# Rwanda

## Demographic and Health Survey 2019-20

*Supplemental Report for HIV Prevalence*

Republic of Rwanda

# Rwanda Demographic and Health Survey 2019–20

## Supplemental Report for HIV Prevalence


**National Institute of Statistics of Rwanda**
**Kigali, Rwanda**

**Ministry of Health**
**Kigali, Rwanda**

**The DHS Program**
**ICF**
**Rockville, Maryland, USA**


**July 2023**

The 2019–20 Rwanda Demographic and Health Survey (2019–20 RDHS) was implemented by the National Institute of Statistics of Rwanda (NISR) in collaboration with the Ministry of Health (MOH). Funding for the 2019–20 RDHS was provided by the Government of Rwanda, the United States Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), Enabel (Belgian Development Agency), the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), and the U.S. Centers for Disease Control and Prevention (CDC). ICF provided technical assistance through The DHS Program, a USAID-funded project that provides support and technical assistance in the implementation of population and health surveys in countries worldwide.

Additional information about the 2019–20 RDHS may be obtained from the National Institute of Statistics of Rwanda, 6139 Kigali, Rwanda; telephone: +250 788 383 103; email: info@statistics.gov.rw; website: www.statistics.gov.rw.

Information about The DHS Program may be obtained from ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; telephone: +1-301-407-6500; fax: +1-301-407-6501; email: info@DHSprogram.com; internet: www.DHSprogram.com.

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# FOREWORD

The Government of Rwanda conducted the 2019–20 Rwanda Demographic and Health Survey (RDHS) to collect up-to-date information for monitoring progress on healthcare programs and policies in Rwanda, including the First National Strategy for Transformation (NST1 2017–2024) and the Sustainable Development Goals (SDGs).

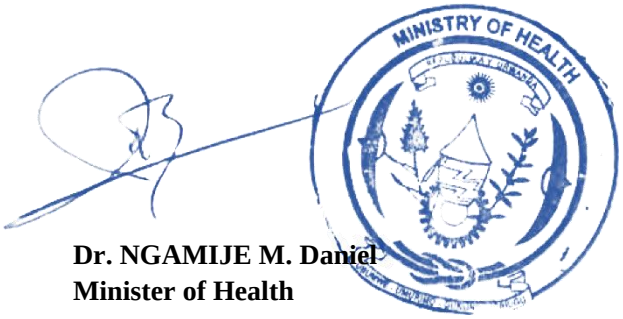
The 2019–20 RDHS is a follow-up to the previous five RDHS surveys. Each survey provides data on background characteristics of the respondents, and demographic and health indicators. The target groups in these surveys were women aged 15–49 and men aged 15–59 who were randomly selected from households across the country. Information about children aged 5 and under also was collected, including the height and weight of the children.

The 2019–20 RDHS was implemented by the National Institute of Statistics of Rwanda (NISR) in partnership with the Ministry of Health (MOH). The Rwanda Biomedical Center (RBC), and in particular the HIV, Malaria, and National Reference Laboratory (NRL) Divisions, collaborated on several aspects of the survey, especially the biomarkers. ICF International provided technical assistance in implementation of the survey.

Funding for the 2019–20 RDHS was provided by the Government of Rwanda, the United States Agency for International Development (USAID), the One United Nations (ONE UN), the U.S. Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), Enabel, and the United Nations Entity for Gender Equality and the Empowerment of Women (UN WOMEN).

Results of the 2019–20 RDHS has shown significant improvement for some indicators and slight decrease in others. This report is therefore an important tool that addresses health concerns, informs policy makers, other stakeholders of priority areas for intervention, and future planning, and resource allocation process.

It provides only a snapshot, however, and it is our sincere hope that researchers will deepen our understanding of the topics covered in the survey by undertaking further analysis of the RDHS datasets. Last but not least, we urge all stakeholders, both individuals and organizations, to play an active role in using this valuable information to contribute to a better quality of life for the Rwandan population.




**Dr. NGAMIJE M. Daniel**
**Minister of Health**

# ACKNOWLEDGMENTS

This report has been prepared with the participation of a large number of individuals and organizations. We would like to express our gratitude to all of them.

First, we sincerely acknowledge the men and women who generously agreed to respond to all questions they were asked. The response rate was high.

We also present our sincere thanks to the Ministry of Local Government and to the local government authorities for their assistance and contributions to the smooth implementation of the survey.

We would like to express our sincere appreciation to the Ministry of Health for close collaboration with the National Institute of Statistics of Rwanda (NISR) during preparation and implementation of the survey. The orientation and directives given by the steering committee members are appreciated.

We also express our gratitude to many international organizations for their vital financial assistance. Contributions from the United States Agency for International Development (USAID), the One United Nations (ONE UN), the Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), Enabel, and the United Nations Entity for Gender Equality and the Empowerment of Women (UNWOMEN) were of immense importance to the effective accomplishment of the survey.

We express our profound gratitude to the team from ICF International, and in particular to Dr. Rathavuth Hong and his colleagues. Their technical assistance contributed to the success of the survey.

We thank the technical staff from the Ministry of Health (MOH), RBC-IHDPC, and NISR, for their unfailing participation in all activities of the survey, which were coordinated by NDAKIZE R. Michel and his assistants, in particular MUKANYONGA Apolline (who retired) for her valuable contribution to the last five RDHSs. We congratulate the supervisors, cartographers, listers, team leaders, interviewers, and biomarkers technicians for their valuable efforts, and also the drivers who were able to overcome the fatigue and other challenges inherent in this type of operation. We also thank the Information and Communication Technology team led by HARERIMAMA Massoud for its contribution to the completion of the survey.

We appreciate the valuable support provided by administrative and financial departments of the NISR. Their interventions allowed this RDHS to be carried out smoothly and under good conditions.

Thank you,

**MURANGWA Yusuf,**
**Director General of NISR**

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ANC | antenatal care |
| CAPI | computer-assisted personal interviewing |
| CDC | U.S. Centers for Disease Control and Prevention |
| COVID-19 | coronavirus disease |
| CSPro | Census and Survey Processing System |
| DBS | dried blood spot |
| DEFT | design effect |
| EA | enumeration area |
| HIV | human immunodeficiency virus |
| MOH | Ministry of Health |
| NISR | National Institute of Statistics of Rwanda |
| NRL | National Reference Laboratory |
| NST1 | First National Strategy for Transformation |
| One UN | One United Nations |
| RBC | Rwanda Biomedical Centre |
| RDHS | Rwanda Demographic and Health Survey |
| RDT | rapid diagnostic test |
| RNEC | Rwanda National Ethics Committee |
| RPHC | Rwanda Population and Housing Census |
| SDG | Sustainable Development Goal |
| STI | sexually transmitted infection |
| UN Women | United Nations Entity for Gender Equality and the Empowerment of Women |
| UNFPA | United Nations Population Fund |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |

# INTRODUCTION AND SURVEY METHODOLOGY 1

The 2019–20 Rwanda Demographic and Health Survey (RDHS) is the sixth Demographic and Health Survey (DHS) conducted in Rwanda, following those implemented in 1992, 2000, 2005, 2010, and 2014–15. The National Institute of Statistics of Rwanda (NISR), in collaboration with the Ministry of Health (MOH), implemented the survey. Data collection took place from November 9, 2019, to July 20, 2020. The data collection was interrupted for more than 2 months from March 21 to June 7, 2020, due to the nationwide lockdown for the coronavirus disease (COVID-19) pandemic. Funding for the 2019–20 RDHS was provided by the Government of Rwanda, the United States Agency for International Development (USAID), One United Nations (One UN), the U.S. Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), and Enabel. ICF provided technical assistance through The DHS Program, which assists countries in the collection of data to monitor and evaluate population, health, and nutrition programs.

## 1.1 SURVEY OBJECTIVES

The primary objective of the 2019–20 RDHS is to provide up-to-date estimates of basic demographic and health indicators, including estimates of the prevalence of HIV among women age 15–49 and men age 15–59. The information collected through the 2019–20 RDHS is intended to assist policymakers and program managers in evaluating and designing programs and strategies for improving the health of the country's population. Details on the survey objectives are available in the final report.

## 1.2 SAMPLE DESIGN

The sampling frame used for the 2019–20 RDHS is the fourth Rwanda Population and Housing Census (RPHC), which was conducted in 2012 by the National Institute of Statistics of Rwanda. The sampling frame is a complete list of enumeration areas (EAs) covering the whole country provided by the National Institute of Statistics, the implementing agency for the RDHS. An EA is a natural village or part of a village created for the 2012 RPHC; these areas served as the counting units for the census.

The 2019–20 RDHS followed a two-stage sample design and was intended to allow estimates of key indicators at the national level as well as for urban and rural areas, Rwanda's five provinces, and each of the country's 30 districts for some indicators. The first stage involved selecting sample points (clusters) consisting of EAs delineated for the 2012 RPHC. A total of 500 clusters were selected, 112 in urban areas and 388 in rural areas.

The second stage involved systematic sampling of households. A household listing operation was undertaken in all selected EAs from June to August 2019, and households to be included in the survey were randomly selected from these lists. Twenty-six households were selected from each sample point, for a total sample size of 13,000 households. Because of the approximately equal sample sizes in each district, the sample is not self-weighting at the national level, and weighting factors have been added to the data file so that the results are proportional at the national level.

All women age 15–49 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed. In half of the households, all men age 15–59 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed. In the subsample

of households selected for the male survey, height and weight measurements, anemia testing, and malaria testing were performed among eligible women who consented to being tested and children less than age 5 with the parent's or guardian's consent. In the same subsample, blood samples were collected for HIV testing from eligible women and men who consented.

## 1.3 QUESTIONNAIRES

Five questionnaires were used for the 2019–20 RDHS: the Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, the Biomarker Questionnaires, and the Fieldworker Questionnaire. These questionnaires, based on The DHS Program's standard Demographic and Health Survey (DHS-7) questionnaires, were adapted to reflect the population and health issues relevant to Rwanda. Comments were solicited from various stakeholders representing government ministries and agencies, nongovernmental organizations, and development partners. The survey protocol was reviewed and approved by the Rwanda National Ethics Committee (RNEC) and the ICF Institutional Review Board. After all questionnaires were finalized in English, they were translated into Kinyarwanda. The 2019–20 RDHS used computer-assisted personal interviewing (CAPI) for data collection.

Details on the Household Questionnaire, the Woman's Questionnaire, and the Man's Questionnaire can be found in the final report.

The survey included two Biomarker Questionnaires. The first questionnaire was used to record the results of anthropometry measurements and other biomarkers (anemia, malaria, and HIV) for women, men, and children. This questionnaire was administered only to the subsample of households selected for the men's survey. The second questionnaire was used to record the results of anthropometry measurements and other biomarkers (anemia, malaria, and micronutrients) for women and children. This questionnaire was administered only to the subsample of seven households per cluster.

The interviewers used tablet computers for data collection. The tablet computers were equipped with Bluetooth® technology to enable remote electronic transfer of files, such as assignments from the team supervisor to the interviewers, individual questionnaires to survey team members, and completed questionnaires from interviewers to team supervisors. The CAPI data collection system employed in the 2019–20 RDHS was developed by The DHS Program with the mobile version of CSPro.

## 1.4 ANTHROPOMETRY, ANEMIA, MALARIA, HIV, AND MICRONUTRIENT TESTING

In the half of the households selected for the male survey, the 2019–20 RDHS implemented anthropometry measurements, anemia testing, and malaria testing for children and women and HIV testing for women and men.

### 1.4.1 Anthropometry, Anemia, Malaria, and Micronutrient Testing

Anthropometry, anemia, and malaria, data and results appear in the final report. Micronutrient data and results will be presented in another supplemental report.

### 1.4.2 HIV Testing

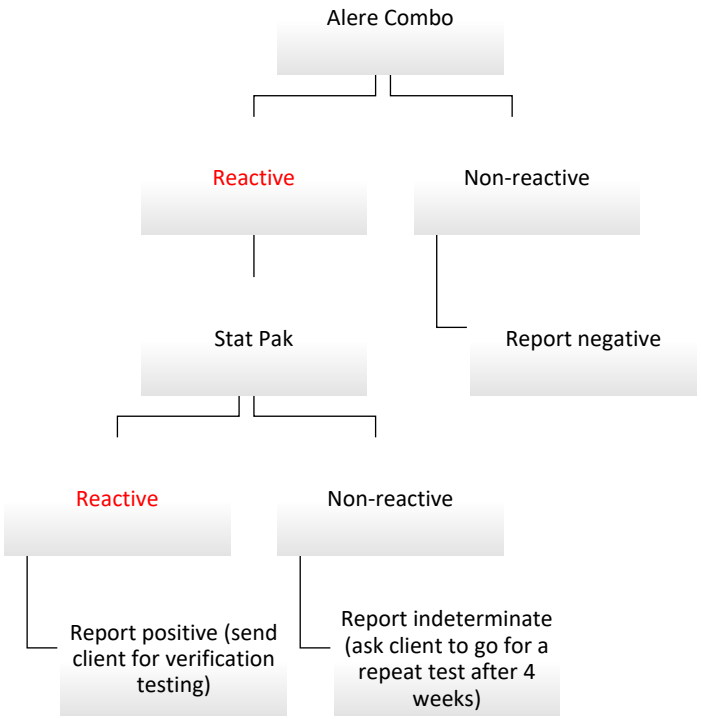
In 50% of the households selected for the men's survey, all women age 15–49 and all men age 15–59 were eligible for HIV testing. In the case of unmarried minors age 15–17, blood was drawn after parental/guardian consent had been obtained. Each team had at least one dedicated HIV counselor who was trained in preparing dried blood spot (DBS) samples and conducting HIV rapid diagnostic tests (RDTs). Pretest counseling and posttest counseling were provided as part of HIV testing. All RDT results were confidential. HIV prevalence for the survey was based on the laboratory test results.

