usually used to describe a disease whose incidence rate is higher than what is expected under "normal" conditions.

Gravida: the number of the pregnancy. A woman who is pregnant for the first time in her life is said to be "gravida one" or "prima-gravida". A woman who is pregnant for the third time in her life is said to be "gravida three" or "multi-gravida". Multi-gravida can be used to describe any woman who is pregnant for the second time or greater in her life.

HIV surveillance: the systematic and regular collection of information on the occurrence, distribution, and trends in HIV infection and factors associated with HIV transmission.

Incidence: the proportion of people in a population that newly develop a disease during a specified time period. The numerator in this proportion is the number of new cases during the specified time period and the denominator is the population at risk (those who do not already have the disease and have the possibility of newly developing the disease) during the specified time period. Incidence rate is not measured through the Namibia HIV sentinel survey.

Option B+: Means putting all HIV Positive antenatal mothers on ART for life, thereby protecting current and future pregnancies and breastfeeding and reducing maternal death

Prevalence: the proportion or number of people in a population who have a disease at a given point in time: the numerator is the number of existing cases of disease at a specified point in time and the denominator is the total population.

Sample: a subset of a population that is included in a study. Because it is not possible to include *all* pregnant women in Namibia in the survey, a subset of the population that is thought to be representative of the general population is included.

Sentinel surveillance: a system of surveillance in which data on a specified health outcome (e.g. HIV) are collected only from a designated subset of health facilities or other reporting sources.

Specimen: a sample of blood drawn from the clients/patients for medical testing

Youth age group refers to women age 15-24 years.

Old age group refers to women aged 25-49 years.

EXECUTIVE SUMMARY

The 2014 National HIV Sentinel Survey (NHSS) marks the 12th such survey to be conducted in Namibia. Biennial surveys have been conducted countrywide since 1992 to monitor the prevalence of HIV through unlinked HIV sentinel surveillance of pregnant women attending antenatal care at public health facilities.

The general 2014 HSS general objectives were:

- to estimate the national prevalence of HIV infection in pregnant women age 15-49 years;
- identify geographic and socio-demographic characteristics associated with higher prevalence and;
- to monitor HIV prevalence trends over time.

Out of 7,920 women enrolled in the 2014 NHSS, majority (69.2%) had been pregnant before (multi-gravida). The highest percentage of enrolment was among women age 20-24 years (28.8%) while the lowest percentages of enrolment were among women age 40-44 years (4.0%) and 45-49 years (0.4%) respectively.

The overall national HIV prevalence among pregnant women receiving antenatal care (ANC) was 16.9%. Site level HIV prevalence varied considerably between sites. The sites with the highest HIV prevalence among pregnant women receiving ANC were Engela (22.8%), Rundu (24.1%), and Katima Mulilo (36.0%). The sites with the lowest HIV prevalence were Opuwo (3.9%), Windhoek Central (4.1%) and Okakarara (9.0%).

By age group, HIV prevalence was observed to be highest among women age 40-44 years (30.6%) and women age 35-39 years (30.3%). HIV prevalence was lowest among women age 15-19 years (5.8%) and women age 20-24 years (9.8%). In 2014, the lowest HIV prevalence among women age 15-24 years was observed in Opuwo (0.0%) followed by Omaruru (1.3%) while the highest HIV prevalence among women age 15-24 years was observed in Katima Mulilo (24.3%) and Engela (14.3%). In 13 (37%) out of 35 sites, more than one quarter of the women within the older age group (25-49 years) were HIV positive.

The overall HIV prevalence of 16.9% in 2014 represents a slight decline from 18.2% in 2012. Results from the 2014 NHSS suggest that Namibia's epidemic remains in a period of stabilization with slow yet sustained decreases in HIV prevalence among pregnant women since 2002. From 2012 to 2014, a decrease in the HIV prevalence was observed at 23 (66%) sites. An increase in the HIV prevalence between 2012 and 2014 was also observed in some sites, of which the greatest increases were observed in Usakos (12.2% to 21.9%), Katutura (14.4% to 19.6%), and Okahao (16.3% to 20.6%).

Since 2006, overall HIV prevalence among the older age group (25-49 years) appears to be stabilizing while the overall HIV prevalence in the younger age group (15-24 years) appears to be declining. The overall HIV prevalence for the youth (15-24 years) was 8.3% in 2014 which shows a decline from 14.2% in 2006.

Overall, the HIV prevalence among women residing in rural areas (16.3%) is similar to HIV prevalence among women residing in urban areas (17.4%). The HIV prevalence among women residing in urban or rural areas is almost similar within each age group, except for women age 40-44 years, among whom there is a higher HIV prevalence in rural areas (33.2%) compared to urban areas (26.7%) while among women age 45-49 years is higher in urban areas (33.3%) compared to rural areas (20.0%).

The 2014 NHSS collected data on the antiretroviral therapy (ART) status of women who participated in the surveillance survey. Overall, 49.1% of all women who tested HIV positive during the survey were already on ART. The percentage of HIV positive women who were already on ART was highest in the older age groups (73.3% among HIV positive women age 40-49 years and 66.7% among HIV positive women age 35-39 years) and lowest in the youngest age group (16.7% among women age 15-19 years).

Some limitations of this survey include:

The results of this survey are not necessarily representative of the general population of Namibia because;

- Specimens were only collected from women so the results are not intended to be representative of men.
- Only specimens from women age 15-49 who were pregnant during the period of the survey were included in the survey. Therefore, women younger than 15 years or older than 49 years were not included in this survey.
- Only specimens from pregnant women receiving ANC at public facilities are included in the NHSS. All women receiving ANC at private facilities are not included in the sample. Consequently, the results of this survey may overestimate or underestimate the true HIV prevalence among all pregnant women in Namibia.

Based on the results of the 2014 NHSS, some recommendations are proposed. These include:

- There is a need to strengthen *targeted*, age-specific prevention interventions to reduce new infections among women of all age groups.
- Compare NHSS data with the results of the Demographic Health Survey Plus (DHS+) and further triangulate with additional data sources to assess the consistency of these data with other available country data and to obtain a more complete and accurate understanding of the national epidemic.
- Explore conducting complementary HIV surveillance studies that include the collection of behavioural and linked biological data, which can be used to assess risk behaviours of HIV positive women and to assess different factors that may be associated with increased risk for HIV infection.
- Conduct a robust evaluation of PMTCT program data, PMTCT HIV testing quality, and related reporting systems to assess the readiness of PMTCT program data to replace or complement the biennial ANC based HIV sentinel surveillance method currently used in Namibia.
- Conduct additional research and surveillance activities that will help to determine the effect of new infections and mortality on overall HIV prevalence estimate and changes in prevalence over time.

1. BACKGROUND

The Government of the Republic of Namibia (GRN) has mounted an aggressive and tireless campaign against HIV and AIDS disease comprising of: surveillance, prevention, treatment, care and support, and impact mitigation. This is demonstrated by the contribution of resources throughout the different years. In 2012/13 government contributed 55.0% of total expenditure while in 2013/14 contribution was 64.0%. This clearly demonstrates the commitment of government to the response to HIV and AIDS[1]. This figure is estimated to increase to 238,804 by the end of the revised NSF period of 2016, and over 250,099 by 2019. The expected increase in the numbers of people living with HIV (PLHIV) is mainly due to a reduction in AIDS-related death as a result of increased coverage of ART throughout the country.

Since 2009, the GRN has set CD4 eligibility to 350 cells/ µL which achieved an increase in ART eligibility from 67% baseline to over 83% by 2013 – midterm for the NSF. The Government of Namibia has since decided to change its CD4 threshold for ART eligibility for adults from 350 to 500 cells/µL. In addition, all pregnant women, all children under 15 years old, all HBV/HIV co-infected patients and HIV-positive persons whose partners are HIV-negative are eligible for ART irrespective of CD4 count. This began with the roll out of the new ART guidelines in 2014. GRN has adopted task shifting allowing trained nurses to initiate ART. In addition, the MOHSS has recruited and trained Health Extension Workers (HEW) who serve as the link between health facilities and communities. GRN is also absorbing health professionals that were previously paid for by development partners. All of these factors are expected to contribute to an increased proportion of HIV positive people being on ART.

The estimated number of new HIV infections among adults is decreasing, which could demonstrate the impact of prevention programmes. Approximately 10,685 people were newly infected with HIV during 2013/14 and projected as 9,784 in 2014/15. The estimated number of new infections coupled with high uptake of ART, has resulted in an estimated 250,942 adults and children living with HIV in Namibia in 2014[2].

After Independence in 1990, the National AIDS Control Programme (NACP) based in the Ministry of Health and Social Services (MoHSS) was established. Consequently, the First Medium Term Plan (MTPI) covering the period 1992-1998 was launched. The Second Medium Term Plan (MTPII) was launched in 1999 for the period 1999-2004, followed by the Third Medium Term Plan (MTPIII) for 2004-2009. Both the MTP II and MTPIII provided a comprehensive framework for the national multi-sectoral and sub-regional response to HIV/AIDS. Following the end of implementation of the Third Mid Term Plan (MTP III), Namibia has been implementing the National Strategic Framework for the HIV/AIDS response, (NSF) 2010/11-2015/16, which was revised in 2013. A mid-term review and revision of the NSF 2010/11-2015/16 was conducted in 2013 resulting to the revised NSF 2010/11-2016/17, effectively aligning the revised NSF with the implementation period of the National Development Plan (NDP 4). The NSF calls for a combined prevention strategy, is built on the strengths of the previous programme and address the areas identified for renewed attention and commitment, as well as for human resource capacity building, and improved financing and enhanced coordination and cooperation with a shift towards the investment approach.

At the national level, MOHSS has a well-established NACP managed by the Directorate for Special Programmes (TB, Malaria and HIV and AIDS) established in 2004. The Directorate is responsible for providing assistance to all sectors in the development and implementation of sector-related HIV/AIDS activity plans in accordance with sectoral obligations.

1.1. History and Context of Sentinel Surveillance

HIV Sentinel surveillance survey among pregnant women receiving ANC clinics has been conducted every second year since 1992 in Namibia. The survey started off with 8 facilities and expanded to 14 facilities in 1994 to include smaller towns and some rural areas. Sites continued to expand and as of 2008, all 35 districts were covered to better represent regional diversity. To achieve sufficient sample size, some of the primary facilities were supplemented by satellite facilities. In 2014, the MOHSS continued the sentinel surveillance survey in 35 districts sites supplemented by 98 satellite sites (Appendix 8). Public health facilities began rolling out PMTCT in 2002, ART in 2003 and VCT services in 2004. As of 2014, 341 out of 360 public health facilities and 100% of the ANC clinics were providing prevention of mother-to-child transmission (PMTCT) services with coverage of 95%.

HIV surveillance forms a critical element in the expanded national response as it allows identification of the geographic and demographic population groups and sub groups most affected by the virus so that comprehensive and evidence-informed HIV prevention, treatment and care programmes can be targeted to these groups. In addition, surveillance activities allow the government to generate strategic information for monitoring HIV trends in various groups, evaluate the effectiveness of policies and programmes and inform further policy development and programme design. The NSF for HIV and AIDS has put in place strategies to prevent the spread of HIV and AIDS and mitigate the impact of the disease in the population. As part of this plan the government will continue to monitor the trends and measure the impact of the epidemic on the population, including conducting sentinel surveillance, DHS+, special surveys and program evaluation.

For each sentinel surveillance round, the MOHSS follows a standardized methodology recommended by the World Health Organization (WHO) as the most suitable way for countries to monitor the trend of HIV infection by key socio-demographic characteristics in different geographical areas and HIV testing is completed on blood samples collected from pregnant women attending ANC clinics collected for syphilis testing. Blood samples are stripped of any personal identifying information prior to HIV testing so there is no way that the HIV status of a particular woman can become known during this process and hence there is no possibility of stigmatization.

Other information that complements ANC sentinel surveillance includes data routinely collected from Prevention of Mother-to-Child Transmission (PMTCT) program. In addition, STI data collected from ANC sites for the same period was used to compare STI and HIV prevalence at each site.

Provision of HIV and AIDS services, including ART, PMTCT and HIV Counselling and Testing (HCT), remains a high priority of the Namibian government. Facility-based sentinel surveillance provides the main data used to inform service delivery roll-out and programme development and allows estimation of the needs of these programmes for national coverage.

Rapid HIV testing continues to be rolled out at PMTCT sites to increase the proportion of women receiving their results by eliminating the need to return to the clinic after results are received from the district or national laboratory. Pre- and post-test counselling is provided according to national PMTCT guidelines.

Namibia follows international guidelines for conducting unlinked anonymous testing which is ethically justifiable for public health practice as the data is used to benefit the entire population for targeting resources for HIV prevention programmes. As the PMTCT programme has had rapid scale up and is available in all ANC sentinel surveillance sites with a high uptake by clients, Namibia has the opportunity for assessing the use of PMTCT data for surveillance purposes thereby minimising costs and duplication of efforts.

In 2013 a nationwide assessment of the quality of PMTCT program data was conducted in all regions and districts that participated in the 2012 Namibia HIV Sentinel Survey. The aim of this assessment was to assess the utility of PMTCT data for routine HIV Sentinel Surveillance. Results from this assessment showed high levels of positive percent agreement between NHSS and PMTCT HCT results, minimum selection bias and high levels of access to PMTCT HCT. Strong preliminary Data Quality Assessment (DQA) results at sentinel sites indicates that Namibia may be approaching readiness to transition to a PMTCT program-data-based system of NHSS. However, the minimum acceptable criteria for negative percent agreement was not met and the level of agreement varied by site. Although these results suggest robust potential for transition in the near future, all NHSS sites and the pooled national estimate must meet minimum criteria for results agreement before PMTCT program data alone can be used for sub-national surveillance, trend-analysis, estimates and projections. Potential sources of results disagreement, including quality of NHSS and PMTCT rapid testing and data, must be identified and corrected.

1.2. Sentinel Surveillance Justification

ANC sentinel surveillance is currently the key data source for HIV estimates in the country. The surveillance data provide inputs for modelling in SPECTRUM, and in other models which estimate and project trends in national HIV prevalence, HIV incidence, estimated number of people living with HIV, and ART needs and is thus essential for programme planning and evaluation.

Sentinel surveillance provides the country program-level information on HIV prevalence trends, stratified by geographic areas as well as age group. Owing to this, MOHSS and other stakeholders will be able to design targeted interventions. This survey is essential because it provides a continuous flow of program data that can be used to model what is happening in the larger population. Periodic population-based surveys that include biological data representative of the population can assist in calibrating and validating the interpretation of sentinel surveillance data.

1.3. Sentinel Surveillance and HIV and AIDS Services

Namibia is classified as a high, generalised and mature HIV prevalence country, with HIV assumed to be primarily transmitted through heterosexual and mother-to-child transmission. It is estimated that over 234,508 people above the age of 15 are living with HIV[3], representing an increase from 245,351 during 2013.

A key entry point for treatment, treatment as prevention and PMTCT has always been HIV counselling and testing (HCT). Mixed methods of HCT delivery are being implemented, ranging from facility based HCT at all levels, provider initiated counselling and testing (PICT), mobile outreach, stand-alone centres, workplace HCT integrated into Wellness programmes and door-to-door HCT.

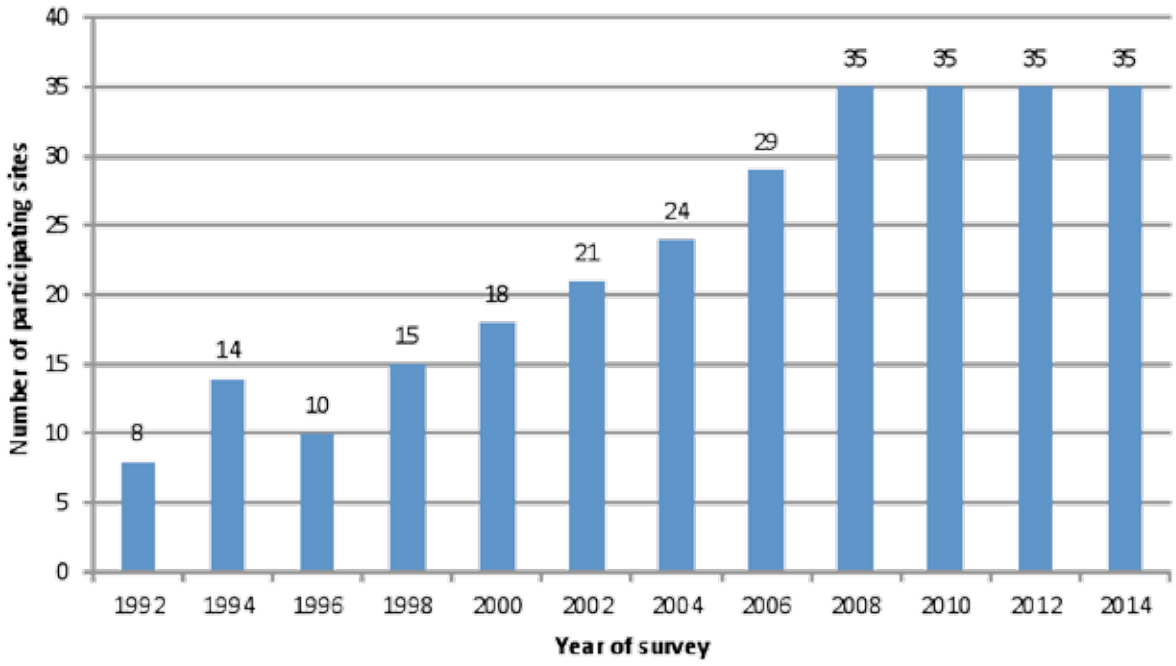
Aligned to the Global Plan, the MOHSS has developed a costed National Strategy and Action Plan for the Elimination of New Paediatric Infections and Keeping their Mothers Alive 2012/2013 – 2015/2016. The PMTCT role has been impressive with approximately 95% of health facilities providing HIV testing and ART by March 2013. The GRN has adopted Option B+ from the WHO recommendations, and the roll out of this approach is expected to have a positive impact on PMTCT results.

HIV sentinel surveillance provides primary information used to inform service delivery roll-out and expansion, programme development, and estimation of the needs of these programmes for universal coverage.

1.4. Participating Sites

In Namibia, sentinel surveillance sites have been selected based on regional coverage, geographic location (whether urban or rural) and the volume of ANC attendees at each site. Beginning with eight health facilities in 1992, the number of sites was increased to 14 in 1994 and to 24 by 2004 (Figure 1). To cover all the districts, surveillance sites were increased to all 34 districts in 2008, with 35 main hospital sites and a maximum of 9 supporting satellite sites.

Figure 1: Number of participating sites, NHSS 1992 - 2014



2. SURVEY OBJECTIVES

2.1. General Objectives

The general objectives of the 2014 NHSS were; to estimate the national prevalence of HIV-infection in pregnant women age 15-49 years; identify geographic and socio-demographic characteristics associated with higher prevalence, and; to monitor prevalence trends over time.

