



MALAWI POPULATION-BASED HIV IMPACT ASSESSMENT MPHIA 2015-2016



FIRST REPORT
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MPHIA 2015-2016 Collaborating Institutions

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The United States Centers for Disease Control and Prevention (CDC)

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Contact Information

Permanent Secretary

Ministry of Health

P.O. Box 30377

Lilongwe

Malawi

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GLOSSARY OF TERMS

90-90-90: An ambitious treatment target to help end the AIDS epidemic. By 2020, 90% of all people living with HIV will know their HIV status; 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy; and 90% of all people receiving antiretroviral therapy will achieve viral suppression (UNAIDS, 2014).

Acquired immunodeficiency syndrome (AIDS): AIDS is a disease caused by infection with the human immunodeficiency virus. AIDS results in severe damage to the immune system, leaving the body vulnerable to life-threatening conditions such as infections and tumors.

Antiretroviral therapy (ART): Treatment with antiretroviral drugs that inhibit the ability of HIV to multiply in the body, leading to improved health and survival among HIV-infected persons.

CD4+ T cells: CD4+ T cells are white blood cells that are an essential part of the human immune system. These cells are often referred to as T-helper cells. HIV attacks and kills CD4+ T cells, leaving the body vulnerable to a wide range of infections. The CD4+ T-cell count is used to determine the degree of weakness of the immune system from HIV infection and can be used to determine the need for and response to ART.

Human immunodeficiency virus (HIV): HIV is the virus that causes AIDS. The virus is passed from person to person through blood, semen, vaginal fluids, and breast milk. HIV attacks CD4+ T cells in the body, leaving the infected person vulnerable to illnesses that would have otherwise been controlled or eliminated by a healthy immune system.

HIV incidence: A measure of the frequency with which new cases of HIV infection occur in a population over a period of time. The denominator is the population at risk and the numerator is the number of new cases occurring during a defined period of time.

HIV prevalence: The proportion of living persons in a population who are infected with HIV at a specific point in time.

HIV viral load: The concentration of HIV in the blood, usually expressed as HIV RNA copies per milliliter.

HIV viral load suppression: An HIV viral load of less than 1,000 copies per milliliter.

LIST OF ABBREVIATIONS

AIDS	Acquired immunodeficiency syndrome
ANC	Antenatal care
ART	Antiretroviral therapy
ARV	Antiretroviral
CDC	U.S. Centers for Disease Control and Prevention
CI	Confidence interval
DNA	Deoxyribonucleic acid
EA	Enumeration area
HBTC	Home-based HIV testing and counseling
HIV	Human immunodeficiency virus
HTC	HIV testing and counseling
IQR	Interquartile range
LAg	Limiting antigen
MDRI	Mean duration of recent infection
ml	Milliliters
µl	Microliters
MPHIA	Malawi Population-Based HIV Impact Assessment
ODn	Normalized optical density
PCR	Polymerase chain reaction
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PLHIV	People living with HIV
PMTCT	Prevention of mother-to-child transmission of HIV
RNA	Ribonucleic acid
SMS	Short Message Service
UNAIDS	Joint United Nations Programme on HIV/AIDS
VLS	Viral load suppression

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EXECUTIVE SUMMARY

The Malawi Population-Based HIV Impact Assessment (MPHIA) was a nationally representative, cross-sectional population-based survey of households across Malawi. MPHIA focused on measuring key biological endpoints to provide direct estimates of HIV-infection risk and burden, and of the effectiveness and population-level impact of the prevention, care, and treatment interventions implemented in the country. Its primary objectives were to estimate the national-level annual HIV incidence among adults aged 15-64, and the subnational prevalence of HIV viral load suppression (VLS) among infected adults. In addition, MPHIA measured national and subnational adult HIV prevalence, CD4 T-cell counts, antiretroviral drugs (ARVs) in blood, transmitted HIV drug resistance, pediatric HIV prevalence, and progress toward the 90-90-90 targets defined by the Joint United Nations Programme on HIV/AIDS (UNAIDS). MPHIA is the first national survey to conduct these measurements in Malawi. The survey also collected information on behaviors associated with HIV acquisition and transmission, and on common HIV comorbidities and other health conditions.

The survey used a two-stage, stratified cluster sample design, in which census enumeration areas (clusters) were selected in the first stage and households in the second stage. The sample was stratified by seven geographical zones: North, Central-East, Central-West, Lilongwe City, South-East, South-West, and Blantyre City. Data collection was conducted between end of November 2015 and August 2016. The survey interviewed 11,386 households. In the households surveyed, 22,405 adults aged 15-64 and 9,993 children aged 0-14 were eligible to participate in the survey. Of those eligible, 19,652 adults were interviewed, and 17,187 adults and 6,166 children provided blood for biomarkers assessment and had HIV status determined. MPHIA provided home-based HIV testing and counseling (HBTC) with return of results, and point of care CD4 T-cell count for those who were HIV positive. HIV viral load results were returned to participants through health facilities of their choice. MPHIA provides weighted estimates. Analysis weights account for sample selection probabilities and are adjusted for nonresponse and noncoverage. The key findings of MPHIA are:

- Annual incidence of HIV infection among adults aged 15-64 was 0.39% (95% CI: 0.22%-0.57%), which corresponds to 39 new HIV infections for every 10,000 persons in a year, and to approximately 30,000 new cases of HIV infection among adults in the country every year.
- HIV prevalence among adults aged 15-64 was 10.6%: 12.5% among females and 8.5% among males. Prevalence varied across the seven zones, ranging from 4.9% in the Central-East zone to 17.7% in Blantyre City. HIV prevalence among adults aged 15-49 was 10.0%. HIV prevalence among children 0-14 years of age was 1.5%.
- Malawi has made substantial progress toward the achievement of the UNAIDS 90-90-90 targets. Among adults aged 15-64 living with HIV, 72.7% reported that they were aware of their HIV-positive status, 89.6% of those aware reported being on antiretroviral therapy (ART), and 91.2% of those reporting being on ART were virally suppressed. The achievement was lower among young people aged 15-24, of whom 49.8% were aware of their status, 82.5% of those aware reported being on ART, and 78.8% of those reporting being on ART were virally suppressed.

- Among HIV-positive males aged 15-64, 40.0% of those residing in urban areas were unaware of their HIV status, compared to 29.6% unaware among those in rural areas. Among HIV-positive females age 15-64, 25.7% of those residing in urban areas and 23.6% of those residing in rural areas were unaware of their HIV status.
- The overall prevalence of VLS (defined as HIV ribonucleic acid [RNA] less than 1,000 copies/milliliter [ml]) among adults aged 15-64 living with HIV was 68.3%, and higher among females (73.1%) than among males (60.9%). There is considerable geographical variation in the prevalence of VLS ranging from 59.5% in Blantyre City to 70.7% in the South-East zone.
- Among those women who gave birth within the year preceding the survey, 97.2% knew their HIV status, and among those who were HIV-positive, 97.9% reported to have received ARVs, which indicates high coverage of interventions for the prevention of mother-to-child transmission of HIV.
- Among children born to HIV-positive mothers age 15-49 years who gave birth during the three years preceding the survey, 49.4% received an infant virologic HIV test before 2 months of age, and 29.3% between 2 and 12 months of age.

MPHIA indicates that HIV continues to cause a significant burden of disease in the country. However, there is remarkable progress toward the achievement of the UNAIDS 90-90-90 targets. The major challenge remains diagnosis, and a critical priority is to identify and link to care those infected but unaware of their HIV status. MPHIA incidence estimates indicate that there are approximately 30,000 new HIV infections annually among adults aged 15-64. The considerable variation in prevalence of HIV infection and viral suppression across regions and population groups indicates that a targeted approach to the delivery of a combination of effective, evidence-based prevention interventions is necessary to reduce transmission. Increasing coverage of diagnosis while sustaining high levels of treatment and viral suppression are key to reduce HIV incidence.

The final report of MPHIA will provide information on ART coverage and progress toward the 90-90-90 targets for the adult and pediatric populations based on measured ARVs in addition to self-reported ART status, ART retention, HIV ARV resistance, knowledge about HIV prevention among young people, discriminatory attitudes toward people living with HIV, self-report of other sexually transmitted infections, and integration of tuberculosis and HIV care.

INTRODUCTION

1.1 Background

The Population-Based HIV Impact Assessment is a multicountry project funded by the United States President's Emergency Plan for AIDS Relief (PEPFAR) to conduct national HIV-focused surveys that describe the status of the HIV epidemic. The surveys measure important national and regional HIV-related parameters, including progress toward the achievement of the UNAIDS 90-90-90 targets (UNAIDS, 2014), and will guide policy and funding priorities.

1.2 Overview of MPHIA 2015-2016

The Malawi Population-Based HIV Impact Assessment (MPHIA), a household-based national survey, was conducted between November 2015 and August 2016 to measure the status of Malawi's national HIV response. MPHIA offered home-based HIV testing and counseling with return of results and collected information about uptake of HIV care and treatment services. This survey is the first in Malawi to measure national HIV incidence, VLS prevalence, pediatric HIV prevalence, CD4 T-cell count distribution, presence of antiretroviral drugs in blood, and transmitted HIV drug resistance. The survey also collected information on selected behaviors associated with HIV acquisition and transmission, and on common HIV co-morbidities and other health conditions.

Although facility-based sentinel surveillance and the population-based studies conducted previously have provided useful knowledge regarding Malawi's HIV epidemic and HIV-control efforts, information critical to understand the current status of the epidemic and guide future interventions was still lacking. While population-level outcomes and impact can be inferred and modeled from facility-level data, this requires a series of untested assumptions about trends in the unobserved segments of the population. In addition, the population-based data that were available focused largely on knowledge, attitudes, and self-reported risk behaviors.

With its focus on measuring key biological endpoints in a nationally representative sample of the population, MPHIA provides direct estimates of HIV-infection risk and burden, of the effectiveness and population-level impact of the prevention, care, and treatment interventions implemented in the country, and of progress toward the achievement of the UNAIDS 90-90-90 targets.

MPHIA was led by the government of Malawi through the Ministry of Health with technical assistance from the United States Centers for Disease Control and Prevention (CDC). The survey was implemented by ICAP at Columbia University in collaboration with local partners, including the Centre for Social Research at the University of Malawi, the National Statistical Office, and the College of Medicine-Johns Hopkins Project at the University of Malawi.

1.3 Specific Objectives

The goal of the survey was to estimate HIV-infection incidence and prevalence in Malawi, to assess the coverage and impact of HIV services at the population level, and to characterize HIV-related risk behaviors using a nationally representative sample of adults and children.

Primary Objectives

- To estimate national-level annual HIV incidence among adults aged 15-64.
- To estimate the subnational (zonal) prevalence of VLS (defined as HIV RNA less than 1,000 copies/ml) among HIV-positive adults aged 15-64.

Secondary Objectives

- To estimate the national prevalence of HIV infection among children aged 0-14.
- To estimate the national and subnational (zonal) prevalence of HIV infection among adults aged 15-64.
- To determine the distribution of CD4 T-cell counts in HIV-positive persons aged 0-64.
- To estimate the prevalence of detectable ARVs in blood and the frequency of transmitted drug resistance among HIV-positive persons aged 0-64.
- To describe the prevalence of HIV-related risk behaviors among adults aged 15-64.
- To describe the uptake of HIV-related services among persons aged 0-64.
- To estimate the prevalence of stunting and undernutrition among HIV-exposed and HIV-infected children under 5 years of age.

DESIGN AND METHODS

2.1 Sampling Frame and Design

MPHIA 2015-2016 was a nationally representative, cross-sectional population-based survey of households across Malawi. The survey used a two-stage, stratified cluster sample design. The sampling frame was comprised of all households in the country based on the 2008 Population and Housing Census, which includes 12,666 enumeration areas (EAs), containing an estimated 2,869,933 households (NSO, 2008). The first stage selected 500 EAs (clusters) using a probability proportional to size method. The 500 EAs were stratified by seven geographical zones: North, Central-East, Central-West, Lilongwe City, South-East, South-West, and Blantyre City. During the second stage, a sample of households was randomly selected within each EA, or cluster, using an equal probability method, where the average number of households selected per cluster was 30 and the actual number of households selected per cluster ranged from 15 to 60 (Table 2.1.A).

The sample size was calculated to provide a representative national estimate of HIV incidence among adults aged 15-64 with a relative standard error less than or equal to 28.9%, as well as representative zonal estimates of VLS prevalence among HIV-positive adults aged 15-64 with 95% confidence intervals (CIs) with $\pm 10\%$ bounds around the point estimates. One-half of the households were randomly selected for inclusion of children aged 0-14, which was designed to provide a representative national estimate of pediatric HIV prevalence with a relative standard error less than or equal to 16.2%. The target sample size was 18,711 for adults aged 15-64, and 8,949 for children aged 0-14.

Table 2.1.A Distribution of sampled enumeration areas and households, by zone

Zone	Enumeration areas			Households		
	Urban	Rural	Total	Urban	Rural	Total
North	7	55	62	238	1364	1602
Central-East	3	75	78	62	1777	1839
Central-West	1	57	58	42	1813	1855
Lilongwe City	72	0	72	2327	0	2327
South-East	5	79	84	109	1817	1926
South-West	4	74	78	131	2400	2531
Blantyre City	68	0	68	2188	0	2188
Total	160	340	500	5097	9171	14268

2.2 Eligibility Criteria, Recruitment, and Consent Procedures

The eligible survey population included:

- women and men aged 18-64 living in the selected households and visitors who slept in the household the night before the survey who were willing and able to provide written consent.
- persons aged 10-17 living in the selected households and visitors who slept in the household the night before the survey who were willing and able to provide written assent, and whose parents or guardians were willing and able to provide written permission to their participation.
- children aged 0-9 living in the selected households and child visitors who slept in the household the night before the survey, whose parents or guardians were willing and able to provide written consent for their participation.

An electronic informed consent form was administered using a tablet. At each stage of the consent process, consent was indicated by signing or making a mark on the consent form on the tablet and on a printed copy, which was retained by the participant. A designated head of household provided written consent for household members to participate in the survey, after which individual members were rostered during a household interview. Adults and emancipated minors then provided written consent on the tablet for an interview. After completing the interview, they provided written consent for participation in the biomarker component of the survey, including home-based HIV testing and counseling, with return of HIV-testing results and CD4 T-cell counts during the household visit. Receipt of tests results was a requirement for participation in the biomarker component. If an individual did not want to receive his or her HIV test result, this was considered a refusal and the survey was concluded. Adults were also asked for written consent to store their blood samples in a repository in order to perform additional tests in the future.

Persons aged 10-17 were asked for assent to the interview (15- to 17-year-olds only) and biomarker components (10- to 17-year-olds) after permission was granted by their parents or guardians. Parents provided consent for biomarker testing for minors below the age of assent (0-9 years). Procedures with illiterate participants or participants with a sight disability involved the use of an impartial witness, chosen by the potential participant, who also signed or made a mark on the consent form on the tablet and the printed copy. If no witness could be identified, the potential participant or household (if the head of household was sight disabled or illiterate) was deemed ineligible.

2.3 Survey Implementation

Survey Staff

Fieldwork started at the end of November 2015 and was completed in August 2016. Fieldwork was conducted by 20 field teams composed of a team leader, two field health workers, two HIV testing and counseling (HTC) providers, two research assistants, and a driver. A total of 225 field coordinators, team leaders, field health workers, HTC providers, research assistants, community-mobilization coordinators, and drivers participated in data collection. Survey personnel were selected based on their qualifications and areas of expertise. The research assistants had primary responsibility for obtaining consent and administering the interview. The field health workers conducted phlebotomy and performed CD4 T-cell counts using a point of care instrument. The HTC providers were responsible for delivering adult and pediatric HIV testing and counseling. The field teams were supervised by four field coordinators and managed by

eight field supervisors, who guided and oversaw data collection activities, performed quality checks, and provided technical support.

In addition, 31 laboratory technicians processed samples and performed additional procedures for HIV-1 viral load, infant virologic HIV testing, and quality control and assurance. National and international monitors periodically conducted direct observation of data collection activities in the field and in the laboratories in order to provide technical support and ensure quality.

Community Sensitization and Mobilization

Community mobilization was conducted prior to data collection to maximize community support and participation in the survey. The mobilization began before fieldwork commenced with a high-level national launch meeting that included key national and regional leaders, mass media, and other stakeholders. Community mobilization teams visited each EA prior to initiation of data collection and partnered with health surveillance assistants to meet key gatekeepers in the communities (chiefs, local government officials, and religious and community leaders). The mobilization teams held community sensitization meetings, disseminated written informational materials such as brochures and posters, and held discussions with selected households and other community residents.

Questionnaire Data Collection

Questionnaire and field laboratory data were collected on mobile tablet devices using an application programmed in Open Data Kit. The household interview collected information on household residents, assets, economic support, recent deaths, and orphans and vulnerable children. The adult interview was administered to participants aged 15 years and older and included modules on demographic characteristics, sexual and reproductive health, marriage, male circumcision, sexual activity, HIV/AIDS knowledge and attitudes, the HIV continuum of care, tuberculosis and other diseases, alcohol use, and gender norms. Participants who self-reported being HIV positive were asked questions about their HIV care experience. Parents also answered questions about their children's (0-14 years) health and participation in HIV testing and care services. In each household, one woman among those aged 15-64 was also randomly selected to answer questions about her experiences with violence. Female participants were interviewed by female staff, and males by male staff, whenever possible. The English, Chichewa, and Tumbuka versions of the questionnaires were reviewed and tested thoroughly for acceptability, feasibility, and flow of questions.

Supervision

Data collection teams were continuously overseen by field-based supervisors. Furthermore, they were periodically monitored by national and international teams with representation from collaborating institutions; these monitoring teams visited field and laboratory sites at least monthly. Field-based supervisors supported teams by organizing supplies and transport of blood samples, coordinating community mobilization efforts, providing technological troubleshooting, and checking the quality of household procedures and data collected. The national and international monitoring teams observed procedures, assessed and ensured protocol adherence, and identified and responded to challenges with data collection. Regular debriefing sessions were held between field-based supervisors and monitoring teams, and monitoring re-

ports were circulated to collaborating institutions and the MPHIA Technical Working Group for response to any issues.

2.4 Field-Based Biomarker Testing

Blood Collection

Blood was collected by qualified survey staff from consenting participants. Fourteen ml of venous blood were collected from persons aged 15 years and older, while 5 ml were collected from persons aged 2-14. One ml of capillary blood was collected from children aged 0-2 using finger-stick for children aged 6-24 months and heel-stick for children under 6 months of age.

Blood samples were labeled with a unique bar-coded participant identification number and stored in temperature-controlled cooler boxes. At the end of each day, samples were transported to a satellite laboratory for processing into plasma aliquots and dried blood spots, and were frozen within 24 hours of blood collection.