The respondent's finger was cleaned with a swab soaked with 70% alcohol and pricked using a retractable safety lancet. The first drop of blood was wiped away, the second drop was used for the first-line RDT, and the third and subsequent drops were used for DBS collection.

### *HIV Rapid Testing*

HIV rapid testing using the national algorithm (**Figure 1.1**) was conducted by survey staff after completion of pretest counseling.

***Figure 1.1*** **Algorithm for rapid HIV testing**




The Rwanda HIV rapid testing algorithm applies two tests in sequence: First Alere Combo (Alere Determine™ HIV-1/2 Ag/Ab Combo) followed by HIV Stat Pak (Chembio | HIV 1/2 STAT-PAK® Assay).

Individuals with a nonreactive result on the first test were informed that they were HIV negative. Individuals with a reactive first test result were then tested with Stat Pak. Those with a reactive result on both screening tests were classified as HIV positive for the purposes of the survey but were referred to a nearby health facility for verification testing and subsequent enrollment into care as required by the national testing algorithm. Individuals with a reactive first test result followed by a nonreactive second test result were classified as indeterminate and referred for retesting in 4 weeks as per the national guidelines.

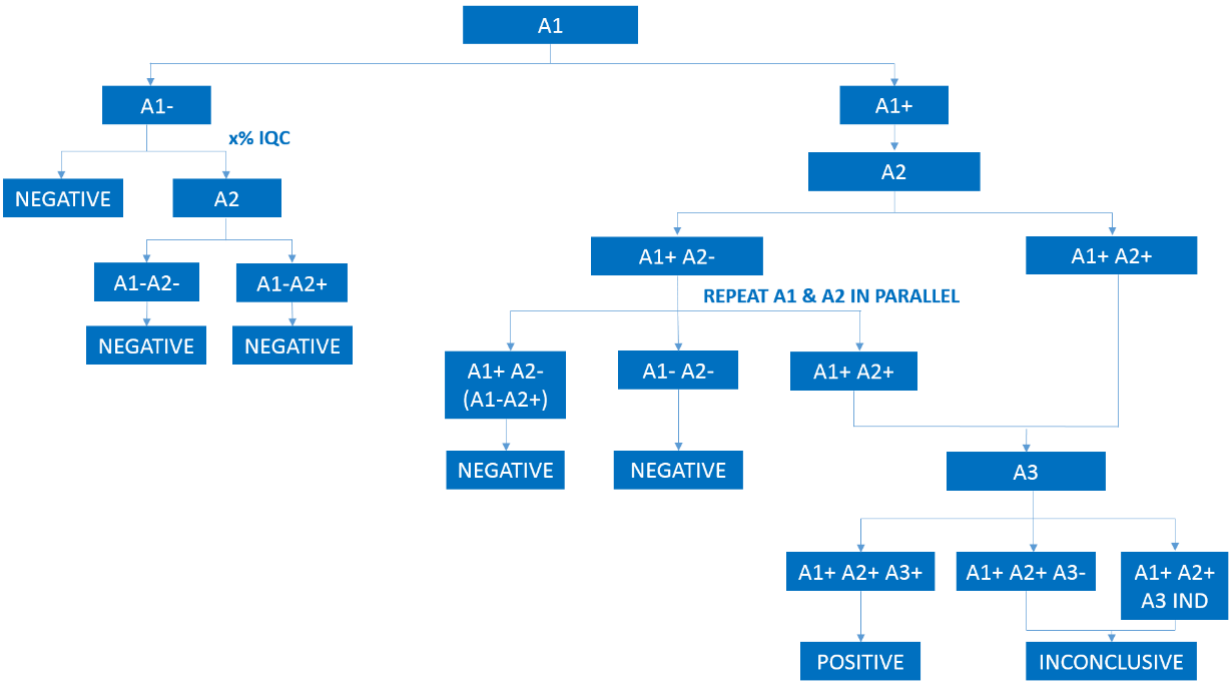
Dedicated nurse counselors provided pretest and posttest counseling and conducted HIV rapid testing. Pretest counseling included an explanation of HIV infection and transmission, the meaning of test results, risks associated with sexual behaviors, and how to prevent and treat HIV and other sexually transmitted infections. Posttest counseling messages were tailored to participants' HIV results and risk profiles.

HIV testing and delivery of results at home were done after creation of conditions that would guarantee respondents' confidentiality.

### *Laboratory-based HIV Testing*

The 2019–20 RDHS included laboratory testing for HIV using dried blood spot samples according to the algorithm shown in **Figure 1.2**.

***Figure 1.2*** **Algorithm for laboratory-based HIV testing**




A CSPro program specially conceived according to the algorithm chosen was provided to the National Reference Laboratory (NRL) to manage the HIV test results. ICF provided training to NRL personnel in the use of this program and tracked indicators related to the progress and quality of HIV testing on a weekly basis. In addition, 2% of the specimens that were nonreactive on the first assay were tested on the second assay for internal quality control.

For the DBS samples, at the time of collection of the blood sample, a unique and random barcoded identification number was assigned to each participant who consented to testing. Sheets of peel-off labels with unique barcodes were preprinted for use in the field. Matching barcode labels were affixed to the Biomarker Questionnaire, a fresh filter paper card, and a blood sample transmittal sheet.

Interviewers collected finger-prick DBS specimens for laboratory HIV testing from women age 15–49 and men age 15–59 who consented to be tested. The protocol for DBS collection and analysis was based on the anonymous linked protocol developed for The DHS Program. This protocol allows for merging of HIV test results with the data on background characteristics and other information collected in the individual questionnaires after removal of all information that could potentially identify an individual.

Interviewers explained the procedure and the confidentiality of the data. Also, they informed respondents that the laboratory testing would be anonymous, that the results could not be returned, and that if they were interested in learning their HIV status, they could receive an HIV rapid diagnostic test in the household. Respondents could consent to laboratory testing only, rapid testing only, both tests, or neither test. If consent was given for laboratory HIV testing, five blood spots from the finger prick were collected on a filter paper card to which a barcode label unique to the respondent was affixed. A duplicate label was attached to the Biomarker Data Collection Form. A third copy of the same barcode was affixed to the DBS transmittal sheet to track the blood samples from the field to the laboratory.

Blood samples were dried overnight and packaged for storage the following morning. Samples were periodically collected from the field and transported to the National Reference Laboratory in the City of Kigali. Upon arrival at the NRL, each blood sample was logged into the CSPro HIV Test Tracking System database and stored at –80°C until tested. DBS laboratory testing was conducted at the NRL from November 2022 to February 2023. Laboratory testing started late as there was a wait for the available test kits to match the testing algorithm.

The NRL used the usual internal quality control system using the known control samples of HIV-positive and HIV-negative aliquots.

## 1.5 Pretest, Training of Field Staff, and Fieldwork

Additional details on survey implementation can be found in the final report.

### 1.5.1 Pretest

A pretest was conducted from July 29 through August 14, 2019, when 25 candidates (15 women and 10 men) participated in questionnaire training. Additionally, 10 biomarker health technicians participated in separate biomarker training conducted in parallel. Biomarker training included training on collecting height and weight data and testing for anemia, malaria, and HIV (RDT and DBS collection).

### 1.5.2 Training of Field Staff

The main training for the 2019–20 Rwanda DHS started on September 30 and ended on November 1, 2019. A total of 160 participants from all over the country were invited to take part in the training.

A variety of different learning tools were used in the training. The training was divided into questionnaire training, CAPI training, biomarker training (including training on HIV testing), and field practice.

The field coordinators were trained in the use of the Biomarker Checklist to ensure quality in terms of HIV testing and collection of biomarker data.

## 1.6 Fieldwork

Data collection was carried out by 17 field teams. Each team was provided a four-wheel-drive truck with a driver. All DBS and other biomarker specimens were transferred to the NISR office biweekly by 10 supervisors from the NISR and NRL who also coordinated and supervised fieldwork activities. The fieldwork for the 2019–20 RDHS was carried out under close supervision starting on November 9, 2019, and was completed on July 20, 2020.

## 1.7 Data Processing

Blood samples were kept at the NRL at –80°C until testing was initiated in the fourth quarter of 2022. Barcode labels on DBS samples, transmittal sheets, and Biomarker Questionnaires were scanned and used as unique identifiers in anonymously linking HIV test results and individual respondents.

Throughout this report, numbers in the tables reflect weighted numbers. Percentages based on 25 to 49 unweighted cases are shown in parentheses, and percentages based on fewer than 25 unweighted cases are suppressed and replaced with an asterisk, to caution readers when interpreting data that a percentage based on fewer than 50 cases may not be statistically reliable.

## 1.8 RESPONSE RATES

**Table 1.1** shows response rates for the 2019–20 RDHS. A total of 13,005 households were selected for the sample, of which 12,951 were occupied. All but two occupied households (12,949) were successfully interviewed, yielding a response rate of nearly 100.0%. In the interviewed households, 14,675 women age 15–49 were identified for individual interviews; interviews were completed with 14,634 women, yielding a response rate of 99.7%. There were 6,503 households in the subsample selected for the male survey, of which 6,472 were occupied. All but one of the occupied households (6,471) were successfully interviewed, yielding a response rate of 100.0%. In this subsample, 6,544 men age 15–59 were identified and 6,513 were successfully interviewed, yielding a response rate of 99.5%. In the subsample selected for the micronutrient survey, 3,501 households were selected, of which 3,492 were occupied. All but one of the occupied households (3,491) were successfully interviewed, yielding a response rate of nearly 100.0%.

**Table 1.1 Results of the household and individual interviews**

Number of households, number of interviews, and response rates, according to residence (unweighted), Rwanda DHS 2019–20

| Result | Residence | | Total |
|---|---|---|---|
| | Urban | Rural | |
| **Household interviews** | | | |
| Households selected | 2,913 | 10,092 | 13,005 |
| Households occupied | 2,892 | 10,059 | 12,951 |
| Households interviewed | 2,892 | 10,057 | 12,949 |
| Household response rate[1] | 100.0 | 100.0 | 100.0 |
| **Interviews with women age 15–49** | | | |
| Number of eligible women | 3,564 | 11,111 | 14,675 |
| Number of eligible women interviewed | 3,551 | 11,083 | 14,634 |
| Eligible women response rate[2] | 99.6 | 99.7 | 99.7 |
| **Household interviews in men's subsample** | | | |
| Households selected | 1,456 | 5,047 | 6,503 |
| Households occupied | 1,441 | 5,031 | 6,472 |
| Households interviewed | 1,441 | 5,030 | 6,471 |
| Household response rate in subsample[1] | 100.0 | 100.0 | 100.0 |
| **Interviews with men age 15–59** | | | |
| Number of eligible men | 1,514 | 5,030 | 6,544 |
| Number of eligible men interviewed | 1,504 | 5,009 | 6,513 |
| Eligible men response rate[2] | 99.3 | 99.6 | 99.5 |
| **Household interviews in micronutrient subsample** | | | |
| Households selected | 784 | 2,717 | 3,501 |
| Households occupied | 784 | 2,708 | 3,492 |
| Households interviewed | 784 | 2,707 | 3,491 |
| Household response rate in subsample[1] | 100.0 | 100.0 | 100.0 |

[1] Households interviewed/households occupied
[2] Respondents interviewed/eligible respondents

# HIV PREVALENCE 2

## Key Findings

- ***Trends in HIV prevalence:*** HIV prevalence in Rwanda has been stable since 2005 and remains at 2.7% among adults age 15–49 (3.5% among women and 1.7% among men).
- ***HIV prevalence by age:*** HIV prevalence increases from 0.7% among respondents age 15–19 to 8.1% among those age 45–49.
- ***HIV prevalence by residence:*** HIV prevalence is higher in urban areas (3.7%) than in rural areas (2.5%).
- ***HIV prevalence according to province:*** HIV prevalence is higher in Kigali (3.8%) than in the other provinces (2.2% to 2.8%).
- ***Marital status and HIV infection:*** HIV prevalence is higher among respondents who are widowed (14.7%) and those who are divorced or separated (9.8%) than among those who have never been in union (1.4%) and those who are currently in union (2.9%).
- ***Male circumcision and HIV infection:*** Uncircumcised men are more likely to be HIV positive (2.5%) than circumcised men (1.1%).

## 2.1 COVERAGE RATES FOR HIV TESTING

**HIV testing coverage rate**

Percentage of women and men who were tested for HIV as part of the survey.

***Sample:*** Women and men who are members of households selected for HIV testing and are within the eligible age range for HIV testing based on information collected in the Household Questionnaire.

The HIV testing coverage rate is calculated as follows:

$$\frac{\text{Women and men age 15–49 who were interviewed and whose blood sample underwent the complete HIV testing algorithm with a final result of positive, negative, indeterminate, or inconclusive}}{\text{All women and men age 15–49 in households selected for HIV testing}}$$

**Table 2.1** shows coverage rates for HIV testing. Nearly all women (more than 99%) and men (99%) who were eligible for HIV testing consented to be interviewed and tested for HIV infection.

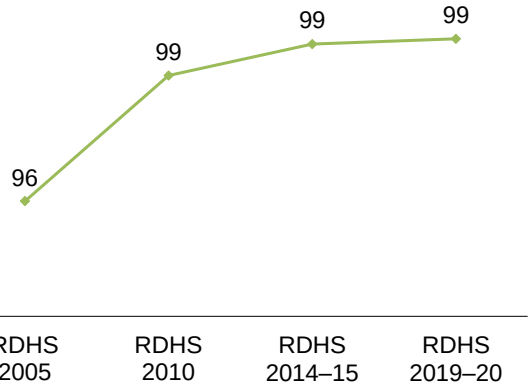
**Trends:** The coverage rate for HIV testing increased from 96% in 2005 to 99% in 2010, 2014–15, and 2019–20 (**Figure 2.1**).

