

# RWANDA



**Malaria Indicator  
Survey (MIS)**

**2017**



Republic of Rwanda



# Rwanda Malaria Indicator Survey

Final Report

2017

Malaria and Other Parasitic Diseases Division  
of the Rwanda Biomedical Center  
Ministry of Health  
Kigali, Rwanda

The DHS Program  
Rockville, Maryland USA

July 2018



The 2017 Rwanda Malaria Indicator Survey (2017 RMIS) was implemented by the Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda Biomedical Center, Ministry of Health. Financial support for the survey was provided by the U.S. President's Malaria Initiative (PMI) and the Global Fund. ICF provided technical assistance through The DHS Program, a USAID-funded project offering support and technical assistance in the implementation of population and health surveys in countries worldwide.

The primary objectives of the 2017 RMIS are to measure the level of ownership and use of mosquito nets; identify treatment practices, including the use of specific antimalarial medications to treat malaria among children age 6-59 months; measure the prevalence of malaria among all household populations, including children age 6-59 months and pregnant women; and assess knowledge, attitudes, and practices related to malaria among women age 15-49.

Additional information about the 2017 RMIS may be obtained from the Malaria and Other Parasitic Diseases Division (MOPDD) of the Rwanda Biomedical Center, Head Office; K. G. 203 Street. P.O. Box 83, Kigali, Rwanda. Telephone: 250-78-830-6814; E-mail: [monique.murindahabi@rbc.gov.rw](mailto:monique.murindahabi@rbc.gov.rw); Internet: [www.rbc.gov.rw](http://www.rbc.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; E-mail: [info@DHSprogram.com](mailto:info@DHSprogram.com); Internet: [www.DHSprogram.com](http://www.DHSprogram.com).

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## FOREWORD

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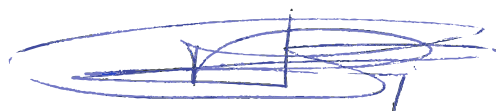
**M**inistry of Health in Rwanda in collaboration with Rwanda Biomedical Center (RBC) conducted the 2017 Rwanda Malaria Indicator Survey (2017 RMIS). The 2017 RMIS was a national survey designed to obtain population based estimates for malaria indicators to compliment routine administrative data that are used to inform policy makers, strategic planning, and evaluation of the Rwanda Malaria Program.

The survey provided information on the prevalence of malaria among the general population, ownership and use of mosquito bed nets, malaria treatment, and assessed malaria knowledge and communication messages in Rwanda.

The Ministry of Health is grateful to the Rwanda Biomedical Center (RBC) under the division of the Malaria and Other Parasitic Disease Division (MOPDD) for their efforts used to conduct this survey. We acknowledge the partnership with the Rwanda National Laboratory (RNL) for their contribution during the training of field personnel and the microscopic reading of malaria slides to determine malaria parasite infections. We also thank the Rwanda National Ethical Committee for ethical clearance that allowed the performance of malaria testing. We are also grateful to the Global Fund, USAID, WHO and the Government of Rwanda for co-funding this survey.

We thank and acknowledge the technical support provided by ICF through The DHS Program during the preparation and finalization of the survey instruments, training of field staff and other survey personnel, data processing, and collaboration on the final report. We also give the appreciation of all who participated in this survey who are not listed. We appreciate also the cooperation of our fellow respondents for making the 2017 RMIS a success.

The Ministry of Health and Rwanda Biomedical Center call for the advocacy from policy makers, program managers, and all others to play a big role in using this valuable data. We hope that the 2017 RMIS datasets will be used efficiently. We encourage data users to conduct further analytical work to deepen understanding on the topics presented in this survey.



**Dr Patrick Ndimubanzi**  
Minister of State in Charge of Public Health and Primary Health Care





## ACKNOWLEDGEMENTS

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**T**he Rwanda Biomedical Center (RBC) wishes to acknowledge the efforts of all organizations and persons who contributed to the success of the 2017 Rwanda Malaria Indicator Survey (2017 RMIS).

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Sincere appreciation goes to the Ministry of Health (MOH) for its close support and to ICF for its technical assistance throughout the survey. We gratefully acknowledge the support of the Steering Committee (SC) and Survey Management Team (SMT) members, who contributed to the successful preparation and implementation of the survey.

We wish to express great appreciation for the work carried out by the technical staff team, namely coordinators, supervisors, surveyors, lab technicians and data processors who worked with enthusiasm to make the survey a success.

We recognize the valuable support provided by RBC leaders, especially administration, finance and procurement services; their support allowed this survey to run smoothly, safely, and in good conditions.

We would also like to extend our special thanks to the Ministry of Local Government and to the local authorities as well as community health workers for their assistance and contribution to the smooth implementation of the survey. Special thanks goes to the team leaders, field editors, drivers, and data entry staff for their valuable time that made this survey possible.

Finally, we are grateful to the survey respondents who generously gave their time to provide the information that forms the basis of this report.

Sincerely,

The image shows a handwritten signature in blue ink on the left, and a circular official seal on the right. The seal features a central emblem with a caduceus and a scale, surrounded by the text 'RWANDA BIOMEDICAL CENTER' and 'URUMUNYI UMUNYAMA GUSHIMIRI'. The signature is written over the seal.

**Jeanine U. Condo, MD, PhD**

**Associate Professor of Public Health**

**Director General of Rwanda Biomedical Center**

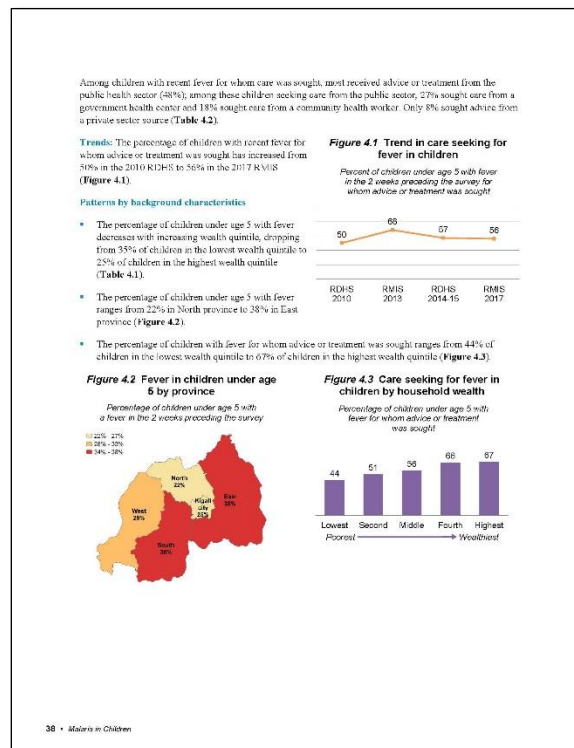


# READING AND UNDERSTANDING TABLES FROM THE 2017 RWANDA MIS (RMIS)

The 2017 RMIS final report is based on tables of data located for quick reference through links in the text (electronic version) and at the end of each chapter. In addition, the report features figures that clearly highlight trends, subnational patterns, and background characteristics. Large colorful maps display data by the provinces in Rwanda. The text has been simplified to highlight key points in bullets and to clearly identify indicator definitions in boxes.

Although the text and figures featured in each chapter highlight some of the most important findings, not every finding can be discussed or displayed graphically. For this reason, 2017 RMIS data users should be comfortable reading and interpreting data tables.

The following pages provide an introduction to the organization of the 2017 RMIS tables, the presentation of background characteristics, and a brief summary of sampling procedures used and understanding denominators. In addition, this section provides some exercises for users as they practice their new skills in interpreting 2017 RMIS tables.