HIV Home-Based Testing and Counseling

HIV HBTC was conducted in each household in accordance with national guidelines (Figure 2.4). As per these guidelines, the survey used a sequential rapid-testing algorithm in the field: as a screening test, Determine™ HIV-1/2 (Alere), and as a confirmatory test, Uni-Gold™ (Trinity Biotech). Individuals with a nonreactive result on the screening test were reported as HIV negative. Individuals with a reactive screening test underwent confirmatory testing. Those with a reactive result on both the screening and confirmatory tests were classified as HIV positive. Individuals with a reactive screening test result followed by a nonreactive confirmatory test result were retested in parallel. If the results were repeatedly discordant, the individual was classified as indeterminate.

HIV-seropositive participants were referred to HIV care and treatment services at a health facility of their choice. For children under age 18, results were returned to a parent or guardian (with the presence of the child for those aged 15-17 years). Participants with indeterminate results were advised to attend a facility in four weeks for repeated testing, as per national guidelines.

For children less than 18 months of age only the screening test (Determine) was performed in the field. If the test was reactive, HIV deoxyribonucleic acid polymerase chain reaction (HIV DNA PCR) for virologic testing of HIV infection was performed in the reference laboratory, as described below (Section 2.5).

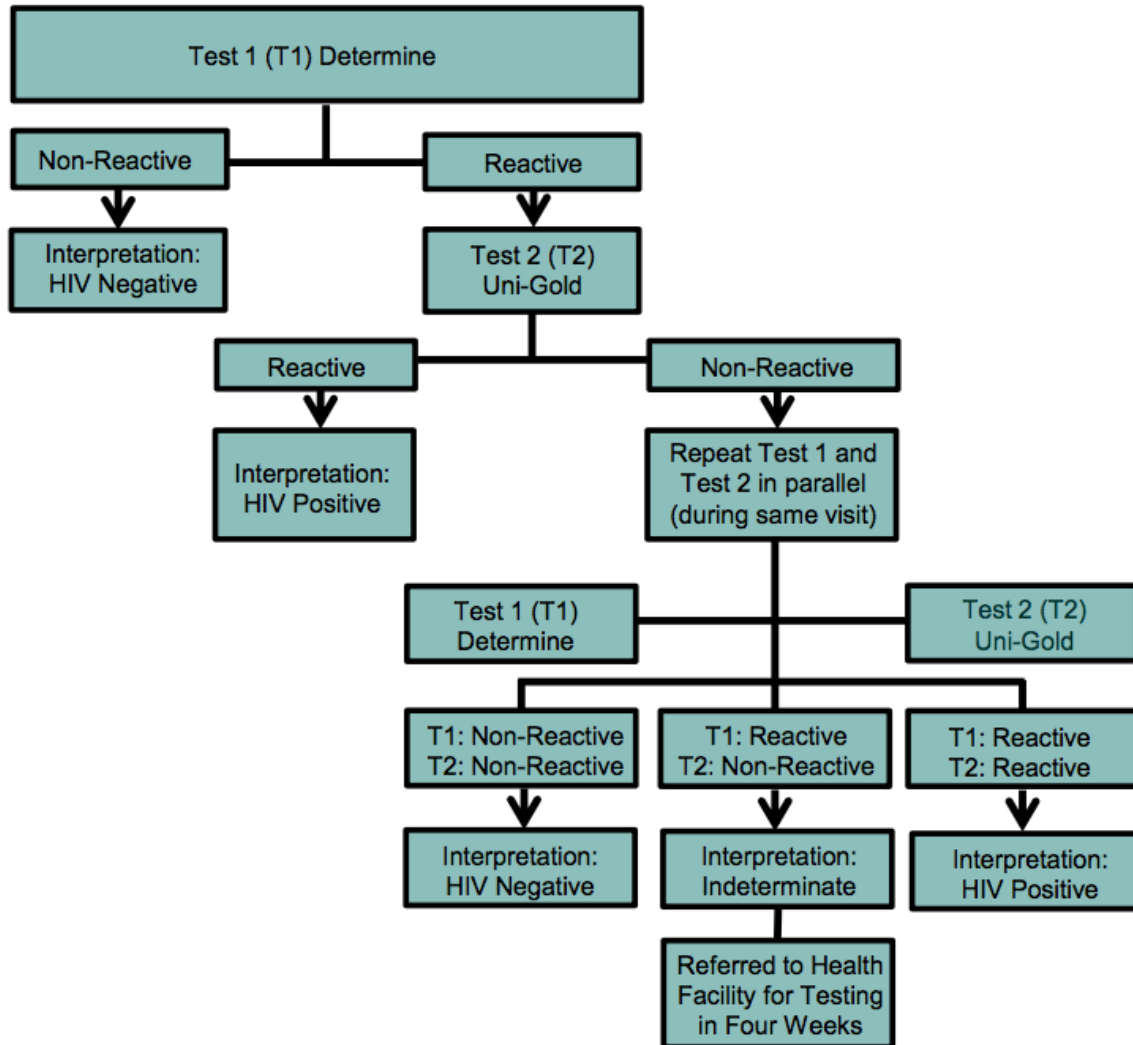
For participants who self-reported being HIV positive but tested HIV negative at the time of the survey, additional laboratory-based testing was conducted using HIV DNA PCR for confirmation of the status. Survey staff revisited these participants to provide counseling on the final confirmed result.

All children under age 5 who tested HIV positive during HBTC underwent anthropometric assessment with height and weight measurements. For the purpose of comparison, 5% of HIV-negative children under 5 also underwent this assessment.

CD4 T-Cell Count Measurement

All participants who tested HIV positive during HBTC, and a random sample of 5% of those who tested HIV negative, received a CD4 T-cell count measurement in the field by qualified survey staff. The measurement was performed using the Pima™ CD4 Analyzer (Alere).

Figure 2.4 Household-based HIV-testing algorithm



2.5 Laboratory-Based Biomarker Testing

Satellite and Central Laboratories

Nine satellite laboratories for the survey were established in existing health facility laboratories. One central reference laboratory was chosen for more specialized tests. At each satellite laboratory, trained technicians performed processing of whole blood specimens into plasma aliquots and dried blood spot cards

for storage at -20°C, testing for quality assurance and HIV confirmatory testing. For quality assurance of the HIV rapid testing conducted in the field, the first 50 samples tested by each field tester, and subsequently all indeterminate, and a random sample of 5% of specimens that tested HIV negative during HBTC, were retested in the laboratory using the national HIV rapid-testing algorithm. All specimens that tested HIV positive during HBTC and those that had confirmed positive or indeterminate rapid test results during quality assurance underwent confirmatory testing using the Geenius HIV 1/2 Supplemental Assay (Bio-Rad). A positive Geenius result defined HIV-positive status. Central laboratory procedures included HIV viral load testing, HIV DNA PCR for infant virologic testing and for confirmation of status of those who self-reported HIV positive but tested negative in HBTC, HIV recency testing, and long-term storage of samples at -80°C.

The survey conducted household revisits for investigation of discrepancies between the results of testing in the field and in the laboratory. The specimens collected during the revisit underwent comprehensive retesting in the laboratory. For each case, an analysis of the nature of the discrepancy and potential sources of error was performed in order to define the definitive HIV status for analytical purposes.

Viral Load Testing

The HIV-1 viral load (HIV RNA copies per ml) of confirmed HIV-positive participants was measured using the Abbott m2000 System (Abbott Molecular Inc., Illinois, United States). The Abbott m2000 System consists of two separate instruments, the m2000sp (which carries out automated extraction, purification, and preparation of HIV-1 RNA), and the m2000rt (which amplifies, detects, and measures the HIV-1 RNA load). For plasma, the 0.6 mL protocol was used, while the open-mode protocol for the Abbott RealTime HIV-1 assay was used to measure viral load from dried blood spot samples from children and adults with insufficient volume of plasma.

Viral load results were returned within 8-10 weeks to the health facility chosen by each HIV-positive participant. Participants were provided with a referral form during HBTC for subsequent retrieval of their results. Survey staff also contacted each participant via Short Message Service (SMS), informing them that their viral load results were available at the chosen facility and further advising them to seek care and treatment.

Infant HIV Virologic Testing

For infants under 18 months of age who screened positive for HIV during HBTC, virologic testing was conducted via HIV DNA PCR using the Abbott Real Time HIV-1 Qualitative Assay (Abbott Molecular, Wiesbaden, Germany) on the Abbott m2000 system. Results were returned to a health facility selected by the child's parent or guardian within eight weeks, and survey staff also contacted the parent or guardian via SMS to inform them that the child's results were available at the facility.

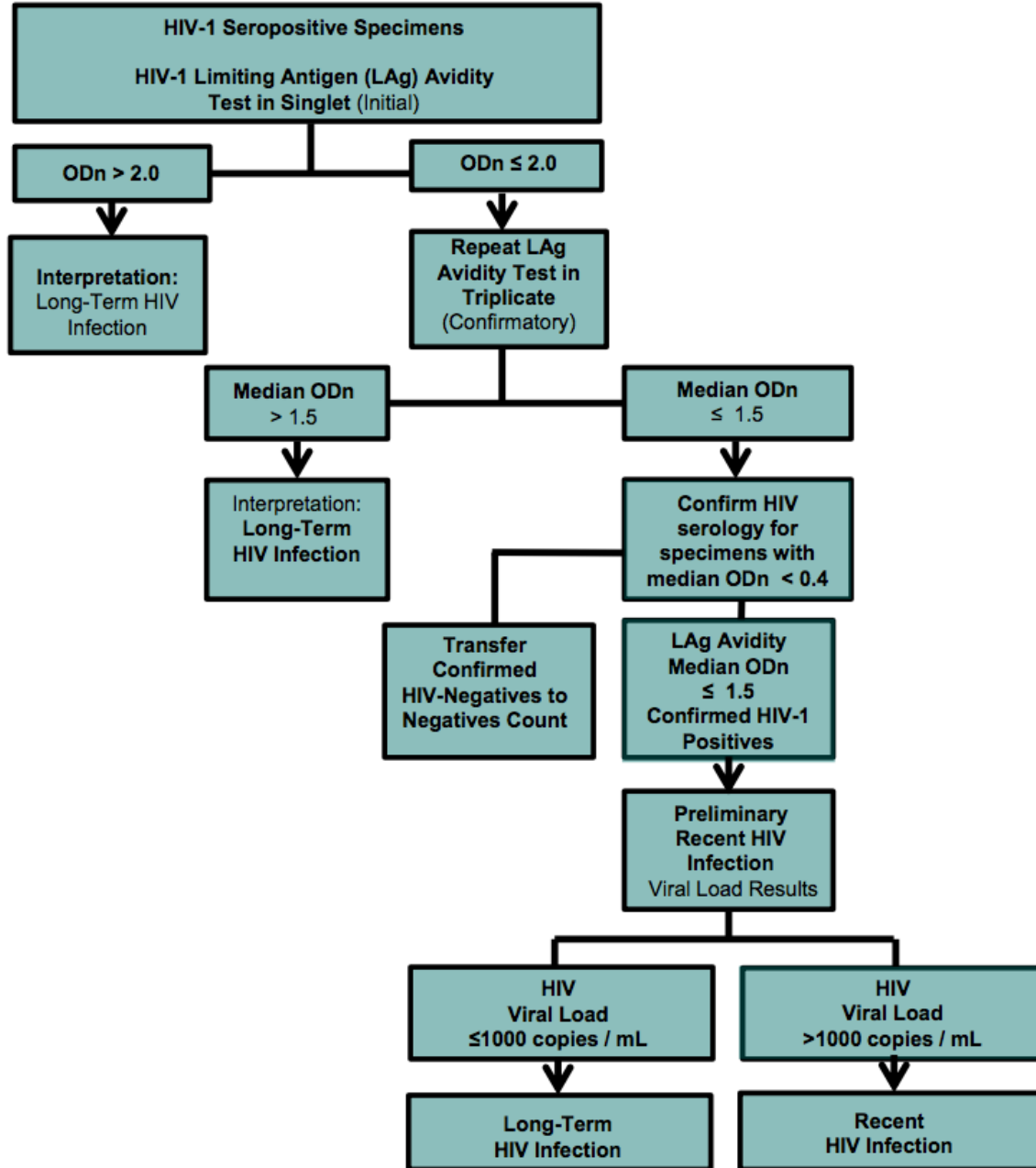
HIV Recency Testing

To distinguish recent from long-term HIV infections in order to estimate incidence, the survey used a laboratory-based testing algorithm that employed a combination of the HIV-1 Limiting Antigen (LAg) Avidity enzyme immunoassay (Sedia Biosciences Corporation) and viral load results (Figure 2.5).

LAg testing was performed twice, with an initial screening test followed by a confirmatory process: specimens with a normalized optical density (OD_n) > 2.0 during initial testing were classified as long-term infections, while those with OD_n ≤ 2.0 underwent further testing of the specimen in triplicate. Specimens with median OD_n > 1.5 in confirmatory testing were classified as long-term infections. Specimens with median OD_n < 0.4 were retested using the HIV diagnostic testing algorithm to confirm HIV-1 seropositivity, and samples identified as HIV-1 seronegative were excluded from the total number of HIV positives and incorporated into the total number of negative specimens for incidence estimation.

Specimens with median OD_n ≤ 1.5 were classified as potential recent infections, and their viral load results were assessed. Specimens with viral load < 1,000 copies/ml were classified as long-term infections, while those with viral load ≥ 1,000 copies/ml were classified as recent infections.

Figure 2.5 HIV recent infection testing algorithm



2.6 Data Processing and Analysis

All field data collected were transmitted to a central server using a secure virtual private network and stored in a secure PostgreSQL database. Data cleaning was conducted using SAS 9.4 (SAS Institute Inc. Cary, North Carolina, United States). Laboratory data were cleaned and merged with the final questionnaire database using unique specimen bar codes and study identification numbers.

All results presented in the report are based on weighted estimates unless otherwise noted. Analysis weights account for sample selection probabilities and are adjusted for nonresponse and noncoverage. Nonresponse adjustments and nonresponse adjusted weights were calculated for households, individual interview, and individual blood draw in a hierarchical form. Adjustment for nonresponse for initial individual and blood-level weights was based on the development of weighting adjustment cells defined by a combination of variables that are potential predictors of response and HIV status. The nonresponse adjustment cells were constructed using the chi-square automatic interaction detection, or CHAID, algorithm. The cells were defined based on data from the household interview for the adjustment of individual-level weights, and from both the household and individual interviews for the adjustment of blood sample-level weights. Post-stratification adjustments were implemented to compensate for noncoverage in the sampling process. This final adjustment calibrated the nonresponse-adjusted individual and blood weights to make the sum of each set of weights conform to national population totals by sex and five-year age groups.

Descriptive analyses of response rates, characteristics of respondents, HIV prevalence, CD4 count distribution, HIV testing, self-reported HIV status, self-reported ART, VLS, prevention of mother-to-child transmission of HIV (PMTCT) indicators, and sexual behavior were conducted using SAS 9.4.

Household response rates were calculated using the American Association for Public Opinion Research Response Rate 4 method (AAPOR, 2015) as the number of complete and incomplete household interviews among all eligible households and those estimated to be eligible among those with unknown eligibility (households not located, not attempted, or unreachable). Vacant and destroyed households, not-a-housing units, and household units with no eligible respondents were considered not eligible and excluded from the calculation.

Individual interview response rates were calculated as the number of individuals who were interviewed divided by the number of individuals eligible to participate in the survey. Blood draw response rates for those aged 15-64 were calculated as the number of individuals who provided blood divided by the number of individuals who were interviewed. Blood draw response rates for those aged 0-14 were calculated as the number of individuals who provided blood divided by the number of individuals eligible to participate in the survey.

Incidence estimates were based on the number of HIV infections identified as recent with the HIV-1 LAg Avidity plus viral load algorithm, and obtained using the CDC Incidence Calculator, which uses the formula (Kassanjee R et al., 2012) recommended by the World Health Organization Technical Working Group on HIV Incidence Assays and the Consortium for the Evaluation and Performance of HIV Incidence Assays, with time cutoff (T) = 1.0 year and residual proportion false recent (PFR) = 0.00 (Appendix).

RESULTS

3.1 Response Rates

Of the 14,268 selected households, 12,731 and 11,386 were occupied and interviewed, respectively. The overall household response rate (unweighted) was 88.6% (83.5% in urban areas and 91.7% in rural areas). After adjusting for differential sampling probabilities and nonresponse, the overall weighted household response rate was 90.2% (Table 3.1.A).

A total of 22,405 adults (10,170 males and 12,235 females) aged 15-64 were eligible to participate in the MPHIA survey. Interview response rates (unweighted) were 81.5% for males and 92.9% for females aged 15-64. For males and females aged 15-64, almost nine out of 10 (87.0% and 87.8%, respectively; unweighted) who were interviewed also had their blood drawn (Table 3.1.B).

In MPHIA, children aged 0-14 in half of the selected households were eligible for blood draw. Of the 6,762 eligible children aged 0-9, 59.4% of males and 60.9% of females (unweighted) had their blood drawn. Of the 3,231 eligible children aged 10-14, 65.1% of males and 64.7% of females had their blood drawn (Table 3.1.B).

Table 3.1.A Results of the household interviews

Number of households selected, occupied, and interviewed and household response rates (unweighted and weighted), by residence, MPHIA 2015-2016

	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	5,097	9,171	14,268
Households occupied	4,689	8,042	12,731
Households interviewed	3,958	7,428	11,386
Household response rate ¹ (unweighted)	83.5	91.7	88.6
Household response rate ¹ (weighted)	85.1	91.2	90.2

¹Household response rate was calculated using the American Association for Public Opinion Research Response Rate 4 method (AAPOR, 2015).