### Patterns by background characteristics

- The coverage rate for HIV testing is higher in rural areas (more than 99%) than in urban areas (98%).
- Because the coverage rate is nearly 100%, differences by age, education, and household wealth are minimal (**Table 2.2**).

***Figure 2.1*** **Trends in HIV testing coverage**

*Coverage of HIV testing among adults age 15–49 from 2005–2019/20*




## 2.2 HIV PREVALENCE

### 2.2.1 HIV Prevalence by Age and Sex

**HIV prevalence**

Percentage of women and men who tested positive for HIV as part of the survey.

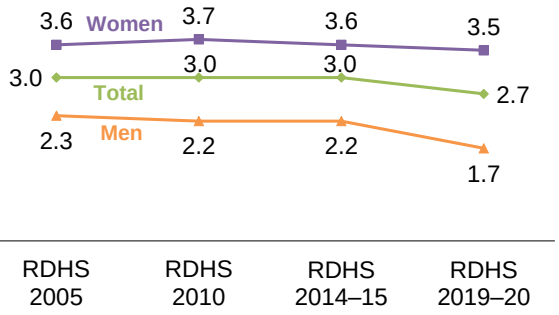
***Sample:*** Women and men age 15–49 tested for HIV as part of the survey

**Table 2.3** shows that 3% of adults age 15–49 in Rwanda are living with HIV. The HIV prevalence rate is 4% among women and 2% among men. Among both women and men, HIV prevalence generally rises with age. The prevalence among women increases from 1% at age 15–19 to 8% at age 40–44 and 10% at age 45–49.Similarly, the prevalence among men increases from 1% at age 15–19 to 3% at age 40–44 and 6% at age 45–49. Five percent of men age 50–59 tested positive for HIV.

**Trends:** HIV prevalence among adults of reproductive age in Rwanda has remained steady at 3% since 2005 (**Figure 2.2**).

***Figure 2.2*** **Trends in HIV prevalence**

*Coverage of HIV testing among adults age 15–49 from 2005–2019/20*




### Patterns by socioeconomic characteristics

- Four percent of respondents in urban areas are infected with HIV, as compared with 3% of those in rural areas (**Table 2.4**).
- The prevalence of HIV is higher among Muslims (4%) than among those from other religious groups (2% to 3%).
- HIV prevalence is higher in City of Kigali (4%) than in the other provinces (2% to 3%).
- Overall, HIV prevalence in Rwanda decreases with increasing education, from 4% among women and men with no education to 1% among those with more than a secondary education.

### Patterns by demographic characteristics

- Fifteen percent of respondents who are widowed and 10% who are divorced or separated are HIV positive, as compared with only 3% of those who are currently married and 1% of those who have never been in union (**Table 2.5**).

- HIV prevalence is higher (8%) among respondents who are in a polygynous union than among those who are in a nonpolygynous union or not currently in union (3% each).
- There is no clear relationship between HIV prevalence and number of times respondents had slept away from home in the 12 months preceding the survey. Similarly, there are no meaningful differences in HIV prevalence with respect to duration of time away from home over the past 12 months.
- Women who were pregnant at the time of the survey are slightly less likely to be HIV positive than women who were not pregnant or who were unsure of their pregnancy status (3% and 4%, respectively).

### 2.2.2 HIV Prevalence by Sexual Behavior

Four percent of respondents age 15–49 who have ever had sex are HIV positive (5% of women and 2% of men) (**Table 2.6**).

#### Patterns by background characteristics

- The prevalence of HIV is higher among women who first had sexual intercourse at age 17 or younger (7%) than among those who first had sex at older ages (3%–5%). Among men, HIV prevalence is higher among those who first had sex at age 16–17 (3%) than among other men.
- HIV prevalence among women increases with increasing number of lifetime sexual partners, from 2% among those with one lifetime partner to 19% among those with five to nine partners. Similarly, HIV prevalence rises from 1% among men with one lifetime partner to 4% among those with three or more partners.
- Respondents with two or more partners in the 12 months prior to the survey are more likely to be HIV positive than other respondents (6% versus 3%–4%).
- Fifteen percent of women who had sex with two or more nonmarital, noncohabiting partners in the 12 months preceding the survey tested positive for HIV, as compared with 4% of women who had no such partners. This pattern was not observed among men.
- Eleven percent of women and 4% of men who used a condom during their most recent sexual intercourse tested positive for HIV. Only 3% of women and 2% of men who did not use a condom are HIV positive.

### 2.2.3 HIV Prevalence among Young People

One percent each of young women and young men age 15–24 tested positive for HIV (**Table 2.7**).

#### Patterns by background characteristics

- HIV prevalence among young people increases slightly with age.
- Young people living in urban areas are more likely to be HIV positive than those living in rural areas (2% versus 1%).
- HIV prevalence is 5% among young women who are divorced, separated, or widowed, as compared with only 2% among those who are in union and 1% among those who have never been married.
- Young women who are pregnant are three times more likely than those who are not pregnant to be HIV positive (3% versus 1%) (**Table 2.7**).

### Patterns by sexual behavior

- Among young women, there is an association between HIV prevalence and number of sexual partners (including nonmarital, noncohabiting partners) in the past 12 months (**Table 2.8**). No such pattern is observed among men.

## 2.2.4 HIV Prevalence by Symptoms of Sexually Transmitted Infections (STIs) and Prior HIV testing

- The prevalence of HIV is 5% among women and 2% among men age 15–49 who have ever had sex and had ever been tested for HIV prior to the survey (**Table 2.9**).

- Respondents who reported that they had ever been tested for HIV are twice as likely to be HIV positive as those who have never been tested (4% versus 2%).

- HIV prevalence is higher among women and men who reported an STI or symptoms of an STI in the 12 months preceding the survey (7% and 5%, respectively) than among those with no recent STIs or STI symptoms (4% and 2%).

## 2.2.5 Prior HIV Testing according to Current HIV Status

**Table 2.10** shows history of HIV testing and receipt of test results prior to the survey according to current HIV status. It is important to note that in this table current HIV status is determined by the result of the 2019–20 RDHS HIV test, but data on prior HIV testing are based on information reported by the respondent during the interview.

- Eighty-nine percent of respondents who tested positive for HIV during the 2019–20 RDHS had ever been tested and received the result of the most recent test. Thirty-four percent of women and men living with HIV were last tested for HIV within the 12 months preceding the survey, while 55% were last tested more than 12 months before the survey, 1% had been tested but did not receive the result, and 11% had never been tested.

- Among respondents testing negative for HIV during the survey, 71% had been tested and received the result (33% within 12 months and 38% after more than 12 months), 1% had been tested but did not receive the result, and 27% had never been tested.

## 2.2.6 HIV Prevalence by Male Circumcision Status

In the 2019–20 RDHS, men were asked whether they were circumcised. **Table 2.11** presents data on HIV prevalence by circumcision status. Overall, 1% of circumcised men age 15–49 are HIV positive, as compared with 3% of uncircumcised men.

## 2.2.7 HIV Prevalence among Couples

**Table 2.12** presents the HIV status of couples living in the same household in which both members were tested.

Overall, 97% of couples have concordant HIV status; in 96% of couples, both members are HIV negative, and in 1% both members are HIV positive.

Three percent of couples have discordant HIV status, including 1% in which the man tested positive for HIV and the woman tested negative and 2% in which the woman tested positive and the man tested negative.

## LIST OF TABLES

For more information on HIV prevalence, see the following tables:

**Table 2.1 Coverage of HIV testing by residence and province**

Percent distribution of women and men age 15–49 eligible for HIV testing by testing status, according to residence and province (unweighted), Rwanda DHS 2019–20

| | HIV test status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DBS tested[1] | | Refused to provide blood | | Absent at the time of blood collection | | Other/missing[2] | | | |
| Residence and province | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Total | Number |
| | | | | | WOMEN | | | | | |
| **Residence** | | | | | | | | | | |
| Urban | 98.7 | 0.0 | 0.8 | 0.1 | 0.0 | 0.1 | 0.2 | 0.2 | 100.0 | 1,801 |
| Rural | 99.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 100.0 | 5,535 |
| **Province** | | | | | | | | | | |
| Kigali | 99.1 | 0.0 | 0.6 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 100.0 | 950 |
| South | 99.6 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 100.0 | 1,746 |
| West | 99.6 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 100.0 | 1,681 |
| North | 99.6 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 100.0 | 1,136 |
| East | 99.5 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 100.0 | 1,823 |
| Total 15–49 | 99.5 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 7,336 |
| | | | | | MEN | | | | | |
| **Residence** | | | | | | | | | | |
| Urban | 98.1 | 0.1 | 0.8 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 100.0 | 1,376 |
| Rural | 99.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 100.0 | 4,488 |
| **Province** | | | | | | | | | | |
| Kigali | 98.6 | 0.0 | 0.5 | 0.1 | 0.0 | 0.1 | 0.4 | 0.3 | 100.0 | 770 |
| South | 99.4 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 1,414 |
| West | 99.6 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 100.0 | 1,338 |
| North | 99.3 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 | 100.0 | 919 |
| East | 98.7 | 0.3 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.6 | 100.0 | 1,423 |
| Total 15–49 | 99.2 | 0.1 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3 | 100.0 | 5,864 |
| 50–59 | 99.7 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 680 |
| Total 15–59 | 99.2 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 100.0 | 6,544 |
| | | | | | TOTAL | | | | | |
| **Residence** | | | | | | | | | | |
| Urban | 98.4 | 0.0 | 0.8 | 0.1 | 0.0 | 0.2 | 0.3 | 0.3 | 100.0 | 3,177 |
| Rural | 99.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 100.0 | 10,023 |
| **Province** | | | | | | | | | | |
| Kigali | 98.8 | 0.0 | 0.6 | 0.1 | 0.0 | 0.1 | 0.2 | 0.2 | 100.0 | 1,720 |
| South | 99.5 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 100.0 | 3,160 |
| West | 99.6 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 100.0 | 3,019 |
| North | 99.5 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 100.0 | 2,055 |
| East | 99.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.3 | 100.0 | 3,246 |
| Total 15–49 | 99.3 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 100.0 | 13,200 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive
[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reason or not enough blood to complete the algorithm

**Table 2.2 Coverage of HIV testing according to selected background characteristics**

Percent distribution of women and men age 15–49 eligible for HIV testing by testing status, according to selected background characteristics (unweighted), Rwanda DHS 2019–20

| | HIV test status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DBS tested[1] | | Refused to provide blood | | Absent at the time of blood collection | | Other/missing[2] | | | |
| Background characteristic | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Inter-viewed | Not inter-viewed | Total | Number |
| | | | | | WOMEN | | | | | |
| **Age** | | | | | | | | | | |
| 15–19 | 99.5 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 1,679 |
| 20–24 | 99.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.2 | 100.0 | 1,153 |
| 25–29 | 99.5 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 100.0 | 1,018 |
| 30–34 | 99.4 | 0.0 | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 100.0 | 1,097 |
| 35–39 | 99.8 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 100.0 | 1,008 |
| 40–44 | 99.3 | 0.1 | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 100.0 | 747 |
| 45–49 | 99.5 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 100.0 | 634 |
| **Education** | | | | | | | | | | |
| No education | 99.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 100.0 | 708 |
| Primary | 99.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 100.0 | 4,159 |
| Secondary | 99.6 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 100.0 | 2,126 |
| More than secondary | 97.7 | 0.0 | 1.5 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | 100.0 | 343 |
| **Wealth quintile** | | | | | | | | | | |
| Lowest | 99.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 100.0 | 1,338 |
| Second | 99.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 100.0 | 1,396 |
| Middle | 99.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 1,358 |
| Fourth | 99.8 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 100.0 | 1,481 |
| Highest | 98.8 | 0.1 | 0.8 | 0.1 | 0.0 | 0.1 | 0.2 | 0.1 | 100.0 | 1,763 |
| Total | 99.5 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 7,336 |
| | | | | | MEN | | | | | |
| **Age** | | | | | | | | | | |
| 15–19 | 99.5 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 100.0 | 1,540 |
| 20–24 | 98.9 | 0.1 | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.5 | 100.0 | 963 |
| 25–29 | 98.5 | 0.1 | 0.5 | 0.3 | 0.0 | 0.0 | 0.1 | 0.4 | 100.0 | 741 |
| 30–34 | 99.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 100.0 | 820 |
| 35–39 | 99.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 100.0 | 788 |
| 40–44 | 99.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | 100.0 | 572 |
| 45–49 | 99.5 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | 440 |
| **Education** | | | | | | | | | | |
| No education | 98.1 | 0.7 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.9 | 100.0 | 425 |
| Primary | 99.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 100.0 | 3,436 |
| Secondary | 99.3 | 0.0 | 0.4 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 100.0 | 1,669 |
| More than secondary | 96.7 | 0.0 | 1.8 | 0.3 | 0.0 | 0.6 | 0.0 | 0.6 | 100.0 | 334 |
| **Wealth quintile** | | | | | | | | | | |
| Lowest | 99.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.5 | 100.0 | 973 |
| Second | 99.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | 100.0 | 1,067 |
| Middle | 99.6 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 100.0 | 1,185 |
| Fourth | 99.4 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 100.0 | 1,267 |
| Highest | 98.4 | 0.0 | 0.7 | 0.1 | 0.1 | 0.1 | 0.3 | 0.4 | 100.0 | 1,372 |
| Total | 99.2 | 0.1 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3 | 100.0 | 5,864 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive
[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reason or not enough blood to complete the algorithm