2.2. Specific Objectives

The following were the specific objectives of the 2014 survey:

- To monitor trends over time in HIV prevalence amongst pregnant women nationally, by site and by age groups;
- To compare and validate programme data from prevention of mother-to-child transmission (PMTCT) with sentinel surveillance results;
- To estimate the prevalence of syphilis among pregnant women by site and age group;
- To disseminate and utilize the information provided by sentinel surveillance and to advocate and plan for more effective services for prevention, treatment, support and care;
- To provide essential input parameters for models to estimate and project national HIV estimates (prevalence, incidence, ART need, orphans, deaths, etc.);
- To retain specimens for other HIV surveillance related activities including drug resistance surveys, and understanding the subtypes of HIV prevalent in the country;
- To estimate prevalence among the 15-24 year olds as a proxy measure of new HIV infections.

3. METHODS

3.1. Overview

The protocol for the 2014 NHSS was developed by the Response Monitoring Subdivision (RM&E) of DSP in conjunction with the National HIV Sentinel Surveillance Technical Working Group (NHSS TWG). The NHSS TWG also provided oversight of the implementation of the survey and conducted field training and supervisory visits. The methods were based on recommendations presented in the WHO Guidelines for Conducting HIV Sentinel Surveys among Pregnant Women and Other Groups.

3.2. Sampling

3.2.1. Selection of sentinel sites

The first site selection strategy for the 2014 NHSS was to maintain the 2012 sentinel surveillance sites so that HIV trends can be monitored over time at these consistent sites. The second strategy was to select sites (and satellite sites) which would allow for estimations of HIV and syphilis prevalence that are representative of all geographical regions and health districts of the country.

In order for a health facility to be included as a main or satellite site in the NHSS, the following criteria must be met:

- Blood is routinely collected from clients;
- A laboratory for processing of specimens and transport to the laboratory that will be conducting HIV testing is in place;
- The site is accessible to surveillance staff;
- On-site staff members are cooperative and trained to conduct sero-surveys;
- Ability to recruit adequate clients for the required sample size during the survey period;
- Availability of on-site counselling and testing services or referral to such services.

Several main sites had some satellite sites, which assisted the main site in the effort to reach the target sample size (Appendix 8). These satellite sites were mainly clinics that were in the vicinity of the main site, i.e. clinics in the same district rendering ANC services to that district's population. Data from these satellite sites were pooled with those from the main site (sample sizes from individual satellite sites would be too small for analysis). For a satellite site to be used, the following criteria were applied:

- Main site and satellite site are servicing the same health district populations;
- Consistent satellite sites were used over survey rounds;
- Staff at satellite site received the same training as the main site staff;
- Supervision included the main as well as the satellite site.

Each main and satellite site were allocated their own bar coded stickers. A total of 98 satellite sites (Appendix 8) contributed to the targeted sample size attained by 35 sentinel surveillance main sites.

3.2.2. Survey population

The target population of the 2014 NHSS included pregnant women receiving ANC services during the period of sample collection at ANC clinics designated as sentinel sites. The women were selected through consecutive sampling until the sample size was met for each site. The specimens for HIV testing were collected from residual blood from routine syphilis testing.

Inclusion criteria

Women receiving ANC that met all of the following criteria were included in the 2014 NHSS:

- 15-49 years of age;
- Receiving ANC for the first time during the current pregnancy;
- Agreeing to a routine blood draw for syphilis screening.

Exclusion criteria

Women receiving ANC that met any of the following criteria were excluded from the 2014 NHSS:

- Previously having attended any ANC clinic during the current pregnancy;
- Age less than 15 years or age greater than 49 years;
- Not agreeing to a routine blood draw for syphilis screening.

3.2.3. Sample size determination

For the 2014 NHSS, sample sizes were calculated for all the participating sites using the WHO guidelines for determining sample size taking into consideration the previous prevalence estimates.

For the 2014 NHSS, oversampling was conducted for the youth age 15-24. It is useful to over-sample 15-24 year age group to create a proxy measure of HIV incidence in the population. HIV prevalence among young women 15-24 is used as a measure of incidence since young women are likely to have only recently been exposed to HIV. HIV prevalence among this group is also a key indicator for UN Global AIDS Response Progress Reporting, Universal Access monitoring and Millennium Development Goal Indicators. By over-sampling young women we are also better able to measure trends over time in this critical age group for different sites. Sites were selected based on high uptake of services in previous surveys. These sites required intensive monitoring of the enrolment process to identify; 1) when the site had reached the base target sample size for pregnant women age 15-49 and; 2) when the site had reached the target sample size for the youth (age 15-24 years) oversample. However, the oversampling samples were not included in this analysis as not all the sites were able to reach their sample size. The samples will be banked for future analysis.

3.3. Survey duration

The maximum sampling duration was 19 weeks from the 10 March to 30 August 2014. When a site achieved the site-specific target sample size (and youth oversample if required) in a period less than the maximum sampling duration, collection of samples stopped at that particular site. However, the data collection period was extended to 30 September 2014, mainly because some specimens from some sites were reported as haemolysed at the central laboratory. To compensate for this and to ensure that the target sample size was reached, other sites that hadn't reached their target samples also continued to collect data.

3.4. Pre-survey training

The DSP RME Subdivision organized and coordinated a full week pre-survey protocol training for NHSS TWG members and regional level supervisors and included focal persons from all the districts. The following week, the national and regional level supervisors went to their respective sites where they conducted trainings to build the knowledge and skills of the site-level survey implementers on how to conduct the survey properly. The site-level survey training for implementers included all the districts laboratory focal persons, Chief Medical Officers (CMOs), District Principal Medical Officers (PMOs), Matrons from the participating districts, nurses working in the ANC clinics or providing these services and staff from the satellite sites.

Prior to initiation of the 2014 NHSS, materials and equipment that were needed for the survey were provided to the main sites and satellite sites, as well as the district NIP laboratories. The supplies included booklets of ISFs, unique specimen identification barcode stickers, progress reporting forms, a laminated copy of NHSS data collection and specimen collection laboratory flow chart, cool boxes, and marker pens.

3.5. Data and specimen collection

An unlinked anonymous testing approach for data collection was used, as recommended by the WHO. Individual survey forms (ISF) (Appendix 3) were used by facility staff responsible for implementing the survey to collect socio-demographic information from eligible woman receiving ANC. All required data elements for the survey were extracted from routine ANC data sources (ANC Passport & ANC/PMTCT register) and logged onto the self-carbonizing ISF. The ISF captured included the following information:

- Bar coded sticker (Unique Identification);
- Date of ANC visit;
- District abbreviation;
- Site number;
- Type of facility;
- Woman's age;
- Place of residence (to be classified as Urban or Rural) a list with all urban places will be provided from NPC, Electoral Commission, Ministry of Regional Local Government, Housing & Rural Development (MRLGHRD) etc categories as a guide);
- Gravidity;
- ART participation;
- Patient tested for HIV
- HIV test result
- Nurse's Surname and Initial Nurse's Signature

A unique survey identification barcode sticker was appended to each ISF. This unique survey barcode sticker had the same ID number as a second barcode sticker that was appended to the blood specimen tube that was collected from the same woman (described below). At the end of each day, the ISF was checked alongside the blood samples by nurses for accuracy and completeness and labelling in the case of the blood specimens. The original copy of the ISF was submitted to the national level and carbonized copies of all ISF were retained at the site.

3.6. Laboratory Procedures

3.6.1. Preparation of specimens

A routine blood draw for syphilis screening was conducted for all women attending their first ANC visits. After determining a woman's eligibility, the site staff would mark the 10 ml red top tube which is used for routine syphilis testing with the unique survey barcode sticker provided specifically for the NHSS. All tubes were sent to the local Namibian Institute of Pathology (NIP) district laboratory and centrifuged, after which at least three ml of serum was separated in a five ml red top tube. A third identical survey barcode identification sticker was affixed to the five ml red top tube and refrigerated prior to being transported to the NIP in Windhoek for HIV testing. The survey barcode sticker affixed to the 10 ml tube was blackened out while the name of the patient remained on it for syphilis testing. This process completed the de-linking of the patient information from the survey. The HIV result thus could not be linked to specific patient.

Cold chain was maintained during specimen transportation from sites to the local laboratory as well as from the local laboratory to the central laboratory. This was done by monitoring the cool box ambient temperature on arrival by NIP laboratory staff through measuring the temperature of the water contained in the bottle package with the specimen in the cool box.

A shipping/results form **(Appendix 4)** was designed to record the unique survey barcode sticker ID, the individual data, and the HIV testing results for each specimen. A fourth identical survey barcode sticker was attached to this shipping/results form by the district NIP laboratory staff. This form and the specimens were shipped to the NIP national reference laboratory for HIV testing. When the HIV test was completed, the results were recorded next to the respective unique survey barcode sticker. The result forms were then forwarded to MOHSS/DSP: Response Monitoring & Evaluation (RM&E) Subdivision for data entry in the 2014 NHSS database.

3.6.2. Testing procedures

For HIV testing in the 2014 NHSS, each sample was tested using the Abbot Architect HIV ag/ab combo assay (Abbot Diagnostics, USA) to detect HIV antibodies (HIV-1/2), which is a fourth generation assay that can simultaneously detect p24 antigen and HIV antibodies. The Architect HIV ag/ab combo assay has been reported to give a sensitivity of 100% (95% confidence interval [CI](98.4 – 100%).[4] All NHSS specimens that tested positive were confirmed using the DXI 800 (Beckman-Coulter, USA), which is a 4th generation ELISA test that detects p24 antigen and HIV antibodies. If the confirmation test was positive, "positive" was recorded as the final result.

3.6.3. Recording and transmission of results

All HIV testing was conducted at the NIP National Reference Laboratory in Windhoek, with results entered on a shipping/results form. Results were forwarded to the DSP RM&E Subdivision on a weekly basis where they were entered into a database by DSP/RM&E staff using Epi Info version 7 as a data entry application.

3.7. Syphilis testing

Syphilis screening among pregnant women is a universal practice in Namibia, even outside of NHSS. Data on syphilis serology is therefore available. Syphilis test results for each woman receiving ANC during the survey period were collected in the normal way where the results were entered into the NIP database and reported back to the woman.

The syphilis results for women collected during the survey period were extracted from the NIP database without identifying the client details.

Patient level syphilis results were not linked to patients level HIV test results during the NHSS.

3.8. Quality Assurance

3.8.1. National Level Quality Assurance

A technical working group (TWG) was formed with representatives from DSP: RM&E Subdivision (Secretariat), other MoHSS Directorates (i.e., Primary Health Care, Policy, Planning and HRD, etc.) and other partners such as Global Fund, NIP, NSA, WHO, UNAIDS, USAID, UNICEF, and the CDC.

The TWG conducted regular site support visits as scheduled as well as needed. A quality assurance tool **(Appendix 6)** as recommended by the WHO guidelines was completed during each supervisory visit and forwarded to the DSP: RM&E Subdivision for subsequent analysis and action.

3.8.2. Field Level

The Primary Heath Care (PHC) supervisors, the regional Chief Health Programme Administrator (CHPA), Senior Health Programme Administrator (SHPA) for Special Programmes as well as Family Health (FH) acted as site level supervisors during the 2014 NHSS. Their duties included consistent monitoring of the collection, transportation, and delivery of blood samples and collecting and submitting ISFs during the entire NHSS period at each site. The supervisors completed the weekly progress forms and submitted them to the Response Monitoring and Evaluation (RM&E) subdivision on a weekly basis. To maintain quality, the national supervisors in collaboration with the regional supervisors conducted on-site verification and trainings when problems were identified.

3.8.3. Laboratory

NIP is an important partner for the NHSS and played a critical role during the survey planning, implementation and monitoring.

All surveillance activities in the laboratory were supervised by the Laboratory Supervisor of the National Reference Laboratory. Logistical aspects were handled by the Technologist assigned to the survey team at the National Reference Laboratory according to the existing routine arrangement.

NIP officers (mainly Technologists/Technicians in charge) at the district NIP laboratories cross checked blood samples and completed data collection forms for all IDs for every shipment batch received. The weekly specimen tube batches were sent to NIP National Reference Laboratory in Windhoek using the existing transport to the NIP National Reference Laboratory in Windhoek.

Routine quality assurance procedures are maintained by NIP in line with ISO 17025 and/or 15189 standard. This included daily internal quality assurance using known quality control materials supplied by the HIV testing assay manufacturer (Abbott) and monthly external quality assurance. The laboratory supervisors verified all the results before recording them on the data form. At the end of the testing, 10% of randomly selected samples were retested by an external independent laboratory for quality assurance to measure discordance rate and 99.7% of the resuits matched.

3.9. Data Management and Analysis

3.9.1. Data Management

All ISFs were checked for completeness and accuracy in the field by the site supervisor on a daily basis. These ISFs were also checked by the supervisors on a daily basis for completeness and accuracy. The missing or inconsistent data identified by the regional supervisors were corrected immediately.

Completed ISFs were sent in weekly batches via NIP to DSP RM&E Subdivision. Data entry was conducted in the offices of DSP: RM&E subdivision by data clerks under the supervision of the Head of the Subdivision and the Data Manager. Data were electronically entered using Epi Info version 7 (Centers for Disease Control and Prevention, Atlanta, Georgia, USA).

3.9.2. Data Quality Assessment

Epi-Info "check codes" were developed and routinely applied to the NHSS dataset in order to identify missing values and out of range values for any variables as well as logical inconsistencies between any two or more variable collected from each woman. Also, ISFs that were received at the national level that had apparent missing or out of range values for any variables were flagged for investigation by the NHSS data clerks. Data quality issues identified at the national level were investigated and corrected during national level support visit which were conducted three times during the survey at all main and satellite sites.

Entry of data in the NHSS database was completed twice by two data entry clerks to create two independent files from the same hard copy data. Prior to analysis, these two files were then electronically compared. All discrepancies identified between the two separate data files were rectified by consulting the original paper tools after which a cleaned master analytic file was created.

3.9.3. Analysis

The HIV prevalence among women included in the 2014 NHSS was calculated overall and specific to each sentinel site. Results were stratified by age group, urban/rural residential status and gravidity group. The percentage of women testing HIV positive during the 2014 NHSS who were already on ART was calculated by site, age group and urban/rural residential status. Site level trends in HIV prevalence among pregnant women included in the 2010, 2012 and 2014 NHSS were estimated by using the chi-square test for linear trend. Survey data were analyzed using Stata V.12.1.

Overall and site level 2014 NHSS prevalence estimates were compared with national and district level HIV prevalence estimates from PMTCT program data and routine syphilis data from the NIP reference laboratory that were reported during the same time period in which the 2014 NHSS was conducted.

3.10. Ethical considerations

The 2014 NHSS was conducted by means of unlinked anonymous testing of blood samples obtained for routine diagnostic purposes. After routine testing, blood samples were stripped of identifying information and were coded thus eliminating any possibility of tracing the identity of ANC clients. The unique survey barcode number was recorded on

the form and also used for labelling the blood samples and linking laboratory results with demographic data. The bar code was used to link the demographic information captured on the ISF with the laboratory results while maintaining anonymity of the survey participant.

The ISFs were kept in a locked location at the MoHSS, DSP RM&E Subdivision. All data were entered and analyzed on password protected computers and the NHSS dataset itself is password protected. Field visits were conducted during the survey to ensure the availability of trained staff, adherence to guidelines for the surveillance as well as confidentiality guidelines.

Means to protect the rights of participants were considered during the planning and implementation of the survey. Staff training included objectives to minimize the probability that a woman could experience any kind of negative consequence during the timeframe of the surveillance. No personal identifying information was collected with the blood sample. In addition, each ANC client was offered routine PMTCT services thus allowing clients to know their HIV status if they accepted counselling and testing.

3.11. Dissemination and use of the results

A comprehensive report of the 2014 NHSS was prepared by the DSP: RM&E Subdivision in collaboration with the TWG and submitted to the Permanent Secretary, MOHSS for comment and approval. The 2014 NHSS was officially launched on the commemoration of the World AIDS Day, December 2014. User friendly pamphlets were developed to ensure that the wider community obtain access to the information. The surveillance data generated through this survey will be used to:

- Advocate for the mobilization of human and financial resources and the targeted expansion and integration of the national ART program to meet the needs of the maturing epidemic;
- Plan for the roll-out, expansion, and integration of services for prevention, treatment care and support within the country;
- Estimate trends and impact of the HIV epidemic in various age groups and districts
- Produce national models to project the magnitude of the epidemic over time;
- To make well informed and evidence-based decisions.
- Triangulate with other national surveys such as the DHS+, 2013

4. RESULTS

4.1. Summary of Enrolment

Table 1: Summary of enrolment, completeness of data, and total sample achieved, NHSS 2014

	Target sample size	Number of women sampled	Percentage of target sampled ^	Number of missing specimens or test results	Number of invalid specimens	Specimens tested for HIV results available ǂ	Percentage of target sample achieved *
Namibia	**8,015**	**7,920**	**98.8**	**84**	**109**	**7,727**	**96.4**
By site							
Andara	257	255	99.2	0	0	255	99.2
Aranos	173	138	79.8	0	0	138	79.8
Eenhana	217	216	99.5	1	0	215	99.1
Engela	259	259	100.0	0	0	259	100.0
Gobabis	158	158	100.0	0	0	158	100.0
Grootfontein	225	223	99.1	1	0	222	98.7
Karasburg	215	215	100.0	1	0	214	99.5
Katima Mulilo	380	380	100.0	5	0	375	98.7
Katutura State Hospital	209	209	100.0	0	0	209	100.0
Keetmanshoop	166	165	99.4	2	0	163	98.2
Khorixas	188	183	97.3	3	0	180	95.7
Luderitz	284	284	100.0	5	1	278	97.9
Mariental	198	195	98.5	3	1	191	96.5
Nankudu	195	195	100.0	0	0	195	100.0
Nyangana	284	280	98.6	1	0	279	98.2
Okahandja	259	259	100.0	26	38	195	75.3
Okahao	230	228	99.1	0	0	228	99.1
Okakarara	157	157	100.0	1	0	156	99.4
Okongo	273	263	96.3	0	0	263	96.3
Omaruru	180	174	96.7	4	0	170	94.4
Onandjokwe	313	313	100.0	14	0	299	95.5
Opuwo	156	156	100.0	0	1	155	99.4
Oshakati	286	286	100.0	0	0	286	100.0
Oshikuku	306	306	100.0	0	0	306	100.0
Otjiwarongo	236	236	100.0	0	0	236	100.0
Outapi	254	254	100.0	0	0	254	100.0
Outjo	192	190	99.0	1	1	188	97.9
Rehoboth	157	156	99.4	2	0	154	98.1
Rundu	304	304	100.0	1	0	303	99.7
Swakopmund	211	210	99.5	0	0	210	99.5
Tsandi	278	278	100.0	1	0	277	99.6
Tsumeb	258	257	99.6	0	0	257	99.6
Usakos	185	166	89.7	12	35	119	64.3
Walvisbay	219	219	100.0	0	0	219	100.0
Windhoek Central Hospital	153	153	100.0	0	32	121	79.1

^ *% = (# of women sampled/ target sample size)*

ǂ *this number represents the number specimens from women that were included in the final analysis, i.e. the number of women who were enrolled in the NHSS.*

* *% = (# specimens tested with results available / target sample size).*

The overall target sample size for the 2014 NHSS was 8,015. **Table 1** shows that a total of 7,920 eligible women receiving ANC services were initially sampled for the survey. 193 (2.4%) women who were initially sampled were excluded because the HIV test results were missing at the end of the survey or their specimens were invalid. Reasons for invalid included; hemolysis of blood samples, or; insufficient volume of blood for the HIV test. Therefore, a total of 7,727 women (96.4% of the target sample size) were enrolled in the 2014 NHSS and included in the final analysis. The site level achievement of target sample size ranged from 64.3% to 100%.