Table 3.1.B Results of the individual interviews and blood draws

Number of eligible individuals and response rates for individual interviews and blood draws (unweighted and weighted), by residence and sex, MPHIA 2015-2016

	Residence					
	Urban		Rural		Total	
	Males	Females	Males	Females	Males	Females
Eligible individuals, age 0-9 years						
Number of eligible individuals	1,003	1,073	2,282	2,404	3,285	3,477
Blood draw response rate (unweighted)	60.4	62.3	58.9	60.3	59.4	60.9
Blood draw response rate (weighted)	59.5	60.7	56.2	57.5	56.7	58.0
Eligible individuals, age 10-14 years						
Number of eligible individuals	478	531	1,142	1,080	1,620	1,611
Blood draw response rate (unweighted)	65.7	63.1	64.8	65.6	65.1	64.7
Blood draw response rate (weighted)	65.6	64.7	62.4	62.4	62.8	62.8
Eligible individuals, age 15-24 years						
Number of eligible individuals	1,545	1,845	2,253	2,749	3,798	4,594
Interview response rate (unweighted)	79.9	88.0	81.4	90.1	80.8	89.3
Interview response rate (weighted)	81.5	87.7	80.6	89.5	80.8	89.2
Blood draw response rate (unweighted) ¹	87.3	88.2	87.2	86.6	87.3	87.3
Blood draw response rate (weighted)	88.0	89.3	86.5	85.4	86.8	86.2
Eligible individuals, age 15-49 years						
Number of eligible individuals	3,808	4,312	5,222	6,694	9,030	11,006
Interview response rate (unweighted)	75.9	91.0	84.1	93.8	80.7	92.7
Interview response rate (weighted)	75.9	91.1	83.5	93.4	81.9	93.0
Blood draw response rate (unweighted) ¹	84.4	88.4	88.0	87.3	86.6	87.7
Blood draw response rate (weighted)	85.2	89.1	87.4	86.1	86.9	86.7
Eligible individuals, aged 15-64						
Number of eligible individuals	4,150	4,661	6,020	7,574	10,170	12,235
Interview response rate (unweighted)	76.4	91.1	85.0	94.1	81.5	92.9
Interview response rate (weighted)	76.4	91.2	84.4	93.7	82.7	93.2
Blood draw response rate (unweighted) ¹	84.7	88.4	88.5	87.4	87.0	87.8
Blood draw response rate (weighted)	85.5	89.0	87.8	86.3	87.3	86.8

¹For all age groups who were eligible for an interview (15-64 years), the blood draw response rate shown is among those who completed the interview.

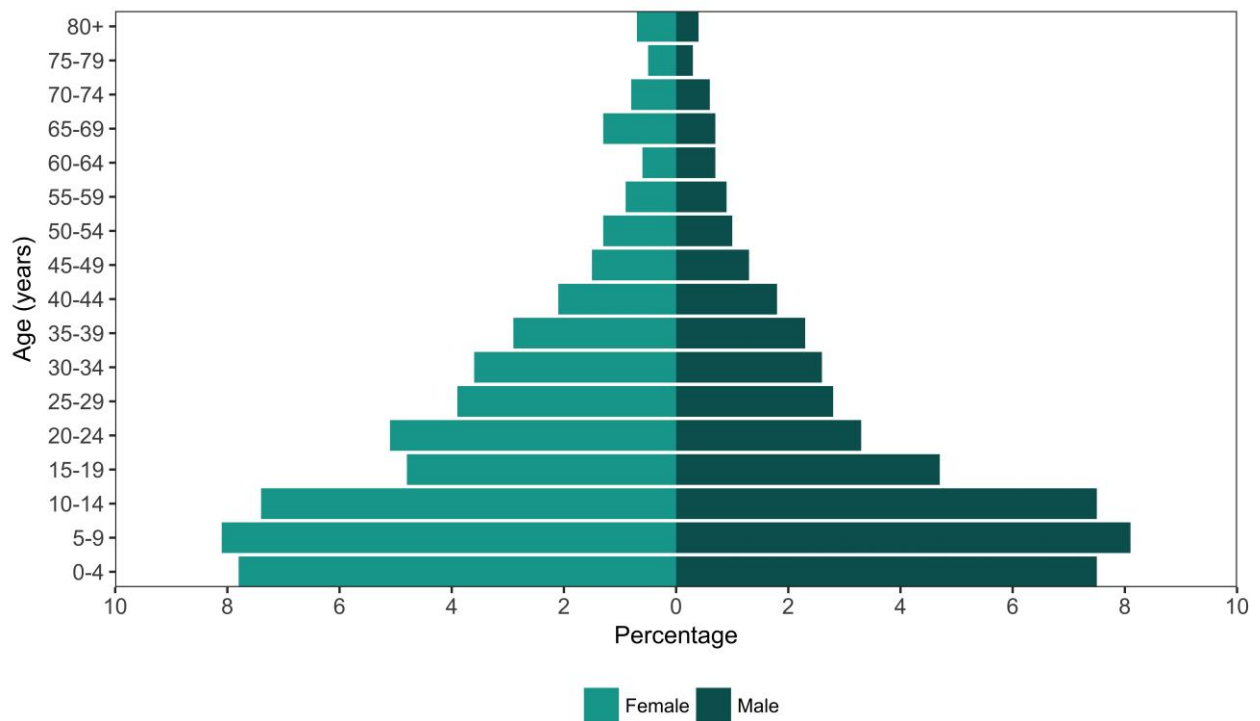
3.2 Characteristics of Households and Respondents

Households

Overall, while the majority of the households (55.9%) were male-headed, a large percentage of the households (44.1%) were headed by females. This distribution was similar between urban and rural areas: 57.8% of urban households were male-headed and 42.2% were female-headed, while 55.5% of rural households were male-headed and 44.5% were female-headed. The median household size was four members (interquartile range [IQR] 3-5) and the median number of children under 18 years of age in households was two (IQR 1-3; Table 3.2.A).

Children under age 15 comprised 46.3% (23.0% males and 23.3% females) of the de facto household population, while those aged 15-49 constituted 42.7% (18.9% males and 23.8% females) and those aged 50 years and older constituted 10.9% (4.6% males and 6.3% females; Figure 3.2.A; Table 3.2.B).

Figure 3.2.A Distribution of the de facto population by sex and age



Respondents

Overall, four in five (80.1%) respondents aged 15-64 lived in rural areas. The majority of the respondents (60.9%) were married or living together, while over a third (35.8%) of the males and one in five (21.6%) of the females had never been married. Almost two-thirds (62.1%) of the respondents aged 15-64 had attended primary education, while one-fourth (25.2%) had some secondary education. Only 3.3% had more than secondary education. Overall, 21.2% of respondents were aged 15-19 and 68.2% were aged 20-49, while only 10.6% were aged 50-64 (Table 3.2.C).

Table 3.2.A Household composition

Percent distribution of households by sex of head of household; median size of household, and median (Q1, Q3) number of children under 18 years of age, by residence, MPHIA 2015-2016

Characteristic	Residence					
	Urban		Rural		Total	
	Percent	Number	Percent	Number	Percent	Number
Household headship						
Male	57.8	2287	55.5	4136	55.9	6423
Female	42.2	1671	44.5	3292	44.1	4963
Total	100.0	3958	100.0	7428	100.0	11386

Characteristic	Residence					
	Urban		Rural		Total	
	Median	Q1, Q3	Median	Q1, Q3	Median	Q1, Q3
Size of households	4	(3, 5)	4	(3, 6)	4	(3, 5)
Number of children under 18 years of age	2	(1, 3)	2	(1, 3)	2	(1, 3)

Table 3.2.B Age and sex distribution of the de facto household population

Percent distribution of the de facto household population, by five-year age group and sex, MPHIA 2015-2016

Age	Males		Females		Total	
	Percent	Number	Percent	Number	Percent	Number
0-4	7.5	3,267	7.8	3,358	15.3	6,625
5-9	8.1	3,444	8.1	3,506	16.2	6,950
10-14	7.5	3,202	7.4	3,237	14.8	6,439
15-19	4.7	2,172	4.8	2,213	9.5	4,385
20-24	3.3	1,679	5.1	2,413	8.4	4,092
25-29	2.8	1,438	3.9	1,858	6.8	3,296
30-34	2.6	1,293	3.6	1,688	6.2	2,981
35-39	2.3	1,111	2.9	1,307	5.1	2,418
40-44	1.8	847	2.1	909	3.9	1,756
45-49	1.3	589	1.5	660	2.8	1,249
50-54	1.0	459	1.3	562	2.4	1,021
55-59	0.9	387	0.9	389	1.8	776
60-64	0.7	301	0.6	282	1.3	583
65-69	0.7	308	1.3	517	2.1	825
70-74	0.6	233	0.8	317	1.4	550
75-79	0.3	122	0.5	200	0.9	322
≥80	0.4	152	0.7	238	1.1	390
Total	46.6	21,004	53.4	23,654	100.0	44,658

Table 3.2.C Demographic characteristics of the adult population

Percent distribution of the population age 15-64 years, by sex and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percent	Number	Percent	Number	Percent	Number
Residence						
Urban	20.9	3,169	18.9	4,244	19.9	7,413
Rural	79.1	5,115	81.1	7,124	80.1	12,239
Zone						
North	14.3	1,109	13.2	1,424	13.8	2,533
Central-East	17.4	1,272	15.1	1,493	16.2	2,765
Central-West	20.9	951	20.5	1,303	20.7	2,254
Lilongwe City	7.7	1,464	6.5	1,924	7.1	3,388
South-East	16.5	910	19.8	1,474	18.2	2,384
South-West	16.5	1,217	19.0	1,925	17.8	3,142
Blantyre City	6.6	1,361	5.9	1,825	6.2	3,186
Marital status						
Never married	35.8	3,007	21.6	2,249	28.5	5,256
Married or living together	59.9	4,860	61.9	7,248	60.9	12,108
Divorced or separated	3.8	347	11.7	1,285	7.9	1,632
Widowed	0.5	58	4.9	574	2.8	632
Education¹						
No education	5.4	413	13.2	1,247	9.4	1,660
Primary	59.8	4,468	64.3	6,757	62.1	11,225
Secondary	30.5	2,857	20.2	2,896	25.2	5,753
More than secondary	4.4	543	2.3	461	3.3	1,004
Religion						
Catholic	19.5	1,646	18.8	2,142	19.2	3,788
CCAP	18.3	1,637	16.9	2,128	17.6	3,765
Anglican	2.5	209	2.3	276	2.4	485
Seventh Day Adventist	5.9	561	6.1	833	6.0	1,394
Baptist	2.4	207	2.3	268	2.4	475
Other Christian	29.9	2,370	33.5	3,739	31.8	6,109
Muslim	10.6	751	12.6	1,103	11.7	1,854
None	3.4	245	0.7	63	2.0	308
Other	7.5	640	6.6	807	7.0	1,447
Age						
15-19	21.5	1,680	21.0	1,858	21.2	3,538
20-24	17.7	1,389	17.4	2,244	17.5	3,633
25-29	14.7	1,120	14.7	1,756	14.7	2,876
30-34	12.1	1,010	12.3	1,608	12.2	2,618
35-39	9.8	877	9.9	1,238	9.9	2,115
40-44	7.8	706	7.9	873	7.9	1,579
45-49	6.0	501	6.1	626	6.0	1,127
50-54	4.4	395	4.5	531	4.5	926
55-59	3.4	332	3.5	365	3.5	697
60-64	2.5	274	2.8	269	2.7	543
Total 15-49	89.6	7,283	89.2	10,203	89.4	17,486
Total 15-64	100.0	8,284	100.0	11,368	100.0	19,652

¹Education categories refer to the highest level of education attended, whether or not that level was completed.

3.3 HIV Incidence, HIV Prevalence, and Immunosuppression

Key Findings

Annual incidence of HIV infection among adults aged 15-64 in Malawi was 0.39%: 0.52% among females, and 0.26% among males. This corresponds to approximately 30,000 new cases of HIV infection annually among adults aged 15-64 in Malawi.

Prevalence of HIV infection among adults aged 15-64 in Malawi was 10.6%: 12.5% among females, and 8.5% among males. This corresponds to approximately 900,000 people living with HIV aged 15-64 in Malawi.

Prevalence of VLS among HIV-positive adults aged 15-64 in Malawi was 68.3%: 73.1% among females, and 60.9% among males.

HIV Incidence

MPHIA was designed to estimate national annual HIV incidence among adults aged 15-49. In this age group, estimated incidence was 0.36% (95% CI: 0.19%-0.53%). HIV incidence for adults aged 15-64 was estimated to be 0.39% (95% CI: 0.22%-0.57%). HIV incidence was 0.26% among men and 0.52% among women aged 15-64. Among males, annual incidence peaked in 35- to 49-year-olds (0.49%), and among females, annual incidence peaked in 25- to 34-year-olds (0.87%). However, these results should be interpreted with caution, as the differences are not statistically significant and the survey was not designed to estimate age- and gender-specific differences (Table 3.3.A).

HIV Prevalence

Overall, HIV prevalence among adults aged 15-64 was 10.6%: 8.5% in males, and 12.5% in females. Prevalence in urban areas was 14.2%, compared to 9.7% in rural areas (Table 3.3.B).

HIV prevalence for children aged 0-14 was 1.5%. In adults aged 15-64, HIV prevalence ranged from 1.5% in 15- to 19-year-olds to 21.7% in 40- to 44-year-olds. The peak HIV prevalence in females was 24.6%, observed in those aged 40-44, and the peak HIV prevalence in males was 22.1%, observed in those aged 45-49. Prevalence among 15- to 24-year-old females was 3.4%, compared to 13.6% among females aged 25-29 (Tables 3.3.B and 3.3.D).

Differences in prevalence between males and females were significant in the age groups of 20-24, 25-29, 30-34, and 35-39. There were no significant differences by sex above age 40. Among young people aged 15-24, HIV prevalence was twice as high among females (3.4%) as among males (1.5%), and HIV prevalence among 25- to 29-year-olds was almost three times greater in females (13.6%) compared to males (4.7%; Table 3.3.D; Figure 3.3.A).

Among adults aged 15-64, HIV prevalence was 14.8% among those with no education, compared to 10.4% among those with more than secondary school education. HIV prevalence in females with no education was 16.5%, compared to 11.8% and 12.9% in those with secondary and more than secondary edu-

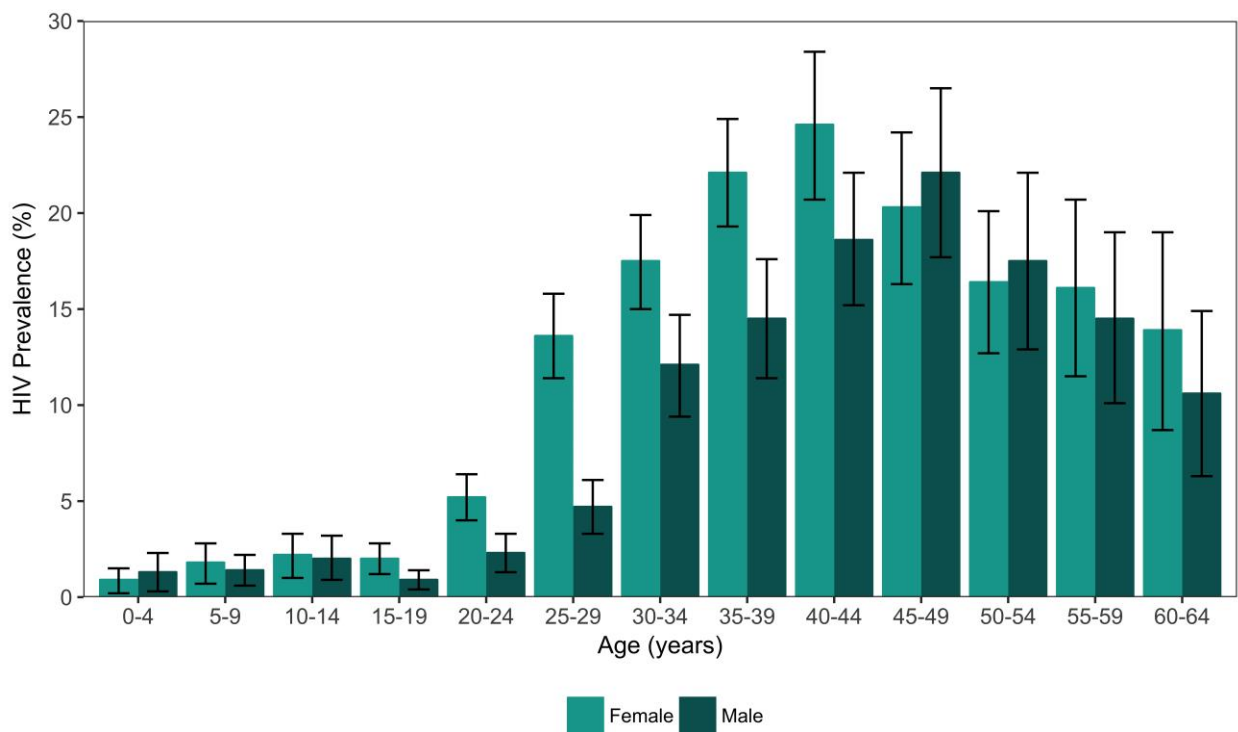
ation, respectively. HIV prevalence in males with no education was 10.7%, compared with 6.8% among those with secondary education (Table 3.3.B).

Among those aged 15-64 who have never married—a group dominated by younger segments of the population—the HIV prevalence was 2.4%. Among those who were married or living with a partner, HIV prevalence was 11.4%; in comparison, HIV prevalence was nearly twice as high (21.7%) among those who were divorced or separated and four times as high (43.9%) among those who were widowed (Table 3.3.B).

HIV prevalence among women aged 15-49 who were pregnant at the time of the survey was estimated to be 8.7%, compared to 12.5% among women who were not pregnant (Table 3.3.C).

Table 3.3.C presents HIV prevalence according to demographic characteristics in males and females aged 15-49.

Figure 3.3.A HIV prevalence among persons aged 0-64, by sex and age



The burden of HIV infection varied across the country. HIV prevalence ranged from 4.9% in Central-East to 17.7% in Blantyre City (Figures 3.3.B and 3.3.C, and Table 3.3.B). In the southern region of the country (South-East, South-West, and Blantyre City), HIV prevalence among females was higher than among males. In Blantyre City, prevalence in females aged 15-64 was 21.8%, compared to 14.0% in males (Table 3.3.B).