**Table 2.3 HIV prevalence by age**

Among de facto women age 15–49 and men age 15–59 who were interviewed and tested, percentage HIV positive, according to age, Rwanda DHS 2019–20

| | Women | | Men | | | |
|---|---|---|---|---|---|---|
| Age | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| 15–19 | 0.6 | 1,621 | 0.8 | 1,530 | 0.7 | 3,152 |
| 20–24 | 1.8 | 1,148 | 1.3 | 963 | 1.6 | 2,111 |
| 25–29 | 2.8 | 1,012 | 1.1 | 710 | 2.1 | 1,722 |
| 30–34 | 4.2 | 1,111 | 1.1 | 835 | 2.9 | 1,946 |
| 35–39 | 3.4 | 1,006 | 1.9 | 794 | 2.7 | 1,800 |
| 40–44 | 7.7 | 741 | 3.0 | 576 | 5.6 | 1,317 |
| 45–49 | 9.5 | 630 | 6.1 | 446 | 8.1 | 1,076 |
| 50–59 | na | na | 4.9 | 667 | na | na |
| Total 15–49 | 3.5 | 7,270 | 1.7 | 5,855 | 2.7 | 13,125 |
| Total 15–59 | na | na | 2.0 | 6,522 | na | na |

na = not applicable

**Table 2.4 HIV prevalence by socioeconomic characteristics**

Percentage HIV positive among women and men age 15–49 who were tested, according to socioeconomic characteristics, Rwanda DHS 2019–20

| | Women | | Men | | | |
|---|---|---|---|---|---|---|
| Background characteristic | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Religion** | | | | | | |
| Catholic | 3.8 | 2,627 | 1.7 | 2,463 | 2.8 | 5,089 |
| Protestant | 3.3 | 3,441 | 1.9 | 2,341 | 2.7 | 5,781 |
| Adventist | 3.0 | 913 | 0.7 | 748 | 2.0 | 1,660 |
| Muslim | 5.6 | 148 | 3.2 | 154 | 4.4 | 302 |
| Traditional | * | 1 | * | 0 | * | 1 |
| Jehovah's Witness | 3.6 | 71 | (0.0) | 28 | 2.5 | 99 |
| Other | * | 16 | * | 8 | * | 24 |
| No religion | 2.4 | 54 | 3.9 | 113 | 3.4 | 167 |
| **Employment (past 12 months)** | | | | | | |
| Not employed | 3.3 | 1,926 | 0.4 | 648 | 2.6 | 2,574 |
| Employed | 3.6 | 5,344 | 1.9 | 5,207 | 2.7 | 10,551 |
| **Residence** | | | | | | |
| Urban | 5.0 | 1,439 | 2.1 | 1,116 | 3.7 | 2,555 |
| Rural | 3.1 | 5,831 | 1.6 | 4,739 | 2.5 | 10,570 |
| **Province** | | | | | | |
| Kigali | 5.2 | 1,052 | 2.1 | 879 | 3.8 | 1,931 |
| South | 3.8 | 1,522 | 1.6 | 1,240 | 2.8 | 2,762 |
| West | 2.9 | 1,604 | 1.6 | 1,270 | 2.4 | 2,874 |
| North | 2.9 | 1,092 | 1.3 | 889 | 2.2 | 1,980 |
| East | 3.2 | 2,000 | 1.9 | 1,576 | 2.6 | 3,577 |
| **Education** | | | | | | |
| No education | 5.3 | 722 | 2.6 | 421 | 4.3 | 1,143 |
| Primary | 3.8 | 4,204 | 2.0 | 3,575 | 3.0 | 7,779 |
| Secondary | 2.5 | 2,027 | 1.1 | 1,565 | 1.9 | 3,593 |
| More than secondary | 1.6 | 317 | 0.2 | 293 | 1.0 | 610 |
| **Wealth quintile** | | | | | | |
| Lowest | 3.4 | 1,281 | 2.7 | 926 | 3.1 | 2,207 |
| Second | 3.6 | 1,408 | 1.9 | 1,078 | 2.8 | 2,486 |
| Middle | 2.7 | 1,380 | 1.6 | 1,228 | 2.2 | 2,608 |
| Fourth | 4.5 | 1,506 | 1.3 | 1,282 | 3.0 | 2,788 |
| Highest | 3.3 | 1,695 | 1.5 | 1,340 | 2.5 | 3,035 |
| Total 15–49 | 3.5 | 7,270 | 1.7 | 5,855 | 2.7 | 13,125 |
| 50–59 | na | na | 4.9 | 667 | na | na |
| Total 15–59 | na | na | 2.0 | 6,522 | na | na |

Note: Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
na = not applicable

**Table 2.5 HIV prevalence by demographic characteristics**

Percentage HIV positive among women and men age 15–49 who were tested, according to demographic characteristics, Rwanda DHS 2019–20

| Demographic characteristic | Women | | Men | | | |
|---|---|---|---|---|---|---|
| | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Marital status** | | | | | | |
| Never married | 1.7 | 2,902 | 1.1 | 2,874 | 1.4 | 5,776 |
| Ever had sexual intercourse | 3.6 | 969 | 1.6 | 1,113 | 2.6 | 2,083 |
| Never had sexual intercourse | 0.7 | 1,932 | 0.8 | 1,761 | 0.8 | 3,693 |
| Married/living together | 3.4 | 3,704 | 2.1 | 2,863 | 2.9 | 6,566 |
| Divorced or separated | 10.3 | 469 | 8.0 | 104 | 9.8 | 574 |
| Widowed | 15.3 | 195 | * | 14 | 14.7 | 209 |
| **Type of union** | | | | | | |
| In polygynous union | 9.0 | 299 | 3.9 | 77 | 8.0 | 377 |
| In nonpolygynous union | 3.0 | 3,367 | 2.0 | 2,785 | 2.5 | 6,152 |
| Not currently in union | 3.6 | 3,567 | 1.4 | 2,992 | 2.6 | 6,559 |
| Don't know/missing | (2.7) | 38 | * | 0 | (2.7) | 38 |
| **Times slept away from home in past 12 months** | | | | | | |
| None | 3.4 | 4,212 | 1.6 | 3,654 | 2.6 | 7,866 |
| 1–2 | 3.4 | 2,441 | 2.0 | 1,547 | 2.9 | 3,988 |
| 3–4 | 4.3 | 361 | 1.5 | 363 | 2.9 | 724 |
| 5+ | 4.2 | 256 | 1.7 | 290 | 2.9 | 547 |
| **Time away in past 12 months** | | | | | | |
| Away for more than 1 month at a time | 2.4 | 546 | 1.5 | 635 | 1.9 | 1,181 |
| Away for less than 1 month at a time | 3.9 | 2,513 | 2.0 | 1,566 | 3.2 | 4,078 |
| Not away | 3.4 | 4,212 | 1.6 | 3,654 | 2.6 | 7,866 |
| **Currently pregnant** | | | | | | |
| Pregnant | 2.5 | 434 | na | na | na | na |
| Not pregnant or not sure | 3.6 | 6,836 | na | na | na | na |
| **ANC for last birth in the past 3 years** | | | | | | |
| ANC provided by the public sector | 2.9 | 2,179 | na | na | na | na |
| ANC provided by other than the public sector | 0.0 | 63 | na | na | na | na |
| No ANC/no birth in the past 3 years | 3.8 | 5,029 | na | na | na | na |
| Total 15–49 | 3.5 | 7,270 | 1.7 | 5,855 | 2.7 | 13,125 |
| 50–59 | na | na | 4.9 | 667 | na | na |
| Total 15–59 | na | na | 2.0 | 6,522 | na | na |

Note: Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
na = not applicable
ANC = Antenatal care

**Table 2.6 HIV prevalence by sexual behavior**

Percentage HIV positive among women and men age 15–49 who ever had sex and were tested for HIV, according to sexual behavior characteristics, Rwanda DHS 2019–20

| Sexual behavior characteristic | Women | | Men | | | |
|---|---|---|---|---|---|---|
| | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Age at first sexual intercourse** | | | | | | |
| <16 | 6.8 | 461 | 1.7 | 498 | 4.1 | 960 |
| 16–17 | 7.4 | 929 | 3.1 | 453 | 6.0 | 1,382 |
| 18–19 | 4.6 | 1,314 | 2.2 | 752 | 3.8 | 2,066 |
| 20+ | 3.0 | 2,623 | 1.9 | 2,355 | 2.5 | 4,977 |
| Missing | * | 11 | (5.1) | 35 | (3.9) | 46 |
| **Number of lifetime partners** | | | | | | |
| 1 | 1.9 | 3,376 | 0.6 | 1,627 | 1.5 | 5,003 |
| 2 | 6.3 | 1,239 | 2.2 | 1,171 | 4.4 | 2,410 |
| 3–4 | 11.7 | 567 | 3.9 | 814 | 7.1 | 1,381 |
| 5–9 | 18.7 | 114 | 3.9 | 334 | 7.7 | 449 |
| 10+ | (31.7) | 32 | 4.4 | 148 | 9.3 | 180 |
| Missing | * | 8 | * | 0 | * | 8 |
| **Multiple sexual partners in past 12 months** | | | | | | |
| 0 | 5.9 | 1,038 | 1.7 | 671 | 4.2 | 1,709 |
| 1 | 3.9 | 4,193 | 2.2 | 3,101 | 3.2 | 7,295 |
| 2+ | 14.4 | 107 | 2.5 | 321 | 5.5 | 428 |
| **Nonmarital, noncohabiting partners in past 12 months[1]** | | | | | | |
| 0 | 4.1 | 4,702 | 2.0 | 3,368 | 3.2 | 8,069 |
| 1 | 6.3 | 566 | 2.9 | 608 | 4.6 | 1,174 |
| 2+ | 14.5 | 70 | 1.7 | 118 | 6.5 | 188 |
| **Condom use at last sexual intercourse in past 12 months** | | | | | | |
| Used condom | 10.9 | 487 | 3.5 | 588 | 6.9 | 1,074 |
| Did not use condom | 3.3 | 3,814 | 1.9 | 2,835 | 2.7 | 6,649 |
| No sexual intercourse in past 12 months | 5.9 | 1,038 | 1.7 | 671 | 4.2 | 1,709 |
| **Condom use at last sexual intercourse with a nonmarital, noncohabiting partner in past 12 months[1]** | | | | | | |
| Used condom | 9.3 | 294 | 2.0 | 505 | 4.7 | 800 |
| Did not use condom | 5.4 | 342 | 4.4 | 221 | 5.0 | 562 |
| No sexual intercourse with any nonmarital, noncohabiting partners in past 12 months[1] | 4.1 | 4,702 | 2.0 | 3,368 | 3.2 | 8,069 |
| **Paid for sexual intercourse in past 12 months** | | | | | | |
| Yes | na | na | 6.0 | 82 | na | na |
| Used condom | na | na | 5.5 | 62 | na | na |
| Did not use condom | na | na | * | 20 | na | na |
| No (no paid sexual intercourse/no sexual intercourse in past 12 months) | na | na | 2.0 | 4,012 | na | na |
| Total 15–49 | 4.5 | 5,338 | 2.1 | 4,094 | 3.5 | 9,432 |
| 50–59 | na | na | 5.0 | 661 | na | na |
| Total 15–59 | na | na | 2.5 | 4,755 | na | na |

Note: Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
na = not applicable
[1] Any partner who was not a spouse and did not live with the respondent

**Table 2.7 HIV prevalence among young people by background characteristics**

Percentage HIV positive among women and men age 15–24 who were tested for HIV, according to background characteristics, Rwanda DHS 2019–20

| Background characteristic | Women | | Men | | | |
|---|---|---|---|---|---|---|
| | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Age** | | | | | | |
| 15–19 | 0.6 | 1,621 | 0.8 | 1,530 | 0.7 | 3,152 |
| 15–17 | 0.6 | 1,069 | 0.8 | 1,003 | 0.7 | 2,073 |
| 18–19 | 0.5 | 552 | 0.8 | 527 | 0.7 | 1,079 |
| 20–24 | 1.8 | 1,148 | 1.3 | 963 | 1.6 | 2,111 |
| 20–22 | 1.2 | 703 | 1.2 | 613 | 1.2 | 1,317 |
| 23–24 | 2.7 | 445 | 1.3 | 350 | 2.1 | 795 |
| **Marital status** | | | | | | |
| Never married | 0.8 | 2,302 | 1.0 | 2,353 | 0.9 | 4,655 |
| Ever had sex | 1.2 | 547 | 1.6 | 711 | 1.4 | 1,257 |
| Never had sex | 0.7 | 1,755 | 0.8 | 1,643 | 0.7 | 3,398 |
| Married/living together | 2.1 | 406 | 0.4 | 133 | 1.6 | 539 |
| Divorced/separated/widowed | 5.0 | 61 | * | 7 | 4.5 | 69 |
| **Currently pregnant** | | | | | | |
| Pregnant | 2.8 | 119 | na | na | na | na |
| Not pregnant or not sure | 1.0 | 2,651 | na | na | na | na |
| **Residence** | | | | | | |
| Urban | 1.5 | 569 | 1.4 | 465 | 1.5 | 1,034 |
| Rural | 1.0 | 2,200 | 0.9 | 2,028 | 0.9 | 4,228 |
| **Province** | | | | | | |
| Kigali | 2.0 | 385 | 1.4 | 347 | 1.8 | 732 |
| South | 1.8 | 564 | 0.9 | 527 | 1.4 | 1,091 |
| West | 1.0 | 622 | 1.1 | 561 | 1.0 | 1,182 |
| North | 0.8 | 423 | 0.3 | 374 | 0.5 | 796 |
| East | 0.2 | 777 | 1.2 | 684 | 0.7 | 1,461 |
| **Education** | | | | | | |
| No education | (0.0) | 39 | (0.0) | 49 | 0.0 | 88 |
| Primary | 1.0 | 1,341 | 1.2 | 1,361 | 1.1 | 2,702 |
| Secondary | 1.2 | 1,319 | 0.8 | 1,034 | 1.0 | 2,354 |
| More than secondary | 1.2 | 70 | 0.0 | 49 | 0.7 | 119 |
| **Wealth quintile** | | | | | | |
| Lowest | 1.2 | 412 | 2.0 | 342 | 1.5 | 754 |
| Second | 1.3 | 523 | 1.4 | 468 | 1.4 | 992 |
| Middle | 0.2 | 521 | 0.7 | 529 | 0.4 | 1,050 |
| Fourth | 0.8 | 587 | 0.2 | 571 | 0.5 | 1,158 |
| Highest | 1.7 | 726 | 1.2 | 583 | 1.5 | 1,309 |
| Total | 1.1 | 2,770 | 1.0 | 2,493 | 1.0 | 5,263 |