## Example 1: Exposure to Messages about Malaria by Media Source A Question Asked of All Survey Respondents

Table 6.3 Media exposure to malaria messages								1
Percentage of women age 15-49 who have seen or heard a message about malaria in the past 6 months through specific sources of media, according to background characteristics, Rwanda MIS 2017								
Background characteristic	Radio	Television	Poster/ Billboard	Community health worker	Community event	Anywhere else	Number of women	
<b>Age</b>								
15-19	50.2	7.7	7.9	36.8	27.2	16.7	966	
20-24	42.0	6.4	7.6	30.0	24.3	14.4	849	
25-29	41.0	5.0	7.9	29.0	21.6	14.0	823	
30-34	43.1	5.2	6.4	33.1	24.2	15.2	776	
35-39	44.6	5.2	5.2	33.5	26.3	14.8	673	
40-44	42.0	5.7	6.3	36.3	27.3	13.4	545	
45-49	44.7	4.3	6.1	37.9	27.4	12.9	390	
<b>Residence</b>								
Urban	49.8	16.2	11.6	24.1	20.6	15.3	1,143	
Rural	42.5	2.8	5.6	36.1	26.6	14.6	3,879	
<b>Province</b>								
Kigali city	50.0	18.5	10.1	23.7	22.6	14.3	809	
South	36.4	2.8	4.7	27.4	17.2	15.1	1,019	
West	40.7	3.5	5.5	34.0	22.6	13.4	1,111	
North	47.5	3.7	7.7	36.7	33.1	13.0	952	
East	47.5	3.5	7.5	42.4	30.4	17.4	1,131	
<b>Education</b>								
No education	29.0	0.9	2.2	25.9	17.4	12.8	625	
Primary	43.0	3.5	5.6	35.0	26.2	14.5	3,096	
Secondary or higher	54.2	13.6	12.5	33.0	26.6	16.2	1,301	
<b>Wealth quintile</b>								
Lowest	25.6	1.1	3.0	26.6	20.6	12.3	942	
Second	33.6	0.4	3.1	35.9	23.7	13.7	937	
Middle	46.0	0.9	5.0	38.2	27.6	15.2	971	
Fourth	53.7	2.2	7.2	40.0	28.7	15.1	975	
Highest	57.7	20.7	14.5	27.5	25.4	16.7	1,197	
<b>Total</b>	44.1	5.8	7.0	33.4	25.2	14.7	5,022	

**Step 1:** Read the title and subtitle of Table 6.3. These tell you the topic and the specific population group being described. In this example, the table describes women’s exposure to messages about malaria in the 6 months before the survey by media source. All eligible female respondents age 15-49 were asked these questions.

**Step 2:** Scan the column headings—highlighted in green. The headings describe the categories of information. In this table, the first six columns of data show different sources of messages about malaria that women were exposed to in the 6 months before the survey. The last column lists the number of women interviewed in the survey.

**Step 3:** Scan the row headings—the first column highlighted in blue. These headings show the different ways in which the data are divided into categories based on population characteristics. In this example, the table presents women’s exposure to messages about malaria by age, urban-rural residence, province, educational level, and wealth quintile. Most of the tables in the 2017 RMIS report are divided into these same categories.

**Step 4:** Look at the row at the bottom of the table highlighted in pink. These percentages represent the totals of all women age 15-49 and their exposure to messages about malaria by different media sources. In this example, 44.1%\* of women heard a message about malaria on the radio and 33.4% heard a message about malaria from a community health worker in the 6 months before the survey.

**Step 5:** To determine the percentage of women with secondary or higher education who saw a message about malaria on a poster or billboard in the six months before the survey, draw two imaginary lines, as shown



**in purple** on the table. This shows that 12.5% of women with secondary or higher education saw a message about malaria on a poster or billboard in the 6 months before the survey.

By looking at patterns by background characteristics, you can see how exposure to messages about malaria varies across Rwanda. Knowing how exposure to messages about malaria varies among groups can help program planners and policy makers determine how to most effectively reach their target populations.

\*For this document, data are presented exactly as they appear in the table including decimal places. However, the text in the remainder of this report rounds data to the nearest whole percentage point.

**Practice:** Use the table in Example 1 to answer the following questions:

- What percentage of women in Rwanda were exposed to a message about malaria via a community event in the 6 months before the survey?
- What age group was most likely to have heard a message about malaria from a community health worker in the 6 months before the survey?
- Compare women in urban areas to women in rural areas—which group is more likely to have seen a message about malaria on television in the six months before the survey?
- What are the lowest and highest percentages (range) of women who were heard a message about malaria on the radio in the 6 months before the survey by province?
- Is there a clear pattern in exposure to messages about malaria via television by education level?
- Is there a clear pattern in exposure to messages about malaria at a community event by wealth quintile?

Answers:  
a) 25.2%  
b) Women age 45-49: 37.9% of women in this age group heard a message about malaria from a community health worker in the six months before the survey.  
c) Women in urban areas: 16.2% of women in urban areas saw a message about malaria on television in the six months before the survey, compared to 2.8% of women in rural areas.  
d) 36.4% of women in South province heard a message about malaria on the radio in the six months before the survey, compared to 50.0% of women in Kigali city.  
e) Exposure to messages about malaria on television increases as a woman's level of education increases; 0.9% of women with no higher education saw a message about malaria on television in the six months before the survey, compared to 13.6% of women secondary or higher education.  
f) There is no clear pattern in exposure to messages about malaria at a community event by wealth quintile.

## Example 2: Type of Antimalarial Drugs Used Minimum Number of Cases Necessary for Reliable Results

<b>Table 4.3 Type of antimalarial drugs used</b>							
Among children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, Rwanda MIS 2017							
Background characteristic	Percentage of children who took:						Number of children with fever who took antimalarial drug
	Any ACT	Quinine pills	Quinine injection	Artesunate rectal	Artesunate injection	Other anti-malarial	
<b>Age in months</b>							
< 6	*	*	*	*	*	*	4
6-11	*	*	*	*	*	*	9
12-23	(95.0)	(2.7)	(0.0)	(0.0)	(2.2)	(0.0)	37
24-35	(98.4)	(0.0)	(0.0)	(1.6)	(0.0)	(0.0)	27
36-47	(100.0)	(0.0)	(2.0)	(0.0)	(0.0)	(0.0)	54
48-59	(100.0)	(0.0)	(0.0)	(3.9)	(0.0)	(0.0)	43
<b>Sex</b>							
Male	98.4	1.1	1.2	2.4	0.0	0.0	91
Female	99.0	0.0	0.0	0.0	1.0	0.0	83
<b>Residence</b>							
Urban	*	*	*	*	*	*	11
Rural	98.6	0.6	0.7	1.3	0.5	0.0	164
<b>Province</b>							
Kigali city	*	*	*	*	*	*	10
South	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	40
West	*	*	*	*	*	*	28
North	*	*	*	*	*	*	5
East	97.5	1.1	1.2	0.5	0.9	0.0	92
<b>Mother's education</b>							
No education	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	39
Primary	98.1	0.9	0.9	1.8	0.7	0.0	119
Secondary or higher	*	*	*	*	*	*	17
<b>Wealth quintile</b>							
Lowest	(97.4)	(2.6)	(2.8)	(0.0)	(0.0)	(0.0)	39
Second	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	44
Middle	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	44
Fourth	(97.4)	(0.0)	(0.0)	(0.0)	(2.6)	(0.0)	32
Highest	*	*	*	*	*	*	15
<b>Total</b>	98.7	0.6	0.6	1.2	0.5	0.0	175

ACT = Artemisinin-based combination therapy  
 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.