Figure 3.3.B HIV prevalence among adults aged 15-64, by zone

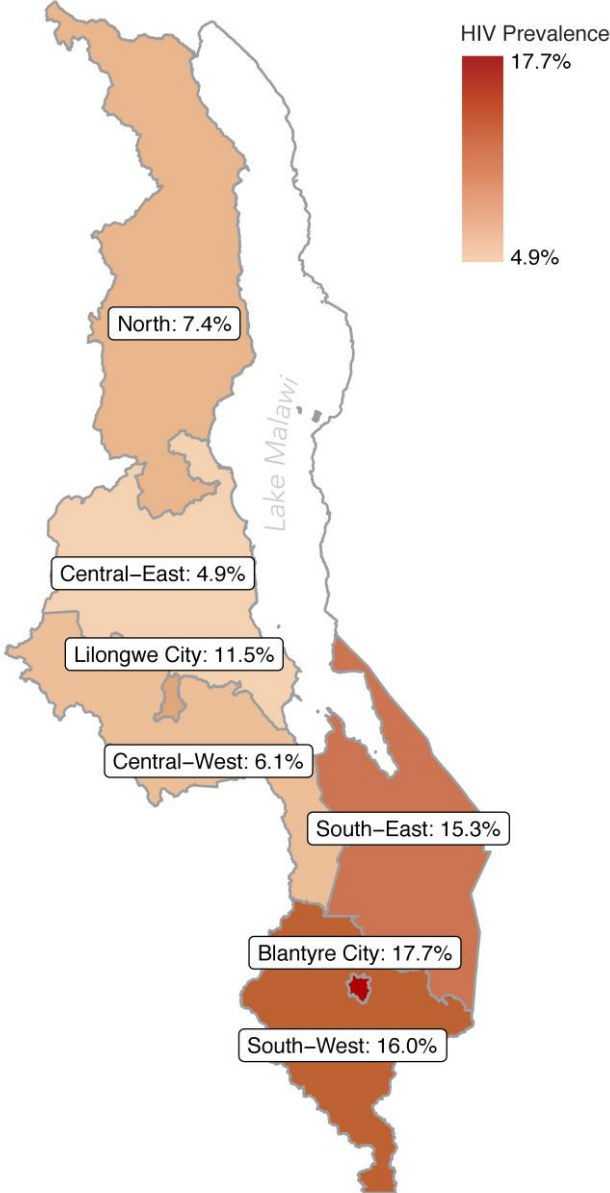
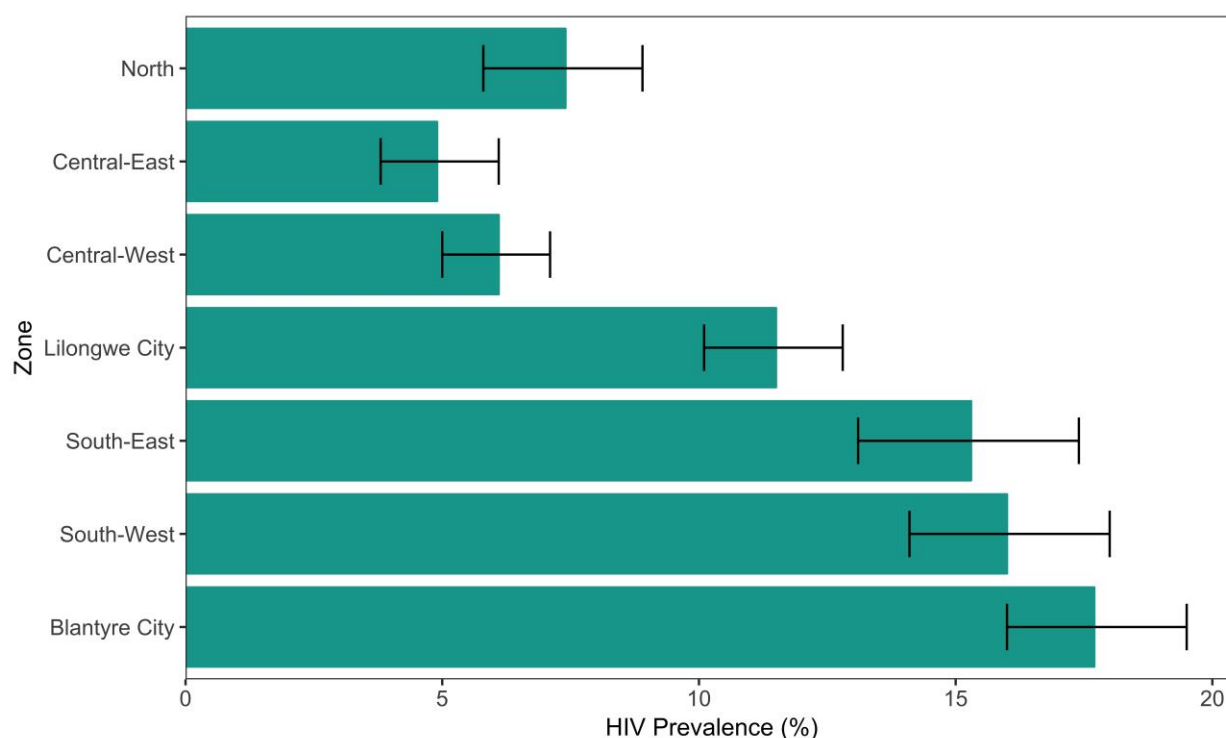


Figure 3.3.C HIV prevalence among adults aged 15-64, by zone



CD4 T-Cell Counts and Immunosuppression

Among HIV-positive 15- to 64-year-olds, 58.4% were immunosuppressed, with a CD4 cell count of less than 500 cells/microliter (μl). Nearly three-quarters of HIV-positive men were immunosuppressed (71.0%), whereas half of women were immunosuppressed (50.4%). The median CD4 cell count was 445 cells/ μl in HIV-positive individuals aged 15-64: 379 cells/ μl and 497 cells/ μl in males and in females, respectively (Table 3.3.E).

Among HIV-positive individuals aged 15-64 who self-reported as previously diagnosed with HIV and on ART, 52.4% had a CD4 cell count of less than 500 cells/ μl (67.9% of males and 44.2% of females). The overall median CD4 cell count was 486 cells/ μl : 398 cells/ μl among males and 533 cells/ μl among females (Table 3.3.E; Figure 3.3.D).

Among HIV-positive individuals aged 15-64 who self-reported as previously diagnosed with HIV but not on ART, 78.7% had a CD4 cell count of less than 500 cells/ μl (88.6% of males and 69.5% of females). The overall median CD4 cell count was 326 cells/ μl : 283 cells/ μl and 386 cells/ μl in males and females, respectively (Table 3.3.E; Figure 3.3.D).

The percentage of individuals with CD4 cell count less than 500 cells/ μl did not vary by residence, zone, marital status, education, religion, or age. The median CD4 cell count was observed to be less than 500 cells/ μl across all zones and marital status, education, religion, and age categories, except among 15- to 19-year-olds (Table 3.3.E).

Figure 3.3.D CD4 T-cell count distributions among HIV-positive adults aged 15-64, by ART status

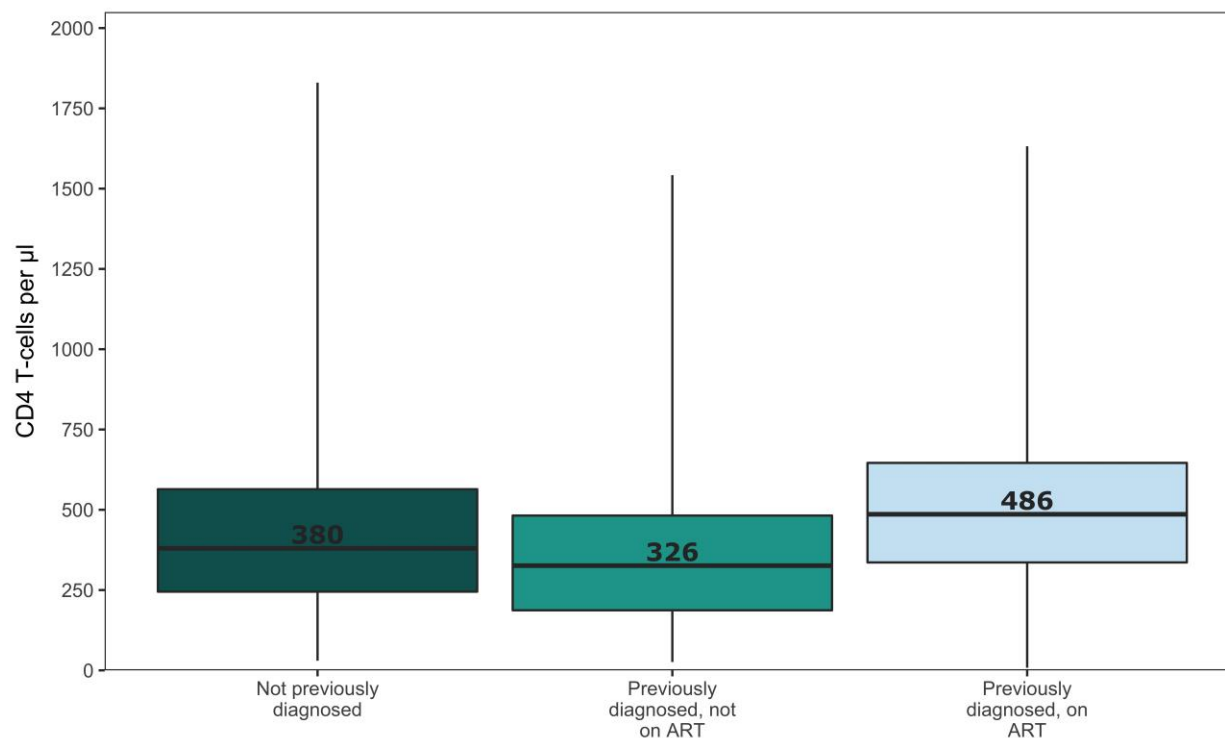


Table 3.3.A Annual HIV incidence

Annual incidence of HIV among persons aged 15-64, by sex and age, MPHIA 2015-2016

Age	Males		Females		Total	
	Percentage annual incidence	95% CI	Percentage annual incidence	95% CI	Percentage annual incidence	95% CI
15-24	0.05	(0.00, 0.19)	0.40	(0.04, 0.77)	0.23	(0.03, 0.43)
25-34	0.40	(0.00, 0.91)	0.87	(0.11, 1.63)	0.63	(0.19, 1.07)
35-49	0.49	(0.00, 1.09)	0.06	(0.00, 0.25)	0.28	(0.00, 0.57)
15-49	0.26	(0.04, 0.48)	0.46	(0.18, 0.75)	0.36	(0.19, 0.53)
15-64	0.26	(0.05, 0.47)	0.52	(0.22, 0.82)	0.39	(0.22, 0.57)

Table 3.3.B HIV prevalence by demographic characteristics: 15-64 years

Prevalence of HIV among persons age 15-64 years, by sex and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percentage HIV positive	Number	Percentage HIV positive	Number	Percentage HIV positive	Number
Residence						
Urban	10.8	2,683	17.7	3,750	14.2	6,433
Rural	7.9	4,525	11.3	6,229	9.7	10,754
Zone						
North	6.0	1,017	8.7	1,301	7.4	2,318
Central-East	3.8	1,160	6.2	1,341	4.9	2,501
Central-West	5.7	860	6.4	1,149	6.1	2,009
Lilongwe City	8.5	1,265	14.8	1,729	11.5	2,994
South-East	12.5	742	17.4	1,210	15.3	1,952
South-West	13.1	1,050	18.4	1,682	16.0	2,732
Blantyre City	14.0	1,114	21.8	1,567	17.7	2,681
Marital status						
Never married	1.6	2,611	3.5	1,997	2.4	4,608
Married or living together	11.6	4,230	11.3	6,311	11.4	10,541
Divorced or separated	18.6	304	22.8	1,150	21.7	1,454
Widowed	51.4	53	43.1	510	43.9	563
Education						
No education	10.7	353	16.5	1,032	14.8	1,385
Primary	9.1	3,963	11.9	5,994	10.6	9,957
Secondary	6.8	2,473	11.8	2,559	8.9	5,032
More than secondary	9.0	417	12.9	387	10.4	804
Religion						
Catholic	6.6	1,486	10.2	1,916	8.4	3,402
CCAP	7.9	1,422	10.4	1,875	9.2	3,297
Anglican	10.0	187	11.0	241	10.5	428
Seventh Day Adventist	9.2	484	14.0	746	11.7	1,230
Baptist	11.4	187	16.2	238	13.8	425
Other Christian	9.3	2,054	13.3	3,277	11.5	5,331
Muslim	6.7	632	14.7	925	11.1	1,557
Other	12.5	542	14.0	705	13.3	1,247
None	7.4	200	(12.5)*	49	8.4	249
Pregnancy status						
Currently pregnant	NA	NA	8.7	562	NA	NA
Not currently pregnant	NA	NA	12.9	9,292	NA	NA
Total 15-64	8.5	7,208	12.5	9,979	10.6	17,187

*Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.3.C HIV prevalence by demographic characteristics: 15-49 years

Prevalence of HIV among persons age 15-49 years, by sex and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percentage HIV positive	Number	Percentage HIV positive	Number	Percentage HIV positive	Number
Residence						
Urban	9.9	2,439	17.3	3,470	13.5	5,909
Rural	7.2	3,867	10.9	5,479	9.1	9,346
Zone						
North	4.9	894	8.8	1,157	6.8	2,051
Central-East	3.4	987	5.8	1,207	4.6	2,194
Central-West	5.0	735	5.7	1,009	5.3	1,744
Lilongwe City	7.6	1,159	14.1	1,607	10.6	2,766
South-East	11.9	627	16.6	1,051	14.5	1,678
South-West	12.2	900	18.8	1,472	15.8	2,372
Blantyre City	13.0	1,004	21.6	1,446	17.1	2,450
Marital status						
Never married	1.5	2,596	3.5	1,960	2.3	4,556
Married or living together	11.1	3,412	11.7	5,713	11.4	9,125
Divorced or separated	19.1	262	23.2	996	22.1	1,258
Widowed	(59.0)	29	53.0	269	53.7	298
Education						
No education	10.0	258	17.6	750	15.3	1,008
Primary	8.5	3,348	11.6	5,343	10.2	8,691
Secondary	6.0	2,326	11.1	2,481	8.1	4,807
More than secondary	8.0	373	12.6	371	9.7	744
Religion						
Catholic	6.1	1,298	9.7	1,687	7.9	2,985
CCAP	7.1	1,266	9.6	1,637	8.3	2,903
Anglican	10.3	165	11.5	215	10.9	380
Seventh Day Adventist	8.0	437	13.8	694	11.1	1,131
Baptist	10.3	163	17.6	218	13.9	381
Other Christian	8.2	1,789	13.0	2,971	10.9	4,760
Muslim	6.2	546	13.9	839	10.5	1,385
None	7.2	158	(10.8)*	44	7.9	202
Other	12.3	473	14.0	637	13.1	1,110
Pregnancy status						
Currently pregnant	NA	NA	8.7	562	NA	NA
Not currently pregnant	NA	NA	12.5	8,263	NA	NA
Total 15-49	7.8	6,306	12.1	8,949	10.0	15,255

*Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.3.D HIV prevalence by age

Prevalence of HIV among persons age 0-64 years, by sex and age, MPHIA 2015-2016

Age	Males		Females		Total	
	Percentage HIV positive	Number	Percentage HIV positive	Number	Percentage HIV positive	Number
0-17 months	0.0	230	0.7	266	0.4	496
18-59 months	1.7	664	0.9	707	1.4	1,371
5-9	1.4	1,057	1.8	1,144	1.6	2,201
10-14	2.0	1,054	2.2	1,043	2.1	2,097
Total 0-4	1.3	894	0.9	974*	1.1	1,868*
Total 0-14	1.5	3,005	1.5	3,161*	1.5	6,166*
15-19	0.9	1,497	2.0	1,646	1.5	3,143
20-24	2.3	1,181	5.2	1,934	3.8	3,115
25-29	4.7	938	13.6	1,511	9.3	2,449
30-34	12.1	870	17.5	1,425	14.9	2,295
35-39	14.5	765	22.1	1,097	18.4	1,862
40-44	18.6	609	24.6	785	21.7	1,394
45-49	22.1	446	20.3	551	21.2	997
50-54	17.5	355	16.4	469	16.9	824
55-59	14.5	295	16.1	326	15.4	621
60-64	10.6	252	13.9	235	12.4	487
Total 15-24	1.5	2,678	3.4	3,580	2.5	6,258
Total 15-49	7.8	6,306	12.1	8,949	10.0	15,255
Total 15-64	8.5	7,208	12.5	9,979	10.6	17,187

*Cell contains one more observation than the addition of the corresponding disaggregated age categories as there is one female who is known to be under 5 years of age but whose exact age is unknown.

Table 3.3.E Median CD4 count and prevalence of immunosuppressionAmong HIV-positive persons aged 15-64, median CD4 count and percentage with immunosuppression (<500 cells/ μ l), by sex, self-reported diagnosis and ART status, and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Males			Females			Total		
	Median (Q1, Q3)	Percentage <500 cells/ μ L	Number	Median (Q1, Q3)	Percentage <500 cells/ μ L	Number	Median (Q1, Q3)	Percentage <500 cells/ μ L	Number
Self-reported diagnosis and treatment status									
Not previously diagnosed	344 (233, 524)	73.0	219	407 (251, 602)	64.2	338	380 (245, 562)	68.3	557
Previously diagnosed, not on ART	283 (187, 426)	88.6	62	386 (186, 534)	69.5	111	326 (187, 482)	78.7	173
Previously diagnosed, on ART	398 (267, 544)	67.9	413	533 (381, 696)	44.2	1,038	486 (336, 646)	52.4	1,451
Missing	*	*	10	*	*	9	*	*	19
Residence									
Urban	355 (222, 515)	73.0	323	480 (305, 665)	52.4	732	424 (266, 613)	60.4	1,055
Rural	382 (251, 535)	70.3	381	503 (352, 674)	49.6	764	449 (307, 623)	57.7	1,145
Zone									
North	308 (176, 465)	78.2	67	439 (270, 602)	60.5	112	380 (207, 536)	67.8	179
Central-East	352 (298, 423)	(83.1)	40	419 (273, 626)	56.1	78	392 (288, 552)	66.5	118
Central-West	392 (233, 536)	67.2	55	536 (344, 682)	41.6	81	475 (302, 647)	53.3	136
Lilongwe City	358 (224, 580)	67.0	117	512 (338, 661)	48.6	280	450 (280, 633)	55.7	397
South-East	398 (249, 544)	70.2	104	501 (356, 673)	49.9	230	458 (304, 621)	57.4	334
South-West	399 (267, 544)	68.3	150	506 (368, 690)	48.5	346	468 (333, 644)	55.7	496
Blantyre City	361 (248, 519)	72.5	171	469 (312, 635)	54.1	369	418 (278, 590)	61.7	540
Marital status									
Never married	419 (260, 624)	55.7	55	445 (283, 671)	53.3	100	423 (275, 662)	54.3	155
Married or living together	381 (260, 531)	71.0	558	502 (359, 677)	49.8	845	442 (297, 608)	60.0	1,403
Divorced or separated	293 (189, 482)	77.2	62	468 (317, 660)	53.3	307	434 (289, 618)	58.3	369
Widowed	235 (119, 397)	(86.2)	29	512 (339, 660)	47.1	242	476 (323, 639)	51.6	271

Education									
No education	431 (300, 609)	(60.8)	44	466 (317, 633)	54.9	195	461 (316, 631)	56.1	239
Primary	377 (234, 522)	72.5	425	508 (359, 685)	48.3	876	451 (298, 627)	58.0	1,301
Secondary	373 (262, 545)	70.5	199	475 (312, 674)	53.6	370	420 (285, 595)	61.1	569
More than secondary	366 (220, 515)	(68.0)	36	447 (307, 605)	52.7	53	385 (278, 600)	60.9	89
Religion									
Catholic	410 (280, 587)	59.9	125	523 (366, 693)	45.7	245	486 (328, 661)	51.1	370
CCAP	378 (273, 531)	70.2	133	482 (335, 646)	52.7	264	423 (294, 604)	60.2	397
Anglican	*	*	14	473 (382, 585)	(52.8)	28	478 (404, 602)	(55.6)	42
Seventh Day Adventist	337 (220, 437)	(82.1)	49	498 (328, 679)	49.8	130	426 (293, 591)	61.9	179
Baptist	*	*	21	440 (322, 598)	(58.1)	44	385 (220, 563)	65.9	65
Other Christian	372 (246, 522)	72.5	223	507 (340, 688)	49.0	507	452 (299, 631)	57.7	730
Muslim	303 (194, 455)	86.2	51	465 (300, 625)	55.7	152	423 (262, 555)	64.0	203
None	*	*	16	*	*	10	356 (204, 522)	(64.3)	26
Other	393 (248, 587)	67.1	71	499 (323, 709)	48.9	115	411 (297, 651)	57.7	186
Age									
15-19	*	*	14	516 (313, 738)	(45.8)	38	514 (298, 736)	47.1	52
20-24	405 (284, 545)	(62.3)	27	506 (341, 736)	49.8	131	474 (315, 701)	53.4	158
25-29	364 (250, 496)	74.8	48	483 (340, 661)	56.0	215	456 (283, 633)	60.6	263
30-34	341 (214, 500)	74.7	107	511 (337, 698)	47.8	291	437 (284, 615)	58.2	398
35-39	409 (265, 587)	64.6	121	486 (331, 637)	51.8	294	465 (298, 612)	56.7	415
40-44	337 (220, 527)	71.7	126	503 (365, 601)	48.5	213	444 (299, 576)	58.1	339
45-49	394 (279, 526)	68.1	106	507 (330, 673)	48.1	134	418 (314, 620)	58.2	240
50-54	326 (232, 449)	78.3	69	432 (300, 640)	57.9	90	400 (257, 570)	68.1	159
55-59	361 (224, 511)	74.5	51	514 (370, 599)	44.1	57	421 (295, 578)	58.0	108
60-64	371 (225, 457)	(85.9)	35	540 (378, 724)	(44.5)	33	424 (348, 644)	61.4	68
Total 15-49	381 (248, 536)	69.4	549	498 (337, 673)	50.4	1,316	450 (298, 625)	57.5	1,865
Total 15-64	379 (240, 531)	71.0	704	497 (339, 673)	50.4	1,496	445 (297, 621)	58.4	2,200

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

3.4 90-90-90 Indicators

In order to bring the HIV epidemic under control, UNAIDS has set the ambitious target referred to as 90-90-90: by 2020, 90% of all persons living with HIV will know their HIV status; 90% of all persons with diagnosed HIV infection will receive sustained antiretroviral therapy (ART); and 90% of all persons receiving ART will have viral suppression (UNAIDS, 2014).