Table 2: Distribution of age among women enrolled in the NHSS 2014

	Number enrolled	Percentage of total
Namibia	7,727	96.4
Young vs. old age groups		
15-24 years	3,560	46.1
25-49 years	4,167	53.9
All age groups		
15-19 years	1,335	17.3
20-24 years	2,225	28.8
25-29 years	1,733	22.4
30-34 years	1,277	16.5
35-39 years	823	10.7
40-44 years	307	4.0
45-49 years	27	0.4

Figure 2: Distribution of age among women enrolled in the NHSS 2014

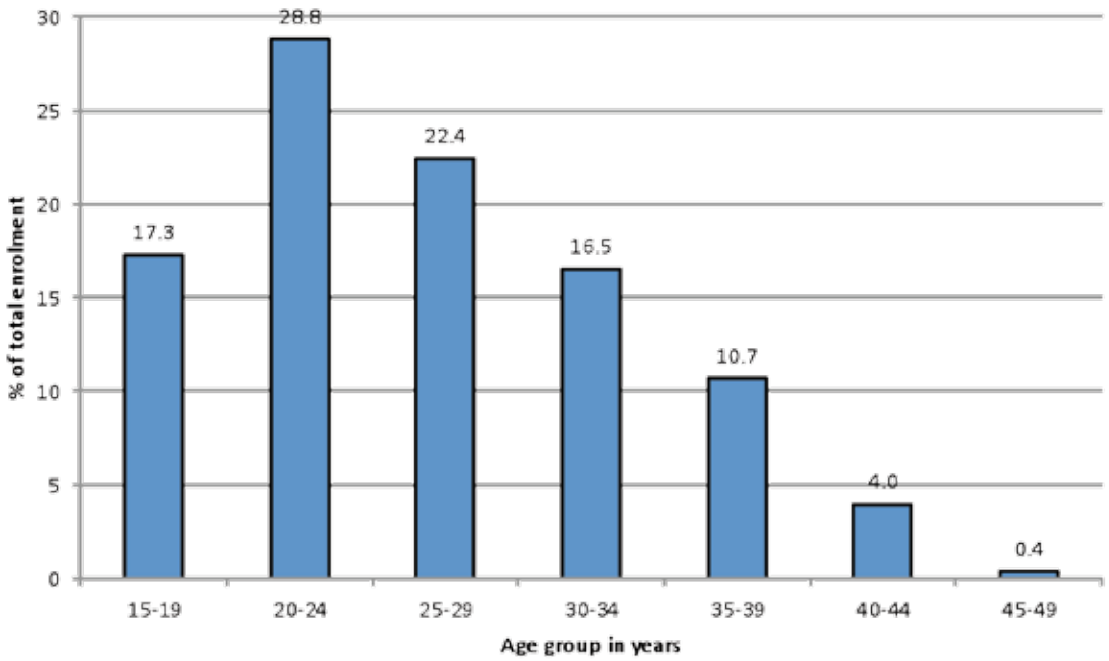


Table 2 and **Figure 2** show the age distribution of women enrolled in the 2014 NHSS. The majority of women enrolled in the 2014 NHSS were under 25 years old. Women in the 20-24 years age group accounted for the greatest percentage of enrollees (28.8%), while the least percentages of enrollees were women age 40-44 years (4.0%) and 45-49 years (0.4%) respectively.

Table 3: Distribution of gravidity and age among women enrolled in the NHSS 2014

	Prima-gravida		Multi-gravida	
	Number enrolled[^]	Percentage of total [*]	Number enrolled [#]	Percentage of total [€]
Namibia	2,382	30.8	5,345	69.2
Young vs. old age groups				
15-24 years	2,046	57.5	1,514	42.5
25-49 years	336	8.1	3,831	91.9
All age groups				
15-19 years	1,100	82.4	235	17.6
20-24 years	946	42.5	1,279	57.5
25-29 years	230	13.3	1,503	86.7
30-34 years	75	5.9	1,202	94.1
35-39 years	29	3.5	794	96.5
40-44 years	2	0.7	305	99.3
45-49 years	0	0.0	27	100.0

[^] *represents number of enrollees within age group who were prima-gravida*

[*] *% = (# prima-gravida women enrolled / # women enrolled in age group)*

[#] *represents number of enrollees within age group who were prima-gravida*

[€] *% = (# multi-gravida women enrolled / # women enrolled in age group)*

Table 3 shows the distribution of gravidity by age group among women enrolled in the 2014 NHSS. Out of 7,727 women enrolled in the 2014 NHSS, 2,382 (30.8%) were prima-gravida (first pregnancy) and 5,345 (69.2%) were multi-gravida (pregnant at least one time before). The greatest age-specific percentage of women who were prima-gravida was observed within the 15-19 year age group (82.7%), while the greatest age-specific percentage of women who were multi-gravida was observed among the 40-49 year age group (99% -100%). Nearly half (42.5%) of women under the age of 25 years were pregnant for at least the second time.

4.2: HIV Prevalence

Figure 3: Overall HIV prevalence among pregnant women receiving antenatal care, NHSS 1992 - 2014

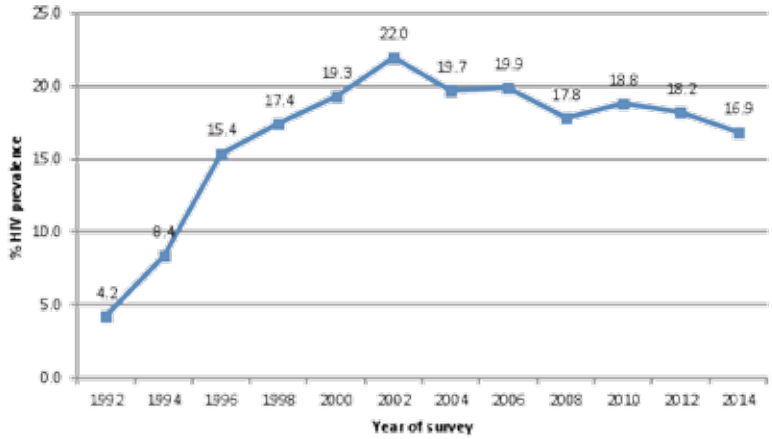


Figure 3 shows the overall HIV prevalence among pregnant women included in the NHSS in Namibia from 1992 – 2014. The overall HIV prevalence among pregnant women receiving ANC in Namibia was 16.9% during the 2014 NHSS. In 2012, the overall HIV prevalence was 18.2%. Following a peak in 2002, HIV prevalence appears to have stabilized and declined slowly during subsequent years until the present.

Table 4: HIV prevalence by age group, NHSS 2014

	Number tested	Number HIV positive	HIV prevalence (%) ^
Namibia	7,727	1,303	16.9
Young vs. old			
15-24 years	3,560	297	8.3
25-49 years	4,167	1,006	24.1
All age groups			
15-19 years	1,335	78	5.8
20-24 years	2,225	219	9.8
25-29 years	1,733	299	17.3
30-34 years	1,277	357	28.0
35-39 years	823	249	30.3
40-44 years	307	94	30.6
45- 49 years	27	7	25.9

^ *% = (# HIV positive within age group / # tested for HIV within age group)*

Figure 4: HIV prevalence by age group, NHSS 2014

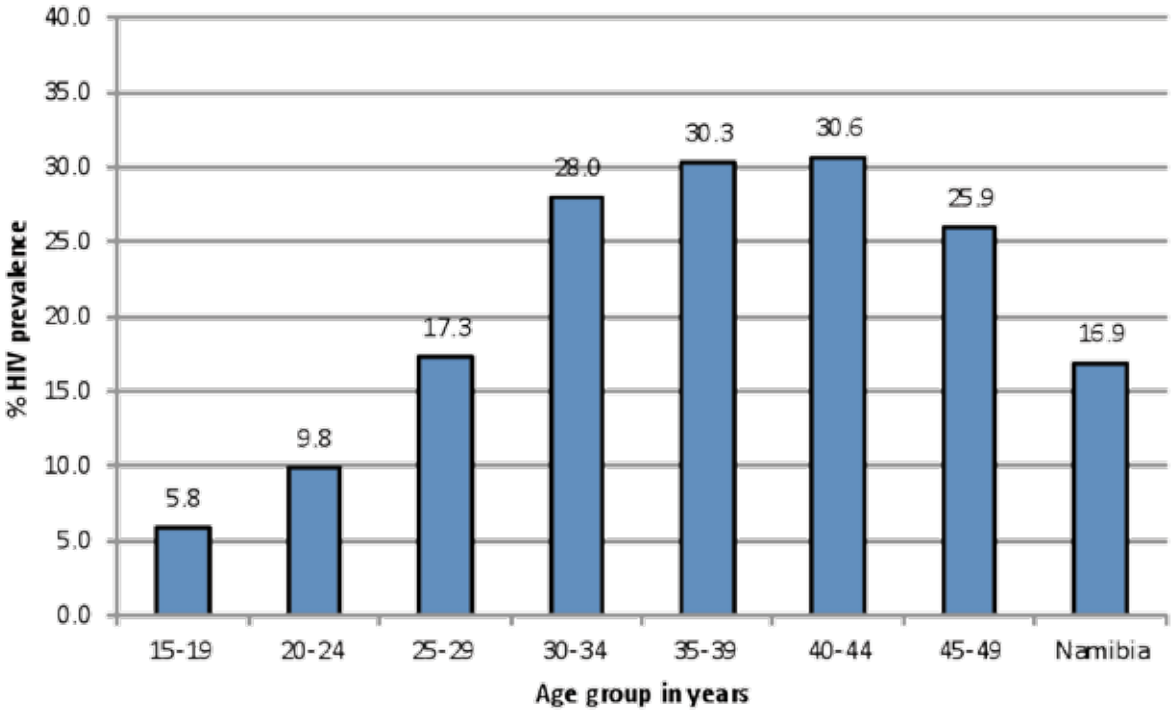


Table 4 and **Figure 4** show HIV prevalence by age group compared to the overall HIV prevalence in the 2014 NHSS. HIV prevalence is highest among women age 40-44 years (30.6%) and women age 35-39 years (30.3%). HIV prevalence is lowest among women age 15-19 years (5.8%) and women age 20-24 years (9.8%). The relatively few number of pregnant women age 45-49 enrolled in the NHSS (n=34) limits the precision and the interpretation of the point estimate (25.9%).

Table 5: HIV prevalence by gravidity and age, NHSS 2014

	Prima-gravida			Multi-gravida		
	Number tested	Number HIV positive	HIV prevalence (%) ^	Number tested	Number HIV positive	HIV prevalence (%) *
Namibia	2,382	161	6.8	1,142	1,142	21.4
Young vs. old age groups						
15-24 years	2,046	120	5.9	1,514	177	11.7
25-49 years	336	41	12.2	3,831	965	25.2
All age groups						
15-19 years	1,100	57	5.2	235	21	8.9
20-24 years	946	63	6.7	1,279	156	12.2
25-29 years	230	25	10.9	1,503	274	18.2
30-34 years	75	7	9.3	1,202	350	29.1
35-39 years	29	9	31.0	794	240	30.2
40-44 years	2	0	0.0	305	94	30.8
45-49 years	-	-	-	27	7	25.9

^ *% = (# prima-gravida tested within age group / # of prima-gravida HIV positive within age group)*

* *% = (# multi-gravida tested within age group / # of prima-gravida HIV positive within age group)*

Table 5 shows HIV prevalence by gravidity and age group. HIV prevalence was higher among multi-gravida women (21.4%) compared to prima-gravida women (6.8%) overall, and within each age group. HIV prevalence was highest among prima-gravida women age 35-39 years and multi-gravida women age 40-44 years, which is consistent with the age-specific prevalence shown in **Table 3.**

Table 6: HIV prevalence by sentinel site, NHSS 2014

	Number tested	Number HIV positive	HIV prevalence^	95% confidence interval *	Standard error
Namibia	7,727	1303	16.9	-	-
By site					
Andara	255	51	20.0	15.1 - 24.9	2.5
Aranos	138	16	11.6	6.2 - 17.0	2.7
Eenhana	215	28	13.0	8.5 - 17.6	2.3
Engela	259	59	22.8	17.6 - 27.9	2.6
Gobabis	158	20	12.7	7.4 - 17.9	2.7
Grootfontein	222	31	14.0	9.4 - 18.6	2.3
Karasburg	214	31	14.5	9.7 - 19.2	2.4
Katima Mulilo	375	135	36.0	31.1 - 40.8	2.5
Katutura State Hospital	209	41	19.6	14.2 - 25.0	2.8
Keetmanshoop	163	23	14.1	8.7 - 19.5	2.7
Khorixas	180	23	12.8	7.9 -17.7	2.5
Luderitz	278	58	20.9	16.1 - 25.7	2.4
Mariental	191	23	12.0	7.3 - 16.7	2.4
Nankudu	195	31	15.9	10.7 -21.1	2.6
Nyangana	279	35	12.5	8.6 - 16.5	2.0
Okahandja	195	26	13.3	8.5 - 18.1	2.4
Okahao	228	47	20.6	15.3 - 25.9	2.7
Okakarara	156	14	9.0	4.4 - 13.5	2.3
Okongo	263	46	17.5	12.9 - 22.1	2.3
Omaruru	170	22	12.9	7.8 - 18.0	2.6
Onandjokwe	299	67	22.4	17.6 - 27.2	2.4
Opuwo	155	6	3.9	0.8 - 6.9	1.6
Oshakati	286	52	18.2	13.7 - 22.7	2.3
Oshikuku	306	57	18.6	14.2 - 23.0	2.2
Otjiwarongo	236	34	14.4	9.9 - 18.9	2.3
Outapi	254	29	11.4	7.5 - 15.3	2.0
Outjo	188	21	11.2	6.6 - 15.7	2.3
Rehoboth	154	14	9.1	4.5 - 13.7	2.3
Rundu	303	73	24.1	19.2 - 28.9	2.5
Swakopmund	210	22	10.5	6.3 - 14.7	2.1
Tsandi	277	56	20.2	15.5 - 25.0	2.4
Tsumeb	257	38	14.8	10.4 - 19.1	2.2
Usakos	119	26	21.9	14.3 - 29.4	3.8
Walvisbay	219	43	19.6	14.3 - 24.9	2.7
Windhoek Central Hospital	121	5	4.1	0.5 - 7.7	1.8

^ % = (# positive / # tested for HIV)

** Standardized methodology for conducting HIV sentinel serosurveys does not included calculation of 95% confidence intervals of overall, or aggregate, HIV prevalence estimates.*

Figure 5: HIV prevalence overall and by sentinel site, NHSS 2014

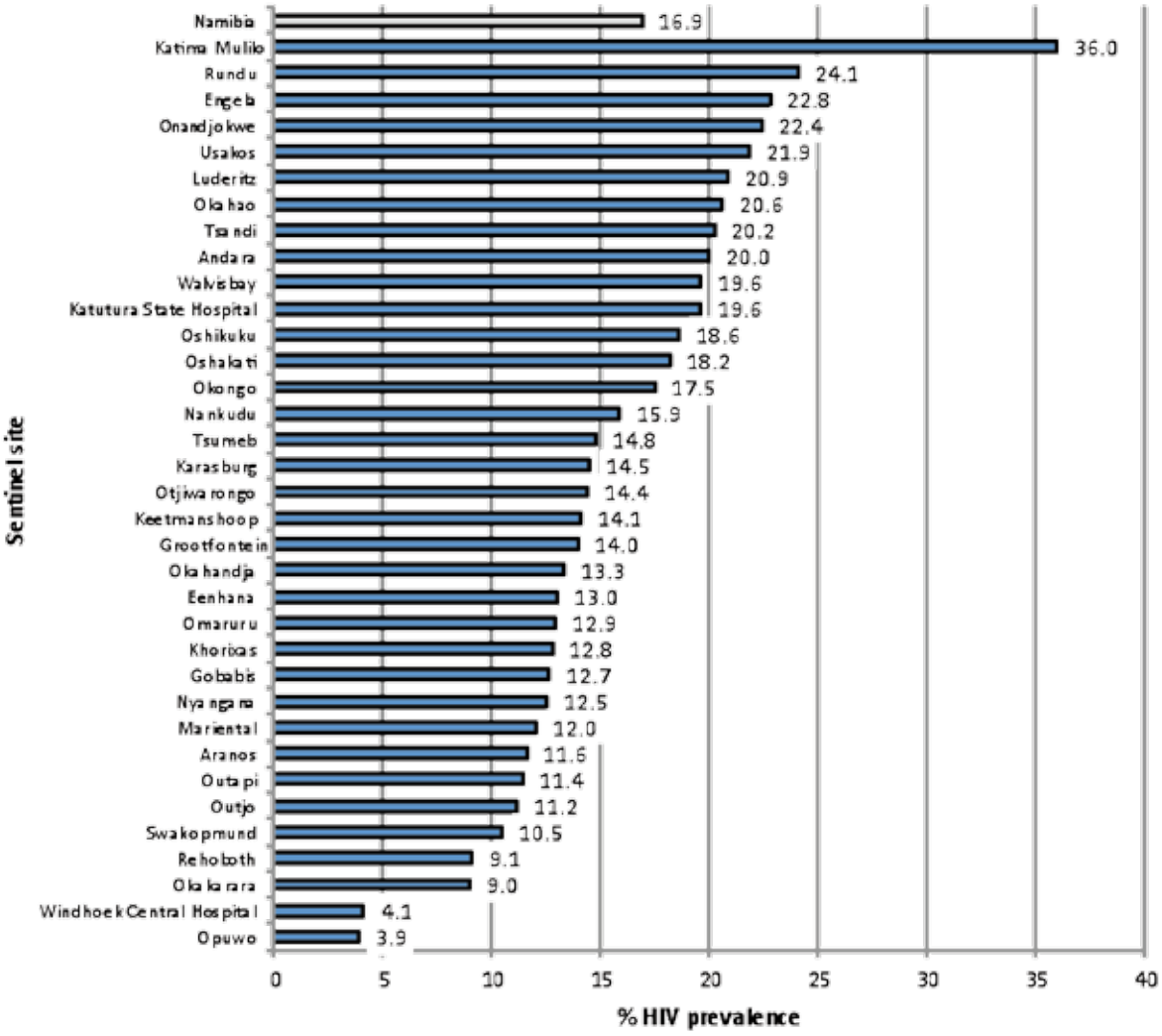


Table 6 and **Figure 5** show HIV prevalence by sentinel site among pregnant women included in the 2014 NHSS. The site with the highest HIV prevalence was Katima Mulilo (36.0%) followed by Rundu (24.1%), Engela (22.8%), and Onandjokwe (22.4%). The sites with the lowest prevalence were Opuwo (3.9%), Windhoek Central Hospital (4.1%), Okakarara (9.0%), and Rehoboth (9.1%). Figure 4 presents the sites in order (top to bottom) of highest to lowest prevalence. The median HIV prevalence among sentinel sites was 14.1%.