**Step 1:** Read the title and subtitle of Table 4.3. In this example, the table is about children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication.

**Step 2:** Find the denominator of the table—that is the number of children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication. The table shows that 174 children under age 5 with fever in the 2 weeks preceding the survey took any antimalarial medication.

**Step 3:** Now examine the table for signs that the data should be interpreted with caution. Only 174 children under age 5 with fever in the 2 weeks preceding the survey took any antimalarial medication. After these children are further divided into the background characteristic categories, there may be too few cases for the percentages to be reliable.

- What percentage of children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication in the lowest wealth quintile took any artemisinin-based combination therapy (ACT)? 97.4%. This percentage is in parentheses because there are between 25 and 49 children

(unweighted) in this category. Readers should use this number with caution—it may not be reliable. (For more information on weighted and unweighted numbers, see Example 3.)

- What percentage of children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication whose mothers have secondary or higher education took any ACT? There is no number in this cell—only an asterisk. This is because fewer than 25 children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication whose mothers have secondary or higher education were identified in the 2017 RMIS. Results for this group are not reported. The subgroup is very small, and therefore the data are not reliable.

**Note:** When parentheses or asterisks are used in a table, the explanation will be noted under the table. If there are no parentheses or asterisks in a table, you can proceed with confidence that enough cases were included in all categories and that the data are reliable.

### Example 3: Understanding Sampling Weights in 2017 RMIS Tables

A sample is a group of people who have been selected for a survey. In the 2017 RMIS, the sample is designed to represent the national population of women age 15-49. In addition to national data, most countries want to collect and report data on smaller geographical or administrative areas. However, doing so requires a minimum sample size per area. For the 2017 RMIS, the survey sample is representative at the national and provincial levels, and for urban and rural areas.

**Table 2.8 Background characteristics of respondents**  
Percent distribution of women age 15-49 by selected background characteristics, Rwanda MIS 2017

Background characteristic	Number of women		
	Weighted percent	Weighted number	Unweighted number
<b>Province</b>			
Kigali city	16.1	809	983
South	20.3	1,019	1,095
West	22.1	1,111	1,040
North	19.0	952	928
East	22.5	1,131	976
Total 15-49	100.0	5,022	5,022

To generate statistics that are representative of Rwanda as a whole and the five provinces, the number of women surveyed in each province should contribute to the size of the total (national) sample in proportion to size of the province. However, if some provinces have small populations, then a sample allocated in proportion to each province’s population may not include sufficient women from each province for analysis. To solve this problem, provinces with small populations are oversampled. For example, let’s say that you have sufficient funds to interview 5,022 women and want to produce results that are representative of Rwanda as a whole and its provinces (as in Table 2.8). However, the total population of Rwanda is not evenly distributed among the provinces: some provinces, such as East, are more heavily populated while others, such as Kigali city are less populated. Thus, Kigali city must be oversampled.

A sampling statistician determines how many women should be interviewed in each province in order to obtain reliable statistics. The **blue column (1)** in Table 2.8 shows the actual number of women interviewed in each province. Within the provinces, the number of women interviewed ranges from 928 in North to 1,095 in South province. This number of interviews is sufficient to obtain reliable results in each province.

With this distribution of interviews, some provinces are overrepresented and some provinces are underrepresented. For example, the population in East province is about 23% of the population in Rwanda, while Kigali city’s population contributes only about 16% of the population. As the blue column illustrates, the number of women interviewed in East province accounts for only about 19% of the total sample of women interviewed (976/5,022) and the number of women interviewed in Kigali city accounts for almost the same percentage of the total sample of women interviewed (20%, or 983/5,022). This unweighted distribution of women does not accurately represent the total population.

In order to obtain statistics that are representative of Rwanda, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) so that it resembles the true distribution in Rwanda. Women from a smaller province, like Kigali city, should contribute a smaller amount to the national total. Women from a larger province, like East, should contribute more. Therefore, DHS statisticians mathematically calculate a “weight” which is used to adjust the number of women from each province so that each province’s contribution to the total is proportional to the actual population of the province. The numbers in the **purple column (2)** represent the “weighted” values. The weighted values can be smaller or larger than the unweighted values at the provincial level. The total national sample size of 5,022 women has not changed after weighting, although the distribution of the women in the provinces has been changed to represent their contribution to the total population size.

How do statisticians weight each category? They take into account the probability that a woman was selected in the sample. If you were to compare the **green column (3)** to the actual population distribution of Rwanda, you would see that women in each province are contributing to the total sample with the same weight that they
















contribute to the population of the Rwanda. The weighted number of women in the survey now accurately represents the proportion of women who live in East province and the proportion of women who live in Kigali city.

With sampling and weighting, it is possible to interview enough women to provide reliable statistics at national and provincial levels. In general, only the weighted numbers are shown in each of the 2017 RMIS tables, so don't be surprised if these numbers seem low: they may actually represent a larger number of women who were interviewed.

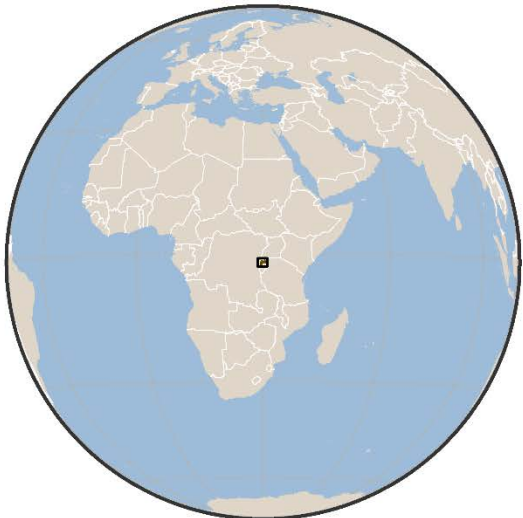


## ADDITIONAL DHS PROGRAM RESOURCES

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<p><b>The DHS Program Website</b> – Download free DHS reports, standard documentation, key indicator data, and training tools, and view announcements.</p>	<p>DHSprogram.com</p>	
<p><b>STATcompiler</b> – Build custom tables, graphs, and maps with data from 90 countries and thousands of indicators.</p>	<p>Statcompiler.com</p>	
<p><b>DHS Program Mobile App</b> – Access key DHS indicators for 90 countries on your mobile device (Apple, Android, or Windows).</p>	<p>Search DHS Program in your iTunes or Google Play store</p>	
<p><b>DHS Program User Forum</b> – Post questions about DHS data, and search our archive of FAQs.</p>	<p>userforum.DHSprogram.com</p>	
<p><b>Tutorial Videos</b> – Watch interviews with experts and learn DHS basics, such as sampling and weighting, downloading datasets, and How to Read DHS Tables.</p>	<p>www.youtube.com/DHSProgram</p>	
<p><b>Datasets</b> – Download DHS datasets for analysis.</p>	<p>DHSprogram.com/Data</p>	
<p><b>Spatial Data Repository</b> – Download geographically linked health and demographic data for mapping in a geographic information system (GIS).</p>	<p>spatialdata.DHSprogram.com</p>	
<p><b>Social Media</b> – Follow The DHS Program and join the conversation. Stay up to date through:</p>		
<p> <b>Facebook</b> www.facebook.com/DHSprogram</p>		<p> <b>Twitter</b> www.twitter.com/DHSprogram</p>
<p> <b>Pinterest</b> www.pinterest.com/DHSprogram</p>		<p> <b>LinkedIn</b> www.linkedin.com/company/dhs-program</p>
<p> <b>YouTube</b> www.youtube.com/DHSprogram</p>		<p> <b>Blog</b> Blog.DHSprogram.com</p>

# RWANDA





The 2017 Rwanda Malaria Indicator Survey (RMIS) was implemented by the Ministry of Health's Rwanda Biomedical Center (RBC)/Malaria and Other Parasitic Diseases Division (MOPDD) through funding from the U.S. President's Malaria Initiative (PMI) and the Global Fund (GF). Data collection took place from October 23 to December 23, 2017. ICF provided technical assistance through The DHS Program, a USAID-funded project that offers support and technical assistance in the implementation of population and health surveys in countries worldwide.