Self-Reported HIV Testing

HIV testing is an important preventive strategy and constitutes the entry point into the care and treatment cascade. Nearly two-thirds (65.5%) of males and 81.6% of females aged 15-64 reported having ever tested for HIV and receiving their test results. For both males and females, about one-third tested for HIV in the year preceding the survey (32.2% among males and 39.4% among females; Tables 3.4.A and 3.4.B).

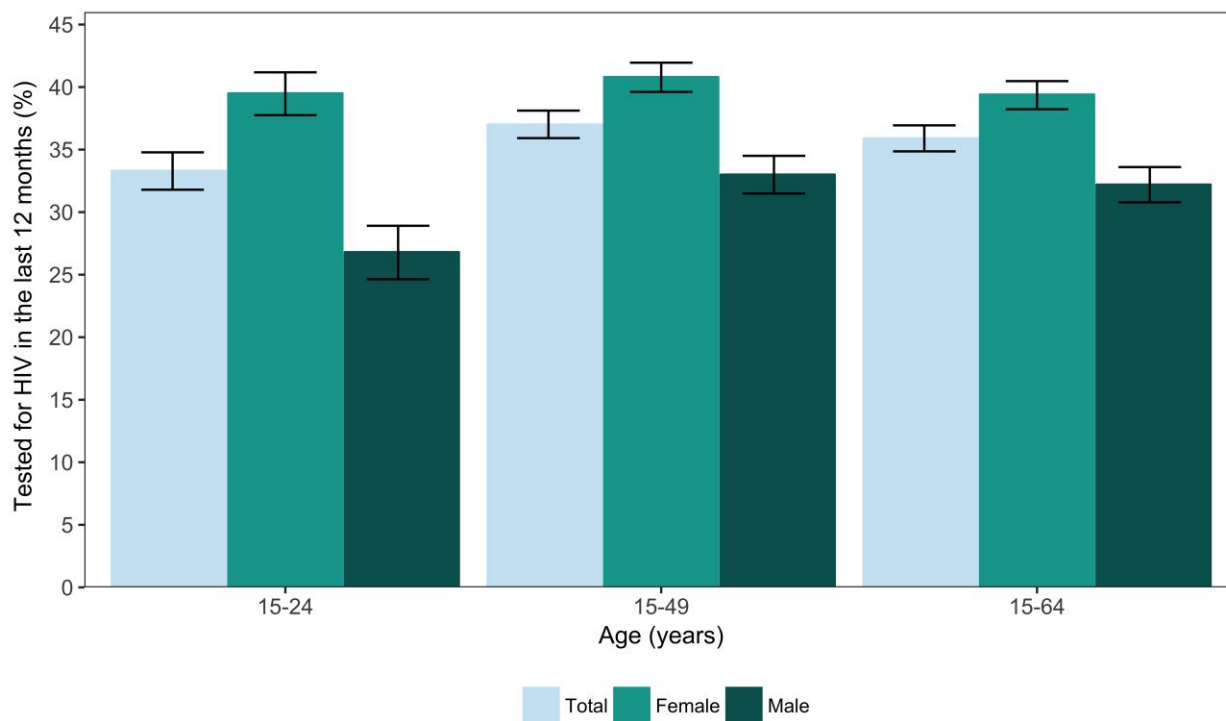
Among males of most age groups, over two-thirds reported ever testing for HIV and receiving their results; however, only 33.2% of males aged 15-19 reported ever testing for HIV. The percentage of males testing for HIV and receiving results in the year preceding the survey ranged from 17.1% among 15- to 19-year-olds to 42.2% among 25- to 29-year-olds. Among females, 47.2% of 15- to 19-year-olds had ever been tested for HIV and received results, compared to over 90.0% among females aged 20-44. Among older females, percentages ever tested ranged from 59.0% among 60- to 64-year-olds to 76.8% among 50- to 54-year-olds. About one-half of women aged 20-24 and 25-29 (52.5% and 49.6%, respectively) were tested for HIV in the year preceding the survey (Tables 3.4.A and 3.4.B; Figure 3.4.A).

There was variation in lifetime and recent HIV testing by education status. Among males with more than secondary education, 82.8% reported having ever tested for HIV and receiving their results, compared to 63.3% of males with no education. Among females, percentages ever tested for HIV and testing for HIV in the year preceding the survey were highest among those with more than secondary education (89.1% and 43.9%, respectively; Tables 3.4.A and 3.4.B).

Among males, about three-quarters of those who were married or cohabiting and divorced or separated (77.9% and 72.2%, respectively) reported ever testing for HIV. Percentages of testing were even higher among females: 92.1% of married or cohabiting females and 90.6% of divorced or separated females reported ever testing for HIV. Among both males and females, less than half of those who were never married had ever been tested (44.1% and 46.2%, respectively; Tables 3.4.A and 3.4.B).

Around 90% of those testing positive in the MPHIA survey reported ever testing for HIV and receiving their results (88.0% among males and 94.7% among females). Among those testing negative in MPHIA, 63.0% of males and 79.0% of females reported ever testing for HIV. Among those who were not tested in the MPHIA survey, 40.8% among males and 53.7% among females reported having tested for HIV in the year preceding the survey and receiving their results (Tables 3.4.A and 3.4.B).

Figure 3.4.A Self-reported HIV testing in the last 12 months, by sex and age



Self-Reported HIV Treatment Status

Among HIV-positive adults aged 15-64, one-third (32.4%) of the males and one-quarter (24.1%) of the females were unaware of their HIV-positive status. Over half (58.2%) of HIV-positive males were aware of their status and on ART, while 69.5% of HIV-positive females were on ART. Among urban HIV-positive males aged 15-64, 40.0% were unaware of their HIV status, compared to 29.6% among those in rural areas. Awareness of HIV status among females did not vary by residence (25.7% aware among those residing in urban areas and 23.6% among those in rural areas; Tables 3.4.C and 3.4.D).

Among HIV-positive males, the percentage of those who were unaware of their HIV status ranged from 66.7% among 20- to 24-year-olds to 14.4% among 60- to 64-year-olds. Among HIV-positive females, the percentage unaware of their HIV status ranged from 58.3% among 15- to 19-year-olds to 14.2% among 40- to 44-year-olds. The percentage of HIV-positive males who reported being on ART ranged from 23.1% among 20- to 24-year-olds to 75.0% among 60- to 64-year-olds, while the percentage of HIV-positive females who reported being on ART ranged from 37.4% among 15- to 19-year-olds to 79.9% among 40- to 44-year-olds (Tables 3.4.C and 3.4.D).

Among married and cohabiting HIV-positive adults aged 15-64, 59.4% of males and 69.5% of females were aware of their status and on ART (Tables 3.4.C and 3.4.D).

Viral Load Suppression

Viral load suppression is a key indicator of treatment success in HIV-positive individuals. In MPHIA, VLS was defined as viral load less than 1,000 HIV RNA copies per ml. Overall, 68.3% of HIV-positive persons aged 15-64 had HIV VLS (60.9% among males and 73.1% among females). The proportion with viral suppression was highest among those who reported being previously diagnosed and on ART (91.2%) and lowest among those who reported to be previously diagnosed but not on ART (15.9%). About one-quarter (27.5%) of HIV-positive persons who reported that they were not previously diagnosed had VLS (Table 3.4.E).

Less than one-half (47.7%) of never-married HIV-positive persons had VLS, while 67.3% of married or cohabiting persons, 71.3% of divorced or separated persons, and 81.3% of widowed persons were virally suppressed (Table 3.4.E).

Among HIV-positive persons aged 0-64, the prevalence of VLS ranged from 39.3% among 15- to 19-year-olds to 78.8% among 60- to 64-year-olds. Viral load suppression prevalence was less than 50% among males younger than 30 years, while among males aged 30-64, VLS prevalence ranged from 51.6% among males aged 30-34 to 77.6% among males aged 50-54. Among HIV-positive females, prevalence of VLS was less than 50% among those aged 15-19, but higher than 70% among females age 30 years and older (Table 3.4.F; Figure 3.4.B).

By zone, the percentage of HIV-positive adults aged 15-64 with VLS ranged from 59.5% in Blantyre City to 70.6% in the Central-West zone and 70.7% in the South-East zone. Among females, the prevalence of VLS was higher than 70% in all zones (71.0% in North zone to 77.1% in South-East zone), except in Blantyre City (63.1%), where HIV prevalence was highest. Among males, percentages of VLS in Lilongwe City and Blantyre City were similarly low (53.7% and 54.3%, respectively; Table 3.4.E; Figure 3.4.C and 3.4.D).

Figure 3.4.B Viral load suppression (VLS) prevalence among HIV-positive persons aged 0-64, by sex and age

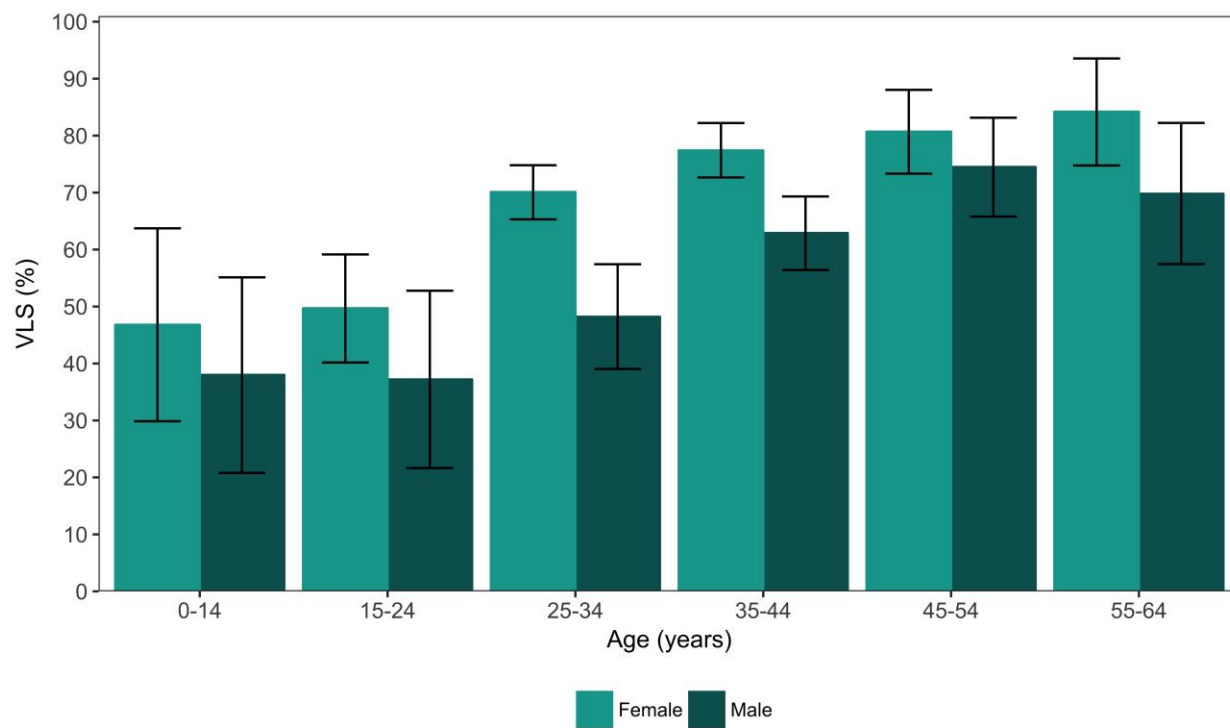


Figure 3.4.C Viral load suppression (VLS) prevalence among HIV-positive adults aged 15-64, by zone

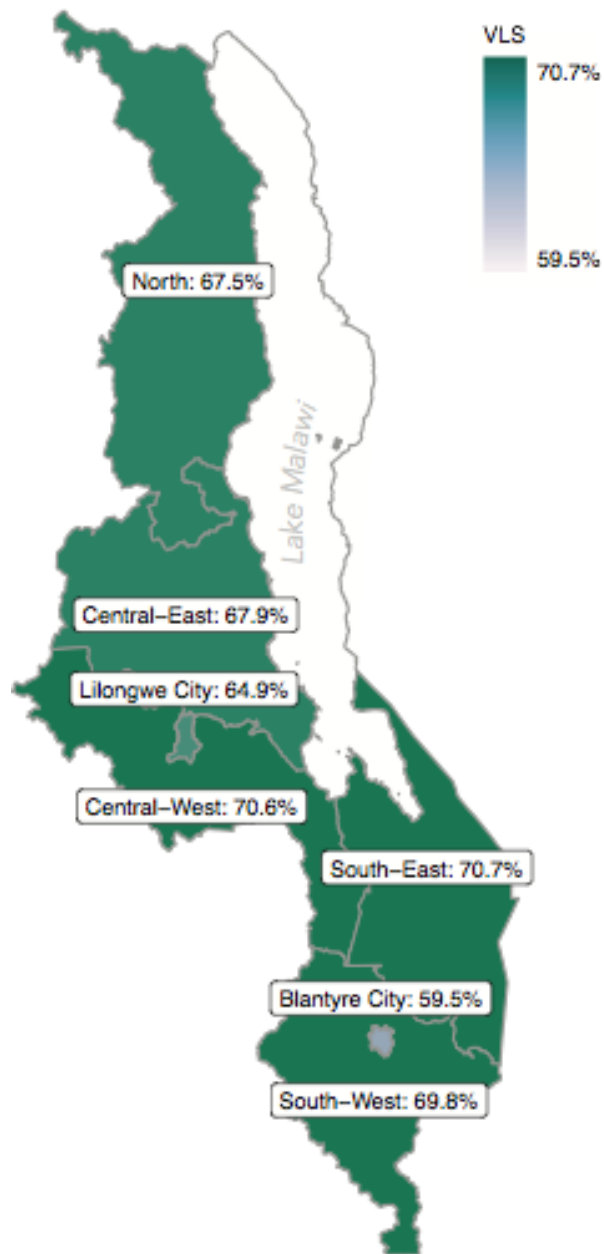
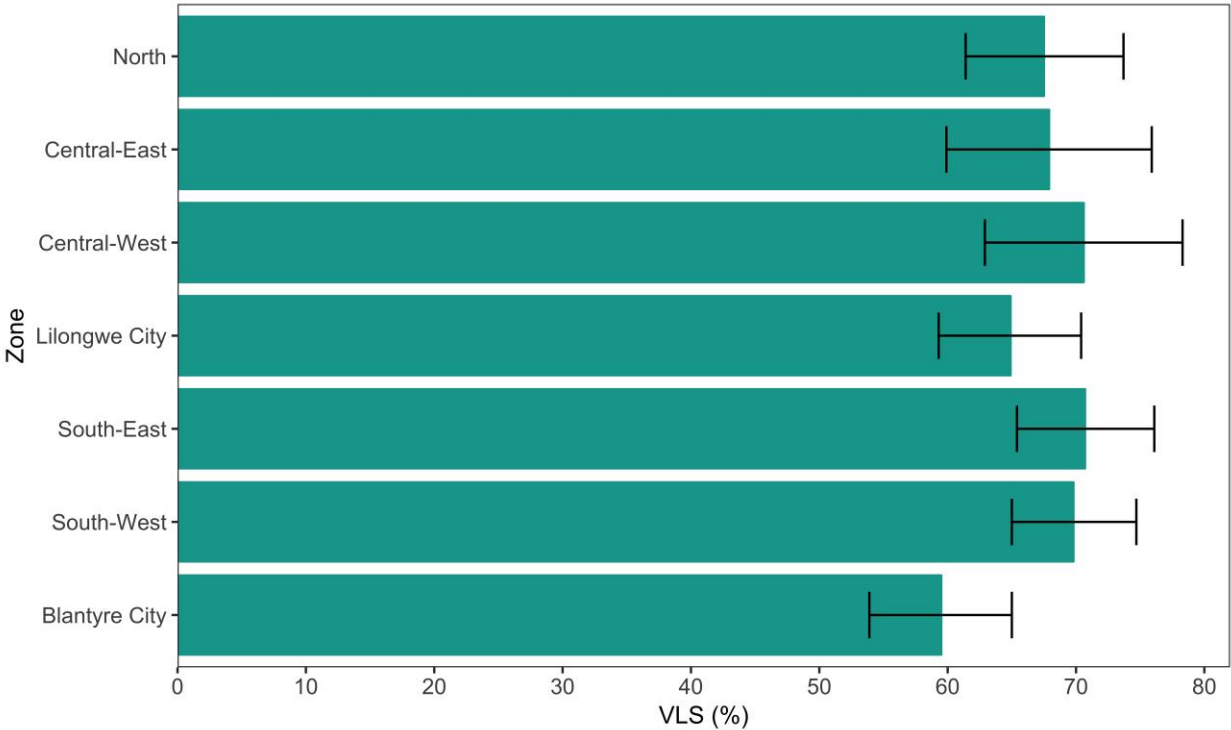


Figure 3.4.D Viral load suppression (VLS) among HIV-positive adults aged 15-64, by zone



Overall 90-90-90 Targets

Key Findings

Diagnosed: In Malawi, 72.7% of those persons living with HIV aged 15-64 reported knowing their HIV status: 75.9% of HIV-positive females and 67.6% of HIV-positive males reported that they know their HIV status.