Table 7: HIV prevalence by urban or rural residential status and age, NHSS 2014

	Urban residence ^		Rural residence ^	
	Number HIV positive	HIV prevalence *	Number HIV positive	HIV prevalence *
Namibia	642	17.4	661	16.3
Young vs. old age groups				
15-24 years	153	9.0	144	7.8
25-49 years	489	24.7	517	23.6
All age groups				
15-19 years	38	6.6	40	5.3
20-24 years	115	10.3	104	9.4
25-29 years	157	18.5	142	16.1
30-34 years	171	27.8	186	28.1
35-39 years	125	32.5	124	28.3
40-44 years	32	26.7	62	33.2
45-49 years	4	33.3	3	20.0

^ The urban/rural classification refers to the woman's place or residence, not the health facility in which the woman attended ANC. Residential status is classified as either urban or rural by the woman's self-reported place of residence.

** % = (# tested positive within age group and residential status group / # tested within age group and residential status group)*

Figure 6: HIV prevalence by urban or rural residential status and age, NHSS 2014

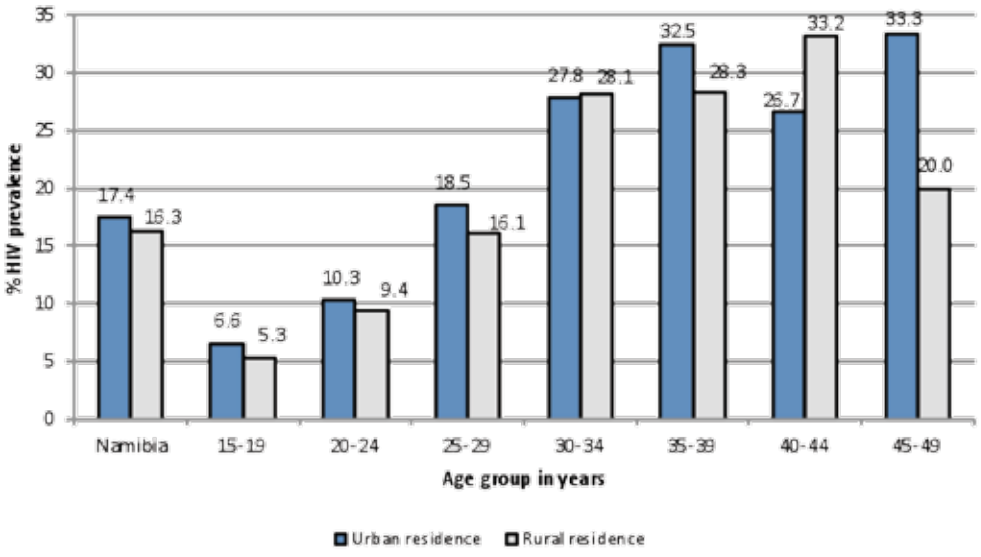
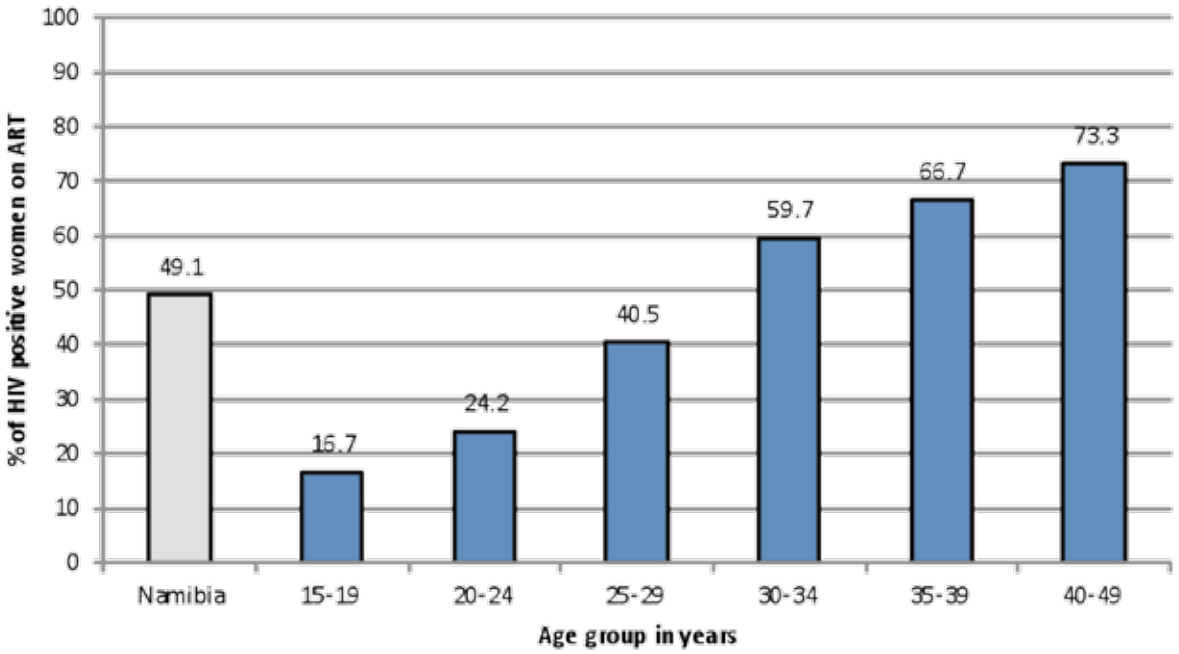


Table 7 and **Figure 6** show the distribution of HIV prevalence among pregnant women included in the 2014 NHSS by urban and rural residential status and age group. Overall, HIV prevalence among pregnant women residing in rural areas (16.3%) is similar to that among women residing in urban areas (17.4%). HIV prevalence among women residing in urban or rural areas is comparable within each age group, except for women age 45-49 years, among whom there is a higher prevalence in urban areas (33.0%) compared to rural areas (20.0%). However, the relatively small number of women (n=27) enrolled this category limit our ability to draw make meaningful comparisons.

4.3. ART Coverage among women testing HIV positive during the 2014 HSS

Data about the receipt of ART among HIV positive women was transcribed from routine ANC/PMTCT program data and entered on the 2014 NHSS individual survey form. Women were classified as "already on ART" if they were already initiated on ART before the 1st ANC visit during which they were sampled for the NHSS. Results of analysis of these data are described in this section **(4.3)**.

Figure 7: Percentage of HIV positive women who were already on ART, NHSS 2014



Overall, almost half (49.1%) of all women that tested HIV positive during the 2014 NHSS were already on ART **(Figure 7, Table 8)**. The observed percentage of HIV positive women who were already on ART is lowest in the youngest age group (16.7% among women age 15-19 years) and highest in the older age groups (66.7% among HIV positive women age 35-39 and 73.3% among HIV positive women age 40-49 years, respectively).

Table 8: Percentage of HIV positive women who were already on ART by sentinel site, NHSS 2014

	Number HIV positive	Number HIV positive already on ART	Percentage of HIV positive already on ART ^
Namibia	1,303	640	49.1
By site			
Andara	51	24	47.1
Aranos	16	6	37.5
Eenhana	28	21	75.0
Engela	59	22	37.3
Gobabis	20	12	60.0
Grootfontein	31	9	29.0
Karasburg	31	17	54.8
Katima Mulilo	135	51	37.8
Katutura State Hospital	41	15	36.6
Keetmanshoop	23	8	34.8
Khorixas	23	6	26.1
Luderitz	58	39	67.2
Mariental	23	13	56.5
Nankudu	31	19	61.3
Nyangana	35	16	45.7
Okahandja	26	11	42.3
Okahao	47	30	63.8
Okakarara	14	5	35.7
Okongo	46	25	54.4
Omaruru	22	12	54.6
Onandjokwe	67	33	49.3
Opuwo	6	5	83.3
Oshakati	52	21	40.4
Oshikuku	57	28	49.1
Otjiwarongo	34	16	47.1
Outapi	29	19	65.5
Outjo	21	12	57.1
Rehoboth	14	8	57.1
Rundu	73	35	48.0
Swakopmund	22	14	63.6
Tsandi	56	38	67.9
Tsumeb	38	19	50.0
Usakos	26	12	46.2
Walvisbay	43	17	39.5
Windhoek Central Hospital	5	2	40.0

^ *(# positive / # on ART)*

Table 8 shows the percentage of women testing HIV positive who were already on ART during the 2014 NHSS within each site. The percentage of HIV positive women already on ART varies by site, with the highest percentages observed in Eenhana (75.0%), Tsandi (67.9%) and Swakopmund (63.6%). The sites with the lowest percentage of HIV positive women who were already on ART are Khorixas (26.1%), Grootfontein (29.0%) and Keetmanshoop (34.8%).

Table 9: Percentage of HIV positive women who were already on ART by rural or urban place of residence and age, NHSS 2014

	Urban residence		Rural residence	
	Number HIV positive already on ART	Percentage of HIV positive already on ART ^	Number HIV positive already on ART	Percentage of HIV positive already on ART ^
Namibia	297	46.3	343	51.9
Young vs. old age groups				
15-24 years	31	20.3	35	24.3
25-49 years	266	54.4	308	59.6
All age groups				
15-19 years	5	13.2	8	20.0
20-24 years	26	22.6	27	26.0
25-29 years	61	38.9	60	42.3
30-34 years	101	59.1	112	60.2
35-39 years	82	65.6	84	67.7
40-49 years	22	61.1	52	80.0

Figure 8: Percentage of HIV positive women who were already on ART by rural or urban place of residence and age, NHSS 2014

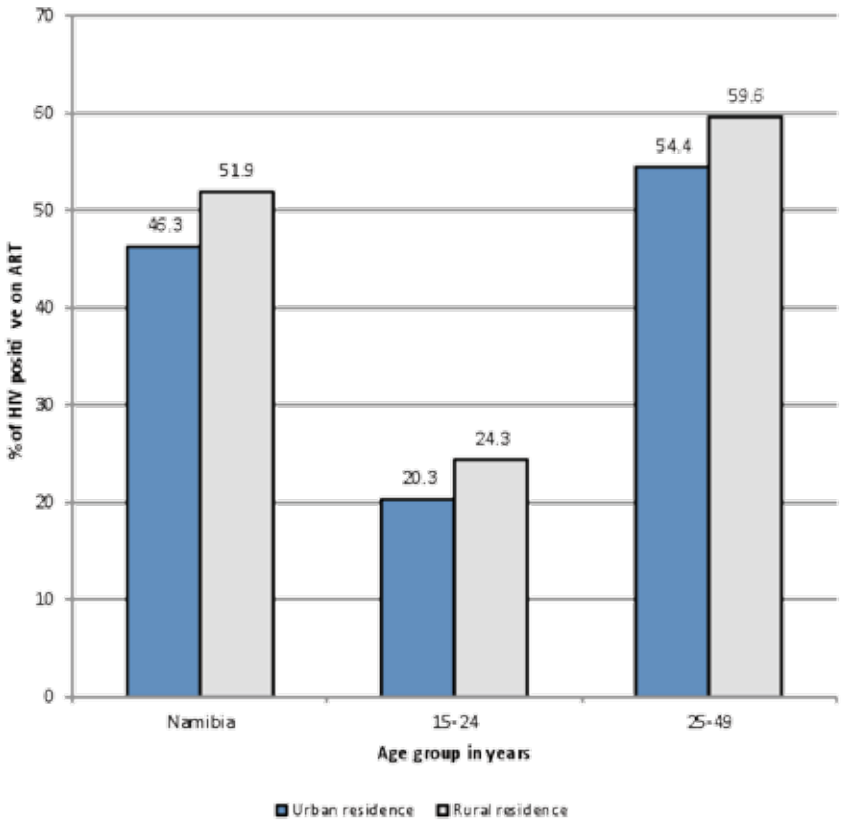


Figure 8 and Table 9 show the percentage of HIV positive women who were already on ART residing in urban or rural areas in 2014 NHSS. A slight difference was reported in the percentage of HIV positive women on ART residing in rural (51.9%) and urban areas (46.3%) overall. Among younger women (age 15-24 years), the percentage of HIV positive women on ART is slightly higher among those residing in rural areas (24.3%) compared to those residing in urban areas (20.3%). The percentage of HIV positive women on ART is much higher among older women (age 25-49 years) residing in rural and urban areas observed at 59.6% and 54.4%, respectively.

4.4. Trends in HIV prevalence over time

Table 10 and **Figure 9** show the trends in HIV prevalence within different age groups from 1994 - 2014. From 2006-2014, there appears to be a decrease in HIV prevalence among women age 15-24 years. For the same time period, there appears to be little to no change among women age 25-49 years.

Table 10: Trend in HIV prevalence by year of NHSS and age, NHSS 1994 – 2014

	% HIV prevalence by year of NHSS										
	1994	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**	**2014**
Namibia	8.4	15.4	17.4	19.3	22.0	19.7	19.9	17.8	18.8	18.2	16.9
Young vs. old age groups											
15-24 years	-	-	-	-	-	-	14.2	10.6	10.3	8.9	8.3
25-49 years	-	-	-	-	-	-	26.5	24.7	26.4	26.3	24.1
All age groups											
15-19 years	6.0	11.0	12.0	12.0	11.0	10.0	10.2	5.1	6.6	5.4	5.8
20-24 years	11.0	18.0	20.0	20.0	22.0	18.0	16.4	14.0	12.5	10.9	9.8
25-29 years	9.0	17.0	22.0	25.0	28.0	26.0	26.9	23.8	22.8	20.9	17.3
30-34 years	9.0	18.0	19.0	21.0	27.0	24.0	29.5	27.2	29.6	30.8	28.0
35-39 years	3.0	8.0	12.0	15.0	21.0	24.0	24.1	26.0	29.7	33.9	30.3
40-44 years	1.0	12.0	14.0	9.0	16.0	12.0	16.9	17.7	26.4	20.7	30.6
45-49 years	12.0	1.0	13.0	8.0	12.0	13.0	9.1	13.8	25.8	12.1	26.0

Figure 9: Trends in HIV prevalence by year of NHSS among young and old age groups, NHSS 2006 - 2014

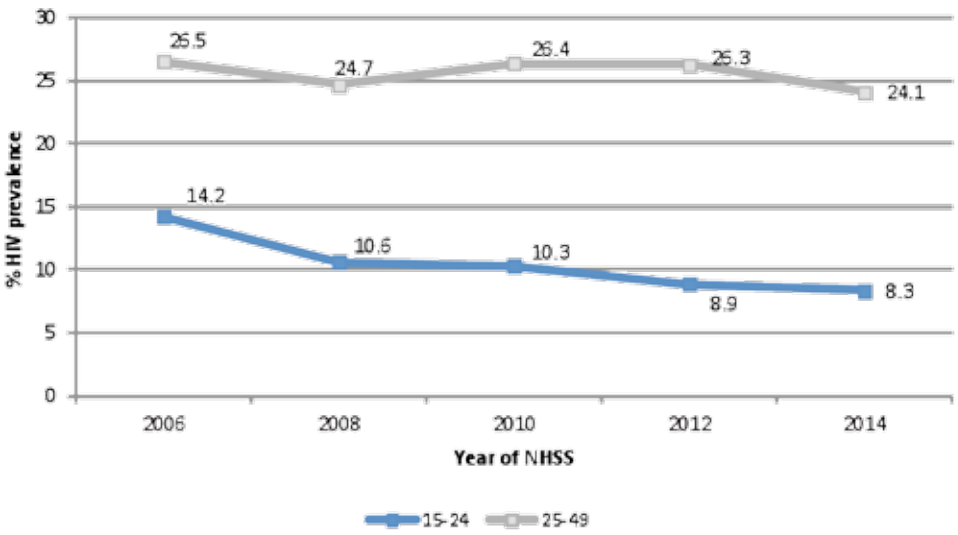


Table 11 shows site-level trends in HIV prevalence among pregnant women included in the NHSS from 2010 to 2014. When considering the trend in HIV prevalence from 2008-2012, the overall HIV prevalence among pregnant women in Namibia appears to have been fairly stable. However, we are seeing a slight decrease in the overall HIV prevalence between 2012 and 2014. The Chi-square test for linear trend was used to detect statistically significant changes in HIV prevalence from 2010 to 2014. Statistically significant or borderline significant decreases in HIV prevalence since 2010 were observed among younger women in Okahandja, Omaruru, and Rundu while significant or borderline increases in HIV prevalence were observed among younger women in Luderitz, Oshikuku and Usakos. Significant or borderline decreases in HIV prevalence among older women were observed in Grootfontein, Katutura, Nyangana, Onadjokwe, Oshakati and Windhoek Central.