## 1.1 SURVEY OBJECTIVES

The 2017 RMIS, a comprehensive, nationally representative household survey, was designed in line with the Roll Back Malaria Monitoring and Evaluation Working Group (RBM-MERG) guidelines. The primary objective of the 2017 RMIS project is to provide up-to-date estimates of basic demographic and health indicators related to malaria. Specifically, the 2017 RMIS collected information on household ownership of mosquito nets, care seeking behavior by adults, and treatment of fever in children. All members of sampled households were also tested for malaria infection. Knowledge of malaria was assessed among interviewed women. The information collected through the 2017 RMIS is intended to assist policy makers and program managers in evaluating and designing programs and strategies for improving the health of the country's population.

## 1.2 SAMPLE DESIGN

The 2017 RMIS followed a two-stage sample design that would allow estimates of key indicators to be determined for the nation as a whole, for urban and rural areas, and for the five provinces.

In the first stage, sample points, or clusters, were selected from the sampling frame, which consisted of enumeration areas (EAs) delineated during the 2012 Population and Housing Census. A total of 170 clusters with probability proportional to size were selected from these EAs.

In the second stage, sampling involved systematic selection of households. A household listing operation was undertaken in all selected EAs during the main data collection. Households to be included in the survey were then randomly selected from these lists. Thirty households were selected from each EA, for a total sample size of 5,100 households. Because of the approximately equal sample size for each region, the sample is not self-weighting at the national level. Results shown in this report have been weighted to account for the complex sample design. See Appendix A for additional details on the sampling procedures.

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. Testing for malaria took place with consent from adults age 15 or older and from parents or guardians of children age 6 months to 14 years.

## 1.3 QUESTIONNAIRES

Data was primarily collected using three questionnaires: the Household Questionnaire, the Woman's Questionnaire, and the Biomarker Questionnaire. Core questionnaires available from the RBM-MERG were adapted to reflect the population and health issues relevant to Rwanda. The modifications were decided upon at a series of meetings with various stakeholders from MOPDD and other international donors. Questionnaires in

English and in Kinyarwanda were used for interviewing during the survey. Additionally, a two-page Fieldworker Questionnaire was filled out by all people who implemented the 2017 RMIS in the field.

The Household Questionnaire was used to list all the usual members of and visitors to selected households. Basic information was collected on the characteristics of each person listed in the household, including his or her age, sex, and relationship to the head of the household. The data on the age and sex of household members, obtained from the Household Questionnaire, were used to identify women eligible for an individual interview. All de facto members of the household age 6 months and older are eligible for malaria testing. Additionally, the Household Questionnaire captured information on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, materials used in flooring, ownership of various durable goods, and ownership and use of mosquito nets.

The Woman's Questionnaire was used to collect information from all women age 15-49. These women were asked questions on the following:

- Background characteristics (age, residential history, education, literacy, and religion)
- Reproductive history for the last 5 years
- Prevalence and treatment of fever among children under age 5
- Knowledge about malaria (symptoms, causes, and how to prevent)
- Sources of messages about malaria

The Biomarker Questionnaire was used to record the results of the malaria testing for all members of the household as well as to gather consent for testing.

Consent statements were developed for administering the Household, Woman's, and Biomarker Questionnaires. They were formulated for malaria testing, and for treatment of children and adults with positive malaria rapid diagnostic test (RDT) results. Verbal informed consent was sought from eligible respondents before they were administered the Household Questionnaire and the Individual Questionnaire and before biomarker data was collected. In the case of non-emancipated minors, age 15-17, consent was obtained first from the parent/guardian or other responsible adult, followed by assent from the respondent. For children age 6 months to 14 years who were eligible for malaria testing, consent was obtained from a parent/guardian or other responsible adult prior to testing. The survey staff recorded their unique identification number and signed to indicate that the consent procedure was properly administered, and whether or not the respondent provided their consent.

The Fieldworker Questionnaire was self-administered by all fieldworkers who enter the field to implement the survey. The questionnaire collected information on a fieldworker's basic background characteristics (residential status, age, sex, marital status, education, and language spoken), past experience with large surveys such as a DHS or MIS, and current employment status with the survey-implementing agency.

## **1.4 MALARIA TESTING**

Blood samples for malaria testing were collected by finger- or heel-prick from all household members age 6 months and older. Each field team included one laboratory technician who carried out the malaria testing and prepared the blood smears. The team provided malaria medications for respondents who tested positive for malaria, in accordance with the approved treatment protocols. The field laboratory technicians requested written, informed consent for each test before the blood samples were collected, according to the protocols approved by the Rwanda National Ethical Committee in Rwanda and the institutional review board at ICF (formerly ICF International).

**Malaria testing using a rapid diagnostic test (mRDT).** A single-use, sterile lancet was used to make a finger- or heel-prick. A drop of blood was tested immediately using the Rwanda-approved SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup> rapid diagnostic test (RDT). This qualitative test detects the histidine-rich protein II antigen of malaria, *Plasmodium falciparum* (Pf), in human whole blood (Standard Diagnostics, Inc.). The parasite, transmitted by a mosquito, is the major cause of malaria in Rwanda. The diagnostic test includes a disposable sample applicator that comes in a standard package. A tiny volume of blood is captured on the applicator and placed in the well of the testing device. All field laboratory technicians were trained to perform the RDT in the field, in accord with manufacturers' instructions. RDT results were available in 20 minutes and recorded as either positive or negative, with faint test lines being considered positive. Malaria RDT results were provided to the respondent or to a child's parent or guardian in oral and written form and were recorded on the Biomarker Questionnaire.

Respondents who tested positive for malaria were offered a full course of medicine, according to standard procedures for uncomplicated malaria treatment in Rwanda. To ascertain the correct dose, a lab technician on each field team was trained to use treatment guidance charts and to ask about any medications the child might already be taking. The interviewers were also trained to ask for signs and symptoms of severe malaria. They provided the age-appropriate dose of artemisinin-based combination therapy (ACT), along with instructions on how to administer the medicine to a child. The field work team observed administration of the first dose of ACT.

**Malaria testing using blood smears.** In addition to the RDT, thick and thin blood smears were prepared in the field. Each blood smear slide was given a bar code label, with a duplicate affixed to the Biomarker Questionnaire. An additional copy of the bar code label was affixed to a blood sample transmittal form to track the journey of each blood sample from the field to the laboratory. The slides were stained with Giemsa stain in the field, dried in a dust-free environment, and stored in slide boxes. The thick and thin blood smear slides were collected regularly from the field, along with the completed Biomarker Questionnaires, and transported to the laboratory for logging and microscopic reading. In the laboratory, the slides were examined to determine the presence or absence of *Plasmodium* infection and, if present, the parasite density. All stained slides were read by two independent microscopists unaware of RDT results. Slides with discordant microscopy results were again analyzed by a third microscopist (tie breaker) for final validation.