Note: Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
na = not applicable

**Table 2.8 HIV prevalence among young people by sexual behavior**

Percentage HIV positive among women and men age 15–24 who have ever had sex and were tested for HIV, according to sexual behavior characteristics, Rwanda DHS 2019–20

| | Women | | Men | | | |
|---|---|---|---|---|---|---|
| Sexual behavior characteristic | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Multiple sexual partners in past 12 months** | | | | | | |
| 0 | 0.7 | 315 | 2.3 | 411 | 1.6 | 725 |
| 1 | 2.1 | 660 | 0.5 | 389 | 1.5 | 1,049 |
| 2+ | (4.8) | 40 | (0.0) | 51 | 2.1 | 91 |
| **Nonmarital, noncohabiting partners in past 12 months[1]** | | | | | | |
| 0 | 1.6 | 734 | 1.9 | 539 | 1.7 | 1,273 |
| 1 | 2.1 | 256 | 0.6 | 268 | 1.3 | 524 |
| 2+ | (4.6) | 24 | (0.0) | 44 | 1.6 | 68 |
| **Condom use at last sexual intercourse in past 12 months** | | | | | | |
| Used condom | 3.8 | 143 | 0.5 | 245 | 1.7 | 388 |
| Did not use condom | 1.8 | 557 | 0.5 | 195 | 1.5 | 752 |
| No sexual intercourse in past 12 months | 0.7 | 315 | 2.3 | 411 | 1.6 | 725 |
| Total | 1.8 | 1,014 | 1.4 | 851 | 1.6 | 1,865 |

Note: Figures in parentheses are based on 25–49 unweighted cases.
[1] Any partner who was not a spouse and did not live with the respondent

**Table 2.9 HIV prevalence by other characteristics**

Percentage HIV positive among women and men age 15–49 who have ever had sex and were tested for HIV, according to whether they had a sexually transmitted infection (STI) in the past 12 months and prior testing for HIV, Rwanda DHS 2019–20

| | Women | | Men | | | |
|---|---|---|---|---|---|---|
| Characteristic | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **STI in past 12 months** | | | | | | |
| Had STI or STI symptoms | 7.2 | 737 | 5.3 | 272 | 6.6 | 1,009 |
| No STI, no symptoms | 4.1 | 4,597 | 1.9 | 3,822 | 3.1 | 8,419 |
| Don't know/missing | * | 3 | * | 0 | * | 3 |
| **Prior HIV testing** | | | | | | |
| Ever tested | 4.6 | 4,982 | 2.4 | 2,958 | 3.8 | 7,940 |
| Received results | 4.6 | 4,951 | 2.4 | 2,935 | 3.8 | 7,886 |
| Did not receive results | (3.1) | 31 | (3.3) | 23 | 3.2 | 54 |
| Never tested | 3.0 | 356 | 1.4 | 1,136 | 1.8 | 1,492 |
| Total 15–49 | 4.5 | 5,338 | 2.1 | 4,094 | 3.5 | 9,432 |

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

**Table 2.10 Prior HIV testing by current HIV status**

Percent distribution of women and men age 15–49 who tested HIV positive and who tested HIV negative, according to HIV testing status prior to the survey, Rwanda DHS 2019–20

| | Women | | Men | | | |
|---|---|---|---|---|---|---|
| HIV testing prior to the survey | HIV positive | HIV negative | HIV positive | HIV negative | HIV positive | HIV negative |
| Ever tested for HIV and received the result of the most recent test | 93.0 | 77.5 | 77.2 | 63.9 | 88.5 | 71.4 |
| Tested in the past 12 months and received the result[1] | 34.9 | 35.8 | 32.1 | 30.3 | 34.1 | 33.3 |
| Tested 12 or more months ago and received the result[1] | 58.1 | 41.7 | 45.1 | 33.6 | 54.5 | 38.1 |
| Ever tested for HIV and did not receive the result of the most recent test | 0.8 | 1.5 | 0.8 | 1.4 | 0.8 | 1.4 |
| Not previously tested | 6.2 | 21.0 | 22.0 | 34.7 | 10.7 | 27.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number | 255 | 7,015 | 101 | 5,754 | 356 | 12,769 |

[1] Of the most recent HIV test

**Table 2.11 HIV prevalence by male circumcision**

Among men age 15–49 who were tested for HIV, percentage HIV positive by circumcision status, according to background characteristics, Rwanda DHS 2019–20

| Background characteristic | Circumcised by health worker/professional | | Circumcised by traditional practitioner/family/friend | | All circumcised[1] | | Uncircumcised | |
|---|---|---|---|---|---|---|---|---|
| | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number | Percentage HIV positive | Number |
| **Age** | | | | | | | | |
| 15–19 | 0.9 | 1,033 | (2.5) | 46 | 1.0 | 1,111 | 0.4 | 419 |
| 20–24 | 0.9 | 676 | * | 23 | 1.0 | 717 | 2.1 | 246 |
| 25–29 | 0.3 | 394 | * | 22 | 0.3 | 432 | 2.3 | 277 |
| 30–34 | 0.3 | 373 | (6.1) | 30 | 0.7 | 424 | 1.5 | 412 |
| 35–39 | 1.0 | 249 | * | 19 | 1.3 | 289 | 2.2 | 504 |
| 40–44 | 2.2 | 176 | * | 12 | 2.0 | 194 | 3.6 | 382 |
| 45–49 | 8.4 | 91 | * | 11 | 7.2 | 106 | 5.8 | 340 |
| **Religion** | | | | | | | | |
| Catholic | 1.1 | 1,204 | 2.9 | 67 | 1.3 | 1,303 | 2.2 | 1,160 |
| Protestant | 1.2 | 1,228 | 0.0 | 57 | 1.1 | 1,333 | 2.8 | 1,008 |
| Adventist | 0.2 | 391 | * | 22 | 0.5 | 427 | 1.0 | 320 |
| Muslim | 2.4 | 106 | * | 14 | 2.7 | 140 | * | 14 |
| Traditional | * | 0 | * | 0 | * | 0 | * | 0 |
| Jehovah's Witness | * | 14 | * | 1 | * | 16 | * | 12 |
| Other | * | 1 | * | 0 | * | 1 | * | 5 |
| No religion | (0.0) | 48 | * | 2 | (0.0) | 54 | 7.4 | 59 |
| **Residence** | | | | | | | | |
| Urban | 1.2 | 763 | (0.0) | 33 | 1.3 | 831 | 4.5 | 285 |
| Rural | 1.0 | 2,230 | 2.3 | 130 | 1.1 | 2,444 | 2.2 | 2,294 |
| **Province** | | | | | | | | |
| Kigali | 1.0 | 591 | * | 26 | 1.1 | 636 | 4.7 | 243 |
| South | 0.8 | 461 | 0.0 | 42 | 0.7 | 514 | 2.3 | 726 |
| West | 1.2 | 697 | 3.4 | 65 | 1.5 | 795 | 1.8 | 475 |
| North | 1.0 | 423 | * | 12 | 1.0 | 442 | 1.6 | 447 |
| East | 1.2 | 822 | * | 17 | 1.2 | 887 | 2.9 | 688 |
| **Education** | | | | | | | | |
| No education | 3.3 | 100 | * | 8 | 2.9 | 115 | 2.5 | 307 |
| Primary | 1.3 | 1,465 | 2.2 | 97 | 1.3 | 1,619 | 2.6 | 1,956 |
| Secondary | 0.8 | 1,198 | (1.9) | 43 | 1.0 | 1,289 | 1.9 | 277 |
| More than secondary | 0.0 | 230 | * | 15 | 0.0 | 252 | (1.6) | 40 |
| **Wealth quintile** | | | | | | | | |
| Lowest | 1.9 | 284 | (4.2) | 27 | 2.4 | 324 | 2.8 | 603 |
| Second | 1.5 | 441 | * | 26 | 1.3 | 487 | 2.3 | 591 |
| Middle | 0.8 | 571 | (3.0) | 34 | 0.9 | 629 | 2.4 | 599 |
| Fourth | 0.5 | 736 | (2.5) | 33 | 0.5 | 787 | 2.4 | 495 |
| Highest | 1.3 | 961 | (0.0) | 43 | 1.3 | 1,048 | 2.3 | 291 |
| Total 15–49 | 1.1 | 2,993 | 1.8 | 163 | 1.1 | 3,274 | 2.5 | 2,579 |
| 50–59 | 8.3 | 122 | * | 13 | 8.0 | 147 | 4.0 | 520 |
| Total 15–59 | 1.4 | 3,115 | 2.3 | 176 | 1.4 | 3,422 | 2.7 | 3,099 |

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

[1] Includes all men who report they are circumcised, including men circumcised by medical or traditional practitioners. Also includes those circumcised by other practitioners, those who don't know what practitioner performed their circumcision, and those who did not report a practitioner of circumcision, not shown separately.

**Table 2.12 HIV prevalence among couples**

Percent distribution of couples living in the same household, both of whom were tested for HIV, by HIV status, according to background characteristics, Rwanda DHS 2019–20

| Background characteristic | Both HIV positive | Man HIV positive, woman HIV negative | Woman HIV positive, man HIV negative | Both HIV negative | Either undetermined | Total | Number |
|---|---|---|---|---|---|---|---|
| **Woman's age** | | | | | | | |
| 15–19 | (0.0) | (0.0) | (0.0) | (100.0) | (0.0) | 100.0 | 34 |
| 20–29 | 0.5 | 0.8 | 1.3 | 97.5 | 0.0 | 100.0 | 849 |
| 30–39 | 1.0 | 1.1 | 1.7 | 96.2 | 0.0 | 100.0 | 1,388 |
| 40–49 | 2.8 | 1.1 | 2.8 | 93.3 | 0.0 | 100.0 | 802 |
| **Man's age** | | | | | | | |
| 15–19 | * | * | * | * | * | 100.0 | 3 |
| 20–29 | 0.3 | 0.3 | 1.2 | 98.2 | 0.0 | 100.0 | 481 |
| 30–39 | 0.6 | 0.6 | 1.9 | 96.9 | 0.0 | 100.0 | 1,333 |
| 40–49 | 2.4 | 1.6 | 1.7 | 94.2 | 0.0 | 100.0 | 901 |
| 50–59 | 2.6 | 1.7 | 3.1 | 92.5 | 0.0 | 100.0 | 354 |
| **Age difference between partners** | | | | | | | |
| Woman older | 1.3 | 0.4 | 2.5 | 95.8 | 0.0 | 100.0 | 478 |
| Same age/man older by 0–4 years | 1.0 | 0.9 | 1.4 | 96.7 | 0.0 | 100.0 | 1,402 |
| Man older by 5–9 years | 1.7 | 1.0 | 2.2 | 95.1 | 0.0 | 100.0 | 780 |
| Man older by 10–14 years | 2.3 | 1.6 | 1.8 | 94.3 | 0.0 | 100.0 | 276 |
| Man older by 15+ years | 1.2 | 3.2 | 2.1 | 93.6 | 0.0 | 100.0 | 137 |
| **Type of union** | | | | | | | |
| Nonpolygynous | 1.2 | 0.9 | 1.5 | 96.4 | 0.0 | 100.0 | 2,855 |
| Polygynous | 3.7 | 2.3 | 6.2 | 87.8 | 0.0 | 100.0 | 212 |
| Don't know/missing | * | * | * | * | * | 100.0 | 5 |
| **Multiple partners in past 12 months[1]** | | | | | | | |
| Both no | 1.3 | 1.0 | 1.7 | 96.0 | 0.0 | 100.0 | 2,846 |
| Man yes, woman no | 1.2 | 1.4 | 3.9 | 93.6 | 0.0 | 100.0 | 205 |
| Woman yes, man no | * | * | * | * | * | 100.0 | 17 |
| Both yes | * | * | * | * | * | 100.0 | 5 |
| **Residence** | | | | | | | |
| Urban | 2.7 | 0.3 | 3.6 | 93.4 | 0.0 | 100.0 | 488 |
| Rural | 1.1 | 1.1 | 1.5 | 96.3 | 0.0 | 100.0 | 2,585 |
| **Province** | | | | | | | |
| Kigali | 1.9 | 0.9 | 2.6 | 94.7 | 0.0 | 100.0 | 407 |
| South | 1.6 | 1.0 | 2.0 | 95.4 | 0.0 | 100.0 | 634 |
| West | 1.3 | 0.8 | 1.4 | 96.5 | 0.0 | 100.0 | 692 |
| North | 1.1 | 1.0 | 1.4 | 96.5 | 0.0 | 100.0 | 506 |
| East | 1.0 | 1.2 | 2.0 | 95.7 | 0.0 | 100.0 | 833 |
| **Woman's education** | | | | | | | |
| No education | 2.2 | 0.9 | 2.1 | 94.8 | 0.0 | 100.0 | 423 |
| Primary | 1.3 | 1.3 | 1.7 | 95.7 | 0.0 | 100.0 | 2,027 |
| Secondary | 1.1 | 0.0 | 2.4 | 96.5 | 0.0 | 100.0 | 497 |
| More than secondary | 0.1 | 0.3 | 1.1 | 98.5 | 0.0 | 100.0 | 126 |
| **Man's education** | | | | | | | |
| No education | 1.2 | 1.1 | 2.2 | 95.5 | 0.0 | 100.0 | 394 |
| Primary | 1.4 | 1.0 | 1.7 | 95.8 | 0.0 | 100.0 | 2,173 |
| Secondary | 1.4 | 1.2 | 2.2 | 95.2 | 0.0 | 100.0 | 367 |
| More than secondary | 0.0 | 0.0 | 1.5 | 98.5 | 0.0 | 100.0 | 139 |
| **Wealth quintile** | | | | | | | |
| Lowest | 1.2 | 1.9 | 2.1 | 94.8 | 0.0 | 100.0 | 579 |
| Second | 1.5 | 0.5 | 1.5 | 96.5 | 0.0 | 100.0 | 597 |
| Middle | 1.2 | 1.2 | 1.2 | 96.3 | 0.0 | 100.0 | 674 |
| Fourth | 1.3 | 0.9 | 2.3 | 95.5 | 0.0 | 100.0 | 647 |
| Highest | 1.5 | 0.5 | 2.1 | 95.9 | 0.0 | 100.0 | 575 |
| Total | 1.3 | 1.0 | 1.9 | 95.8 | 0.0 | 100.0 | 3,073 |

Note: Table is based on couples for whom a valid test result (positive or negative) is available for both partners. Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[1] A respondent is considered to have had multiple sexual partners in the past 12 months if he or she had sexual intercourse with two or more people during this time period. (Respondents with multiple partners include polygynous men who had sexual intercourse with two or more wives.)