Table 11: Trends in HIV prevalence by year of NHSS and age, NHSS 2010 – 2014

	HIV prevalence (%) by age group and year of NHSS								
	Age 15-24 years			Age 25-49 years			Namibia		
	2010	2012	2014	2010	2012	2014	2010	2012	2014
Namibia	**10.3**	**8.9**	**8.3**	**26.4**	**26.3**	**24.1**	**18.8**	**18.2**	**16.9**
By site									
Andara	12.5	10.9	10.5	28.0	28.3	30.6	19.2	19.1	20.0
Aranos	12.8	12.1	7.1	9.8	10.2	18.5	11.2	11.2	11.6
Eenhana	12.8	7.4	6.5	23.7	22.1	19.4	18.6	15.0	13.0
Engela	13.5	11.5	14.3	30.6	25.8	28.6	22.4	19.3	22.8
Gobabis	8.8	9.1	9.1	22.3	10.9	15.2	15.6	9.9	12.7
Grootfontein	9.9	6.1	12.1	19.5	24.3	15.5**	14.8	15.9	14.0
Karasburg	10.3	1.2	6.0	22.8	23.2	21.9	17.0	14.9	14.5
Katima Mulilo	23.1	21.5	24.3	46.6	51.8	46.9	35.6	37.7	36.0
Katutura State Hospital	11.0	4.3	9.0	32.0	20.9	29.4**	23.4	14.4	19.6
Keetmanshoop	9.8	4.4	6.2	13.7	17.0	22.0	11.7	10.6	14.1
Khorixas	12.3	6.7	8.0	16.7	17.3	17.4	14.9	12.4	12.8
Luderitz	4.0	14.1	6.1**	27.3	27.4	31.3	18.1	22.0	20.9
Mariental	7.0	9.4	7.5	20.5	18.1	16.5	13.8	13.5	12.0
Nankudu	8.1	1.7	6.0	21.9	28.9	26.3	13.5	13.1	15.9
Nyangana	8.3	8.2	8.0	19.3	36.2	17.8*	12.8	22.0	12.5*
Okahandja	8.2	9.3	2.3**	16.0	27.7	22.0	12.6	19.3	13.3
Okahao	6.9	3.8	8.8	31.5	28.6	30.2	19.9	16.3	20.6
Okakarara	9.1	6.6	6.0	5.2	13.3	12.5	7.1	9.9	9.0
Okongo	7.6	9.6	7.9	28.6	29.8	24.8	19.5	20.8	17.5
Omaruru	8.5	6.8	1.3**	28.7	16.2	23.3	18.6	11.8	12.9
Onandjokwe	10.4	9.2	11.9	33.1	36.7	27.8**	24.4	25.7	22.4
Opuwo	4.8	8.8	0.0	11.8	10.7	7.0	8.8	9.8	3.87*
Oshakati	14.8	7.8	9.4	31.7	32.6	23.5**	25.1	22.3	18.2
Oshikuku	4.9	12.2	5.9**	35.6	35.0	28.8	22.5	24.7	18.6**
Otjiwarongo	10.0	8.4	8.6	23.5	25.6	20.2	16.9	16.9	14.4
Outapi	6.3	10.9	3.5*	27.8	24.3	18.0	18.3	18.7	11.4*
Outjo	12.1	8.3	4.4	17.3	18.7	17.4	14.6	12.8	11.2
Rehoboth	2.5	9.5	2.6**	7.5	10.0	15.8	4.2	9.8	9.1
Rundu	17.9	17.4	10.8**	29.3	31.7	38.6	23.2	24.5	24.1
Swakopmund	7.3	6.4	5.3	26.3	21.1	14.8	17.8	14.5	10.5
Tsandi	11.8	8.8	9.3	37.4	37.2	29.7	25.5	23.4	20.2
Tsumeb	11.8	10.9	6.4	34.3	25.4	22.9	24.3	19.2	14.8
Usakos	5.0	3.2	11.1**	24.4	22.4	28.4	14.8	12.2	21.9*
Walvisbay	11.9	7.1	13.9	24.3	24.7	22.5	19.6	17.2	19.6
Windhoek Central Hospital	4.5	0.0	1.9	12.7	16.3	5.8*	9.1	9.6	4.1**

Chi-square test for linear trend used to test for significance in the association between advancing year of NHSS and HIV infection

** indicates a statistically significant (P ≤ 0.05) change in HIV prevalence from 2010 to 2014*

** * indicates a borderline statistically significant (P ≤ 0.1) change in HIV prevalence from 2010 to 2014*

Table 12: Trends in HIV prevalence by year of NHSS, NHSS 1992 – 2014

	HIV prevalence (%) by year of NHSS											
	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2012	2014
Namibia	**4.2**	**8.4**	**15.4**	**17.3**	**19.3**	**22**	**19.7**	**19.9**	**17.8**	**18.8**	**18.2**	**16.9**
By site												
Andara	-	2.0	11.0	16.0	15.0	21.0	18.0	22.7	14.2	19.2	19.1	20.0
Aranos	-	-	-	-	-	-	-	-	5.9	11.3	11.2	11.6
Eenhana	-	-	-	-	-	-	-	21.4	11.6	18.6	15.0	13.0
Engela	-	7.0	18.0	17.0	23.0	19.0	19.0	27.0	20.1	22.4	19.3	22.8
Gobabis	1.0	-	-	9.0	9.0	13.0	13.0	7.9	13.1	15.6	9.9	12.7
Grootfontein	-	9.0	-	-	-	30.0	28.0	19.3	16.9	14.8	15.9	14.0
Karasburg	-	-	-	-	-	-	-	22.7	18.3	17.0	14.9	14.5
Katima Mulilo	14.0	25.0	24.0	29.0	33.0	43.0	42.0	39.4	31.7	35.6	37.7	36.0
Katutura State Hospital	4.0	7.0	16.0	23.0	31.0	27.0	22.0	21.7	21.7	23.4	14.4	19.6
Keetmanshoop	3.0	8.0	-	7.0	17.0	16.0	16.0	18.5	12.7	11.7	10.6	14.1
Khorixas	-	-	-	-	-	-	-	-	10.9	14.9	12.4	12.8
Luderitz	-	-	-	-	-	-	22.0	22.5	20.1	18.1	22.0	20.9
Mariental	-	-	-		10.0	12.0	11.0	10.2	10.8	13.8	13.5	12.0
Nankudu	-	-	-	13.0	18.0	16.0	19.0	13.9	10.5	13.5	13.1	15.9
Nyangana		6.0	5.0	10.0	16.0	22.0	15.0	10.2	19.5	12.8	22.0	12.5
Okahandja	-	-	-	-	-	-	-	18.5	14.9	12.6	19.3	13.3
Okahao	-	-	-	-	-	-	-	22.5	27.4	19.8	16.3	20.6
Okakarara	-	-	-	-	-	-	-	-	11.4	7.1	9.9	9.0
Okongo	-	-	-	-	-	-	-	-	20.7	19.5	20.8	17.5
Omaruru	-	-	-	-	-	-	-	-	12.0	18.6	11.8	12.9
Onandjokwe	-	8.0	17.0	21.0	23.0	28.0	22.0	23.7	21.9	24.0	25.7	22.4
Opuwo	3.0	1.0	4.0	6.0	7.0	9.0	9.0	7.9	7.9	8.8	9.8	3.9
Oshakati	4.0	14.0	22.0	34.0	28.0	30.0	25.0	27.1	22.4	25.1	22.3	18.2
Oshikuku	-	-	-	-	21.0	27.0	27.0	22.4	21.7	22.5	24.7	18.6
Otjiwarongo	2.0	9.0	-	16.0	18.0	25.0	17.0	18.7	15.2	16.9	16.9	14.4
Outapi	-	-	-	-	-	23.0	17.0	20.7	19.6	18.3	18.7	11.4
Outjo	-	-	-	-		-	-	-	18.0	14.6	12.8	11.2
Rehoboth	-	3.0			9.0	10.0	14.0	13.9	6.3	4.2	9.8	9.1
Rundu	-	8.0	8.0	14.0	14.0	22.0	21.0	20.1	18.8	23.2	24.5	24.1
Swakopmund	3.0	7.0	17.0	15.0	22.0	16.0	28.0	17.3	14.2	17.8	14.5	10.5
Tsandi	-	-	-	-	-	-	-	-	25.9	25.5	23.4	20.2
Tsumeb	-	-	-	-	-	25.0	16.0	17.0	17.1	24.3	19.2	14.8
Usakos	-	-	-	-	-	-	-	-	17.8	14.8	12.2	21.9
Walvisbay	-	-	-	29.0	28.0	25.0	26.0	22.1	21.4	19.6	17.2	19.6
Windhoek Central Hospital	-	-	-	-	-	-	10.0	9.1	4.7	9.1	9.6	4.1

(-) no prevalence estimate available because site did not participate in HSS during indicated year

Table 12 shows the site level and overall HIV prevalence for Namibia during NHSS year 1992-2014. 1992-2002 marked a period of consistent biennial increases in HIV prevalence being observed in most sites, leading to overall peak prevalence of 22.0% being observed in 2002. From 2004-2014, stabilized HIV prevalence was observed in most sites, although in 2014 there was an observed slight decline in HIV prevalence in most sites.

Figure 10: HIV prevalence by health district, NHSS 2008, 2010, 2012 and 2014

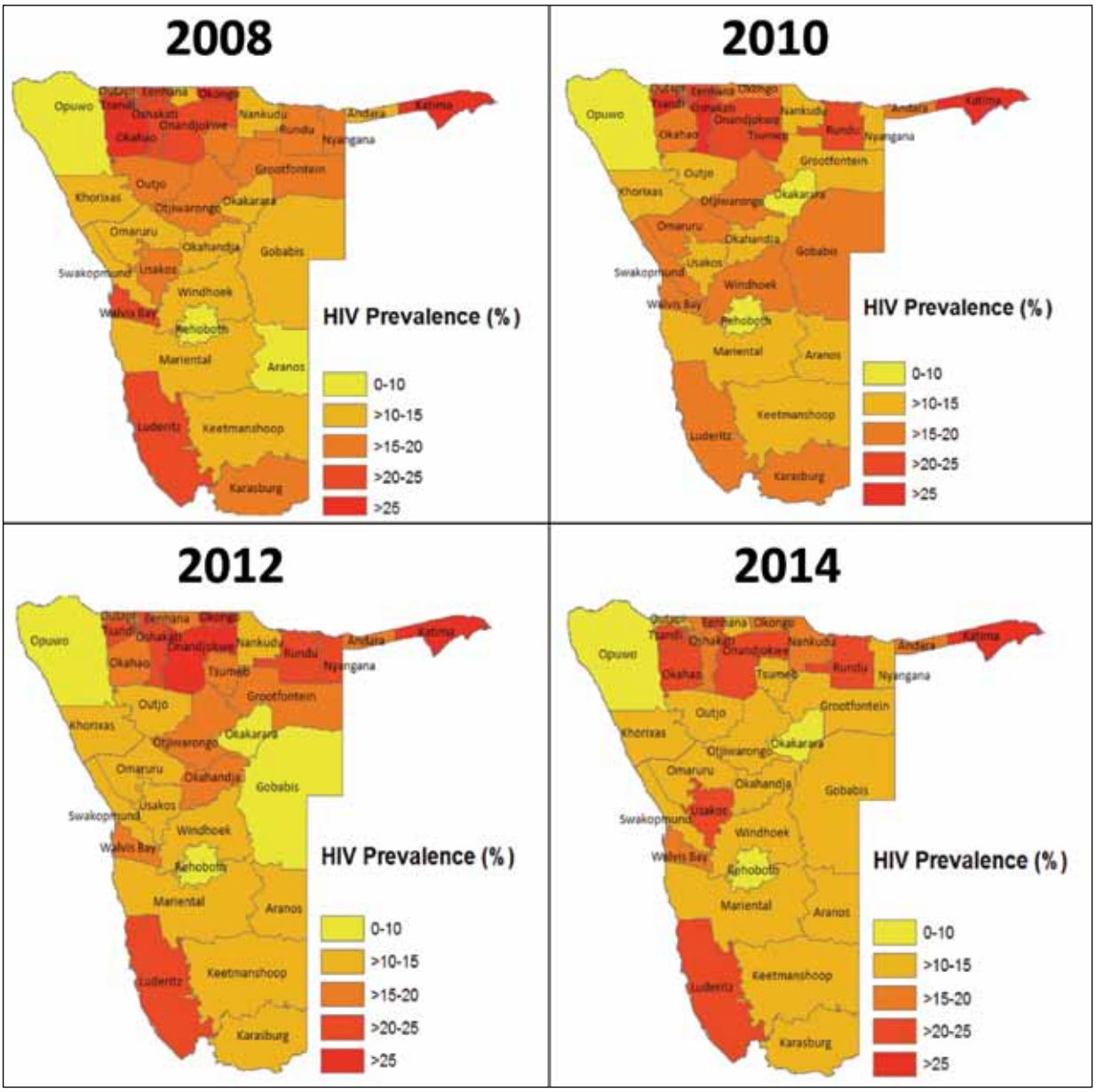


Figure 10 shows the HIV prevalence by health district from 2008 - 2014. Districts with higher HIV prevalence are represented by darker orange to dark red coloring and districts with lower HIV prevalence are represented with light orange to yellow coloring. Over the past four rounds of NHSS, in general HIV prevalence is disproportionately distributed in the country. According to NHSS prevalence estimates, the burden of HIV appears to be greatest in the north (Tsandi, Oshakati, Okongo, Oshikuku, Okahao, Onandjokwe, Engela) and north east (Rundu and Katima Mulilo) with high burdens also in the south (Luderitz) and west (Walvis Bay). HIV prevalence has been disproportionally low at Opuwo, Rehoboth and Okakarara respectively.

Figure 11: HIV prevalence by age group from 2008 – 2014 and the percentage of HIV positive women who were already on ART during the 2012 and 2014 NHSS

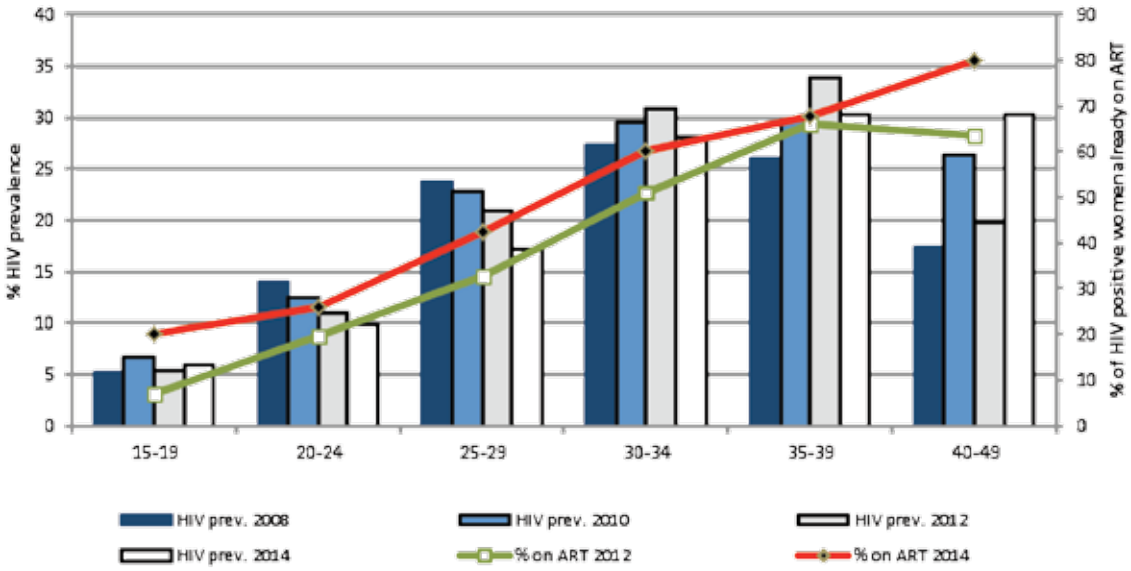


Figure 11 shows the relationship between the percentages of HIV positive women who were already on ART in 2012 and 2014 and HIV prevalence from 2008-2014 in each age group. The columns in the figure show HIV prevalence (primary vertical access) within each age group from the 2008 – 2014. The lines in the figure shows the percentage of women testing positive during the 2012 and 2014 NHSS who were already on ART before the survey (secondary vertical access). From 2008 to 2014, HIV prevalence declined from 14.0% to 9.8% among women age 20-24 years, and from 23.8% to 17.2% among women age 25-29 years). During that same time, HIV prevalence increased among the older age groups (from 27.2% to 28.0% among women age 30-34 years, 26.0% to 30.2% among women age 35-39 years and from 17.3% to 30.2% among women age 40-49 years). However, among women age 15-19 years, there was no clear trend in HIV prevalence between 2008 and 2014. The percentages of HIV infected women who were already on ART during the 2012 and 2014 NHSS is higher in the older age groups (in which increasing prevalence was observed from 2008-2014) compared to the younger age groups. Increases in the percentage of HIV infected women who were already on ART from 2012 to 2014 were observed in all age groups.

5. SENTINEL SURVEILLANCE AND OTHER DATA SOURCES

In order to enhance the confidence and explanatory power of the NHSS findings, routine PMTCT programme data were analysed to see if they support the same interpretations revealed from this survey. Routine data on syphilis testing captured in the NIP database were also analysed. The results of the comparisons between these data sources and the results of 2014 NHSS are presented in the section below **(5.1 – 5.2).**

5.1. HIV Prevalence Data from Routine PMTCT Program Data

The World Health Organization (WHO) and other leading public health organizations recommend that countries evaluate and strengthen the quality of PMTCT program data so that it can be used for routine surveillance purposes.[5] If PMTCT program performance is strong, geographic coverage is wide, and uptake of HIV testing is unbiased (independent of HIV sero-status) and high, PMTCT program data may be of sufficient quality to be used for HIV surveillance purposes.

For this reason, results from the NHSS 2014 were compared to data collected from two other sources of PMTCT program data, including; PMTCT program summary data that is reported through the district health information system (DHIS), and; PMTCT rapid testing results or known serostatus data that was entered directly by health facility staff onto the NHSS ISF of participants at the time of sampling for the NHSS 2014. The results of this comparison are presented in **Table 13 and 14.**

5.1.1 Comparison of NHSS HIV test results and routine PMTCT program data reported through the DHIS

Table 13 shows HIV prevalence estimates resulting from the 2014 NHSS that are compared to the overall and site level prevalence estimates produced from 2014 PMTCT program summary data that is reported through the district health information system (DHIS).

Table 13: Comparison of HIV prevalence estimates from 2014 PMTCT program data vesus results of the 2014 NHSS

	PMTCT program data reported through DHIS		NHSS 2014	
	Prevalence	(95% CI)	Prevalence	(95% CI)
Namibia	16.7		16.9	
By site				
Andara	21.3	(17.8 - 25.1)	20.0	(15.1 - 24.9)
Aranos	10.7	(6.3 - 16.9)	11.6	(6.2 - 17.0)
Eenhana	19.0	(17.0 - 21.1)	13.0	(8.5 - 17.6)
Engela	16.5	(13.5 - 19.8)	22.8	(17.6 - 27.9)
Gobabis	11.4	(9.6 - 13.3)	12.7	(7.4 - 17.9)
Grootfontein	14.3	(11.6 - 17.5)	14.0	(9.4 - 18.6)
Karasburg	15.1	(11.4 - 19.4)	14.5	(9.7 - 19.2)
Katima Mulilo	30.7	(28.5 - 32.9)	36.0	(31.1 - 40.8)
Katutura State Hospital	17.4	(15.8 - 19.2)	19.6	(14.2 - 25.0)
Keetmanshoop	11.9	(9.3 - 14.9)	14.1	(8.7 - 19.5)
Khorixas	13.4	(8.6 - 19.6)	12.8	(7.9 -17.7)
Luderitz	20.2	(16.2 - 24.7)	20.9	(16.1 - 25.7)
Mariental	10.1	(7.6 - 13.0)	12.0	(7.3 - 16.7)
Nankudu	16.8	(14.6 - 19.2)	15.9	(10.7 -21.1)
Nyangana	13.0	(10.4 - 15.9)	12.5	(8.6 - 16.5)
Okahandja	25.5	(22.3 - 28.7)	13.3	(8.5 - 18.1)
Okahao	19.5	(15.9 - 23.6)	20.6	(15.3 - 25.9)
Okakarara	11.3	(7.7 - 15.9)	9.0	(4.4 - 13.5)
Okongo	15.5	(9.3 - 23.6)	17.5	(12.9 - 22.1)
Omaruru	11.0	(6.6 - 16.8)	12.9	(7.8 - 18.0)
Onandjokwe	17.3	(15.9 - 18.2)	22.4	(17.6 - 27.2)
Opuwo	8.0	(6.5 - 9.7)	3.9	(0.8 - 6.9)
Oshakati	19.3	(18.0 - 20.6)	18.2	(13.7 - 22.7)
Oshikuku	21.5	(19.5 - 23.6)	18.6	(14.2 - 23.0)
Otjiwarongo	13.0	(10.5 - 15.7)	14.4	(9.9 - 18.9)
Outapi	12.9	(11.6 - 14.4)	11.4	(7.5 - 15.3)
Outjo	11.6	(8.1 - 15.9)	11.2	(6.6 - 15.7)
Rehoboth	9.8	(7.3 - 12.7)	9.1	(4.5 - 13.7)
Rundu	17.2	(15.9 - 18.5)	24.1	(19.2 - 28.9)
Swakopmund	14.2	(11.6 - 17.0)	10.5	(6.3 - 14.7)
Tsandi	19.5	(16.3 - 23.0)	20.2	(15.5 - 25.0)
Tsumeb	16.0	(13.4 - 18.9)	14.8	(10.4 - 19.1)
Usakos	15.8	(10.8 - 22.0)	21.9	(14.3 - 29.4)
Walvis Bay	22.8	(17.6 - 28.7)	19.6	(14.3 - 24.9)
Windhoek Central Hospital	10.2	(8.9 - 11.6)	4.1	(0.5 - 7.7)

Overall the pooled HIV prevalence observed during the 2014 NHSS was nearly identical to the HIV prevalence from PMTCT program data that was reported through the DHIS during the same time period **(Table 13).** However, discrepant prevalence estimates produced by the two data sources were observed in many sites. Identifying site level factors that may be associated with discrepant prevalence estimates is beyond the scope of this report.