The microscopic results were quality checked by internal quality control processes. Internal quality control consisted of having an independent microscopist read 5% of all slides in the study.

## 1.5 TRAINING OF FIELD STAFF

A 2-week training course for field staff took place from October 9-21, 2017, at the Golden Tulip Hotel in Bugesera District. Overall, 60 people attended the training, including 15 field supervisors, 30 interviewers, and 15 biomarker technicians. Staff from MOPDD and ICF led the training and served as the supervisory team for fieldwork practice.

During the training two parallel sessions were organized: one for the interviewers and team supervisors and one for the biomarker technicians. The training of the interviewers and team supervisors focused on how to fill out the Household, Woman's, and Biomarker questionnaires, conduct mock interviews, and improve interviewing techniques. Participants learned how to assign households to interviewers and how to organize finished questionnaires in completed clusters to prepare for transfer to the central data processing center. Throughout the training, quizzes were administered to assess how well the participants absorbed the training materials on completing the paper questionnaires.

Training of the biomarker technicians focused on how to prepare blood samples for malaria testing. The training involved presentations, discussion, and actual test procedures. The technicians were trained to identify household members eligible for testing, administer informed consent, conduct the malaria rapid tests, make thick and thin blood smears, and administer the correct treatment protocols. They were also trained to store the blood slides, record test results on the Biomarker Questionnaire, and provide the results to the parents/guardians of the children tested. Finally, technicians learned how to record children's malaria testing results on the brochures and how to fill in the referral slip for any child found to be severely ill.

To help put the importance of the 2017 RMIS into context for the trainees, the training also included presentations given by MOPDD staff on the epidemiology of malaria and Rwanda-specific policies and programs on malaria. All participants took part in 2-day field practice exercises in Kigali.

## **1.6 FIELDWORK**

Fifteen teams were organized for field data collection. Each team consisted of one field supervisor, two health professionals to interview and administer treatment, one laboratory technician to conduct biomarker testing, and one driver. The field staff also included national coordinators who collected slides from the field teams and delivered them to the Malaria Laboratory of the National Referral Laboratory.

Field data collection for the 2017 RMIS started on October 23, 2017. For maximum effect, survey coordinators visited all 15 teams at least twice per week. Fieldwork concluded on December 23, 2017.

## **1.7 LABORATORY TESTING**

Standard protocols were used to read blood slides for the presence of malaria parasites, perform malaria parasite density calculations, and malaria parasite species identification. All blood smear slides were stained with Giemsa and read by laboratory technicians. Blood smears were considered negative if no parasites were found after counting 200 fields. For quality control, all slides were read by a second laboratory technician, and a third reviewer in case of discordant results. In addition, 5% of the slides were read a second time by an independent, external microscopist to ascertain the quality of microscopy reading.

## **1.8 DATA PROCESSING**

Data entry began on November 1, 2017, 2 weeks after the survey launched in the field. Data were entered by a team of eight data processing personnel recruited and trained for this task. They were assisted during these operations by two staff members who aided in questionnaire reception, data verification, and coding. Completed questionnaires were periodically brought in from the field to the MOPDD headquarters, where assigned agents checked them and coded the open-ended questions. Next, the questionnaires were sent to the data entry facility and the blood samples (blood smear slides) were sent to the lab to be read for the malaria parasites. Data were entered using CPro, a program developed jointly by the United States Census Bureau, the ORC Macro MEASURE DHS+ program, and Serpro S.A. Processing the data concurrent with data collection allowed for regular monitoring of teams' performance and data quality. Field check tables were regularly generated during data processing to check various data quality parameters. As a result, feedback was given on a regular basis, encouraging teams to continue quality work and to correct areas in need of improvement. Feedback was individually tailored to each team. Data entry, which included 100% double entry to minimize keying error, was completed on December 31, 2017. Data editing, was completed on January 26, 2018. Data cleaning and finalization was completed on February 9, 2018.

## 1.9 ETHICAL CONSIDERATION

The protocol for the 2017 RMIS was approved by both the Rwanda National Ethics Committee (RNEC) and the ICF institutional review board. All data and other information collected were kept confidential. The data files are stripped of all personal identifiers. The risks and benefits of participation in the survey were explained to respondents and informed consent for interview or blood collection was sought. Respondents gave consent to be part of the survey.

## 1.10 RESPONSE RATES

**Table 1.1** shows that of the 5,096 households selected for the sample, 5,061 were occupied at the time of fieldwork. Among the occupied households, 5,041 were successfully interviewed, yielding a total household response rate of 99.6%. In the interviewed households, 5,088 women were identified as eligible for individual interview, and 5,022 were successfully interviewed, yielding a response rate of 98.7%.

Result	Residence		
	Urban	Rural	Total
<b>Household interviews</b>			
Households selected	1,200	3,896	5,096
Households occupied	1,188	3,873	5,061
Households interviewed	1,177	3,864	5,041
Household response rate <sup>1</sup>	99.1	99.8	99.6
<b>Interviews with women age 15-49</b>			
Number of eligible women	1,339	3,749	5,088
Number of eligible women interviewed	1,321	3,701	5,022
Eligible women response rate <sup>2</sup>	98.7	98.7	98.7

<sup>1</sup> Households interviewed/households occupied  
<sup>2</sup> Respondents interviewed/eligible respondents



### Key Findings

- **Drinking water:** Almost all urban households (95%) have access to an improved source of drinking water compared with 74% of rural households.
- **Sanitation:** 65% of households use an improved toilet facility; 17% have a toilet facility that would be classified as improved if not shared with other households, 16% use an unimproved toilet facility, and 2% practice open defecation.
- **Household Wealth:** 67% of the households in Kigali city are in the highest wealth quintile, while 36% of the households in the South province are in the lowest wealth quintile.
- **Electricity:** 80% of households in rural areas do not have electricity.
- **Ownership of agricultural land:** Only 36% of households own some agricultural land (13% in urban areas and 42% in rural areas).
- **Literacy:** Overall, younger women are more likely to be literate than older women. Ninety-four percent of women age 15-19 are literate compared with 67% of women age 45-49.
- **Health insurance:** Generally, 8 in 10 households (79%) have at least one household member covered by health insurance.

Information on the socioeconomic characteristics of the household population in the 2017 RMIS provides a context to interpret demographic and health indicators and can indicate the representativeness of the survey. In addition, this information sheds light on the living conditions of the population of Rwanda.

This chapter presents information on source of drinking water, sanitation, wealth, ownership of durable goods, and composition of the household population. In addition, characteristics of the survey respondents such as age, education, and literacy, are summarized. Socioeconomic characteristics are useful for understanding the factors that affect use of health services and other health behaviors related to malaria control.

## 2.1 DRINKING WATER SOURCES AND TREATMENT

### Improved sources of drinking water

Includes piped water, public taps, standpipes, tube wells, boreholes, protected dug wells, springs, and rainwater. Households using bottled water for drinking are classified as using an improved source only if their water for cooking and handwashing is from an improved source.