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# SAMPLE DESIGN

# Appendix A

## A.1 INTRODUCTION

The 2019–20 Rwanda Demographic and Health Survey (2019–20 RDHS) follows those implemented in 1992, 2000, 2005, 2010, and 2014–15. A nationally representative sample of 500 clusters and 13,000 households were selected. All women age 15–49 who were usual residents of the selected households or who slept in the household the night before the survey were eligible for the survey. In half of the households, all men age 15–59 who were usual residents of the selected households or who slept in the household the night before the survey were eligible for the male survey. In the male survey subsample, all women and men eligible for interviews were eligible for HIV testing.

## A.2 SAMPLING FRAME

The sampling frame used for the 2019–20 RDHS is the Rwanda Population and Housing Census (RPHC), which was conducted in 2012. In the 2012 RPHC, Rwanda was divided into provinces, with each province being subdivided into districts, each district into sectors, each sector into cells, and each cell into villages. The five provinces comprise 30 districts and 417 sectors. Details on the sampling frame are provided in Appendix A of the final report.

## A.3 STRUCTURE OF THE SAMPLE AND SAMPLING PROCEDURE

The sample for the 2019–20 RDHS was a stratified sample selected in two stages from the 2012 census frame. Stratification was achieved by separating each district into urban and rural areas, each of which formed a sampling stratum. In total, 60 sampling strata were created. Samples were selected independently in each sampling stratum via a two-stage selection procedure. Implicit stratification and proportional allocation were achieved at each of the lower administrative unit levels by sorting the sampling frame within the explicit stratum according to administrative unit at different levels before sample selection and by using a probability proportional to size selection at the first stage of sampling.

In the first stage, 500 enumeration areas (EAs) were selected with probability proportional to EA size and with independent selection in each sampling stratum. A household listing operation was carried out in all of the selected EAs before the main survey. In the second stage, a fixed number of 26 households were selected from each selected EA in the newly updated listing. Details on the sampling procedure can be found in Appendix A of the final report.

## A.4 SELECTION PROBABILITIES AND SAMPLING WEIGHTS

Due to the nonproportional allocation of the sample to the different provinces and their districts and the possible differences in response rates, sampling weights will be required for any analysis using 2019–20 RDHS data to ensure the actual representativeness of the survey results at the national level as well as the domain level. Since the 2019–20 RDHS sample was a two-stage stratified cluster sample, sampling weights were calculated based on sampling probabilities separately for each sampling stage and for each cluster. The following notations were used:

$P_{1hi}$: first-stage sampling probability of the $i^{th}$ EA in stratum $h$
$P_{2hi}$: second-stage sampling probability within the $i^{th}$ EA (household selection)

Let $n_h$ be the number of EAs selected in stratum $h$, $M_{hi}$ the total population according to the sampling frame in the $i^{th}$ EA, and $\sum M_{hi}$ the total population in stratum $h$. The probability of selecting the $i^{th}$ EA in the 2019–20 RDHS sample is calculated as follows:

$$\frac{n_h M_{hi}}{\sum M_{hi}}$$

Let $s_{hi}$ be the proportion of households in the selected segment relative to the total number of households in EA $i$ in stratum $h$ if the EA is segmented; otherwise, $s_{hi} = 1$. Then the probability of selecting cluster $i$ in the sample is:

$$P_{1hi} = \frac{n_h M_{hi}}{\sum M_{hi}} \times s_{hi}$$

A 2019–20 RDHS cluster is either an EA or a segment of a large EA. Let $L_{hi}$ be the number of households listed in the household listing operation in cluster $i$ in stratum $h$, and let $m_{hi}$ be the number of households selected in the cluster. The second stage's selection probability for each household in the cluster is calculated as follows:

$$P_{2hi} = \frac{m_{hi}}{L_{hi}}$$

The overall selection probability of each household in cluster $i$ of stratum $h$ is therefore the product of the two-stage selection probabilities:

$$P_{hi} = P_{1hi} \times P_{2hi}$$

The design weight for each household in cluster $i$ of stratum $h$ is the inverse of its overall selection probability:

$$W_{hi} = 1 / P_{hi}$$

A spreadsheet containing all sampling parameters and selection probabilities was prepared to facilitate the calculation of the design weights. Design weights were adjusted for household nonresponse and for individual nonresponse to obtain the sampling weights for households and for women and men, respectively. All of the nonresponse adjustments were made at the sampling stratum level. Differences in the household sampling weights and the individual sampling weights were introduced by individual nonresponse. The final sampling weights were normalized so that the total number of unweighted cases was equal to the total number of weighted cases at the national level for both household weights and individual weights. The sampling weights for HIV testing were calculated in a similar way, with correction of nonresponse for both individual surveys and HIV testing, but the normalization of the sampling weights was different. The HIV testing weights were normalized for women and men together at the national level so that the HIV prevalence rates calculated for women and men in combination would be valid. Sampling weights for the domestic violence module were calculated based on the number of eligible male and female respondents in the household selected for the module. Different sets of sampling weights were calculated for (1) all households selected for the survey, (2) the women's individual survey, (3) households selected for the male survey, (4) the men's individual survey, (5) the women's domestic violence module, (6) the men's domestic violence module, (7) women's HIV testing, and (8) men's HIV testing.

It is important to note that normalized weights are relative weights that are valid for estimating means, proportions, and ratios but not valid for estimating population totals or for pooled data. Normalization must be done at the national level; a piece-wise normalization, for example a normalization by region, will introduce bias for national indicators. Also, the number of weighted cases using the normalized weight has no direct relation with survey precision because it is relative. Especially for oversampled areas, the number of weighted cases will be much smaller than the number of unweighted cases, with only the latter being directly related to survey precision.

Sampling errors were calculated for selected indicators for the national sample, for urban and rural areas separately, and for each of the five provinces.

## A.5 SURVEY IMPLEMENTATION

**Table A.1** and **Table A.2** present response rates for women and men, respectively, by urban and rural areas and by province. The male subsample constituted one in two of the households selected for the women's sample.

**Table A.1 Sample implementation: Women**

Percent distribution of households and eligible women age 15–49 by results of the household and individual interviews, and household, eligible women, and overall women response rates, according to residence and province (unweighted), Rwanda DHS 2019–20

| | Residence | | Province | | | | | |
|---|---|---|---|---|---|---|---|---|
| Result | Urban | Rural | City of Kigali | South | West | North | East | Total |
| **Selected households** | | | | | | | | |
| Completed (C) | 99.3 | 99.7 | 99.3 | 99.6 | 99.5 | 99.5 | 99.8 | 99.6 |
| Household present but no competent respondent at home (HP) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Household absent (HA) | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dwelling vacant/address not a dwelling (DV) | 0.6 | 0.2 | 0.5 | 0.3 | 0.3 | 0.4 | 0.2 | 0.3 |
| Dwelling destroyed (DD) | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Other (O) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of sampled households | 2,913 | 10,092 | 1,586 | 3,407 | 2,912 | 2,082 | 3,018 | 13,005 |
| Household response rate (HRR)[1] | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **Eligible women** | | | | | | | | |
| Completed (EWC) | 99.6 | 99.7 | 99.5 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 |
| Not at home (EWNH) | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| Postponed (EWP) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Refused (EWR) | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Incapacitated (EWI) | 0.1 | 0.2 | 0.0 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 |
| Other (EWO) | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of women | 3,564 | 11,111 | 1,931 | 3,489 | 3,319 | 2,300 | 3,636 | 14,675 |
| Eligible women response rate (EWRR)[2] | 99.6 | 99.7 | 99.5 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 |
| Overall women response rate (OWRR)[3] | 99.6 | 99.7 | 99.5 | 99.8 | 99.8 | 99.7 | 99.7 | 99.7 |

[1] Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\frac{100 * C}{C + HP + P + R + DNF}$$

[2] The eligible women response rate (EWRR) is equivalent to the percentage of interviews completed (EWC).
[3] The overall women response rate (OWRR) is calculated as:

$$OWRR = HRR * EWRR/100$$

**Table A.2 Sample implementation: Men**

Percent distribution of households and eligible men age 15–59 by results of the household and individual interviews, and household, eligible men, and overall men response rates, according to residence and province (unweighted), Rwanda DHS 2019–20

| | Residence | | Province | | | | | |
|---|---|---|---|---|---|---|---|---|
| Result | Urban | Rural | City of Kigali | South | West | North | East | Total |
| **Selected households** | | | | | | | | |
| Completed (C) | 99.0 | 99.7 | 99.0 | 99.4 | 99.7 | 99.7 | 99.7 | 99.5 |
| Household present but no competent respondent at home (HP) | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Household absent (HA) | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dwelling vacant/address not a dwelling (DV) | 0.9 | 0.2 | 0.8 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 |
| Dwelling destroyed (DD) | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other (O) | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of sampled households | 1,456 | 5,047 | 793 | 1,704 | 1,456 | 1,040 | 1,510 | 6,503 |
| Household response rate (HRR)[1] | 100.0 | 100.0 | 100.0 | 99.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| **Eligible men** | | | | | | | | |
| Completed (EMC) | 99.3 | 99.6 | 99.5 | 99.7 | 99.7 | 99.6 | 99.1 | 99.5 |
| Not at home (EMNH) | 0.5 | 0.1 | 0.4 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Refused (EMR) | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Incapacitated (EMI) | 0.2 | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 | 0.7 | 0.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of men | 1,514 | 5,030 | 851 | 1,599 | 1,498 | 1,017 | 1,579 | 6,544 |
| Eligible men response rate (EMRR)[2] | 99.3 | 99.6 | 99.5 | 99.7 | 99.7 | 99.6 | 99.1 | 99.5 |
| Overall men response rate (OMRR)[3] | 99.3 | 99.6 | 99.5 | 99.6 | 99.7 | 99.6 | 99.1 | 99.5 |

[1] Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\frac{100 * C}{C + HP + P + R + LNT}$$

[2] The eligible men response rate (EMRR) is equivalent to the percentage of interviews completed (EMC).
[3] The overall men response rate (OMRR) is calculated as:

$$OMRR = HRR * EMRR/100$$

## A.6 COVERAGE OF HIV TESTING

**Tables A.3** and **A.4** present coverage of HIV testing by social and demographic characteristics such as marital status, type of union, time away from home, and religion.

**Table A.3 Coverage of HIV testing by social and demographic characteristics: Women**

Percent distribution of interviewed women age 15–49 by HIV testing status, according to social and demographic characteristics (unweighted), Rwanda DHS 2019–20

| Characteristic | HIV test status: DBS tested[1] | Refused to provide blood | Other/ missing[2] | Total | Number |
|---|---|---|---|---|---|
| **Marital status** | | | | | |
| Never married | 99.7 | 0.2 | 0.1 | 100.0 | 3,015 |
| Ever had sexual intercourse | 99.7 | 0.1 | 0.2 | 100.0 | 1,011 |
| Never had sexual intercourse | 99.8 | 0.2 | 0.0 | 100.0 | 2,004 |
| Married/living together | 99.7 | 0.2 | 0.1 | 100.0 | 3,652 |
| Divorced or separated | 99.8 | 0.2 | 0.0 | 100.0 | 457 |
| Widowed | 99.5 | 0.5 | 0.0 | 100.0 | 195 |
| **Type of union** | | | | | |
| In polygynous union | 100.0 | 0.0 | 0.0 | 100.0 | 285 |
| In nonpolygynous union | 99.7 | 0.2 | 0.1 | 100.0 | 3,334 |
| Not currently in union | 99.7 | 0.2 | 0.1 | 100.0 | 3,667 |
| Don't know/missing | 100.0 | 0.0 | 0.0 | 100.0 | 33 |
| **Ever had sexual intercourse** | | | | | |
| Yes | 99.7 | 0.2 | 0.1 | 100.0 | 5,315 |
| No | 99.8 | 0.2 | 0.0 | 100.0 | 2,004 |
| **Currently pregnant** | | | | | |
| Pregnant | 99.8 | 0.2 | 0.0 | 100.0 | 414 |
| Not pregnant or not sure | 99.7 | 0.2 | 0.1 | 100.0 | 6,905 |
| **Times slept away from home in past 12 months** | | | | | |
| None | 99.7 | 0.2 | 0.0 | 100.0 | 4,237 |
| 1–2 | 99.7 | 0.2 | 0.2 | 100.0 | 2,460 |
| 3–4 | 99.7 | 0.3 | 0.0 | 100.0 | 371 |
| 5+ | 100.0 | 0.0 | 0.0 | 100.0 | 251 |
| **Time away in past 12 months** | | | | | |
| Away for more than 1 month at a time | 100.0 | 0.0 | 0.0 | 100.0 | 545 |
| Away for less than 1 month at a time | 99.6 | 0.2 | 0.2 | 100.0 | 2,537 |
| Not away | 99.7 | 0.2 | 0.0 | 100.0 | 4,237 |
| **Religion** | | | | | |
| Catholic | 99.8 | 0.1 | 0.1 | 100.0 | 2,733 |
| Protestant | 99.7 | 0.2 | 0.1 | 100.0 | 3,373 |
| Adventist | 99.8 | 0.2 | 0.0 | 100.0 | 917 |
| Muslim | 99.4 | 0.0 | 0.6 | 100.0 | 162 |
| Traditional | 100.0 | 0.0 | 0.0 | 100.0 | 1 |
| Jehovah's Witness | 96.9 | 3.1 | 0.0 | 100.0 | 64 |
| Other | 100.0 | 0.0 | 0.0 | 100.0 | 12 |
| No religion | 100.0 | 0.0 | 0.0 | 100.0 | 57 |
| Total | 99.7 | 0.2 | 0.1 | 100.0 | 7,319 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive

[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reason or not enough blood to complete the algorithm

**Table A.4 Coverage of HIV testing by social and demographic characteristics: Men**

Percent distribution of interviewed men 15–49 by HIV testing status, according to social and demographic characteristics (unweighted), Rwanda DHS 2019–20

| | HIV test status | | | | | |
|---|---|---|---|---|---|---|
| Characteristic | DBS tested[1] | Refused to provide blood | Absent at the time of blood collection | Other/ missing[2] | Total | Number |
| **Marital status** | | | | | | |
| Never married | 99.8 | 0.2 | 0.0 | 0.1 | 100.0 | 2,908 |
| Ever had sexual intercourse | 99.9 | 0.0 | 0.0 | 0.1 | 100.0 | 1,137 |
| Never had sexual intercourse | 99.7 | 0.3 | 0.0 | 0.1 | 100.0 | 1,771 |
| Married/living together | 99.6 | 0.3 | 0.0 | 0.1 | 100.0 | 2,805 |
| Divorced or separated | 99.1 | 0.0 | 0.9 | 0.0 | 100.0 | 107 |
| Widowed | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 13 |
| **Type of union** | | | | | | |
| In polygynous union | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 73 |
| In nonpolygynous union | 99.6 | 0.3 | 0.0 | 0.1 | 100.0 | 2,732 |
| Not currently in union | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 3,028 |
| **Ever had sexual intercourse** | | | | | | |
| Yes | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 4,735 |
| No | 99.7 | 0.3 | 0.0 | 0.1 | 100.0 | 1,778 |
| **Circumcised** | | | | | | |
| Yes | 99.5 | 0.3 | 0.0 | 0.1 | 100.0 | 3,265 |
| No | 99.9 | 0.1 | 0.0 | 0.0 | 100.0 | 2,567 |
| Don't know/missing | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 1 |
| **Times slept away from home in past 12 months** | | | | | | |
| None | 99.8 | 0.1 | 0.0 | 0.0 | 100.0 | 3,574 |
| 1–2 | 99.6 | 0.1 | 0.1 | 0.2 | 100.0 | 1,559 |
| 3–4 | 99.2 | 0.8 | 0.0 | 0.0 | 100.0 | 381 |
| 5+ | 99.1 | 0.9 | 0.0 | 0.0 | 100.0 | 319 |
| **Time away in past 12 months** | | | | | | |
| Away for more than 1 month at a time | 99.4 | 0.5 | 0.2 | 0.0 | 100.0 | 647 |
| Away for less than 1 month at a time | 99.5 | 0.3 | 0.0 | 0.2 | 100.0 | 1,612 |
| Not away | 99.8 | 0.1 | 0.0 | 0.0 | 100.0 | 3,574 |
| **Religion** | | | | | | |
| Catholic | 99.9 | 0.1 | 0.0 | 0.0 | 100.0 | 2,520 |
| Protestant | 99.6 | 0.4 | 0.0 | 0.0 | 100.0 | 2,262 |
| Adventist | 99.5 | 0.3 | 0.1 | 0.1 | 100.0 | 748 |
| Muslim | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 161 |
| Traditional | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 1 |
| Jehovah's Witness | 92.9 | 3.6 | 0.0 | 3.6 | 100.0 | 28 |
| Other | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 6 |
| No religion | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 107 |
| Total 15–49 | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 5,833 |
| 50–59 | 99.7 | 0.3 | 0.0 | 0.0 | 100.0 | 680 |
| Total 15–59 | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 6,513 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive

[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reason or not enough blood to complete the algorithm

**Tables A.5** and **A.6** present coverage of HIV testing by sexual behavior characteristics such as age at first sexual intercourse, numbers and types of sexual partners, condom use during sexual intercourse, and prior HIV testing.

**Table A.5 Coverage of HIV testing by sexual behavior characteristics: Women**

Percent distribution of interviewed women age 15–49 who ever had sexual intercourse by HIV test status, according to sexual behavior characteristics (unweighted), Rwanda DHS 2019–20

| Sexual behavior characteristic | HIV test status | | | Total | Number |
|---|---|---|---|---|---|
| | DBS tested[1] | Refused to provide blood | Other/ missing[2] | | |
| **Age at first sexual intercourse** | | | | | |
| <16 | 100.0 | 0.0 | 0.0 | 100.0 | 454 |
| 16–17 | 99.7 | 0.1 | 0.2 | 100.0 | 916 |
| 18–19 | 99.9 | 0.1 | 0.0 | 100.0 | 1,298 |
| 20+ | 99.6 | 0.3 | 0.1 | 100.0 | 2,636 |
| Missing | 100.0 | 0.0 | 0.0 | 100.0 | 11 |
| **Number of lifetime partners** | | | | | |
| 1 | 99.8 | 0.1 | 0.1 | 100.0 | 3,364 |
| 2 | 99.8 | 0.1 | 0.1 | 100.0 | 1,234 |
| 3–4 | 99.0 | 0.9 | 0.2 | 100.0 | 575 |
| 5–9 | 100.0 | 0.0 | 0.0 | 100.0 | 104 |
| 10+ | 100.0 | 0.0 | 0.0 | 100.0 | 31 |
| Missing | 100.0 | 0.0 | 0.0 | 100.0 | 7 |
| **Multiple sexual partners in past 12 months** | | | | | |
| 0 | 99.8 | 0.2 | 0.0 | 100.0 | 1,059 |
| 1 | 99.7 | 0.2 | 0.1 | 100.0 | 4,161 |
| 2+ | 100.0 | 0.0 | 0.0 | 100.0 | 95 |
| **Nonmarital, noncohabiting partners in past 12 months[3]** | | | | | |
| 0 | 99.8 | 0.2 | 0.0 | 100.0 | 4,670 |
| 1 | 99.3 | 0.2 | 0.5 | 100.0 | 579 |
| 2+ | 100.0 | 0.0 | 0.0 | 100.0 | 66 |
| **Condom use at last sexual intercourse in past 12 months** | | | | | |
| Used condom | 99.6 | 0.0 | 0.4 | 100.0 | 482 |
| Did not use condom | 99.7 | 0.2 | 0.1 | 100.0 | 3,774 |
| No sexual intercourse in past 12 months | 99.8 | 0.2 | 0.0 | 100.0 | 1,059 |
| **Condom use at last sexual intercourse with a nonmarital, noncohabiting partner in past 12 months[3]** | | | | | |
| Used condom | 99.3 | 0.0 | 0.7 | 100.0 | 296 |
| Did not use condom | 99.4 | 0.3 | 0.3 | 100.0 | 349 |
| No sexual intercourse with any nonmarital, noncohabiting partners in past 12 months[3] | 99.8 | 0.2 | 0.0 | 100.0 | 4,670 |
| **Prior HIV testing** | | | | | |
| Ever tested | 99.7 | 0.2 | 0.1 | 100.0 | 4,948 |
| Received results | 99.7 | 0.2 | 0.1 | 100.0 | 4,916 |
| Did not receive results | 100.0 | 0.0 | 0.0 | 100.0 | 32 |
| Never tested | 100.0 | 0.0 | 0.0 | 100.0 | 367 |
| Total | 99.7 | 0.2 | 0.1 | 100.0 | 5,315 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive

[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reason or not enough blood to complete the algorithm

[3] Any partner who was not a spouse and did not live with the respondent

**Table A.6 Coverage of HIV testing by sexual behavior characteristics: Men**

Percent distribution of interviewed men age 15–49 who ever had sexual intercourse by HIV test status, according to sexual behavior characteristics (unweighted), Rwanda DHS 2019–20

| | HIV test status | | | | | |
|---|---|---|---|---|---|---|
| Sexual behavior characteristic | DBS tested[1] | Refused to provide blood | Absent at the time of blood collection | Other/ missing[2] | Total | Number |
| **Age at first sexual intercourse** | | | | | | |
| <16 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 512 |
| 16–17 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 448 |
| 18–19 | 99.9 | 0.0 | 0.0 | 0.1 | 100.0 | 707 |
| 20+ | 99.6 | 0.3 | 0.0 | 0.1 | 100.0 | 2,359 |
| Missing | 97.2 | 2.8 | 0.0 | 0.0 | 100.0 | 36 |
| **Number of lifetime partners** | | | | | | |
| 1 | 99.8 | 0.2 | 0.0 | 0.1 | 100.0 | 1,645 |
| 2 | 99.8 | 0.1 | 0.0 | 0.1 | 100.0 | 1,161 |
| 3–4 | 99.5 | 0.4 | 0.1 | 0.0 | 100.0 | 796 |
| 5–9 | 99.4 | 0.3 | 0.0 | 0.3 | 100.0 | 315 |
| 10+ | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 145 |
| **Multiple sexual partners in past 12 months** | | | | | | |
| 0 | 99.7 | 0.0 | 0.1 | 0.1 | 100.0 | 693 |
| 1 | 99.7 | 0.3 | 0.0 | 0.1 | 100.0 | 3,065 |
| 2+ | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 304 |
| **Nonmarital, noncohabiting partners in past 12 months[3]** | | | | | | |
| 0 | 99.6 | 0.2 | 0.0 | 0.1 | 100.0 | 3,338 |
| 1 | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 612 |
| 2+ | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 112 |
| **Condom use at last sexual intercourse in past 12 months** | | | | | | |
| Used condom | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 577 |
| Did not use condom | 99.6 | 0.3 | 0.0 | 0.1 | 100.0 | 2,792 |
| No sexual intercourse in past 12 months | 99.7 | 0.0 | 0.1 | 0.1 | 100.0 | 693 |
| **Condom use at last sexual intercourse with a nonmarital, noncohabiting partner in past 12 months[3]** | | | | | | |
| Used condom | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 501 |
| Did not use condom | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 223 |
| No sexual intercourse with any nonmarital, noncohabiting partners in past 12 months[3] | 99.6 | 0.2 | 0.0 | 0.1 | 100.0 | 3,338 |
| **Paid for sexual intercourse in past 12 months** | | | | | | |
| Yes | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 75 |
| Used condom | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 56 |
| Did not use condom | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 19 |
| No (no paid sexual intercourse/no sexual intercourse in past 12 months) | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 3,987 |
| **Prior HIV testing** | | | | | | |
| Ever tested | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 2,943 |
| Received results | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 2,916 |
| Did not receive results | 100.0 | 0.0 | 0.0 | 0.0 | 100.0 | 27 |
| Never tested | 99.6 | 0.3 | 0.0 | 0.1 | 100.0 | 1,119 |
| Total 15–49 | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 4,062 |
| 50–59 | 99.7 | 0.3 | 0.0 | 0.0 | 100.0 | 673 |
| Total 15–59 | 99.7 | 0.2 | 0.0 | 0.1 | 100.0 | 4,735 |

[1] Includes all dried blood spot (DBS) specimens tested at the lab and for which there is a final result, i.e., positive, negative, or inconclusive
[2] Includes (1) other results of blood collection (e.g., technical problem in the field), (2) lost specimens, (3) noncorresponding bar codes, and (4) lab results such as blood not tested for technical reasons or not enough blood to complete the algorithm
[3] Any partner who was not a spouse and did not live with the respondent

# ESTIMATES OF SAMPLING ERRORS

## Appendix B

The estimates from a sample survey are affected by two types of errors: nonsampling errors and sampling errors. Nonsampling errors are the results of mistakes made in implementing data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts were made during the implementation of the 2019–20 Rwanda Demographic and Health Survey (2019–20 RDHS) to minimize this type of error, nonsampling errors are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in the 2019–20 RDHS is only one of many samples that could have been selected from the same population, using the same design and sample size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability among all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results.

Sampling error is usually measured in terms of the *standard error* for a particular statistic (mean, percentage, etc.), which is the square root of the variance. The standard error can be used to calculate confidence intervals within which the true value for the population can reasonably be assumed to fall. For example, for any given statistic calculated from a sample survey, the value of that statistic will fall within a range of plus or minus two times the standard error of that statistic in 95% of all possible samples of identical size and design.

If the sample of respondents had been selected by simple random sampling, it would have been possible to use straightforward formulas for calculating sampling errors. However, the 2019–20 RDHS sample was the result of a multistage stratified design, and, consequently, it was necessary to use more complex formulas. Sampling errors are computed using SAS programs developed by ICF International. These programs use the Taylor linearization method to estimate variances for survey estimates that are means, proportions, or ratios. The Jackknife repeated replication method is used for variance estimation of more complex statistics such as fertility and mortality rates.