5.1.2. Comparison of NHSS HIV test results and PMTCT serostatus data captured on the NHSS survey form

According to recommendations from WHO, several analyses were performed to compare NHSS and PMTCT serostatus data that were reported on the NHSS ISF. NHSS and PMTCT HIV prevalence estimates, positive percent agreement (PPA) and negative percent agreement (NPA) between NHSS and PMTCT HTC HIV test results, and selection bias, defined as the percent relative change from the total NHSS HIV prevalence (among participants who do and do not receive PMTCT HTC) to the observed NHSS HIV prevalence (among HSS participants who do receive PMTCT HTC), were calculated at the site-level. Pooled percentages, as well as the median and inter-quartile range (IQR), of the site-level percentages, were calculated at the national-level. Minimum acceptable assessment standards were set as follows: pooled PPA > 97.9, pooled NPA > 99.7, pooled PMTCT HTC uptake > 90%, and pooled selection-bias < +/- 10%. Assuming 99.5% net sensitivity and specificity of the PMTCT rapid testing serial algorithm, PPA or NPA values below the assessment thresholds indicate error beyond what would be expected due to statistical error alone (i.e. human error). The results of these analyses are presented in **Table 14.**

Overall, 7,618 (98.6%) pregnant women participated in the 2014 NHSS also had PMTCT serostatus data captured on the NHSS survey form **(Table 14)**. Pooled HIV prevalence was 16.7% by PMTCT serostatus data and 16.9% by NHSS results. Pooled NPA and PPA between PMTCT serostatus data and NHSS results were 99.4% and 96.1%, which are slightly below the minimum acceptable assessment standard thresholds of 99.7% and 97.9, respectively.

Table 14: Comparison of HIV prevalence estimates produced by PMTCT program data reported thorough the DHIS to result of the NHSS 2014

	PMTCT data captured on NHSS survey form		NHSS results data		Data comparison assessment standards			
	HIV prevalence	(95% CI)	HIV prevalence	(95% CI)	NPA ^	PPA *	PMTCT HIV testing uptake £	Selection bias ≠
Namibia	16.7		16.9		99.4	96.1	99.8	0.0
By site								
Andara	22.2	(16.4 - 27.9)	20.0	(15.1 - 24.9)	100.0	93.8	99.6	0.00
Aranos	12.1	(6.5 - 17.8)	11.6	(6.2 - 17.0)	100.0	100.0	95.7	0.05
Eenhana	13.0	(8.4 - 17.5)	13.0	(8.5 - 17.6)	100.0	100.0	100.0	0.00
Engela	23.2	(18.0 - 28.3)	22.8	(17.6 - 27.9)	99.0	98.3	100.0	0.00
Gobabis	12.7	(8.5 - 17.5)	12.7	(7.4 - 17.9)	100.0	100.0	100.0	0.00
Grootfontein	13.9	(9.3 - 18.4)	14.0	(9.4 - 18.6)	99.5	96.8	100.0	0.00
Karasburg	14.4	(9.7 - 19.2)	14.5	(9.7 - 19.2)	100.0	100.0	100.0	0.00
Katima Mulilo	34.8	(29.9 - 39.6)	36.0	(31.1 - 40.8)	97.9	93.3	100.0	0.00
Katutura State Hospital	17.7	(12.4 - 22.9)	19.6	(14.2 - 25.0)	98.8	85.0	97.6	0.00
Keetmanshoop	11.0	(6.1 - 15.8)	14.1	(8.7 - 19.5)	99.3	73.9	100.0	0.00
Khorixas	12.0	(7.3 - 16.8)	12.8	(7.9 -17.7)	100.0	95.7	100.0	0.00
Luderitz	21.5	(16.7 - 26.3)	20.9	(16.1 - 25.7)	99.6	100.0	100.0	0.00
Mariental	11.3	(6.8 - 15.8)	12.0	(7.3 - 16.7)	100.0	95.7	100.0	0.00
Nankudu	17.4	(11.7 - 23.2)	15.9	(10.7 -21.1)	100.0	100.0	99.5	0.01
Nyangana	11.2	(7.4 - 14.9)	12.5	(8.6 - 16.5)	100.0	90.9	100.0	0.00
Okahandja	15.4	(11.0 - 19.9)	13.3	(8.5 - 18.1)	96.5	96.2	100.0	0.00
Okahao	20.6	(15.3 - 25.9)	20.6	(15.3 - 25.9)	100.0	100.0	100.0	0.00
Okakarara	9.7	(5.0 - 14.4)	9.0	(4.4 - 13.5)	99.3	92.9	98.7	0.01
Okongo	17.1	(12.5 - 21.7)	17.5	(12.9 - 22.1)	99.5	95.7	100.0	0.00
Omaruru	13.3	(8.2 - 18.4)	12.9	(7.8 - 18.0)	98.6	95.5	99.4	0.01
Onandjokwe	22.8	(18.1 - 27.4)	22.4	(17.6 - 27.2)	98.3	92.4	99.7	-0.01
Opuwo	3.9	(0.7 - 6.9)	3.9	(0.8 - 6.9)	100.0	100.0	100.0	0.00
Oshakati	18.2	(13.7 - 22.7)	18.2	(13.7 - 22.7)	99.6	98.1	100.0	0.00
Oshikuku	19.0	(14.6 - 23.4)	18.6	(14.2 - 23.0)	99.2	98.3	100.0	0.00
Otjiwarongo	14.0	(9.5 - 18.4)	14.4	(9.9 - 18.9)	99.0	91.2	100.0	0.00
Outapi	11.8	(7.8 - 15.8)	11.4	(7.5 - 15.3)	99.6	100.0	100.0	0.00
Outjo	11.6	(7.0 - 16.2)	11.2	(6.6 - 15.7)	99.4	100.0	100.0	0.00
Rehoboth	9.0	(4.4 - 13.5)	9.1	(4.5 - 13.7)	100.0	100.0	100.0	0.00
Rundu	24.0	(19.2 - 28.4)	24.1	(19.2 - 28.9)	100.0	100.0	100.0	0.00
Swakopmund	10.5	(6.3 - 14.7)	10.5	(6.3 - 14.7)	99.5	95.5	100.0	0.00
Tsandi	19.8	(15.1 - 24.5)	20.2	(15.5 - 25.0)	100.0	98.2	100.0	0.00
Tsumeb	14.8	(10.4 - 19.2)	14.8	(10.4 - 19.1)	100.0	100.0	100.0	0.00
Usakos	20.1	(13.8 - 26.3)	21.9	(14.3 - 29.4)	98.9	100.0	98.8	0.01
Walvis Bay	19.2	(13.9 - 24.4)	19.6	(14.3 - 24.9)	100.0	97.7	100.0	0.00
Windhoek Central Hospital	5.2	(1.7 - 8.8)	4.1	(0.5 - 7.7)	99.1	80.0	100.0	0.00

^ *General assessment standards set by the WHO for using PMTCT data for surveillance are; NPA > 99.7*

* *General assessment standards set by the WHO for using PMTCT data for surveillance are; PPA > 97.9*

£ *PMTCT HIV testing uptake is defined as the percentage of women that received HIV testing through the PMTCT program on the same day that they were sampled for the NHSS.*

≠ *Selection bias is defined as the percent relative change from the total NHSS HIV prevalence among participants who do and do not receive PMTCT HIV testing, to the NHSS HIV prevalence among HSS participants who do receive PMTCT HIV testing. General assessment standards set by the WHO for using PMTCT data for surveillance are; selection bias < +/- 10%.*

5.2. Syphilis surveillance data from routine laboratory records

Syphilis testing (RPR testing, with positives confirmed by TPHA) is routinely offered to all pregnant women in Namibia. Syphilis testing was performed as part of routine ANC services and results were obtained from the Namibia Institute of Pathology (NIP) and resulting data were analyzed by district with results presented below in **Table 15** and **Table 16.**

Table 15: Syphilis surveillance data from routine laboratory by district among women age 15-49 years

	Number negative	Number positive	Number tested	Syphilis prevalence (%)	NHSS HIV prevalence (%)
Overall	**52,753**	**1,044**	**53,797**	**1.9**	**16.9**
By site					
Andara	805	26	831	3.1	20
Aranos	126	4	130	3.1	11.6
Eenhana	2,011	17	2,028	0.8	13
Engela	4,413	143	4,556	3.1	22.8
Gobabis	1,555	79	1,634	4.8	12.7
Grootfontein	900	8	908	0.9	14
Karasburg	502	9	511	1.8	14.5
Katima Mulilo	2,334	86	2,420	3.6	36
Katutura State Hospital	4,823	85	4,908	1.7	19.6
Keetmanshoop	1,032	8	1,040	0.8	14.1
Khorixas	396	6	402	1.5	12.8
Luderitz	506	5	511	1.0	20.9
Mariental	1,341	36	1,377	2.6	12
Nankudu	1,080	17	1,097	1.5	15.9
Nyangana	771	19	790	2.4	12.5
Okahandja	492	5	497	1.0	13.3
Okahao	556	3	559	0.5	20.6
Okakarara	388	-	388	0.0	9
Okongo	715	11	726	1.5	17.5
Omaruru	362	2	364	0.5	12.9
Onandjokwe	3,297	69	3,366	2.0	22.4
Opuwo	1,568	4	1,572	0.3	3.87
Oshakati	4,241	83	4,324	1.9	18.2
Oshikuku	1,734	45	1,779	2.5	18.6
Otjiwarongo	1,171	6	1,177	0.5	14.4
Outapi	2,676	19	2695	0.7	11.4
Outjo	321	8	329	2.4	11.2
Rehoboth	92	5	97	5.2	9.1
Rundu	3,738	101	3,839	2.6	24.1
Swakopmund	1,162	23	1,185	1.9	10.5
Tsandi	589	6	595	1.0	20.2
Tsumeb	1,173	19	1,192	1.6	14.8
Usakos	117	4	121	3.3	21.9
Walvisbay	1,608	8	1,616	0.5	19.6
Windhoek Central Hospital	4,158	75	4,233	1.8	4.1

^*Source: Namibia Institute of Pathology (NIP) , routine, de-identified patient level data from routine testing among pregnant women receiving ANC at health facilities in Namibia. Data is included on women from all facilities-both public and private-in which NIP provides syphilis testing services.*

Table 15 shows the comparison of district syphilis prevalence among pregnant women receiving syphilis testing as part of routine ANC from March – September 2014. Out of 53,797 tests performed, 1.9% tested positive for syphilis. District level syphilis prevalence was lowest in Okakarara (0.1%), Opuwo (0.3%), Okahao (0.5%), Omaruru (0.5%) Otjiwarongo (0.5%) and Walvisbay (0.5%). Syphilis prevalence was highest in Rehoboth (5.2%), Gobabis (4.8%), and Katima Mulilo (3.6%).

Table 16: Syphilis prevalence among women by age group who tested for syphilis

	Number tested	Number negative	Number positive	Syphilis prevalence (%)	HSS 2014 PREVALENCE
Namibia	**53,797**	**52,753**	**1,044**	**1.9**	**16.9**
Age group					
15-19	7,864	7,740	124	1.6	5.8
20-24	14,652	14,346	306	2.1	9.8
24-29	12,286	12,026	260	2.1	17.3
30-34	9,877	9,675	202	2.0	28.0
35-39	6,042	5,946	96	1.6	30.3
40-44	2,426	2,386	40	1.6	30.6
45-49	650	634	16	2.5	26.0

Table 16 shows the syphilis prevalence by age group. Syphilis prevalence was highest among women in 45-49 age group (2.5%) while it is lowest amongst the women 15-19 and 40-44 age groups with a Syphilis prevalence of 1.6% respectively.

Table 17: Syphilis prevalence trends among women age 15-49 years by site and NHSS year

	Syphilis Prevalence by Year (%)		
	2010	2012	2014
Namibia	**1.9**	**1.9**	**1.9**
By site			
Andara	1.8	1.7	3.1
Aranos	6.6	3.2	3.1
Eenhana	0.7	1.2	0.8
Engela	2.0	1.2	3.1
Gobabis	10.0	8.2	4.8
Grootfontein	3.6	2.4	0.9
Karasburg	1.5	0.5	1.8
Katima Mulilo	2.3	2.2	3.6
Katutura State Hospital	2.3	2.0	1.7
Keetmanshoop	1.1	1.8	0.8
Khorixas	0.3	0.9	1.5
Luderitz	2.3	2.5	1.0
Mariental	3.1	1.9	2.6
Nankudu	0.9	0.5	1.5
Nyangana	1.2	2.6	2.4
Okahandja	0.5	2.5	1.0
Okahao	1.8	3.3	0.5
Okakarara	0.7	2.4	0.0
Okongo	1.2	1.7	1.5
Omaruru	1.5	0.0	0.5
Onandjokwe	0.5	1.1	2.0
Opuwo	1.2	0.1	0.3
Oshakati	1.9	2.7	1.9
Oshikuku	2.0	1.6	2.5
Otjiwarongo	0.7	4.2	0.5
Outapi	0.6	0.7	0.7
Outjo	1.7	0.9	2.4
Rehoboth	3.4	6.7	5.2
Rundu	2.3	2.3	2.6
Swakopmund	1.3	2.0	1.9
Tsandi	1.6	0.8	1.0
Tsumeb	3.2	2.0	1.6
Usakos	2.2	2.2	3.3
Walvisbay	0.9	1.7	0.5
Windhoek Central Hospital	0.6	0.9	1.8

Table 17 shows site-level trends in syphilis prevalence among pregnant women receiving syphilis testing as part of routine ANC during the survey periods. The overall syphilis prevalence among pregnant women in Namibia has been stable at 1.9 % since 2010. However, Gobabis recorded highest syphilis prevalence in 2010 and 2012 of 10.0% and 8.2%, respectively. In addition, second highest prevalence of 4.8% was observed in Gobabis, after Rehoboth which recorded a prevalence of 5.2% in 2014. Overall, lower syphilis prevalence was observed in Opuwo, Outapi, Walvis Bay and Eenhana in 2010-2014.

Table 18: Syphilis prevalence among women by Age group and NHSS Year

	Syphilis Prevalence by Year (%)		
	2010	2012	2014
Namibia	**1.9**	**1.9**	**1.9**
Age group			
15-19	1.8	1.6	1.6
20-24	2.0	1.9	2.1
24-29	2.1	2.1	2.1
30-34	2.2	2.1	2.0
35-39	2.1	1.6	1.6
40-44	1.2	2.4	1.6
45-49	1.6	1.9	2.5

Table 18 shows trends in syphilis prevalence by age group and year since 2010. An increasing trend of syphilis prevalence was observed among women in 45-49 year's age group which remained the highest prevalence of 2.5% in 2014. Stable syphilis prevalence was observed among women age 20-34 years across the three NHSS year period. Among women of age 15-19 years, syphilis prevalence had been also stable with a low syphilis prevalence of 1.6% observed in recent survey years.

6. LIMITATIONS

The following limitations apply to the 2014 NHSS:

The results of this survey are not necessarily representative of the general population of Namibia because of the following reasons:

- Specimens were only collected from women so the results are not intended to be representative of men.
- Only specimens from pregnant women age 15-49 who were pregnant during the period of the survey were included in the survey. Therefore, women younger than 15 years or older than 49 years were not included in this survey.
- Only specimens from pregnant women receiving ANC at public facilities are included in the HSS. All women receiving ANC at private facilities are not included in the sample. Consequently, the results of this survey may overestimate or underestimate the true HIV prevalence among all pregnant women in Namibia.

A few sites did not reach their targeted sample size as required, which reduces the precision of the prevalence estimate within those sites. However, most sites successfully achieved their target sample size. There were some haemolysed blood samples for specific sites detected at the Central Laboratory which could not be used and this led to the extension of the data collection period.
The NHSS is designed to give information on HIV prevalence, not HIV incidence. Although measuring HIV prevalence in the 15-24 year age group can be used as a proxy for incidence, it is not possible to make definitive conclusions about the trend in new infections over time.

Because the survey uses routinely collected ANC program data, behavioral data cannot be included in the interpretations of the NHSS. Lack of behavioral data which could be linked to biological data prevents assessment of behavioral factors that may be associated with HIV infection.

In a few sites health workers trained to conduct the survey were rotated to other departments and other untrained staffs were then left to continue with the survey, which led to some errors in the data collection. However, nearly all of these data quality issues were identified and corrected through regular data quality assessments and supervisory support visits.

7. DISCUSSION

Trends in HIV prevalence among pregnant women receiving antenatal care in Namibia

The results of the 2014 NHSS demonstrate that HIV remains a major public health challenge affecting younger and older women across Namibia. Therefore, sustained investment in high quality prevention, care and treatment interventions should remain a priority for the GRN and its partners for the foreseeable future.

Results from the 2014 NHSS suggest that Namibia's epidemic remains in a period of stabilization with slow yet sustained decreases in HIV prevalence among pregnant women since 2004 after the peak prevalence of 22% in 2002. A decrease over time in observed HIV prevalence that is estimated from sentinel sero-surveillance may reflect a decrease in new infections relative to mortality among HIV-infected persons. Conversely, it may reflect an increase in mortality relative to new infections. Our interpretation of the results of the 2014 and complementary program and research data is that reductions in new infections – especially among younger women - are outpacing AIDS-related deaths – especially among older women. This interpretation is based on the following evidence:

From 2002-2014, the observed HIV prevalence among women in the 15-19 and 20-24 year old age groups decreased from 11.0% to 5.8% and 22.0% to 9.8%, respectively. Although HIV prevalence is not a measure of new infections, HIV prevalence among younger women (age <25 years) is often at times used as a proxy measure of new infections. This is because younger pregnant women are more likely to have recently become sexually active and thus are likely to have a higher proportion of new infections than older women. In this context, the substantial decrease in HIV prevalence that has been observed among younger women in Namibia suggests that new infections in this age group are decreasing. This hypothesis is supported by Namibia's most recent SPECTRUM model-based estimates and projections report, which shows declines in new infections among females 15-24 age from 4,318 in 2002 to 2,454 in 2013, and also by a more statistically robust estimate of trend in HIV prevalence among pregnant women from NHSS from 2002 to 2012 in Namibia using Bayesian hierarchical logistic models which showed near certain declines in prevalence among younger women[7,8]. Additionally, HIV prevalence among women age 25-29 years also decreased from 28.0% to 17.3% from 2002-2014. This may represent a cohort effect, by which women become older between sampling periods and move from one age group to another. Therefore, new infections prevented among women age 15-24 during early rounds of NHSS may contribute to lower prevalence among women age 25-29 years during later rounds.