On treatment: Among those persons living with HIV aged 15-64 who reported knowing their HIV status, 89.6% reported current use of ART: 91.6% of HIV-positive females and 86.1% of HIV-positive males who reported that they know their HIV status reported current use of ART.

Virally suppressed: Among those persons living with HIV aged 15-64 who reported current use of ART, 91.2% were virally suppressed: 92.1% of HIV-positive females and 89.5% of HIV-positive males who reported current use of ART were virally suppressed.

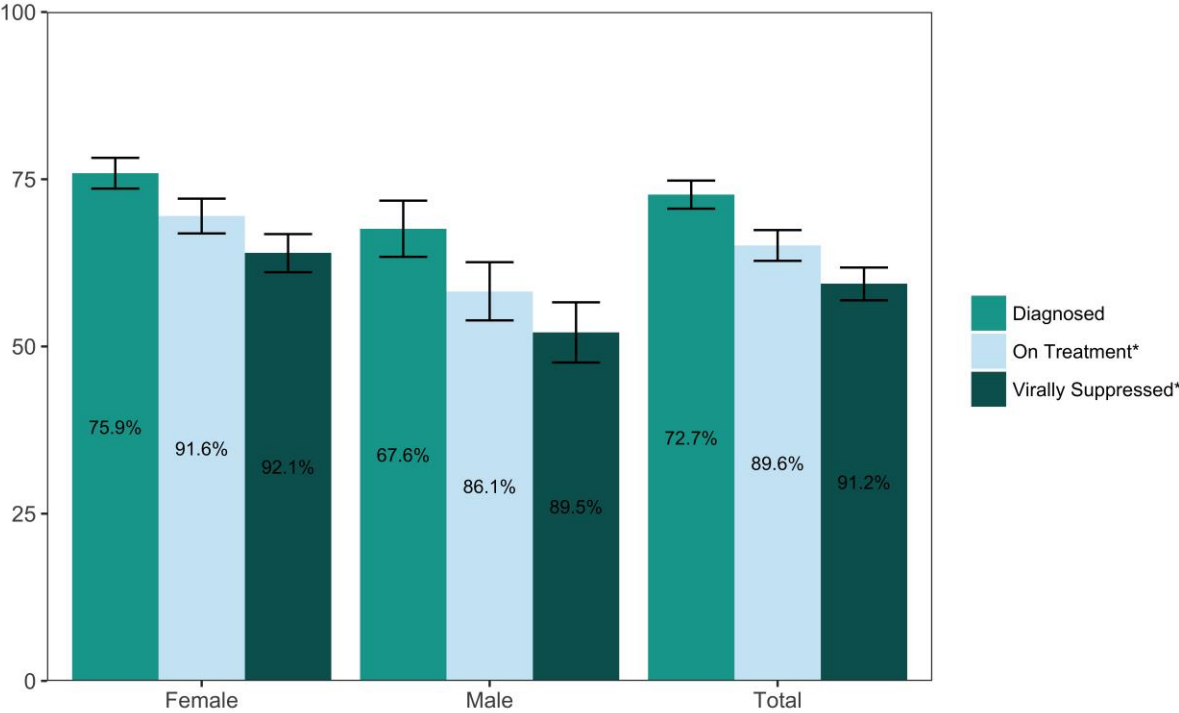
Malawi has nearly achieved the second and achieved the third of the UNAIDS 90-90-90 targets: 89.6% of HIV-positive adults aged 15-64 who know their status reported being on ART, and 91.2% of those on ART were virally suppressed. However, achievement in diagnosis is below the first target, with 72.7% of HIV-positive persons aged 15-64 reporting being aware of their HIV-positive status (Table 3.4.G, Figure 3.4.E).

Among HIV-positive females, 75.9% of 15- to 64-year-olds reported knowing their status, and knowledge of status was highest (82.7%) among 35- to 49-year-olds. HIV-positive males followed a comparable pattern, though with lower coverage of diagnosis throughout the age distribution. Among 15- to 64-year-old males, 67.6% reported knowing their HIV status, and knowledge of status was highest (73.5%) among 35- to 49-year-old males. Across both sexes, only 49.8% of HIV-positive 15- to 24-year-olds were aware of their status (Table 3.4.G).

Among persons aged 15-64 who reported being aware of their HIV-positive status, 91.6% of females and 86.1% of males reported being on ART. The proportion of diagnosed females who reported being on ART ranged from 84.8% among 15- to 24-year-olds to 93.3% among 35- to 49-year-olds. Among males who reported their HIV-positive status, 89.2% of 35- to 49-year-olds reported being on ART; however, 71.9% of 25- to 34-year-old males reported being on ART (Table 3.4.G).

Viral suppression prevalence among adults aged 15-64 reporting ART use was 91.2% overall; however, among young adults aged 15-24, only 78.8% were virally suppressed (Table 3.4.G).

Figure 3.4.E: Progress toward the 90-90-90 targets among HIV-positive adults aged 15-64, by sex



*Inset numbers are conditional percentages. See Key Findings box above.

Table 3.4.A HIV testing: Males

Percentage of males aged 15-64 who have ever received HIV testing and received their test results, and percentage who received HIV testing and received their test results in the past 12 months, by result of MPHIA HIV test and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Percentage who ever received HIV testing and received their results	Percentage who received HIV testing in the past 12 months and received their results	Number
Result of MPHIA HIV test			
HIV positive	88.0	27.6	702
HIV negative	63.0	31.2	6,422
Not tested	68.4	40.8	1,056
Residence			
Urban	66.8	33.1	3,129
Rural	65.2	32.0	5,051
Zone			
North	68.6	34.0	1,095
Central-East	61.1	28.3	1,253
Central-West	63.7	33.1	944
Lilongwe City	67.4	34.4	1,447
South-East	66.9	32.0	894
South-West	66.4	32.8	1,205
Blantyre City	68.8	31.8	1,342
Marital status			
Never married	44.1	23.3	2,985
Married or living together	77.9	37.3	4,790
Divorced or separated	72.2	33.4	339
Widowed	81.7	41.7	56
Education			
No education	63.3	27.5	407
Primary	61.7	29.7	4,410
Secondary	70.9	37.2	2,820
More than secondary	82.8	36.7	541
Religion			
Catholic	66.0	33.5	1,624
CCAP	66.6	31.8	1,624
Anglican	61.0	28.0	206
Seventh Day Adventist	69.0	35.8	556
Baptist	64.0	32.2	205
Other Christian	66.0	32.9	2,336
Muslim	63.7	33.4	742
Other	64.4	25.7	630
None	59.2	26.8	240
Age			
15-19	33.2	17.1	1,668
20-24	66.2	38.7	1,366
25-29	78.3	42.2	1,104
30-34	82.2	39.6	992
35-39	78.3	37.7	867
40-44	77.5	33.7	695
45-49	74.7	29.1	498
50-54	70.1	25.2	390
55-59	67.0	24.9	326
60-64	65.2	25.9	274
Total 15-24	48.0	26.8	3,034
Total 15-49	65.3	33.0	7,190
Total 15-64	65.5	32.2	8,180

Table 3.4.B HIV testing: Females

Percentage of females aged 15-64 who have ever received HIV testing and received their test results, and percentage who received HIV testing and received their test results in the past 12 months, by result of MPHIA HIV test and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Percentage who ever received HIV testing and received their results	Percentage who received HIV testing in the past 12 months and received their results	Number
Result of MPHIA HIV test			
HIV positive	94.7	20.5	1,503
HIV negative	79.0	39.7	8,444
Not tested	84.6	53.7	1,380
Residence			
Urban	83.3	41.1	4,230
Rural	81.2	38.9	7,097
Zone			
North	83.6	39.8	1,418
Central-East	76.6	35.9	1,486
Central-West	80.3	39.7	1,299
Lilongwe City	83.7	44.0	1,919
South-East	82.5	39.8	1,468
South-West	83.0	38.9	1,920
Blantyre City	84.1	40.8	1,817
Marital status			
Never married	46.2	25.1	2,236
Married or living together	92.1	44.8	7,229
Divorced or separated	90.6	41.5	1,280
Widowed	82.4	27.9	570
Education			
No education	81.5	34.4	1,240
Primary	81.3	39.5	6,732
Secondary	81.5	41.7	2,892
More than secondary	89.1	43.9	456
Religion			
Catholic	79.6	37.6	2,130
CCAP	80.3	39.4	2,120
Anglican	77.0	39.6	275
Seventh Day Adventist	81.8	40.9	832
Baptist	82.6	42.5	268
Other Christian	83.8	39.8	3,729
Muslim	80.9	39.2	1,101
Other	81.3	40.1	800
None	82.7	34.4	63
Age			
15-19	47.2	28.6	1,849
20-24	92.8	52.5	2,241
25-29	97.7	49.6	1,752
30-34	96.5	43.8	1,606
35-39	94.5	39.5	1,232
40-44	91.8	36.2	868
45-49	85.1	29.7	625
50-54	76.8	29.2	525
55-59	69.3	28.7	360
60-64	59.0	23.1	269
Total 15-24	67.9	39.5	4,090
Total 15-49	83.0	40.8	10,173
Total 15-64	81.6	39.4	11,327

Table 3.4.C HIV treatment status: Males

Percent distribution of HIV-positive males aged 15-64 by self-reported HIV treatment status and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Unaware of HIV status	Aware of HIV status		Total	Number
		Not on ART	On ART		
Residence					
Urban	40.0	9.0	51.1	100.0	322
Rural	29.6	9.6	60.8	100.0	383
Zone					
North	27.3	3.2	69.6	100.0	67
Central-East	(35.8)	(7.1)	(57.0)	100.0	45
Central-West	33.4	13.0	53.6	100.0	55
Lilongwe City	39.2	10.7	50.1	100.0	117
South-East	29.8	11.0	59.2	100.0	102
South-West	30.4	8.2	61.4	100.0	148
Blantyre City	38.7	10.7	50.6	100.0	171
Marital status					
Never married	57.7	5.6	36.7	100.0	56
Married or living together	31.0	9.6	59.4	100.0	560
Divorced or separated	33.1	8.9	58.0	100.0	60
Widowed	(11.9)	(13.8)	(74.3)	100.0	29
Education					
No education	(43.7)	(8.7)	(47.6)	100.0	43
Primary	31.6	9.7	58.7	100.0	424
Secondary	31.1	9.5	59.4	100.0	200
More than secondary	(33.7)	(5.1)	(61.3)	100.0	38
Religion					
Catholic	33.5	6.1	60.4	100.0	126
CCAP	36.1	9.4	54.5	100.0	136
Anglican	*	*	*	*	14
Seventh Day Adventist	(41.3)	(7.5)	(51.2)	100.0	48
Baptist	*	*	*	*	22
Other Christian	31.4	9.4	59.2	100.0	220
Muslim	25.0	11.1	64.0	100.0	51
None	*	*	*	*	16
Other	29.0	9.9	61.1	100.0	71
Age					
15-19	*	*	*	*	15
20-24	(66.7)	(10.2)	(23.1)	100.0	29
25-29	(53.2)	(17.6)	(29.3)	100.0	48
30-34	37.4	15.5	47.1	100.0	107
35-39	32.4	8.5	59.2	100.0	120
40-44	27.7	5.3	66.9	100.0	125
45-49	18.9	10.1	71.1	100.0	106
50-54	24.3	1.9	73.8	100.0	70
55-59	25.0	4.2	70.7	100.0	50
60-64	(14.4)	(10.7)	(75.0)	100.0	35
Total 15-49	34.5	10.6	54.9	100.0	550
Total 15-64	32.4	9.4	58.2	100.0	705

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.4.D HIV treatment status: Females

Percent distribution of HIV-positive females aged 15-64 by self-reported HIV treatment status and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Aware of HIV status			Total	Number
	Unaware of HIV status	Not on ART	On ART		
Residence					
Urban	25.7	7.6	66.7	100.0	731
Rural	23.6	6.0	70.5	100.0	772
Zone					
North	27.3	4.2	68.5	100.0	114
Central-East	32.0	6.8	61.1	100.0	84
Central-West	27.6	5.3	67.1	100.0	81
Lilongwe City	24.7	9.6	65.7	100.0	279
South-East	22.1	5.5	72.4	100.0	231
South-West	19.9	6.8	73.3	100.0	345
Blantyre City	28.2	8.2	63.6	100.0	369
Marital status					
Never married	46.1	7.8	46.1	100.0	99
Married or living together	25.0	5.5	69.5	100.0	853
Divorced or separated	22.0	9.7	68.3	100.0	308
Widowed	16.0	4.9	79.2	100.0	241
Education					
No education	19.4	5.8	74.8	100.0	196
Primary	22.5	7.0	70.5	100.0	884
Secondary	33.9	5.5	60.6	100.0	369
More than secondary	18.4	2.4	79.2	100.0	52
Religion					
Catholic	20.3	5.3	74.4	100.0	246
CCAP	27.6	4.4	67.9	100.0	267
Anglican	(22.9)	(4.9)	(72.2)	100.0	29
Seventh Day Adventist	24.5	7.6	67.9	100.0	132
Baptist	(18.5)	(15.3)	(66.2)	100.0	44
Other Christian	22.8	6.7	70.5	100.0	509
Muslim	28.8	7.0	64.2	100.0	152
None	*	*	*	*	10
Other	27.3	3.9	68.7	100.0	113
Age					
15-19	(58.3)	(4.3)	(37.4)	100.0	37
20-24	38.6	10.2	51.2	100.0	132
25-29	30.2	9.3	60.5	100.0	217
30-34	25.5	5.4	69.1	100.0	293
35-39	19.4	6.6	74.0	100.0	293
40-44	14.2	5.9	79.9	100.0	215
45-49	18.3	3.1	78.6	100.0	132
50-54	27.4	4.1	68.5	100.0	91
55-59	14.6	8.2	77.2	100.0	58
60-64	(18.2)	(3.2)	(78.6)	100.0	35
Total 15-49	24.6	6.6	68.8	100.0	1,319
Total 15-64	24.1	6.4	69.5	100.0	1,503

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.4.E Viral load suppression prevalence by demographic characteristics

Among HIV-positive persons aged 15-64, percentage with viral load suppression (viral load < 1,000 copies/ml), by sex, self-reported diagnosis, and ART status, and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percentage VLS	Number	Percentage VLS	Number	Percentage VLS	Number
Self-reported diagnosis and treatment status						
Not previously diagnosed	22.0	229	32.2	350	27.5	579
Previously diagnosed, not on ART	12.0	61	19.6	111	15.9	172
Previously diagnosed, on ART	89.5	413	92.1	1,040	91.2	1,453
Missing	*	9	*	6	*	15
Residence						
Urban	53.6	325	68.6	734	62.8	1,059
Rural	63.6	387	74.7	773	70.4	1,160
Zone						
North	62.6	67	71.0	113	67.5	180
Central-East	(60.3)	45	72.7	84	67.9	129
Central-West	66.3	56	74.3	82	70.6	138
Lilongwe City	53.7	119	71.9	279	64.9	398
South-East	59.8	104	77.1	231	70.7	335
South-West	63.5	150	73.5	346	69.8	496
Blantyre City	54.3	171	63.1	372	59.5	543
Marital status						
Never married	42.2	54	51.4	100	47.7	154
Married or living together	62.2	567	72.0	853	67.3	1,420
Divorced or separated	59.9	62	74.3	309	71.3	371
Widowed	(69.5)	29	82.8	243	81.3	272
Education						
No education	(53.5)	44	73.6	197	69.5	241
Primary	60.1	429	74.6	886	68.8	1,315
Secondary	63.1	202	67.0	369	65.2	571
More than secondary	(74.1)	37	72.4	53	73.3	90
Religion						
Catholic	58.9	128	77.5	246	70.2	374
CCAP	57.6	136	71.7	266	65.6	402
Anglican	*	14	(84.5)	29	(81.1)	43
Seventh Day Adventist	(49.6)	48	75.9	132	66.3	180
Baptist	*	22	(61.7)	44	55.3	66
Other Christian	64.7	225	73.1	511	70.0	736
Muslim	66.6	51	70.0	153	69.1	204
Other	65.4	71	68.3	115	66.9	186
None	*	16	*	10	(60.2)	26
Total 15-64	60.9	712	73.1	1,507	68.3	2,219

Table 3.4.F Viral load suppression prevalence by age

Among HIV-positive persons aged 0-64 years, percentage with viral load suppression (viral load <1,000 copies/ml), by sex and age, MPHIA 2015-2016

Age	Males		Females		Total	
	Percentage VLS	Number	Percentage VLS	Number	Percentage VLS	Number
0-4	*	11	*	7	*	18
5-9	*	14	*	23	(51.8)	37
10-14	*	21	*	20	(49.2)	41
15-19	*	15	(35.6)	38	39.3	53
20-24	(31.8)	28	56.2	133	49.2	161
25-29	(41.2)	49	64.7	217	58.9	266
30-34	51.6	110	75.1	292	65.9	402
35-39	61.1	121	75.1	295	69.8	416
40-44	64.6	127	80.1	215	73.7	342
45-49	72.7	106	82.1	133	77.3	239
50-54	77.6	70	78.3	91	78.0	161
55-59	71.2	51	82.7	58	77.5	109
60-64	(67.4)	35	(86.3)	35	78.8	70
Total 15-24	(37.2)	43	49.7	171	46.0	214
Total 15-49	58.1	556	71.7	1,323	66.6	1,879
Total 15-64	60.9	712	73.1	1,507	68.3	2,219

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.4.G 90-90-90 targets: Conditional percentages

90-90-90 targets among people living with HIV aged 15-64, by sex and age, MPHIA 2015-2016

Age	Diagnosed					
	Males		Females		Total	
	Percentage who self-report being HIV positive	Number	Percentage who self-report being HIV positive	Number	Percentage who self-report being HIV positive	Number
15-24	(37.1)	44	55.3	169	49.8	213
25-34	57.6	155	72.2	510	67.5	665
35-49	73.5	351	82.7	640	78.8	991
15-49	65.5	550	75.4	1,319	71.7	1,869
15-64	67.6	705	75.9	1,503	72.7	2,208
Age	On treatment					
	Among males who self-report being HIV positive		Among females who self-report being HIV positive		Total	
	Percentage who self-report ART	Number	Percentage who self-report ART	Number	Percentage who self-report ART	Number
15-24	*	16	84.8	97	82.5	113
25-34	71.9	81	89.9	372	85.0	453
35-49	89.2	255	93.3	535	91.7	790
15-49	83.8	352	91.3	1,004	88.7	1,356
15-64	86.1	475	91.6	1,151	89.6	1,626
Age	Virally suppressed					
	Among males who self-report ART		Among females who self-report ART		Total	
	Percentage virally suppressed	Number	Percentage virally suppressed	Number	Percentage virally suppressed	Number
15-24	*	13	79.6	83	78.8	96
25-34	91.1	56	94.1	330	93.4	386
35-49	89.3	226	91.6	492	90.7	718
15-49	89.1	295	91.5	905	90.7	1,200
15-64	89.5	413	92.1	1,040	91.2	1,453

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

3.5 Prevention of Mother-to-Child Transmission of HIV

Key Findings

99.4% of women aged 15-49 attended at least one antenatal care visit for their most recent pregnancy during the three years prior to the survey.