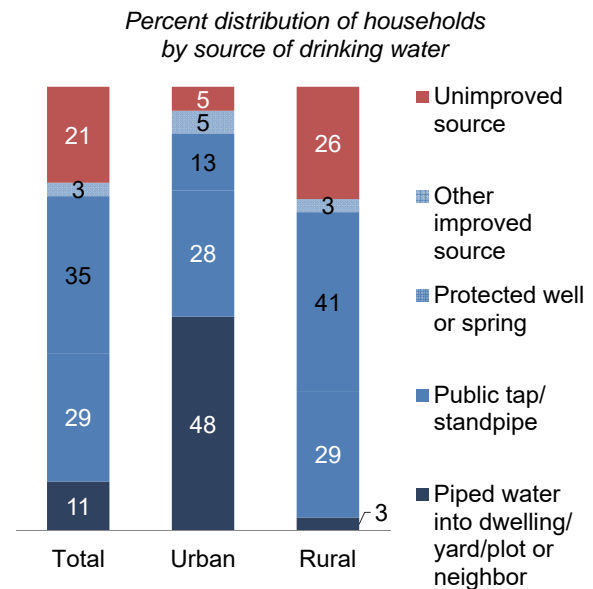
**Sample:** Households

Improved sources of water protect against outside contamination, so water is more likely to be safe to drink. In Rwanda, 79% of households have access to an improved source of drinking water (**Table 2.1**). Ninety-five percent of urban households and 74% of rural households have access to improved water sources.

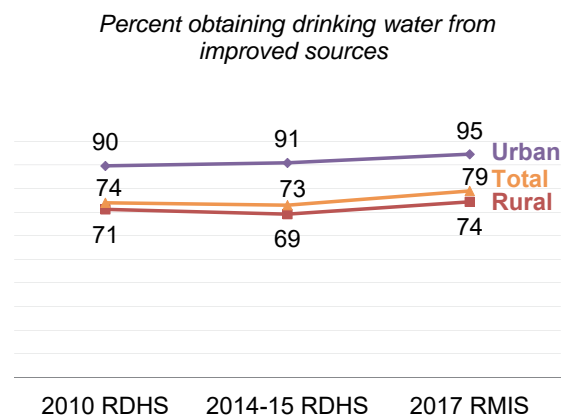
Urban and rural households rely on different sources of drinking water. Forty percent of urban households have piped water in their dwelling or yard, which accounts for the largest percentage of improved water sources for urban households (**Figure 2.1**). In contrast, rural households rely mainly on a protected spring or well (41%). Eighty-three percent of urban and 50% of rural households travel less than 30 minutes to fetch drinking water (**Table 2.1**).

**Trends:** The proportion of households obtaining water from improved sources decreased slightly between the 2010 RDHS and the 2014-15 RDHS (74% and 73% respectively) and then increased to 79% in the 2017 RMIS. The increase occurred in both urban and rural households, increasing from 90% in 2010 to 95% in 2017 in urban areas, and from 71% in 2010 to 74% in 2017 in rural areas (**Figure 2.2**).

**Figure 2.1 Household drinking water by residence**



**Figure 2.2 Trends in source of drinking water by residence**





## 2.2 HOUSEHOLD SANITATION FACILITIES

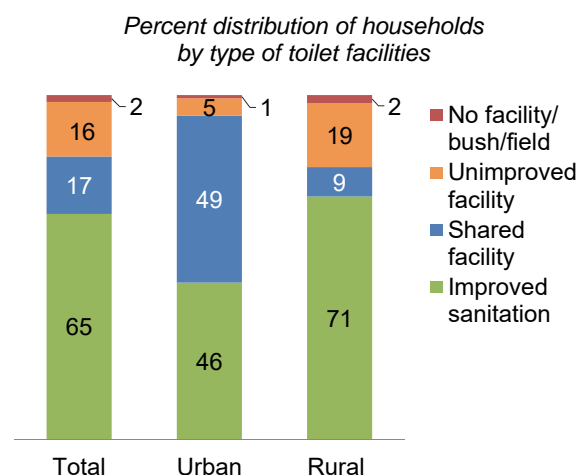
### Improved toilet facilities

Include any non-shared toilet of the following types: flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit (VIP) latrines; pit latrines with slabs; and composting toilets

**Sample:** Households

Nationally, 65% of households use an improved toilet facility. Other households (35%) use unimproved sanitation, including 17% of those with a toilet facility that would be classified as improved if it were not shared with other households. Sixteen percent use an unimproved toilet facility, and 2% practice open defecation (**Figure 2.3**). Households in rural areas (71%) are more likely than urban households (46%) to use improved facilities. However, many urban facilities would be classified as improved if they were not shared with other households. The most commonly used improved toilet facility is the pit latrine with a slab (59%). Less than 1% of households use an improved facility that flushes to a septic tank; this type of toilet is mostly observed among urban households (2%) and not among rural households (less than 1%) (**Table 2.2**).

**Figure 2.3 Household toilet facilities by residence**



Note: Totals may not add to 100 due to rounding.

## 2.3 HOUSING CHARACTERISTICS

The 2017 RMIS collected data on household features such as access to electricity, flooring material, number of sleeping rooms, and types of fuel used for cooking. The responses to these questions, along with information on ownership of household durable goods, contribute to the creation of the household wealth index and provide information relevant for other health indicators.

Exposure to cooking smoke, especially smoke produced from solid fuels like charcoal and firewood, is potentially harmful to health. Both urban and rural households rely on solid cooking fuels, but they differ in which solid fuels are used. The percentage of households using charcoal for cooking is about 12 times higher in urban households than in rural households (63% versus 5%, respectively), while rural households are more likely to use firewood than urban households (73% versus 25%, respectively) (**Table 2.3**).

Overall, one in three households (33%) in Rwanda has access to electricity. Eighty-four percent of urban households and 20% of rural households have access to electricity.

The most common flooring material in Rwanda is earth or sand (70%). Cement is the second most common material (26%). The most common flooring material in urban households is cement (68%) while the most common in rural households is earth or sand (82%).

The number of rooms a household uses for sleeping is an indicator of socioeconomic level and crowding in the household, which can facilitate the spread of disease. In Rwanda, 24% of households use a single room for sleeping, 38% use two rooms, and another 38% use three or more rooms for sleeping (**Table 2.3**).

## Household Durable Goods

Data from the survey revealed information on ownership of household effects, means of transportation, agricultural land, and farm animals. Urban households were more likely than rural households to own a radio (62% versus 37%), television (39% versus 4%), mobile telephone (88% versus 56%), computer (13% versus less than 1%), and car or truck (5% versus less than 1%). In contrast, rural households were more likely than urban households to own agricultural land (42% versus 13%), farm animals (61% versus 19%), and a bicycle (13% vs 8%) (**Table 2.4**).

## 2.4 HOUSEHOLD WEALTH

### Wealth index

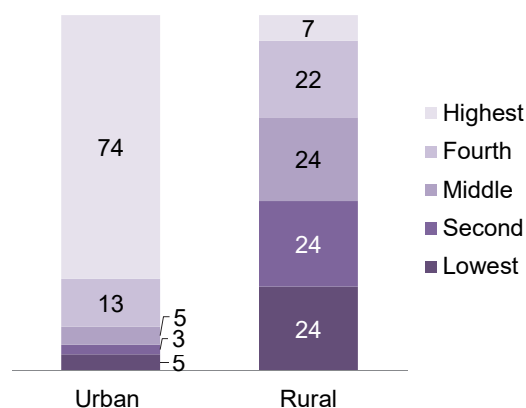
Households are given scores based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics, such as source of drinking water, toilet facilities, and flooring materials. These scores are derived using principal component analysis. National wealth quintiles are compiled by assigning the household score to each usual (de jure) household member, ranking each person in the household population by their score, and then dividing the distribution into five equal categories, each with 20% of the population.