Also from 2002-2014, the observed HIV prevalence remained approximately unchanged among women age 30-34 years and increased among women age 35-39, 40-44, and 45-49 years. These trends are likely a result of decreased mortality among HIV infected women due the successful expansion of Namibia's ART program. Namibia's scale-up of ART has been among the most robust in the world. Namibia achieved 87% coverage of ART among eligible persons by the end of 2011 and estimates of 12-48-month-retention of patients on ART are higher than pooled estimates from other countries in the region.[9]. The total number of people receiving ART in Namibia increased from less than 100 in 2003 to 119,000 in 2014, approximately 60% of whom are women. By 2014, 81% of people in need of ART (at a CD4-based eligibility threshold of 500 cells/uL) were receiving it. According to SPECTRUM estimates, AIDS-related deaths among adults decreased from 10,392 in 2002 to 5,657 in 2013. Because HIV infected women on ART live longer they also have the opportunity to give more births, be included in the NHSS, and contribute data to HIV prevalence estimates. This assumption is substantiated by the fact that close to fifty percent (49%) of all women who tested positive during the 2014 NHSS were already on ART before the current pregnancy. This estimate represents a slight increase from that

reported in 2012 (41%). Also worth noting is that the percentage of HIV infected women already on ART increases with each advancing age group **(Figure 13).** Younger women who were newly identified as HIV positive in earlier years were likely initiated on ART during subsequent years. These HIV-positive women would have grown older and transitioned from the younger to older age groups in subsequent years of NHSS. This transition would likely have caused increases in both HIV prevalence *and* ART coverage in the older groups in later years of NHSS **(see Figure 13).**

Nevertheless, it is imperative to note that the sustained high overall prevalence and the apparent increase in prevalence among the older age groups cannot be explained by expanded coverage of the national ART program alone. Increasing HIV prevalence in the older age groups may be attributed to the continuing occurrence of new infections in all age groups, albeit at a slower rate relative to earlier year of the epidemic.

Finally, HIV prevalence among women age 30-34 and 35-39 years decreased slightly from 30.8% to 28.0% and 33.9% and 30.3%, respectively, between 2012 and 2014. A decrease in new infections among women in these age group, or among younger age groups during earlier years, may have contributed to this decrease. However, it is imperative to consider the possibility that increasing mortality among older HIV infected women may also have contributed to the slight decline in HIV prevalence between 2012 and 2014.

Geographic differences in HIV prevalence

Consistent with the results of previous NHSS, results from the 2014 NHSS highlight that the burden of HIV disease in Namibia varies substantially by geographic areas. Among the 35 health districts, HIV prevalence ranged from 36.0%, 24.1% and 22.8% in Katima Mulilo, Rundu, and Engela, respectively, to 9.1%, 4.1% and 3.9% in Okakarara, Windhoek Central and Opuwo, respectively. Recent age-specific trends in HIV prevalence also varied by health district. Statistically significant or borderline significant decreases in HIV prevalence since 2010 were observed among younger women in Okahandja, Omaruru, and Rundu while significant or borderline increases in HIV prevalence were observed among younger women in Luderitz, Oshikuku and Usakos. Significant or borderline decreases in HIV prevalence among older women were observed in Grootfontein, Katutura, Nyangana, Onandjokwe, Oshakati and Windhoek Central.

Possible factors contributing to epidemic stabilization

Namibia's prevention, care and treatment response has been among the most vigorous in the world**.** Results from the NHSS 2014 could be indicating that this comprehensive response is yielding desirable results in terms of epidemic stabilization. Namibia's ART program has been rapidly scaled up since 2002 and has achieved near universal coverage. Comprehensive PMTCT services are available in all districts and the eradication of infant HIV infection appears achievable. Testing of blood collected for transfusion has been in place for decades. HIV testing and counseling (HTC) opportunities have expanded, including integrated in primary health centres and clinics, dedicated fixed sites, mobile outreach and in home-based settings in several high-burden regions. Information and educational efforts focusing on the interruption of partner concurrency, reducing risk taking associated with alcohol use, and treatment of sexually transmitted infections (STI) are disseminated through peers, mass media, and targeted venues such as schools, workplaces, and alcohol consumption outlets. Condoms have been made more widely available, commercially and through free distribution through government, NGO, and peer outreach. Voluntary medical male circumcision (VMMC) has been set as one of the national HIV prevention strategy with a target of achieving 80% prevalence of MC among Namibian men by 2016/17. The updated 2014 national ART guidelines with earlier initiation reflect the emerging science synthesized within the revised 2013 WHO ART guidelines. Accordingly, dramatic expansion of a "test and treat"

approach whereby all HIV-positive persons at diagnosis are eligible for ART now includes pregnant and breastfeeding women (Option B+), individuals in sero-discordant partnerships; children <15 years old; those co-infected with hepatitis B; and TB co-infected patients. For individuals not in one of these categories, the eligibility criterion has been advanced to earlier initiation (i.e., CD4 ≤500). The potential impact of treatment as prevention (TasP) on HIV incidence and mortality has been demonstrated in Namibia via results of SPECTRUM modeling. Therefore, increased coverage of ART has great potential to further reduce HIV incidence throughout the country.

Use of other data sources for routine HIV sentinel surveillance among pregnant women receiving antenatal care

The NHSS 2012 and 2014 included an assessment of the utility of PMTCT program data for routine NHSS among pregnant women receiving antenatal care. This activity highlighted the potential strengths and challenges for a PMTCT-based NHSS in Namibia. In both 2012 and 2014, high levels of agreement between NHSS and PMTCT HIV test results, minimum selection bias, excellent HCT availability and uptake through the PMTCT program at NHSS sites, and high data quality indicate that Namibia is approaching readiness to transition to a PMTCT-program-data-based system of HIV surveillance. Although national level NHSS and PMTCT-program-data prevalence estimates are virtually identical, levels of percent agreement are slightly below what is set as a general standard by WHO/UNAIDS for the use of PMTCT program data alone for NHSS, trend-analysis, and estimates, which all require accurate sub-national inputs. However, results agreement has improved since 2012. Potential site-level sources of results disagreement, including quality of PMTCT rapid testing and data and proper recording of Known Positive pregnant women, must be identified and corrected. Compliance with existing Rapid Test-Quality Assurance standards needs to be strengthened. Implementing and standardizing the proper measures to address and rectify site-level sources of discrepancies in results would adequately prepare Namibia to phase out the current practice of conducting Unlinked Anonymous Testing (UAT)-based NHSS in order to transition to utilizing routinely collected PMTCT program data for HIV surveillance purposes. In addition, Namibia has started to produce population based HIV prevalence through the DHS+ which can be used to increase in understanding of the HIV epidemic in the general population.

8. CONCLUSIONS

8.1 HIV continues to be a public health concern throughout Namibia, affecting both younger and older women of child bearing age in all geographical areas of the country. Results from the 2014 NHSS suggest that Namibia's epidemic remains in a period of stabilization with slow yet sustained decreases in HIV prevalence among pregnant women since 2004.

8.2 In 2014 the HIV disease burden varies by geographic area and across sentinel surveillance sites, with highest HIV prevalence observed ranging above 20% to 36% in north central and eastern sites.

8.3 Among women of all ages (15-49 years) a decline in HIV prevalence from 2012 to 2014 was observed at 23 (66%) out of 35 sites and an increase was observed at 12 (34%) out of 35 sites. However, that these declines were statistically significant only in a limited number of sites indicates a recent trend of continued epidemic stabilization.

8.4 The highest age-specific prevalence was observed among women age 40-44 years (30.6%) and women age 35-39 years (30.3%) representing a continuing shift in peak HIV prevalence from younger to older age groups. This shift can be expected in a mature and stabilized generalized HIV epidemic.

8.5 The overall HIV prevalence among women age 15-24 years was 8.3%, which shows that it is possible for Namibia achieve the NSF target of 5% prevalence among pregnant women age 15-24 years by 2015/16. The prevalence among women age 15-19 has nearly leveled at 5.8%, so additional is needed to prevent HIV infections in this highly vulnerable young population. There is a continued decrease in prevalence among women age 20-24 from 10.9% in 2012 to 9.8% in 2014.

8.6 Overall, 49.1% of all women who tested HIV positive during the 2014 HSS were already on ART before the survey compared 41.4% in 2012. This indicates a notable success of the ART and PMTCT programs. The sustained high prevalence rate overall and in many sites implies that the continued expansion and integration of ART services will remain an important component of the HIV/AIDS response in the coming years.

8.7 Overall in Namibia, there were no apparent differences in the observed HIV prevalence between pregnant women residing in urban areas and pregnant women residing in rural areas.

9. RECOMMENDATIONS

According to the results of the 2014 NHSS, the following activities are recommended:

9.1 There is a need to strengthen *targeted*, age-specific prevention interventions to reduce new infections among women of all age groups.

9.2 Compare NHSS data with the DHS+ and further triangulate with other data sources to further validate results with available country data.

9.3 Explore conducting complementary HIV surveillance studies that include the collection of behavioural and linked biological data, which can be used to assess risk behaviours of HIV positive women and to assess different factors that may be associated with increased risk for HIV infection.

9.4 Conduct a robust evaluation of PMTCT program data, PMTCT HIV testing quality, and related reporting systems to assess the readiness of PMTCT program data to replace or complement the biennial ANC based HIV sentinel surveillance method currently used in Namibia.

9.5 Conduct additional research and surveillance activities that will help to determine the effect of new infections and mortality on overall HIV prevalence estimate and changes of prevalence over time including routine ART outcome program analysis, AIDS Indicator Survey, defaulter tracing, sentinel incidence surveillance i.e testing of DHS specimen for incidence.

10. APPENDICES

APPENDIX 1: Checklist for 2014 Survey Training

- ☐ History and Context of Sentinel Surveillance
- ☐ Objectives of the 2014 Survey
- ☐ Methods
  - ☐ Site selection
  - ☐ Population samples
  - ☐ Inclusion criteria
  - ☐ Exclusion criteria
  - ☐ Sample size
  - ☐ Sampling period
  - ☐ Over-sampling
- ☐ Blood specimen and data collection
  - ☐ Socio-demographic data collection (Individual Survey Form)
  - ☐ Specimen collection and processing
- ☐ Namibia Institute of Pathology (NIP) laboratory procedures
  - ☐ Specimen surveillance bar code
  - ☐ Testing procedure
  - ☐ Recording and transmission of results
  - ☐ De-linking syphilis
  - ☐ Syphilis testing
- ☐ Quality Assurance
  - ☐ National level
  - ☐ Field
  - ☐ Laboratory
- ☐ Data Management and Analysis
- ☐ Ethical Considerations
- ☐ Dissemination of Results

APPENDIX 2: Sites participating in National HIV Sentinel Survey by Year, Namibia 2002-2014

Region	Sentinel Site Name	Year of Participation						
		2002	2004	2006	2008	2010	2012	2014
CAPRIVI	1. Katima Mulilo	●	●	●	●	●	●	●
ERONGO	2. Swakopmund	●	●	●	●	●	●	●
	3. Walvisbay	●	●	●	●	●	●	●
	4. Omaruru			●	●	●	●	●
	5. Usakos			●	●	●	●	●
HARDAP	6. Mariental	●	●	●	●	●	●	●
	7. Rehoboth	●	●	●	●	●	●	●
	8. Aranos				●	●	●	●
KARAS	9. Luderitz		●	●	●	●	●	●
	10. Karasburg			●	●	●	●	●
	11. Keetmanshoop	●	●	●	●	●	●	●
KAVANGO	12. Rundu	●	●	●	●	●	●	●
	13. Andara	●	●	●	●	●	●	●
	14. Nyangana	●	●	●	●	●	●	●
	15. Nankudu	●	●	●	●	●	●	●
KHOMAS	16. Katutura	●	●	●	●	●	●	●
	17. Windhoek Central		●	●	●	●	●	●
KUNENE	18. Opuwo Clinic	●	●	●	●	●	●	●
	19. Outjo		●	●	●	●	●	●
	20. Khorixas				●	●	●	●
OHANGWENA	21. Engela	●	●	●	●	●	●	●
	22. Eenhana			●	●	●	●	●
	23. Okongo				●	●	●	●
OMAHEKE	24. Gobabis	●	●	●	●	●	●	●
OMUSATI	25. Tsandi Clinic				●	●	●	●
	26. Outapi	●	●	●	●	●	●	●
	27. Okahao			●	●	●	●	●
	28. Oshikuku	●	●	●	●	●	●	●
OSHANA	29. Oshakati	●	●	●	●	●	●	●
OSHIKOTO	30. Onandjokwe	●	●	●	●	●	●	●
	31. Tsumeb	●	●	●	●	●	●	●
OTJOZUNDJUPA	32. Otjiwarongo	●	●	●	●	●	●	●
	33. Grootfontein	●	●	●	●	●	●	●
	34. Okahandja			●	●	●	●	●
	35. Okakarara				●	●	●	●

APPENDIX 3: Individual Survey Form, 2014 NHSS

Ministry of Health and Social Services

2014 HIV ANC Sentinel Surveillance Surve

Individual Survey Form

Form Serial # 0 0 0 1

AFFIX BAR CODE STICKER HERE

1 Date of interview D D / M M / Y Y Y Y

2 District abbreviation

3 Site Number

4 Type of facility
1=Hospital 2=Health Centre 3=Clinic

Extract information below directly from the Ante Natal Care Passport and the ANC Register

5 Patient age (in years)

6 Place of current residence (town name/farm/village and not locations)

7 Gravidity

8 Patient already on HAART before this ANC visit?
, 2 = No

9 Was patient tested for HIV?
1 = Yes, 2 = No

10 HIV test Result
1=Positive, 2 =Negative 3 =Undetermined,
4 = Known Positive, 5 =Results not available

11 Nurse's Surname and Initial

PLEASE NOTE!!! Double check to ensure that all questions are fully completed and then SIGN HERE inside the box !!

--------->

[1] If using ANC/PMTCT Register revised Nov 2011, this refers to code 4 = Already on HAART and if using version May 2010 of the ANC/PMTCT Region, it refers to code 5 = Already on HAART.

APPENDIX 4: Laboratory Shipping/Results Form, 2014 NHSS

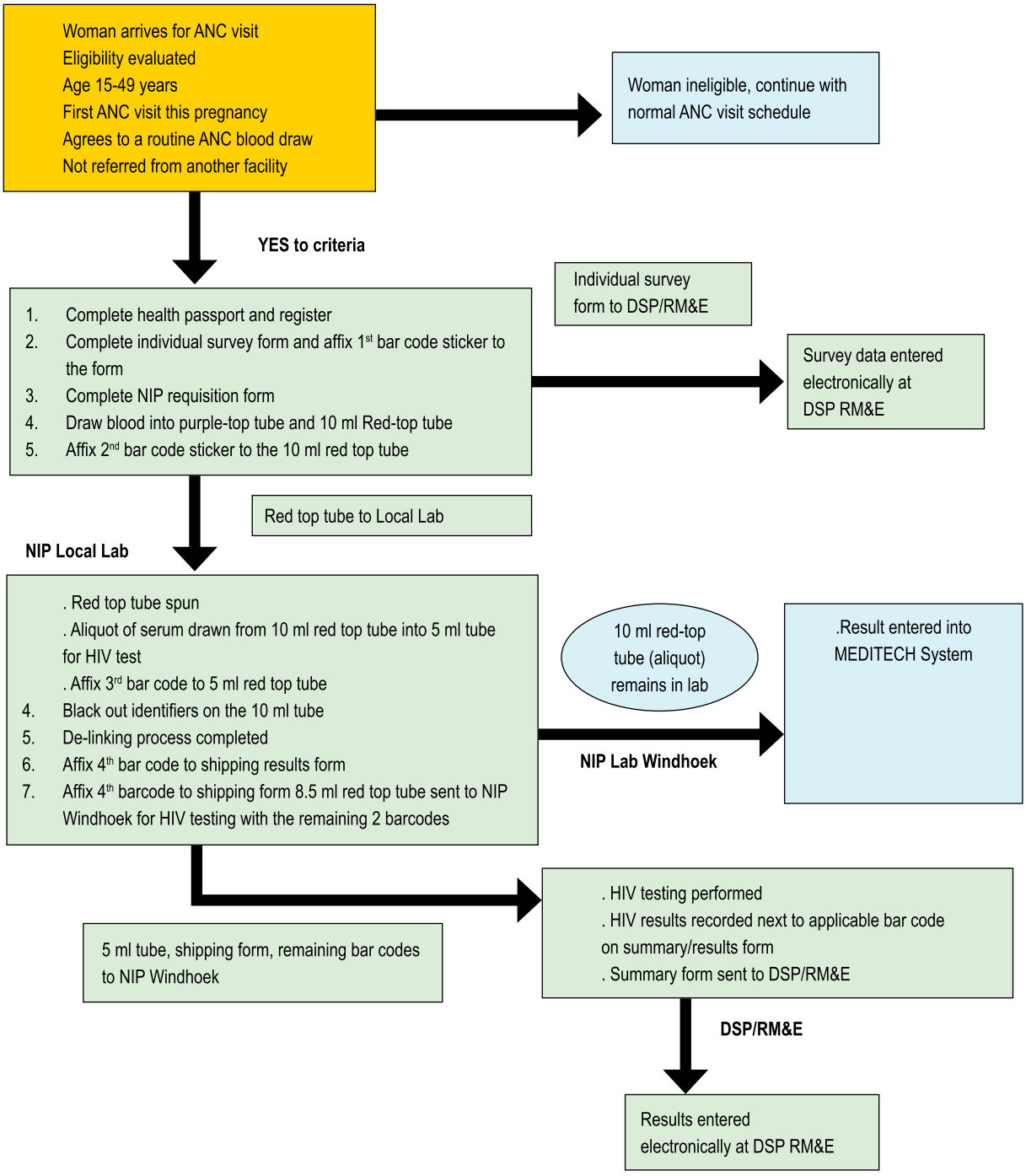
District Lab Name: _____
Date sent to NIP National Lab: _____

* Please indicate reason why tube was not received: tube broken, specimen leaked, etc.

#	Barcode Sticker	Condition of specimen received at district NIP	Date specimen received at national NIP	1st HIV test result		2nd HIV test result *(if 1st positive)*		Final HIV result
				Results	OD	Results	OD	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Instructions for recording the HIV Test Results: *record the qualitative result (i.e. negative or positive) in the left results half of the box and record the quantitative (i.e. ELISA optical density value) in the right half of the box.*

APPENDIX 5: Clinic and Laboratory Flow Chart, 2014 NHSS



APPENDIX 6: Quality Assurance Form, 2014 NHSS

CHECKLIST FOR QUALITY ASSURANCE OF SURVEILLANCE OPERATIONS

Supervisory staff: Use the following checklist as you monitor the quality of operational activities conducted at the sentinel site during supervisory visits.

Site name: _____ Site Code:

SAMPLING

1. Audit records starting from the time ANC surveillance began until the supervisory visit:

Total no. of women visiting ANC for their 1st ANC since surveillance began: _____

Total no. of women sampled since surveillance began: _____

No. blood samples sent since surveillance began: _____

Comments: *(If numbers do not correspond, give reasons* _____

_____

_____

_____

_____

2. Audit records from the last day that ANC services took place in your facility:

No. of women sampled on this day: _____

Were all eligible clients recruited on this day? Yes [ ] No [ ]

Sampling consecutive? Yes [ ] No [ ]

Comments: *(Give reasons if not all eligible clients were sampled consecutively)*

_____

_____

_____

_____

3. List any problems your Site is experiencing with the sentinel survey (for example, inadequate stock of forms, other supplies etc)

(At the Lab, list problems in terms of survey materials and supplies. Remind them to always return the cooler boxes back to the sites).