97.2% of all women aged 15-49 who gave birth during the 12 months preceding the survey knew their HIV status.

97.9% of HIV-positive women aged 15-49 who gave birth during the 12 months preceding the survey received ARVs.

Among women aged 15-49 who gave birth during the three years preceding the survey, the percentage who attended at least one antenatal care (ANC) visit for their most recent birth was 99.4%, with very little variation across demographic characteristics (Table 3.5.A).

Among women aged 15-49 who gave birth during the 12 months preceding the survey, 97.2% reported knowing their HIV status. Over 90% of these women reported being tested for HIV and receiving their result during ANC for this pregnancy (2.3% reported testing positive and 89.7% reported testing negative), while 5.3% of them reported that they already knew they were HIV positive. In urban areas, 7.3% already knew their HIV-positive status, compared to 4.9% in rural areas. A higher percentage of women over age 30 than those younger already knew that they were HIV positive: 8.3% among 35- to 39-year-olds and 10.9% among 40- to 44-year-olds, in contrast to 2.1% among 15- to 19-year-olds and 5.7% among 25- to 29-year-olds. Among women aged 15-49 who gave birth during the 12 months preceding the survey, 4.3% in Blantyre City and 4.2% in Lilongwe reported learning about their HIV-positive status as a result of ANC testing in comparison to lower percentages in the other five zones (from 0.0% in Central-West to 3.6% in South-East (Table 3.5.B).

Among self-reported HIV-positive women 15-49 years who gave birth within the 12 months preceding the survey, 97.9% reported receiving ARVs during pregnancy: 40.3% were newly initiated on ARVs during pregnancy or during labor and delivery, while 57.7% were already taking ARVs at the time of their first ANC visit for the pregnancy (Table 3.5.C).

Among infants born in the three years preceding the survey to women who self-reported being HIV positive during the corresponding pregnancy (diagnosed before or at any time during it), about half (49.4%) received an HIV virologic test within 2 months of birth, while 29.3% received a test within 2 to 12 months of birth, according to mother's report (Table 3.5.D).

Among women aged 15-49 who gave birth within the three years preceding the survey, over 90% were currently breastfeeding their last-born children younger than 18 months. Current breastfeeding decreased to 73.6% among last-born children aged 18-23 months and to 17.5% among last-born children aged 24-36 months. For children last-born to women aged 15-49 in the three years preceding the survey, current breast feeding was reported for 56.7% of those whose mothers tested HIV positive during the survey, and for 67.9% of those whose mothers tested HIV negative (Table 3.5.E).

Table 3.5.A Antenatal care

Among women aged 15-49 who delivered in the three years preceding the survey, percentage who attended at least one antenatal care (ANC) visit for her most recent birth, by selected demographic characteristics, MPHIA 2015-2016

Characteristic	Percentage who attended at least one ANC visit	Number
Residence		
Urban	99.3	1,185
Rural	99.5	2,412
Zone		
North	99.8	451
Central-East	99.5	510
Central-West	99.4	461
Lilongwe City	99.4	565
South-East	99.6	528
South-West	99.3	601
Blantyre City	98.3	481
Marital status		
Never married	99.3	178
Married or living together	99.6	2,990
Divorced or separated	98.4	388
Widowed	(97.4)	40
Education		
No education	98.1	291
Primary	99.5	2,338
Secondary	99.8	872
More than secondary	100.0	95
Religion		
Catholic	99.9	553
CCAP	100.0	581
Anglican	100.0	83
Seventh Day Adventist	100.0	257
Baptist	100.0	92
Other Christian	99.1	1,332
Muslim	99.1	413
None	*	20
Other	98.8	263
Age		
15-19	99.6	323
20-24	99.7	1,217
25-29	99.5	839
30-34	99.8	685
35-39	98.2	364
40-44	98.4	125
45-49	(98.2)	44
Total 15-49	99.4	3,597

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.5.B Prevention of mother-to-child transmission of HIV: Known HIV status

Among women aged 15-49 who gave birth within the past 12 months, percentage who were tested for HIV during antenatal care and received their results or who already knew they were HIV positive, by selected demographic characteristics, MPHIA 2015-2016

Characteristic	Tested for HIV and received result		Percentage who already knew they were HIV positive	Total percentage with known HIV status	Number of women who delivered within the past 12 months
	Percentage who tested HIV positive	Percentage who tested HIV negative			
Residence					
Urban	2.7	88.7	7.3	98.7	431
Rural	2.2	89.8	4.9	96.9	853
Zone					
North	2.3	94.6	1.7	98.7	167
Central-East	1.4	93.5	0.7	95.6	186
Central-West	0.0	93.7	3.4	97.2	166
Lilongwe City	4.2	89.0	4.4	97.6	206
South-East	3.6	84.6	8.3	96.6	186
South-West	3.3	85.2	9.6	98.1	203
Blantyre City	4.3	82.7	11.3	98.3	170
Marital status					
Never married	0.3	91.8	3.1	95.2	72
Married or living together	2.2	90.3	4.7	97.2	1,077
Divorced or separated	4.5	83.2	10.4	98.1	122
Widowed	*	*	*	*	12
Education					
No education	4.8	85.5	7.8	98.1	99
Primary	1.9	90.0	5.4	97.2	829
Secondary	2.5	90.6	3.9	97.1	324
More than secondary	(5.6)	(85.8)	(2.2)	(93.6)	32
Religion					
Catholic	2.4	86.9	6.5	95.8	211
CCAP	1.9	92.9	3.2	98.0	206
Anglican	(0.0)	(82.7)	(12.5)	(95.2)	28
Seventh Day Adventist	1.7	91.9	4.8	98.4	99
Baptist	(3.5)	(76.2)	(8.7)	(88.4)	40
Other Christian	2.4	90.4	5.0	97.8	465
Muslim	2.7	89.0	6.0	97.7	146
Other	2.2	92.9	2.8	97.9	84
None	*	*	*	*	4
Age					
15-19	0.0	94.8	2.1	96.9	162
20-24	1.5	92.9	3.2	97.6	457
25-29	4.1	86.5	5.7	96.2	290
30-34	4.5	83.0	10.2	97.8	211
35-39	2.5	87.0	8.3	97.8	117
40-44	(0.0)	(85.5)	(10.9)	(96.4)	36
45-49	*	*	*	*	11
Total 15-49	2.3	89.7	5.3	97.2	1,284

* An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.5.C Prevention of mother-to-child transmission of HIV: HIV-positive pregnant women who received ARVs

Among HIV-positive women aged 15-49 who gave birth within the past 12 months, percentage who received ARVs during pregnancy to reduce the risk of mother-to-child-transmission of HIV, by age, MPHIA 2015-2016

Characteristic	Percentage who were already taking ARVs at the time of their first ANC visit	Percentage who were newly initiated on ARVs during pregnancy or labor and delivery	Total percentage who received ARVs	Number of HIV-positive women who delivered within the past 12 months
Age				
15-19	*	*	*	3
20-24	*	*	*	23
25-29	(49.0)	(47.5)	(96.5)	29
30-34	(56.8)	(40.9)	(97.7)	37
35-39	*	*	*	16
40-44	*	*	*	5
Total 15-49	57.7	40.3	97.9	113

* An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.5.D Prevention of mother-to-child transmission of HIV: Infant virologic testing

Among HIV-positive women age 15-49 years who delivered within the three years preceding the survey, percentage whose last-born infant had an HIV test done within 2 months of birth and within 2 to 12 months of birth, by reported result of infant's HIV test, MPHIA 2015-2016

Characteristic	Percentage of infants who had an HIV test done within 2 months of birth	Percentage of infants who had an HIV test done between 2 to 12 months of birth	Number of last-born infants of HIV-positive women who delivered within the past 3 years
Infant's HIV test result reported by the mother			
HIV positive	*	*	5
HIV negative	58.8	38.9	206
Don't know / other	(78.0)	(22.0)	32
Total	49.4	29.3	292

* An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.5.E Breastfeeding status by child's age and mother's HIV status

Percent distribution of last-born children born to women aged 15-49 in the three years preceding the survey by breastfeeding status, child's age, and mother's HIV status, MPHIA 2015-2016

Characteristic	Never breastfed	Ever breastfed, but not currently breastfeeding	Currently breast-feeding	Total	Number
Child's age (months)					
0-1	1.1	0.0	97.6	100.0	153
2-3	0.3	0.0	98.6	100.0	208
4-5	1.2	1.4	96.4	100.0	237
6-8	0.7	0.2	97.8	100.0	335
9-11	1.5	2.0	95.2	100.0	305
12-17	0.7	5.7	91.5	100.0	583
18-23	1.3	24.4	73.6	100.0	594
24-36	1.1	79.7	17.5	100.0	1,151
Result of mother's MPHIA HIV test					
HIV positive	1.6	37.0	56.7	100.0	369
HIV negative	1.0	30.1	67.9	100.0	2,778
Not tested	0.8	27.1	70.0	100.0	451
Total 15-49	1.0	30.3	67.1	100.0	3,598

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

3.6 Sexual Behavior

Among females aged 15-64 who reported sexual intercourse before the age of 16, HIV prevalence was 16.9%, which is twice as high as the prevalence among males in the same category (8.5%). Among 15- to 64-year-old females who reported sexual debut after age 20 years, HIV prevalence was 13.2% (Table 3.6.A).

Among males aged 15-64, HIV prevalence was similar for those who reported one partner (10.0%) and for those who reported two or more partners (9.0%) in the 12 months preceding the survey. However, HIV prevalence among women with two or more partners in the 12 months preceding the survey was nearly twice as high as the prevalence in women reporting one partner in the same period of time (20.9% versus 11.6%, respectively; Table 3.6.A).

HIV prevalence among persons aged 15-64 who reported that they used a condom at last sex in the year preceding the survey was 17.8%, compared to 9.2% among persons who reported that they did not use a condom at last sex. Further analysis will be conducted to elucidate these findings and understand the role of knowledge of HIV-positive status on condom use.

MPHIA defined paid sexual intercourse as paying or receiving money for sexual intercourse. HIV prevalence in women aged 15-64 who reported engaging in this activity in the year preceding the survey was twice as high as in those who did not (23.2% versus 11.7%, respectively). However, among those who engaged in paid sexual intercourse, HIV prevalence was similar among those who used a condom during the last paid sexual intercourse (24.7%) and those who did not (22.7%). HIV prevalence in men aged 15-64 who reported that they did and did not engage in paid sexual intercourse in the 12 months preceding the survey was 8.0% and 9.9%, respectively (Table 3.6.A).

Among 15- to 24-year-olds, twice the proportion of males (19.0%) reported having had sexual intercourse before 15 years of age, compared to females (8.8%). Among males, 23.7% of those aged 15-19 reported sexual intercourse before age 15 years, compared to 13.2% of those aged 20-24. Among 15- to 24-year-olds with more than secondary education, 5.2% reported sexual intercourse before the age of 15, compared to 23.1% of those with no education. Among 15- to 24-year-old women, 19.3% of those with no education reported sexual intercourse before the age of 15, compared to only 2.2% of those with more than secondary education. The percentage of young people reporting sexual intercourse before age 15 is elevated in the South-East (18.4%) and South-West (16.2%) zones (Table 3.6.B).

Among males aged 15-64 who reported having sex in the year preceding the survey, 35.6% reported having sex with a nonmarital or noncohabiting partner during this time, of whom 54.8% reported using a condom during their last sexual intercourse with a nonmarital or noncohabiting partner (Table 3.6.C). Among sexually active females aged 15-64, 19.8% reported having sex with a nonmarital or noncohabiting partner in the 12 months preceding the survey, and 45.4% of them reported using a condom during their last sexual intercourse with such a partner (Table 3.6.D).

Among those aged 15-19 who reported having sex in the year preceding the survey, 90.7% of males and 57.2% of females reported having sex with a nonmarital or noncohabiting partner. Of them, 58.3% of

males and 60.4% of females reported condom use during their last sexual intercourse with such nonmarital or noncohabiting partner (Tables 3.6.C and 3.6.D).

A high percentage of never-married males (92.7%) and females (88.9%) reported having sex with a nonmarital or noncohabiting partner in the 12 months preceding the survey. Of these, 62.3% of males and 59.1% of females reported condom use during the last sexual intercourse with such a partner (Tables 3.6.C and 3.6.D).

The percentage of sexually active men who reported having sex with a nonmarital, noncohabiting partner in the year preceding the survey ranged from 19.0% among those with no education to 43.5% among those with secondary education. Among sexually active women, the percentage reporting having sex with a nonmarital, noncohabiting partner ranged from 10.4% among those with no education to 35.8% among those with more than secondary education. In both men and women, condom use at last sex with the nonmarital, noncohabiting partner was below 50% among those with less than secondary education, and especially low (26.7%) among women with no education (Tables 3.6.C and 3.6.D).

The percentage of sexually active females reporting having sex with a nonmarital or noncohabiting partner in the year preceding the survey ranged from 27.2% in Blantyre to 15.4% in the Central-West zone. Among these females, condom use at last sex with a nonmarital or noncohabiting partner ranged from 58.1% in the North to 39.8% and 38.3% in the South-East and South-West zones, respectively (Table 3.6.D).

Table 3.6.A HIV prevalence by sexual behavior

Prevalence of HIV among persons aged 15-64, by sex and sexual behavior characteristics, MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percentage HIV positive	Number	Percentage HIV positive	Number	Percentage HIV positive	Number
Age (years) at first sexual intercourse						
<16	8.5	1,752	16.9	1,958	12.4	3,710
16-17	9.7	1,092	11.6	2,211	10.8	3,303
18-19	10.1	1,438	13.8	2,884	12.3	4,322
≥20	9.7	1,841	13.2	1,741	11.1	3,582
Number of sexual partners in the past 12 months						
0	7.7	887	22.4	1,592	16.3	2,479
1	10.0	3,924	11.6	6,882	10.9	10,806
2 or more	9.0	1,299	20.9	318	10.7	1,617
Condom use at last sexual intercourse in the past 12 months						
Used condom	13.3	1,225	24.6	1,150	17.8	2,375
Did not use condom	8.7	3,989	9.7	6,043	9.2	10,032
No sexual intercourse in the past 12 months	7.7	887	22.4	1,592	16.3	2,479
Paid sexual intercourse in the past 12 months¹						
Yes	8.0	449	23.2	195	11.9	644
Used condom at last paid sexual intercourse	7.1	312	24.7	102	10.5	414
Did not use condom at last paid sexual intercourse	9.7	136	22.7	90	14.4	226
No	9.9	4,763	11.7	6,993	10.8	11,756
Total 15-49	7.8	6,306	12.1	8,949	10.0	15,255
Total 15-64	8.5	7,208	12.5	9,979	10.6	17,187

¹Includes persons who paid or received money for sexual intercourse.