**Sample:** Households

There are variations in the distribution of wealth at residential and regional levels. Rural areas have the most people in the categories of least wealth (24% each) compared with urban areas at 3% and 5%. At the same time, 74% of the urban population ranks among the wealthiest in the country, compared with only 7% of the rural population (**Figure 2.4**). At the provincial level, South province has the highest percentage of population in the lowest wealth category (36%), while Kigali city has a far smaller percentage of the population in this category (4%). Kigali city has the most people in the wealthiest category (67%) compared with South province, which has the least, only 11% (**Table 2.5**).

**Figure 2.4 Household wealth by residence**

Percent distribution of de jure population by wealth quintiles



Note: Totals may not add to 100 due to rounding.

## 2.5 HOUSEHOLD POPULATION AND COMPOSITION

### Household

A person or group of related or unrelated persons who live together in the same dwelling unit(s), who acknowledge one adult male or female as the head of the household, who share the same housekeeping arrangements, and who are considered a single unit.

### De facto population

All persons who stayed in the selected households the night before the interview (whether usual residents or visitors)

### De jure population

All persons who are usual residents of the selected households, whether or not they stayed in the household the night before the interview

### How data are calculated

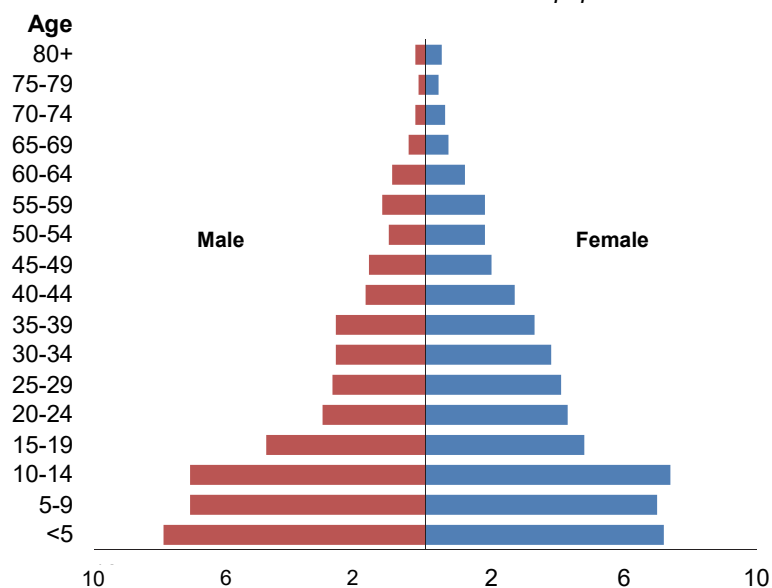
All tables are based on the de facto population, unless specified otherwise.

In the 2017 RMIS, 20,012 people stayed overnight in 5,041 households. The sex ratio was 86 males per 100 females. There were 85 males per 100 females in urban areas and 86 males per 100 females in rural areas. Eighty-one percent of the population lives in rural areas (**Table 2.6**).

Age and sex are important demographic variables and are the primary basis of demographic classification. **Table 2.6** shows the distribution of the de facto household population in the 2017 RMIS by 5-year age groups, according to sex and residence.

The population pyramid in **Figure 2.5** shows the population distribution by sex and by 5-year age groups. The broad base of the pyramid shows that the Rwandan population is young, which is typical of developing countries with a high fertility rate and low life expectancy. Forty-four percent of the population is under age 15, more than half of the population (53%) is between 15 and 64, and only 3% of the population is 65 and older (**Table 2.6**).

**Figure 2.5 Population pyramid**  
Percent distribution of the household population



On average, households in Rwanda have four persons (**Table 2.7.1**). The average number of household members is four even when stratified by province and wealth quintile (**Table 2.7.2**). Men are predominantly the head of the household in Rwanda (62%). The proportion of households headed by men is higher in rural areas, however, than in urban areas (64% versus 56%). In contrast, the proportion of households headed by women is higher in urban areas than in rural areas (44% versus 36%).

## 2.6 BACKGROUND CHARACTERISTICS OF WOMEN RESPONDENTS

More than half of the respondents age 15-49 (53% of women) are younger than 30, which reflects the youthful population. The majority of respondents are Christians (95%), and only 2% are Muslims.

Seventy-seven percent of respondents live in rural areas. The percentage of respondents by province varies minimally, with 16% living in Kigali city, 19% in North province, 20% in South province, 22% in West province, and 23% in East province.

## 2.7 EDUCATIONAL ATTAINMENT OF WOMEN

Studies have consistently shown that educational attainment has a strong effect on health behavior and attitudes. Generally, the higher the level of education a woman has attained, the more knowledgeable she is about both the use of health facilities and health management for herself and for her children.

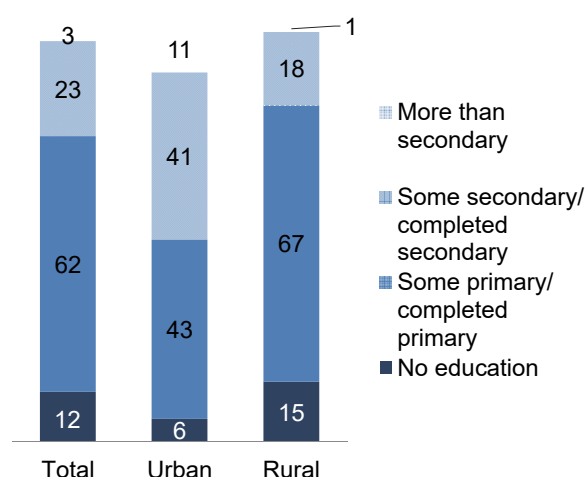
Eighty-eight percent of women in Rwanda have at least some primary education. Twenty-six percent of women have some secondary or higher education, and 12% have no education (**Figure 2.6**). Overall, women have completed a median of 4.8 years of education (**Table 2.9**).

### Patterns by background characteristics

- Fifteen percent of women in rural areas have no education compared with 6% in urban areas.
- At the provincial level, South province recorded the highest percentage of women with no education (18%), while Kigali city had the lowest percentage with only 5% of women having no education.
- The percentage of respondents with no education decreases with increasing wealth quintile, from 25% in the lowest quintile to 2% in the highest quintile.

**Figure 2.6 Education of survey respondents**

*Percent distribution of women age 15-49 by highest level of schooling attended or completed*



## 2.8 LITERACY OF WOMEN

### Literacy

Respondents who have attended higher than secondary school are assumed to be literate. All other respondents were given a sentence to read, and they were considered to be literate if they could read all or part of the sentence.

**Sample:** Women age 15-49

The results show that only 3% of women have more than a secondary education. Among the remaining women (those with secondary education or a lower level, including those with no education), 70% can read the whole sentence, 10% can read part of the sentence, and 17% cannot read at all. The results show that, overall, 83% of women age 15-49 are literate. (**Table 2.10**).

### Patterns by background characteristics

- Literacy is much higher amongst the youngest women age 15-19 (94%) and decreases steadily with age to 67% among the oldest women (45-49).
- Literacy varies by place of residence as 92% of women in urban areas are literate compared with 80% of rural women.
- Regional differences in literacy are notable; literacy is highest among women in the Kigali city (93%) and lowest among women in the South province (with each at about 77%)
- By wealth, literacy ranges from 67% among women in the lowest wealth quintile to 95% among women in the highest quintile.

## 2.9 HOUSEHOLD HEALTH INSURANCE

As part of the 2017 RMIS, household members were asked whether each person in the household had any health insurance. **Table 2.11** shows that, in total, 79% of households in Rwanda have at least one household member covered.