The Taylor linearization method treats any linear statistic such as a percentage or mean as a ratio estimate, $r = y/x$, where $y$ represents the total sample value for variable $y$ and $x$ represents the total number of cases in the group or subgroup under consideration. The variance of $r$ is computed using the formula given below, with the standard error being the square root of the variance:

$$SE^2(r) = var(r) = \frac{1-f}{x^2}\sum_{h=1}^{H}\left[\frac{m_h}{m_h-1}\left(\sum_{i=1}^{m_h} z_{hi}^2 - \frac{z_h^2}{m_h}\right)\right]$$

in which

$$z_{hi} = y_{hi} - rx_{hi} \text{ and } z_h = y_h - rx_h$$

where $h$ represents the stratum, which varies from 1 to $H$;
$m_h$ is the total number of clusters selected in the $h^{th}$ stratum;
$y_{hi}$ is the sum of the weighted values of variable $y$ in the $i^{th}$ cluster in the $h^{th}$ stratum;

$x_{hi}$ is the sum of the weighted number of cases in the $i^{th}$ cluster in the $h^{th}$ stratum; and
$f$ is the overall sampling fraction, which is so small that it is ignored.

In addition to the standard error, the design effect (DEFT) for each estimate is also calculated. The design effect is defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used. A DEFT value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design. Relative standard errors and confidence limits for the estimates are also calculated.

Sampling errors for the 2019–20 RDHS are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for Rwanda as a whole, for urban and rural areas separately, and for each of the five provinces. For each variable, the type of statistic (mean, proportion, or rate) and the base population are given in **Table B.1**. **Tables B.2** through **B.9** present the value of the statistic (R), its standard error (SE), the number of unweighted (N) and weighted (WN) cases, the design effect (DEFT), the relative standard error (SE/R), and the 95% confidence limits (R±2SE) for each variable. The sampling errors for mortality rates are presented for the 5-year period preceding the survey for the national sample and the urban and rural samples and for the 10-year period preceding the survey at other domain levels. The DEFT is considered undefined when the standard error considering a simple random sample is zero (when the estimate is close to 0 or 1).

The confidence interval (e.g., as calculated for *HIV prevalence among women and men age 15–49*) can be interpreted as follows: the overall HIV prevalence among women and men age 15–49 from the national sample is 0.027, and its standard error is 0.002. Therefore, to obtain the 95% confidence limits, one adds and subtracts twice the standard error to the sample estimate, that is, $0.027 \pm 2 \times 0.002$. There is a high probability (95%) that the *true* prevalence is between 0.024 and 0.030 as shown in **Table B.2** (without rounding of the standard error).

For the total sample, the value of the DEFT, averaged over all variables for women, is 1.202. This means that, due to multistage clustering of the sample, the average standard error is increased by a factor of 1.202 over that in an equivalent simple random sample.

**Table B.1 List of selected variables for sampling errors, Rwanda DHS 2019–20**

| Variable | Estimate | Base population |
|---|---|---|
| | WOMEN | |
| Prevalence of HIV (women 15–49) | Proportion | Women 15–49 who were tested |
| Prevalence of HIV (women 15–24) | Proportion | Women 15–24 who were tested |
| | MEN | |
| Prevalence of HIV (men 15–49) | Proportion | Men 15–49 who were tested |
| Prevalence of HIV (men 15–59) | Proportion | Men 15–59 who were tested |
| Prevalence of HIV (men 15–24) | Proportion | Men 15–24 who were tested |
| | MEN AND WOMEN | |
| Prevalence of HIV (men and women 15–49) | Proportion | Men and women 15–49 who were tested |
| Prevalence of HIV (men and women 15–24) | Proportion | Men and women 15–24 who were tested |

**Table B.2 Sampling errors: Total sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.035 | 0.002 | 7,299 | 7,270 | 1.081 | 0.066 | 0.030 | 0.040 |
| HIV prevalence (women 15–24) | 0.011 | 0.002 | 2,816 | 2,770 | 1.150 | 0.208 | 0.006 | 0.015 |
| HIV prevalence (men 15–49) | 0.017 | 0.002 | 5,815 | 5,855 | 1.069 | 0.106 | 0.014 | 0.021 |
| HIV prevalence (men 15–59) | 0.020 | 0.002 | 6,493 | 6,522 | 1.130 | 0.097 | 0.017 | 0.024 |
| HIV prevalence (men 15–24) | 0.010 | 0.002 | 2,485 | 2,493 | 1.121 | 0.225 | 0.005 | 0.014 |
| HIV prevalence (women and men 15–49) | 0.027 | 0.002 | 13,114 | 13,125 | 1.176 | 0.062 | 0.024 | 0.030 |
| HIV prevalence (women and men 15–24) | 0.010 | 0.002 | 5,301 | 5,263 | 1.120 | 0.151 | 0.007 | 0.013 |

**Table B.3 Sampling errors: Urban sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.050 | 0.007 | 1,777 | 1,439 | 1.309 | 0.135 | 0.037 | 0.064 |
| HIV prevalence (women 15–24) | 0.015 | 0.007 | 715 | 569 | 1.476 | 0.453 | 0.001 | 0.028 |
| HIV prevalence (men 15–49) | 0.021 | 0.004 | 1,350 | 1,116 | 1.094 | 0.204 | 0.012 | 0.029 |
| HIV prevalence (men 15–59) | 0.024 | 0.004 | 1,488 | 1,227 | 1.064 | 0.175 | 0.016 | 0.033 |
| HIV prevalence (men 15–24) | 0.014 | 0.006 | 560 | 465 | 1.158 | 0.405 | 0.003 | 0.026 |
| HIV prevalence (women and men 15–49) | 0.037 | 0.004 | 3,127 | 2,555 | 1.321 | 0.120 | 0.028 | 0.046 |
| HIV prevalence (women and men 15–24) | 0.015 | 0.004 | 1,275 | 1,034 | 1.302 | 0.300 | 0.006 | 0.023 |

**Table B.4 Sampling errors: Rural sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.031 | 0.002 | 5,522 | 5,831 | 1.011 | 0.076 | 0.027 | 0.036 |
| HIV prevalence (women 15–24) | 0.010 | 0.002 | 2,101 | 2,200 | 1.036 | 0.228 | 0.005 | 0.014 |
| HIV prevalence (men 15–49) | 0.016 | 0.002 | 4,465 | 4,739 | 1.061 | 0.123 | 0.012 | 0.020 |
| HIV prevalence (men 15–59) | 0.020 | 0.002 | 5,005 | 5,295 | 1.143 | 0.114 | 0.015 | 0.024 |
| HIV prevalence (men 15–24) | 0.009 | 0.002 | 1,925 | 2,028 | 1.117 | 0.270 | 0.004 | 0.014 |
| HIV prevalence (women and men 15–49) | 0.025 | 0.002 | 9,987 | 10,570 | 1.137 | 0.072 | 0.021 | 0.028 |
| HIV prevalence (women and men 15–24) | 0.009 | 0.002 | 4,026 | 4,228 | 1.065 | 0.173 | 0.006 | 0.013 |

**Table B.5 Sampling errors: Kigali sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.052 | 0.009 | 941 | 1,052 | 1.189 | 0.165 | 0.035 | 0.069 |
| HIV prevalence (women 15–24) | 0.020 | 0.010 | 358 | 385 | 1.342 | 0.492 | 0.000 | 0.041 |
| HIV prevalence (men 15–49) | 0.021 | 0.006 | 759 | 879 | 1.103 | 0.276 | 0.009 | 0.032 |
| HIV prevalence (men 15–59) | 0.025 | 0.006 | 840 | 974 | 1.048 | 0.224 | 0.014 | 0.037 |
| HIV prevalence (men 15–24) | 0.014 | 0.008 | 304 | 347 | 1.170 | 0.555 | 0.000 | 0.031 |
| HIV prevalence (women and men 15–49) | 0.038 | 0.005 | 1,700 | 1,931 | 1.164 | 0.142 | 0.027 | 0.049 |
| HIV prevalence (women and men 15–24) | 0.018 | 0.006 | 662 | 732 | 1.250 | 0.363 | 0.005 | 0.030 |

**Table B.6 Sampling errors: South sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.038 | 0.005 | 1,739 | 1,522 | 1.049 | 0.127 | 0.028 | 0.048 |
| HIV prevalence (women 15–24) | 0.018 | 0.006 | 654 | 564 | 1.049 | 0.301 | 0.007 | 0.029 |
| HIV prevalence (men 15–49) | 0.016 | 0.004 | 1,406 | 1,240 | 1.137 | 0.237 | 0.008 | 0.024 |
| HIV prevalence (men 15–59) | 0.019 | 0.005 | 1,591 | 1,400 | 1.340 | 0.241 | 0.010 | 0.028 |
| HIV prevalence (men 15–24) | 0.009 | 0.004 | 598 | 527 | 1.008 | 0.446 | 0.001 | 0.016 |
| HIV prevalence (women and men 15–49) | 0.028 | 0.004 | 3,145 | 2,762 | 1.197 | 0.125 | 0.021 | 0.035 |
| HIV prevalence (women and men 15–24) | 0.014 | 0.003 | 1,252 | 1,091 | 0.989 | 0.238 | 0.007 | 0.020 |

**Table B.7 Sampling errors: West sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.029 | 0.004 | 1,674 | 1,604 | 1.068 | 0.150 | 0.021 | 0.038 |
| HIV prevalence (women 15–24) | 0.010 | 0.004 | 649 | 622 | 0.997 | 0.385 | 0.002 | 0.018 |
| HIV prevalence (men 15–49) | 0.016 | 0.003 | 1,332 | 1,270 | 0.943 | 0.201 | 0.010 | 0.023 |
| HIV prevalence (men 15–59) | 0.020 | 0.003 | 1,492 | 1,421 | 0.954 | 0.172 | 0.013 | 0.027 |
| HIV prevalence (men 15–24) | 0.011 | 0.004 | 592 | 561 | 1.031 | 0.409 | 0.002 | 0.019 |
| HIV prevalence (women and men 15–49) | 0.024 | 0.003 | 3,006 | 2,874 | 1.190 | 0.140 | 0.017 | 0.030 |
| HIV prevalence (women and men 15–24) | 0.010 | 0.003 | 1,241 | 1,182 | 0.955 | 0.264 | 0.005 | 0.016 |

**Table B.8 Sampling errors: North sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.029 | 0.005 | 1,132 | 1,092 | 1.058 | 0.182 | 0.018 | 0.039 |
| HIV prevalence (women 15–24) | 0.008 | 0.006 | 439 | 423 | 1.352 | 0.722 | 0.000 | 0.019 |
| HIV prevalence (men 15–49) | 0.013 | 0.004 | 913 | 889 | 1.143 | 0.331 | 0.004 | 0.021 |
| HIV prevalence (men 15–59) | 0.015 | 0.004 | 1,009 | 981 | 1.143 | 0.287 | 0.007 | 0.024 |
| HIV prevalence (men 15–24) | 0.003 | 0.003 | 381 | 374 | 1.010 | 0.993 | 0.000 | 0.008 |
| HIV prevalence (women and men 15–49) | 0.022 | 0.004 | 2,045 | 1,980 | 1.200 | 0.178 | 0.014 | 0.029 |
| HIV prevalence (women and men 15–24) | 0.005 | 0.003 | 820 | 796 | 1.291 | 0.607 | 0.000 | 0.012 |

**Table B.9 Sampling errors: East sample, Rwanda DHS 2019–20**

| Variable | R | SE | N | WN | DEFT | SE/R | R-2SE | R+2SE |
|---|---|---|---|---|---|---|---|---|
| HIV prevalence (women 15–49) | 0.032 | 0.004 | 1,813 | 2,000 | 1.010 | 0.131 | 0.024 | 0.040 |
| HIV prevalence (women 15–24) | 0.002 | 0.002 | 716 | 777 | 0.919 | 0.710 | 0.000 | 0.006 |
| HIV prevalence (men 15–49) | 0.019 | 0.004 | 1,405 | 1,576 | 1.016 | 0.193 | 0.012 | 0.027 |
| HIV prevalence (men 15–59) | 0.022 | 0.004 | 1,561 | 1,747 | 1.118 | 0.189 | 0.014 | 0.030 |
| HIV prevalence (men 15–24) | 0.012 | 0.005 | 610 | 684 | 1.163 | 0.430 | 0.002 | 0.022 |
| HIV prevalence (women and men 15–49) | 0.026 | 0.003 | 3,218 | 3,577 | 1.127 | 0.121 | 0.020 | 0.033 |
| HIV prevalence (women and men 15–24) | 0.007 | 0.003 | 1,326 | 1,461 | 1.186 | 0.394 | 0.001 | 0.012 |

# ADDITIONAL DHS PROGRAM RESOURCES

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|---|---|---|
| **The DHS Program Website** – Download free DHS reports, standard documentation, key indicator data, and training tools, and view announcements. | DHSprogram.com | |
| **STATcompiler** – Build custom tables, graphs, and maps with data from 90 countries and thousands of indicators. | Statcompiler.com | |
| **DHS Program Mobile App** – Access key DHS indicators for 90 countries on your mobile device (Apple, Android, or Windows). | Search DHS Program in your iTunes or Google Play store | |
| **DHS Program User Forum** – Post questions about DHS data and search our archive of FAQs. | userforum.DHSprogram.com | |
| **Tutorial Videos** – Watch interviews with experts and learn DHS basics, such as sampling and weighting, downloading datasets, and How to Read DHS Tables. | www.youtube.com/DHSProgram | |
| **Datasets** – Download DHS datasets for analysis. | DHSprogram.com/Data | |
| **Spatial Data Repository** – Download geographically linked health and demographic data for mapping in a geographic information system (GIS). | spatialdata.DHSprogram.com | |
| **Learning Hub** – Access online courses for independent learning and workshop participation, communities of practice, and other training resources. | Learning.DHSprogram.com | |
| **GitHub** – Open access to Stata, SPSS and R code for DHS indicators for public use. | Github.com/DHSprogram | |
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| **Facebook** www.facebook.com/DHSprogram | **LinkedIn** www.linkedin.com/company/dhs-program | |
| **YouTube** www.youtube.com/DHSprogram | **Blog** Blog.DHSprogram.com | |