_____

_____

_____

_____

Site staff (print name): _____ (signature): _____

Support visit team leader (print name): _____ (signature): _____

Date of support visit: _____

APPENDIX 7: Weekly Progress Report Form, 2014 NHSS

WEEKLY PROGRESS REPORT FORM, NHSS 2014

To be sent weekly by the local survey team to the Directorate Special Programmes (DSP)

Fax to the attention of: Ms. Anna Jonas/Mr. M. Siboleka
Fax: (061) 224155

Anna Jonas Tel: 061-203-2826	Tuli Nakanyala Tel: 061-203 2438
Sentinel site:	**Date:**
ANC samples collected this week:	
ANC samples collected to date:	
NHSS trained staff resigned/rotated: **Problems/Challenges encountered:** **Form completed by:** _____ **Designation:** _____ **Signature:** _____ **Telephone/Cell number:** _____	

APPENDIX 8: 2014 Sentinel Surveillance Satellite Sites, 2014 NHSS

S/N	Region	Site Name	Year	Code	Site no	Barcode From	Barcode To
1	ZAMBEZI	KATIMA MULILO			S/N		
		KATIMA MULILO CLINIC	14	KMU	1	14 KMU 1 001	14 KMU 1 111
		MAVULUMA CLINIC	14	KMU	2	14 KMU 2 001	14 KMU 2 086
		NGWEZE CLINIC	14	KMU	3	14 KMU 3 001	14 KMU 3 093
		BUKALO HEALTH CENTRE	14	KMU	4	14 KMU 4 001	14 KMU 4 037
		SIBINDA HEALTH CENTRE	14	KMU	5	14 KMU 5 001	14 KMU 5 034
		SANGWALI HC	14	KMU	6	14 KMU 6 001	14 KMU 6 019
	Estimated sample						380
2	ERONGO	SWAKOPMUND					
		TAMARISKIA CLINIC	14	SWA	1	14 SWA 1 001	14 SWA 1 175
		HENTIES BAY HC	14	SWA	2	14 SWA 2 001	14 SWA 2 019
		ARANDIS CLINIC	14	SWA	3	14 SWA 3 001	14 SWA 3 017
	Estimated sample						211
3		WALVIS BAY					
		KUISEBMUND HC	14	WAL	1	14 WAL 1 001	14 WAL 1 073
		COASTAL CLINIC	14	WAL	2	14 WAL 2 001	14 WAL 2 070
		NARRAVILLE CLINIC	14	WAL	3	14 WAL 3 001	14 WAL 3 033
		WALVIS BAY CLINIC	14	WAL	4	14 WAL 4 001	14 WAL 4 043
	Estimated sample						219
4		OMARURU					
		OMARURU CLINIC	14	OMA	1	14 OMA 1 001	14 OMA 1 095
		OMATJETE CLINIC	14	OMA	2	14 OMA 2 001	14 OMA 2 034
		UIS CLINIC	14	OMA	3	14 OMA 3 001	14 OMA 3 032
		OKOMBAHE CLINIC	14	OMA	4	14 OMA 4 001	14 OMA 4 019
	Estimated sample						180
5		USAKOS					
		HAKHASEB CLINIC	14	USA	1	14 USA 1 001	14 USA 1 050
		DR. SAM NUYOMA HC	14	USA	2	14 USA 2 001	14 USA 2 070
		OTJIMBINGWE CLINIC	14	USA	3	14 USA 3 001	14 USA 3 035
		SPITZKOPPE CLINIC	14	USA	4	14 USA 4 001	14 USA 4 015
		TUBUSIS CLINIC	14	USA	5	14 USA 5 001	14 USA 5 015
	Estimated sample						185
6	HARDAP	MARIENTAL					
		MARIENTAL CLINIC	14	MAR	1	14 MAR 1 001	14 MAR 1 122
		GIBEON CLINIC	14	MAR	2	14 MAR 2 001	14 MAR 2 024
		MALTAHOHE HC	14	MAR	3	14 MAR 3 001	14 MAR 3 024
		KALKRAND CLINIC	14	MAR	4	14 MAR 4 001	14 MAR 4 010
		STAMPRIET CLINIC	14	MAR	5	14 MAR 5 001	14 MAR 5 018

	Estimated sample						**198**
7		**REHOBOTH**					
		REHOBOTH HC	14	**REH**	1	**14 REH 1 001**	**14 REH 1 133**
		KLEIN AUB CLINIC	14	**REH**	2	**14 REH 2 001**	**14 REH 2 008**
		RIET OOG CLINIC	14	**REH**	3	**14 REH 3 001**	**14 REH 3 007**
		SCHLIP CLINIC	14	**REH**	4	**14 REH 4 001**	**14 REH 4 009**
	Estimated sample						**157**
8		**ARANOS**					
		ARANOS CLINIC	14	**ARA**	1	**14 ARA 1 001**	**14 ARA 1 127**
		GOCHAS CLINIC	14	**ARA**	2	**14 ARA 2 001**	**14 ARA 2 046**
	Estimated sample						**173**
9	**//KARAS**	**LUDERITZ**					
		LUDERITZ CLINIC	14	**LUD**	1	**14 LUD 1 001**	**14 LUD 1 174**
		AUS CLINIC	14	**LUD**	2	**14 LUD 2 001**	**14 LUD 2 010**
		ROSH PINAH CLINIC	14	**LUD**	3	**14 LUD 3 001**	**14 LUD 3 070**
		ORANJEMUND CLINIC	14	**LUD**	4	**14 LUD 4 001**	**14 LUD 4 030**
	Estimated sample						**284**
10		**KARASBURG**					
		KARASBURG CLINIC	14	**KAR**	1	**14 KAR 1 001**	**14 KAR 1 100**
		ARIAMSVLEI CLINIC	14	**KAR**	2	**14 KAR 2 001**	**14 KAR 2 020**
		NOORDOEWER CLINIC	14	**KAR**	3	**14 KAR 3 001**	**14 KAR 3 090**
		WARMBAD CLINIC	14	**KAR**	4	**14 KAR 4 001**	**14 KAR 4 005**
	Estimated sample						**215**
11		**KEETMANSHOOP**					
		KEETMANSHOOP CLINIC	14	**KEE**	1	**14 KEE 1 001**	**14 KEE 1 070**
		DAAN VILJOEN CLINIC	14	**KEE**	2	**14 KEE2 001**	**14 KEE 2 058**
		BETHANIE HC	14	**KEE**	3	**14 KEE 3 001**	**14 KEE 3 010**
		TSES CLINIC	14	**KEE**	4	**14 KEE 4 001**	**14 KEE 4 005**
		AROAB HC	14	**KEE**	5	**14 KEE 5 001**	**14 KEE 5 010**
		KOES CLINIC	14	**KEE**	6	**14 KEE 6 001**	**14 KEE 6 008**
		BERSEBA CLINIC	14	**KEE**	7	**14 KEE 7 001**	**14 KEE 7 005**
	Estimated sample						**166**
12	**KAVANGO (EAST & WEST)**	**RUNDU**					
		NKARAPAMWE CLINIC	14	**RUN**	1	**14 RUN 1 001**	**14 RUN 1 096**
		NDAMA CLINIC	14	**RUN**	2	**14 RUN 2 001**	**14 RUN 2 082**
		SAUYEMWA CLINIC	14	**RUN**	3	**14 RUN 3 001**	**14 RUN 3 090**
		SHAMBYU HC	14	**RUN**	4	**14 RUN 4 001**	**14 RUN 4 036**
	Estimated sample						**304**
13		**ANDARA**					
		ANDARA HOSPITAL	14	**AND**	1	**14 AND 1 001**	**14 AND 1 040**
		DIVUNDU CLINIC	14	**AND**	2	**14 AND 2 001**	**14 AND 2 042**
		OLD BAGANI CLINIC	14	**AND**	3	**14 AND 3 001**	**14 AND 3 035**

		OMEGA CLINIC	14	AND	4	14 AND 4 001	14 AND 4 026
		SHADIKONGORO CLINIC	14	AND	5	14 AND 5 001	14 AND 5 032
		BIRO CLINIC	14	AND	6	14 AND 6 001	14 AND 6 033
		MAYARA CLINIC	14	AND	7	14 AND 7 001	14 AND 7 027
		MUTJIKU CLINIC	14	AND	8	14 AND 8 001	14 AND 8 022
	Estimated sample						257
14		NYANGANA					
		NYANGANA HOSPITAL	14	NYA	1	14 NYA 1 001	14 NYA 1 099
		KATERE CLINIC	14	NYA	2	14 NYA 2 001	14 NYA 2 028
		MABUSHE CLINIC	14	NYA	3	14 NYA 3 001	14 NYA 3 036
		MBAMBI EAST CLINIC	14	NYA	4	14 NYA 4 001	14 NYA 4 032
		KANDJARA CLINIC	14	NYA	5	14 NYA 5 001	14 NYA 5 010
		KARUKUTA CLINIC	14	NYA	6	14 NYA 6 001	14 NYA 6 020
		NDONGA CLINIC	14	NYA	7	14 NYA 7 001	14 NYA 7 040
		SHINYUNGWE CLINIC	14	NYA	8	14 NYA 8 001	14 NYA 8 019
	Estimated sample						284
15		NANKUDU					
		NANKUDU CLINIC	14	NAN	1	14 NAN 1 001	14 NAN 1 024
		MPUNGU HC	14	NAN	2	14 NAN 2 001	14 NAN 2 022
		NKURENKURU HC	14	NAN	3	14 NAN 3 001	14 NAN 3 055
		RUPARA HC	14	NAN	4	14 NAN 4 001	14 NAN 4 027
		TONDORO HC	14	NAN	5	14 NAN 5 001	14 NAN 5 024
		MBAMBI WEST CLINIC	14	NAN	6	14 NAN 6 001	14 NAN 6 016
		NZINZE CLINIC	14	NAN	7	14 NAN 7 001	14 NAN 7 011
		SIKAROSOMPO CLINIC	14	NAN	8	14 NAN 8 001	14 NAN 8 008
		YINSU CLINIC	14	NAN	9	14 NAN 9 001	14 NAN 9 008
	Estimated sample						195
16	KHOMAS	KSH					
		KATUTURA STATE HOSP	14	KAT	1	14 KAT 1 001	14 KAT 1 105
		KHC	14	KAT	2	14 KAT 2 001	14 KAT 2 045
		KHOMASDAL HC	14	KAT	3	14 KAT 3 001	14 KAT 3 014
		OKURYANGAVA CLINIC	14	KAT	4	14 KAT 4 001	14 KAT 4 045
	Estimated sample						209
17		WCH					
		WINDHOEK CENTRAL HOSP	14	WCH	1	14 WCH 1 001	14 WCH 1 153
	Estimated sample						153
18	KUNENE	OPUWO					
		OPUWO CLINIC	14	OPU	1	14 OPU 1 001	14 OPU 1 151
		ORUMANA CLINC	14	OPU	2	14 OPU 2 001	14 OPU 2 005
	Estimated sample						156
19		OUTJO					
		OUTJO CLINIC	14	OTO	1	14 OTO 1 001	14 OTO 1 144
		KAMANJAB HC	14	OTO	2	14 OTO 2 001	14 OTO 2 048

	Estimated sample						**192**
20		**KHORIXAS**					
		KHORIXAS CLINIC	14	**KHO**	1	**14 KHO 1 001**	**14 KHO 1 161**
		FRANSFONTEIN CLINIC	14	**KHO**	2	**14 KHO 2 001**	**14 KHO 2 013**
		ANKER CLINIC	14	**KHO**	3	**14 KHO 3 001**	**14 KHO 3 014**
	Estimated sample						**188**
21	**OHANGWENA**	**ENGELA**					
		ENGELA CLINIC	14	**ENG**	1	**14 ENG 1 001**	**14 ENG 1 171**
		ODIBO HEALTH CENTRE	14	**ENG**	2	**14 ENG 2 001**	**14 ENG 2 088**
	Estimated sample						**259**
22		**EENHANA**					
		EENHANA CLINIC	14	**EEN**	1	**14 EEN 1 001**	**14 EEN 1 092**
		EPEMBE CLINIC	14	**EEN**	2	**14 EEN 2 001**	**14 EEN 2 012**
		EPINGA CLINIC	14	**EEN**	3	**14 EEN 3 001**	**14 EEN 3 023**
		OMUNDAUNGILO CLINIC	14	**EEN**	4	**14 EEN 4 001**	**14 EEN 4 018**
		ONAMBUTU CLINIC	14	**EEN**	5	**14 EEN 5 001**	**14 EEN 5 011**
		ONGULAYANETANGA CLINIC	14	**EEN**	6	**14 EEN 6 001**	**14 EEN 6 010**
		OSHANDI CLINIC	14	**EEN**	7	**14 EEN 7 001**	**14 EEN 7 020**
		OSHIKUNDE CLINIC	14	**EEN**	8	**14 EEN 8 001**	**14 EEN 8 031**
	Estimated sample						**217**
23		**OKONGO**					
		OKONGO CLINIC	14	**OKO**	1	**14 OKO 1 001**	**14 OKO 1 209**
		EKOKA CLINIC	14	**OKO**	2	**14 OKO 2 001**	**14 OKO 2 030**
		OMBOLOKA CLINIC	14	**OKO**	3	**14 OKO 3 001**	**14 OKO 3 034**
	Estimated sample						**273**
24	**OMAHEKE**	**GOBABIS**					
		EPAKO CLINIC	14	**GOB**	1	**14 GOB 1 001**	**14 GOB 1 113**
		OTJINENE HC	14	**GOB**	2	**14 GOB 2 001**	**14 GOB 2 025**
		AMINUIS CLINIC	14	**GOB**	3	**14 GOB 3 001**	**14 GOB 3 010**
		WITVLEI CLINIC	14	**GOB**	4	**14 GOB 4 001**	**14 GOB 4 010**
	Estimated sample						**158**
25	**OMUSATI**	**OUTAPI**					
		OUTAPI CLINIC	14	**OUT**	1	**14 OUT 1 001**	**14 OUT 1 254**
	Estimated sample						**254**
26		**OKAHAO**					
		OKAHAO CLINIC	14	**OKA**	1	**14 OKA 1 001**	**14 OKA 1 145**
		INDIRA GANDHI HC	14	**OKA**	2	**14 OKA 2 001**	**14 OKA 2 056**
		ETILYASA CLINIC	14	**OKA**	3	**14 OKA 3 001**	**14 OKA 3 029**
	Estimated sample						**230**
27		**OSHIKUKU**					
		OSHIKUKU HOSPITAL	14	**OSH**	1	**14 OSH 1 001**	**14 OSH 1 118**

		OKALONGO HC	14	OSH	2	14 OSH 2 001	14 OSH 2 147
		ONHELEIWA CLINIC	14	OSH	3	14 OSH 3 001	14 OSH 3 041
	Estimated sample						306
28		TSANDI					
		TSANDI CLINIC	14	TSA	1	14 TSA 1 001	14 TSA 1 142
		ONESI HEALTH CENTRE	14	TSA	2	14 TSA 2 001	14 TSA 2 085
		IILYATEKO CLINIC	14	TSA	3	14 TSA 3 001	14 TSA 3 025
		OKATSEYIDHI CLINIC	14	TSA	4	14 TSA 4 001	14 TSA 4 005
		ONGULUMBASHE CLINC	14	TSA	5	14 TSA 5 001	14 TSA 5 021
	Estimated sample						278
29	OSHANA	OSHAKATI					
		OSHAKATI HC	14	IHO	1	14 IHO 1 001	14 IHO 1 286
	Estimated sample						286
30	OSHIKOTO	ONANDJOKWE					
		ONANDJOKWE HOSPITAL	14	ONA	1	14 ONA 1 001	14 ONA 1 313
	Estimated sample						313
31		TSUMEB					
		LOMBARD CLINIC	14	TSU	1	14 TSU 1 001	14 TSU 1 159
		TSUMEB CLINIC	14	TSU	2	14 TSU 2 001	14 TSU 2 045
		OSHIVELO CLINIC	14	TSU	3	14 TSU 3 001	14 TSU 3 054
	Estimated sample						258
32	OTJOZUNDJUPA	OTJIWARONGO					
		ORWETOVENI CLINIC	14	OTJ	1	14 OTJ 1 001	14 OTJ 1 236
	Estimated sample						236
33		GROOTFONTEIN					
		POLY CLINIC	14	GRO	1	14 GRO 1 001	14 GRO 1 225
	Estimated sample						225
34		OKAHANDJA					
		NAU - AIB CLINIC	14	OKH	1	14 OKH 1 001	14 OKH 1 259
	Estimated sample						259
35		OKAKARARA					
		OKAKARARA CLINIC	14	OKK	1	14 OKK 1 001	14 OKK 1 126
		OKONDJATU CLINIC	14	OKK	2	14 OKK 2 001	14 OKK 2 031
	Estimated sample						157
	Total sample size						8015

APPENDIX 9: 2014 NHSS Technical Working Group

	Designation	Name	Email
Government			
MoHSS: DSP	Deputy Director	Ms. A. Muadinohamba (Chairperson)	muadinohambaa@nacop.net
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APPENDIX 10: 2014 NHSS NIP Specimen Logbook

2014 HIV SENTINEL SURVEILLANCE SURVEY SPECIMEN NIP RECEIVING LOGBOOK

LABORATORY LOCATION..... DISTRICT.....

DATE dd/mm/yy	Specimen Codes (Individual Survey bar codes) in sequential order (E.g. 14KEE-1 001 to 010)	Total number of specimens	Recorded by: (Surname and Initial)

11. REFERENCES

[i] MOHSS, (2013). Namibia National AIDS Spending Assessment (NASA), 2012/13 and 2013/14

[ii] *Spectrum GRN Guidelines 500 26 March 2014*, MOHSS, 2014

[iii] *Spectrum GRN Guidelines 500 26 March 2014*, MOHSS, 2014

[iv] Barlow Katrina, Tavares Paul, Perry Keith, Evaluation of the Roche HIV Combi Assay, October 2007.

[v] Fifth meeting of the WHO/AFRO technical network on HIV/AIDS and STI surveillance, 2006, Sept 26-28: Harare, Zimbabwe.

[vi] Jonas A, Gutreuter S, Patel S, Maher A, et al A novel analytical approach confirms stabilization of HIV epidemic in pregnant women in Namibia, Presented at CROI, 2013, Boston.

[vii] Jonas A, Maher AD, Shiraishi R, deKlerk M, et al. National ART Monitoring System Enables Robust Transfer-adjusted Retention Analyses in Namibia, Presented at CROI, 2013, Boston.

[iv] Fox MP, Rosen S, Patient retention in antiretroviral therapy programs up to three years on treatment in sub-Saharan Africa, 2007–2009: systematic review, Tropical Medicine and International Health, Vol 15, Iss Sup s1, pages 1–15, June 2010.

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