Table 3.6.B Sexual intercourse before the age of 15

Percentage of males and females aged 15–24 who had sexual intercourse before the age of 15, by sex and selected demographic characteristics. MPHIA 2015-2016

Characteristic	Males		Females		Total	
	Percentage who had sex before age 15	Number	Percentage who had sex before age 15	Number	Percentage who had sex before age 15	Number
Residence						
Urban	18.2	1,218	8.3	1,602	13.3	2,820
Rural	19.2	1,798	8.9	2,447	13.9	4,245
Zone						
North	15.5	430	7.9	522	11.9	952
Central-East	15.2	443	6.5	530	11.0	973
Central-West	17.0	303	7.7	437	12.1	740
Lilongwe City	15.8	553	6.5	730	11.2	1,283
South-East	27.9	325	10.8	510	18.4	835
South-West	21.8	449	11.2	635	16.2	1,084
Blantyre City	17.1	513	8.7	685	12.8	1,198
Marital status						
Never married	20.2	2,496	7.0	1,920	14.9	4,416
Married or living together	13.4	454	9.2	1,811	10.4	2,265
Divorced or separated	18.2	58	18.4	299	18.3	357
Widowed	*	1	*	13	*	14
Education						
No education	31.2	66	19.3	159	23.1	225
Primary	21.6	1,563	10.2	2,306	15.5	3,869
Secondary	14.9	1,263	4.2	1,435	10.1	2,698
More than secondary	7.5	123	2.2	149	5.2	272
Religion						
Catholic	17.2	617	8.4	803	12.7	1,420
CCAP	13.4	626	6.8	773	10.1	1,399
Anglican	25.1	76	17.1	97	21.2	173
Seventh Day Adventist	15.0	225	6.9	337	10.7	562
Baptist	28.1	92	5.2	94	18.0	186
Other Christian	20.4	813	9.1	1,268	14.3	2,081
Muslim	26.5	326	10.2	392	17.9	718
Other	13.8	178	11.0	267	12.3	445
None	30.3	60	*	13	27.4	73
Age						
15-19	23.7	1,655	9.2	1,843	16.3	3,498
20-24	13.2	1,361	8.3	2,206	10.7	3,567
Total 15-24	19.0	3,016	8.8	4,049	13.7	7,065

*An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

Table 3.6.C Condom use at last sex with a nonmarital, noncohabiting partner: Males

Among males aged 15-64 who reported having sex in the past 12 months, percentage who reported having a nonmarital, noncohabiting partner in the past 12 months; among those who reported having sex with a nonmarital, noncohabiting partner in the past 12 months, percentage who reported using a condom the last time they had sex with a nonmarital, noncohabiting partner; by selected demographic characteristics, MPHIA 2015-2016

Characteristic	Among males who reported having sex in the past 12 months		Among males who reported having sex with a nonmarital, noncohabiting partner in the past 12 months	
	Percentage who reported having sex with a nonmarital, noncohabiting partner in the past 12 months	Number	Percentage who reported using a condom the last time they had sex with a nonmarital, noncohabiting partner	Number
Residence				
Urban	45.5	2,205	59.4	1,008
Rural	33.1	3,775	53.1	1,186
Zone				
North	38.5	761	59.3	267
Central-East	31.6	928	67.1	270
Central-West	28.5	738	49.9	198
Lilongwe City	44.9	1,015	56.0	460
South-East	36.3	681	47.7	234
South-West	38.1	908	51.3	327
Blantyre City	45.1	949	55.4	438
Marital status				
Never married	92.7	1,403	62.3	1,299
Married or living together	14.8	4,305	45.1	644
Divorced or separated	91.3	246	39.7	227
Widowed	*	19	*	18
Education				
No education	19.0	300	49.5	60
Primary	32.6	3,248	48.9	1,054
Secondary	43.5	2,016	62.2	892
More than secondary	42.0	415	65.3	187
Religion				
Catholic	35.0	1,180	56.4	439
CCAP	37.3	1,144	60.9	425
Anglican	43.2	140	56.7	58
Seventh Day Adventist	41.5	397	57.2	170
Baptist	39.0	153	46.6	59
Other Christian	33.3	1,774	53.7	604
Muslim	42.2	538	52.4	244
Other	29.4	452	44.2	135
None	28.9	189	47.3	58
Age				
15-19	90.7	596	58.3	535
20-24	61.1	1,000	64.1	655
25-29	33.2	942	50.5	359
30-34	24.2	884	48.9	241
35-39	21.0	762	43.9	179
40-44	15.2	586	40.2	100
45-49	10.3	413	(34.8)	48
50-54	10.3	325	(19.5)	37
55-59	7.8	258	*	21
60-64	7.4	214	*	19
Total 15-49	39.1	5,183	55.7	2,117
Total 15-64	35.6	5,980	54.8	2,194

* An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

Table 3.6.D Condom use at last sex with a nonmarital, noncohabiting partner: Females

Among females aged 15-64 who reported having sex in the past 12 months, percentage who reported having a nonmarital, noncohabiting partner in the past 12 months; among those who reported having sex with a nonmarital, noncohabiting partner in the past 12 months, percentage who reported using a condom the last time they had sex with a nonmarital, noncohabiting partner; by selected demographic characteristics, MPHIA 2015-2016

Characteristic	Among females who reported having sex in the past 12 months		Among females who reported having sex with a nonmarital, noncohabiting partner in the past 12 months	
	Percentage who reported having sex with a nonmarital, noncohabiting partner in the past 12 months	Number	Percentage who reported using a condom the last time they had sex with a nonmarital, noncohabiting partner	Number
Residence				
Urban	24.7	3,055	50.6	736
Rural	18.6	5,125	43.8	883
Zone				
North	18.2	951	58.1	159
Central-East	16.5	1,160	54.9	165
Central-West	15.4	979	40.4	137
Lilongwe City	25.8	1,431	50.3	342
South-East	21.4	1,048	39.8	210
South-West	22.4	1,328	38.3	277
Blantyre City	27.2	1,283	49.8	329
Marital status				
Never married	88.9	873	59.1	777
Married or living together	2.4	6,511	46.8	167
Divorced or separated	83.3	680	27.5	575
Widowed	93.1	108	36.0	96
Education				
No education	10.4	827	26.7	86
Primary	17.4	4,963	40.1	800
Secondary	31.7	2,062	55.8	615
More than secondary	35.8	325	68.2	118
Religion				
Catholic	21.2	1,524	49.6	335
CCAP	21.2	1,497	58.3	325
Anglican	25.1	193	(64.3)	41
Seventh Day Adventist	24.0	583	41.3	142
Baptist	21.7	209	(43.4)	42
Other Christian	17.5	2,767	40.3	483
Muslim	20.1	778	38.4	143
Other	17.1	567	34.1	97
None	18.1	56	*	11
Age				
15-19	57.2	803	60.4	461
20-24	22.3	1,863	46.1	468
25-29	13.8	1,533	33.6	227
30-34	12.2	1,360	31.2	181
35-39	14.3	977	24.4	143
40-44	11.5	633	39.2	74
45-49	8.2	435	(24.0)	34
50-54	6.3	292	*	19
55-59	3.0	178	*	6
60-64	5.4	106	*	6
Total 15-49	21.0	7,604	45.8	1,588
Total 15-64	19.8	8,180	45.4	1,619

* An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed. Figures in parentheses are based on 25 to 49 unweighted cases.

3.7 Additional Selected Indicators

Self-Reported HIV Status Among Adults Who Tested HIV Positive During the Survey

Among 15- to 64-year-olds who tested HIV positive in MPHIA, 72.8% self-reported their HIV-positive status: 76.0% of females were aware of their HIV-positive status, while 67.7% of males were aware of their HIV-positive status (Table 3.7.A).

Among 15- to 64-year-olds who tested HIV positive in MPHIA, 18.4% self-reported being HIV negative, and 8.8% reported that they had never been tested or had never received their result. Approximately twice as many HIV-positive men reported never having been tested for HIV or never receiving their HIV test results (12.7%) compared to HIV-positive women (6.4%; Table 3.7.A).

There was variation in awareness of HIV-positive status across geographic zones: self-reported knowledge of HIV-positive status ranged from 66.5% in the Central-East to 76.4% in the South-West. About one in eight HIV-positive individuals from Blantyre (12.4%) and Central-East (12.2%) reported that they had never tested for HIV or had never received their HIV test results, compared to a range of 6.2% to 8.8% in the other zones (Table 3.7.A).

Male Circumcision

Among 15- to 64-year-old men, 9.2% reported to have undergone medical circumcision and 16.1% reported to have had a non-medical circumcision. The percentage of males who reported to be uncircumcised ranged from 65.8% among those aged 60-64 to 73.2% among those aged 50-54. Among those who tested HIV positive in the survey, 8.8% reported having undergone medical circumcision, while 67.4% self-reported being uncircumcised. Of those who tested HIV negative, 71.7% self-reported not having undergone any form of circumcision, while 9.0% reported having undergone medical circumcision. The percentage of men who self-reported having undergone medical circumcision ranged from 2.4% in Central-West to 20.9% in Blantyre City (Table 3.7.B).

The proportion who reported medical circumcision was 10 times greater in men with more than secondary education (21.6%) compared to men with no education (2.5%). However, the frequency of non-medical circumcision was approximately three times greater in men with no education (25.3%) compared to men with more than secondary education (7.6%; Table 3.7.B).

Table 3.7.A Self-reported HIV status among adults who tested HIV positive during the survey

Percent distribution of adults aged 15-64 who tested HIV positive during the survey by self-reported HIV status, by selected demographic characteristics, MPHIA 2015-2016

Characteristic	Ever tested for HIV		Self-reported never tested or never received result	Total	Number
	Self-reported HIV positive	Self-reported HIV negative			
Sex					
Male	67.7	19.6	12.7	100.0	707
Female	76.0	17.6	6.4	100.0	1508
Zone					
North	72.8	21.0	6.2	100.0	182
Central-East	66.5	21.3	12.2	100.0	129
Central-West	69.9	22.0	8.1	100.0	137
Lilongwe City	70.0	21.2	8.8	100.0	398
South-East	75.2	16.3	8.5	100.0	334
South-West	76.4	15.5	8.1	100.0	495
Blantyre City	67.5	20.1	12.4	100.0	540
Total 15-49	71.8	19.8	8.4	100.0	1874
Total 15-64	72.8	18.4	8.8	100.0	2215

Table 3.7.B Male circumcision

Percent distribution of males aged 15-64 by self-reported circumcision status, by result of MPHIA HIV test and selected demographic characteristics, MPHIA 2015-2016

Characteristic	Circumcised		Uncircumcised	Unknown	Total	Number
	Medical circumcision	Non-medical circumcision				
Result of MPHIA HIV test						
HIV positive	8.8	18.3	67.4	5.4	100.0	715
HIV negative	9.0	14.6	71.7	4.7	100.0	6493
Not tested	10.8	24.3	60.0	4.9	100.0	1076
Residence						
Urban	16.8	17.0	63.3	2.9	100.0	3169
Rural	7.2	15.9	71.6	5.3	100.0	5115
Zone						
North	3.5	2.8	85.2	8.4	100.0	1109
Central-East	5.4	9.6	79.9	5.1	100.0	1272
Central-West	2.4	7.6	85.0	5.0	100.0	951
Lilongwe City	17.5	13.2	66.1	3.2	100.0	1464
South-East	14.0	44.4	37.2	4.4	100.0	910
South-West	13.3	16.7	67.0	3.0	100.0	1217
Blantyre City	20.9	20.5	55.8	2.8	100.0	1361
Marital status						
Never married	13.8	13.4	68.7	4.1	100.0	3007
Married or living together	6.6	17.4	71.2	4.8	100.0	4860
Divorced or separated	7.5	19.9	62.7	9.9	100.0	347
Widowed	6.3	23.6	63.2	7.0	100.0	58
Education						
No education	2.5	25.3	62.9	9.3	100.0	413
Primary	6.6	17.3	70.5	5.6	100.0	4468
Secondary	13.7	13.4	70.1	2.8	100.0	2857
More than secondary	21.6	7.6	68.0	2.7	100.0	543
Religion						
Catholic	7.7	5.8	81.4	5.0	100.0	1646
CCAP	10.0	8.1	77.6	4.3	100.0	1637
Anglican	11.6	15.2	70.1	3.1	100.0	209
Seventh Day Adventist	15.4	15.0	66.0	3.6	100.0	561
Baptist	5.8	8.2	80.2	5.7	100.0	207
Other Christian	7.9	9.5	77.4	5.2	100.0	2370
Muslim	14.4	79.5	3.0	3.1	100.0	751
Other	7.5	8.5	76.1	7.9	100.0	640
None	3.3	4.9	88.9	2.9	100.0	245
Age						
15-19	12.9	13.8	67.8	5.5	100.0	1680
20-24	12.7	15.8	66.5	5.0	100.0	1389
25-29	9.4	13.8	72.3	4.5	100.0	1120
30-34	7.1	16.4	72.3	4.2	100.0	1010
35-39	8.0	18.2	69.3	4.6	100.0	877
40-44	6.5	16.1	71.7	5.6	100.0	706
45-49	4.2	19.7	72.6	3.6	100.0	501
50-54	3.0	20.5	73.2	3.3	100.0	395
55-59	4.5	17.4	72.5	5.6	100.0	332
60-64	4.2	25.5	65.8	4.5	100.0	274
Total 15-49	9.8	15.6	69.7	4.8	100.0	7283
Total 15-64	9.2	16.1	69.9	4.8	100.0	8284

DISCUSSION AND CONCLUSIONS

- Although HIV continues to cause a significant burden of disease in the country with an estimated 10.6% of adults aged 15-64 infected with HIV, there is remarkable progress toward the achievement of the UNAIDS 90-90-90 targets, with 73% of those adults living with HIV diagnosed, 90% of those diagnosed receiving ART, and 91% of those on treatment virally suppressed. Clearly, the major challenge pertains to diagnosis, and a critical priority is to identify and link to care those infected but unaware of their HIV status. The achievement of these targets is essential not only to prevent HIV-related illness and AIDS-related deaths among those infected, but to prevent transmission and the occurrence of new HIV infections. MPHIA estimated that approximately 30,000 new HIV infections are occurring annually among adults aged 15-64 (HIV incidence: 0.39% [95% CI: 0.22%-0.57%]). Increasing coverage of diagnosis while sustaining high levels of treatment and viral suppression is key to reduce HIV incidence.
- The considerable variation in prevalence of HIV infection and viral suppression across regions and population groups highlights the need to focus interventions, and to rigorously evaluate and map their availability, accessibility, quality and effectiveness in specific geographical areas and demographic groups. The southern region, densely populated and with high HIV prevalence, requires intensified programmatic efforts, particularly Blantyre City, where close to one-fifth of the adult population is infected (HIV prevalence: 17.7%) while only 59.5% of those living with HIV infection are virally suppressed.
- Although the burden of HIV infection in the adult population aged 15-64 is higher for females than for males (prevalence in females 12.5% compared with 8.5% in males), the coverage of key care interventions such as testing, diagnosis, and ART is lower for males than for females. As a consequence, the prevalence of viral suppression is low in infected males aged 15-64, with suppressed HIV viremia observed in only 60.9% of them, in contrast to 73.1% among their female counterparts.
- The high HIV prevalence (12.4%-21.7%) among all five-year age groups over 40 suggests that it is important to address the double burden of HIV and noncommunicable diseases in an aging patient population. The country has initiated response with the inclusion of guidance for the screening and treatment of hypertension in the most recent HIV services guidelines (Malawi Ministry of Health, 2016). In the near future, a comprehensive approach for the prevention and early detection of other cardiovascular, metabolic, renal, and neurological conditions is necessary.
- Among adults aged 15-64 previously diagnosed with HIV but not on ART, the median CD4 T-cell count was 326 cells/ μ l and 78.7% were immunosuppressed (CD4 T-cell count less than 500 cells/ μ l). This finding highlights the need to prioritize initiation of treatment in this group. Among those adults infected with HIV but not previously diagnosed, 68.3% were immunosuppressed. These findings provide further support to the appropriateness of the “test and treat” policy introduced in Malawi in 2016.

- While overall progress toward the 90-90-90 goals is strong at 73-90-91 among HIV-positive adults aged 15-64, additional programmatic support is needed for key groups, including men and young people. While 81.6% of adult females aged 15-64 have ever tested for HIV and received their results, only 65.5% of adult males aged 15-64 have ever tested for HIV. While three-quarters (75.9%) of adult females aged 15-64 who are infected with HIV reported that they were aware of their status, only two-thirds (67.6%) of their male counterparts reported knowledge of their infection status. Improving coverage of diagnosis and linkage to care is particularly important among people aged 15-34 years. Only half (49.8%) of those aged 15-24, and two-thirds (67.5%) of those aged 25-34, currently know that they are infected with HIV, with awareness being particularly low among males in comparison with females.
- Although Malawi has achieved high coverage of the key intervention to reduce vertical transmission of HIV, with 97.9 percent of HIV-positive women aged 15-49 who gave birth during the 12 months preceding the survey reporting that they received ARVs during pregnancy or labor and delivery, there is an important gap in early diagnosis of HIV infection in infants, which is essential to ensure their survival. The current programmatic target for virologic testing of HIV in infants in Malawi is to test at least 85% of children born to HIV-positive women within 2 months of birth, and again at 12 and 24 months of age. However, MPHIA indicates that only half (49.4%) of children born to HIV-positive mothers had HIV virologic testing performed within 2 months of birth, and an additional 29.3% had it performed between two and 12 months of age. It is essential to increase the coverage of virologic testing for HIV. Several system-level interventions can be useful. In the laboratory, facilitating access to testing with the potential use of point-of-care technologies, and, in the facilities, through service quality improvement initiatives, training of health care personnel, and additional points of entry to testing, such as immunization clinics.
- Condom use was low among sexually active women who reported having sex with a nonmarital, noncohabiting partner in the 12 months preceding the survey, with only 45% reporting using a condom the last time they had intercourse with such a partner. Low frequency of condom use in this context was particularly pronounced among women with no education, and also in the high HIV-prevalence zones South-East and South-West. Although the percentage using a condom with a nonmarital, noncohabiting partner was highest among those women aged 15-19 (60.4%) and 20-24 (46.1%), it is necessary to increase uptake of condom use, in addition to other prevention interventions targeting adolescent and young women.
- The implementation of voluntary medical male circumcision has continued to scale up, with higher coverage (9.4%-12.9%) observed among the target 15- to 30-year-old age group in comparison with other age groups, and in high HIV prevalence areas such as Blantyre City (20.9%), South-East (14.0%) and South-West (13.3%). With an important proportion uncircumcised in the target groups, significant further expansion of the program is needed to reach the national target of 60% coverage of medical male circumcision, especially in areas with high HIV prevalence.
- More than one in eight persons (13.7%) aged 15-24 reported having sexual intercourse before the age of 15. Sexual debut before the age of 15 was especially high among those with no education. Reproductive health and HIV-prevention programs should focus on delaying the age of sexual debut, with a special effort to adapt strategies for sections of the population with low education levels.

REFERENCES

Joint United Nations Programme on HIV/AIDS (UNAIDS). An ambitious treatment target to help end the AIDS epidemic. UNAIDS/JC26 (English original). October, 2014.

Kassanje R, McWalter TA, Bärnighausen T, and Welte A. A new general biomarker-based incidence estimator. *Epidemiology*. 2012; 23(5): 721-728.

Malawi National Statistical Office. Malawi 2008 Population and Housing Census Results. NSO, 2008 (http://www.nsomalawi.mw/images/stories/data_on_line/demography/census_2008/Main%20Report/Census%20Main%20Report.pdf).

Ministry of Health Malawi. 2016 Clinical management of HIV in children and adults. Malawi integrated guidelines and standard operating procedures for providing HIV services. Ministry of Health, 2016.

The American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 8th edition. AAPOR, 2015 (https://www.aapor.org/AAPOR_Main/media/publications/Standard-Definitions2015_8thedition-withchanges_April2015_logo.pdf).

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APPENDIX

Weighted counts for numbers of HIV-negative persons (N), numbers of HIV-positive persons (P), numbers tested on the LAg assay (Q), and numbers of recent HIV (R) are provided for use in incidence calculations or UNAIDS Spectrum models. Incidence estimates were calculated using the following parameters: mean duration of recent infection (MDRI) = 130 days (95% CI: 118-142 days); proportion false recent (PFR) = 0.00; and time cutoff (T) = 1 year.

Table APPENDIX Annual HIV incidence auxiliary data

Age	Males				Females				Total			
	Number HIV-negative (N)	Number HIV-positive (P)	Number tested on LAg assay (Q)	Number HIV-recent (R)	Number HIV-negative (N)	Number HIV-positive (P)	Number tested on LAg assay (Q)	Number HIV-recent (R)	Number HIV-negative (N)	Number HIV-positive (P)	Number tested on LAg assay (Q)	Number HIV-recent (R)
15-24	2637.01	40.99	39.51	0.42	3456.75	123.25	123.25	4.98	6101.09	156.91	155.22	4.92
25-34	1662.72	145.28	144.89	2.36	2484.93	451.07	451.07	7.76	4183.05	560.95	560.47	9.47
35-49	1496.07	323.93	323.93	2.64	1886.9	546.1	544.38	0.42	3393.73	859.27	857.71	3.35
15-49	5815.97	490.03	488.10	5.3	7863.99	1085.01	1083.31	12.92	13727.86	1527.14	1523.39	17.55
15-64	6595.05	612.95	610.98	6.2	8731.01	1247.99	1246.31	16.24	15370.74	1816.26	1812.49	21.59