**Trends:** The proportion of households with at least one household member covered by health insurance has generally remained unchanged since 2010. The percentage increased from 78% of households in the 2010 RDHS to 79% of households in the 2014-15 and 2017 surveys.

### Patterns by background characteristics

- Eighty-four percent of households in urban areas, compared with 77% in rural areas, have at least one household member covered by health insurance.
- By province, households with at least one household member covered by health insurance ranged from 83% of households in North province to 74% of households in South province.
- The percentage of households having at least one household member covered by health insurance increases with wealth, ranging from 65% of households to 92% of households in the highest wealth quintile.

## LIST OF TABLES

For detailed information on household population and housing characteristics, see the following tables:

- **Table 2.1 Household drinking water**
- **Table 2.2 Household sanitation facilities**
- **Table 2.3 Household characteristics**
- **Table 2.4 Household possessions**
- **Table 2.5 Wealth quintiles**
- **Table 2.6 Household population by age, sex, and residence**
- **Table 2.7.1 Household composition**
- **Table 2.7.2 Mean number of household members**
- **Table 2.8 Background characteristics of respondents**
- **Table 2.9 Educational attainment: Women**

- **Table 2.10 Literacy: Women**
- **Table 2.11 Household health insurance**

**Table 2.1 Household drinking water**

Percent distribution of households and de jure population by source of drinking water, and by time to obtain drinking water; according to residence, Rwanda MIS 2017

Characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
<b>Source of drinking water</b>						
<b>Improved source</b>	94.6	74.4	78.5	94.6	74.7	78.5
Piped into dwelling/yard plot	39.9	1.5	9.3	40.2	1.8	9.1
Piped to neighbor	8.4	0.7	2.3	7.9	0.7	2.0
Public tap/standpipe	28.3	28.7	28.6	26.6	29.1	28.6
Tube well or borehole	0.9	1.3	1.2	0.9	1.5	1.4
Protected dug well	0.4	2.6	2.2	0.4	2.5	2.1
Protected spring	12.4	38.0	32.8	13.7	37.3	32.8
Rain water	0.0	1.4	1.1	0.0	1.7	1.4
Bottled water, improved source for cooking/handwashing <sup>1</sup>	4.2	0.1	0.9	4.9	0.0	1.0
<b>Unimproved source</b>	5.4	25.5	21.4	5.3	25.2	21.4
Unprotected dug well	0.1	1.1	0.9	0.1	1.1	0.9
Unprotected spring	2.9	16.6	13.9	3.1	16.7	14.1
Tanker truck/cart with small tank	0.6	0.5	0.5	0.5	0.5	0.5
Surface water	1.1	7.1	5.9	1.2	6.9	5.8
Bottled water, unimproved source for cooking/handwashing <sup>1</sup>	0.6	0.0	0.1	0.5	0.0	0.1
Other	0.1	0.0	0.0	0.1	0.0	0.0
Missing	0.0	0.1	0.1	0.0	0.1	0.1
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Time to obtain drinking water (round trip)</b>						
Water on premises <sup>2</sup>	52.8	4.2	14.1	53.2	4.7	13.9
Less than 30 minutes	30.5	45.7	42.7	29.5	45.1	42.1
30 minutes or longer	16.6	49.6	42.9	17.3	49.7	43.6
Don't know/missing	0.1	0.5	0.4	0.1	0.5	0.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Number</b>	<b>1,024</b>	<b>4,017</b>	<b>5,041</b>	<b>3,805</b>	<b>16,190</b>	<b>19,995</b>

<sup>1</sup> Households using bottled water for drinking are classified as using an improved or unimproved source according to their water source for cooking and handwashing.

<sup>2</sup> Includes water piped to a neighbor

**Table 2.2 Household sanitation facilities**

Percent distribution of households and de jure population by type of toilet/latrine facilities, according to residence, Rwanda MIS 2017

Type	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
<b>Improved sanitation</b>	45.5	70.5	65.4	53.6	74.0	70.1
Flush/pour flush to piped sewer system	4.1	0.1	0.9	4.8	0.1	1.0
Flush/pour flush to septic tank	1.9	0.3	0.6	2.6	0.3	0.7
Flush/pour flush to pit latrine	0.9	0.0	0.2	1.0	0.0	0.2
Ventilated improved pit (VIP) latrine	4.6	2.9	3.2	6.0	3.5	3.9
Pit latrine with slab	33.7	65.4	59.0	38.9	68.4	62.8
Composting toilet	0.2	1.7	1.4	0.2	1.7	1.4
<b>Unimproved sanitation</b>	54.5	29.5	34.6	46.4	26.0	29.9
<b>Shared facility<sup>1</sup></b>	48.5	8.6	16.7	40.5	6.9	13.3
Flush/pour flush to piped sewer system	0.3	0.0	0.1	0.3	0.0	0.1
Flush/pour flush to septic tank	0.7	0.0	0.1	0.6	0.0	0.1
Flush/pour flush to pit latrine	0.1	0.0	0.0	0.0	0.0	0.0
Ventilated improved pit (VIP) latrine	2.8	0.5	1.0	2.6	0.5	0.9
Pit latrine with slab	44.6	7.8	15.3	37.1	6.2	12.1
Composting toilet	0.1	0.3	0.2	0.0	0.2	0.2
<b>Unimproved facility</b>	5.1	18.6	15.8	5.2	17.4	15.0
Flush/pour flush not to sewer/septic tank/pit latrine	0.3	0.2	0.2	0.3	0.2	0.2
Pit latrine without slab/open pit	4.3	17.6	14.9	4.6	16.4	14.2
Bucket	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.4	0.3	0.0	0.3	0.3
Missing	0.5	0.4	0.4	0.3	0.3	0.3
<b>Open defecation (no facility/bush/field)</b>	0.9	2.3	2.0	0.7	1.7	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	1,024	4,017	5,041	3,805	16,190	19,995

<sup>1</sup> Facilities that would be considered improved if they were not shared by two or more households.

**Table 2.3 Household characteristics**

Percent distribution of households and de jure population by housing characteristics, percentage using solid fuel for cooking, and percentage using clean fuel for cooking, according to residence, Rwanda MIS 2017

Housing characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
<b>Electricity</b>						
Yes	84.4	20.1	33.2	84.8	22.2	34.1
No	15.5	79.8	66.8	15.2	77.8	65.9
Missing	0.1	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
<b>Flooring material</b>						
Earth/sand	24.0	81.7	69.9	25.0	80.8	70.1
Dung	0.7	1.0	1.0	0.8	1.0	1.0
Palm/bamboo	0.0	0.0	0.0	0.0	0.0	0.0
Parquet or polished wood	0.2	0.0	0.0	0.2	0.0	0.0
Ceramic tiles	5.2	0.2	1.2	6.6	0.2	1.4
Cement	68.1	14.9	25.7	65.5	15.8	25.2
Carpet	1.0	0.1	0.3	1.1	0.0	0.2
Bricks	0.2	0.6	0.5	0.3	0.6	0.5
Other	0.1	0.2	0.2	0.2	0.2	0.2
Missing	0.4	1.2	1.1	0.4	1.4	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
<b>Main wall material</b>						
No walls	0.0	0.1	0.0	0.0	0.0	0.0
Cane/palm/trunks	0.1	0.2	0.2	0.1	0.2	0.2
Dirt	2.9	9.7	8.3	3.1	9.5	8.3
Bamboo with mud	2.9	9.1	7.8	3.0	9.0	7.9
Stone with mud	0.1	0.6	0.5	0.1	0.5	0.5
Uncovered adobe	16.4	36.6	32.5	14.7	35.3	31.3
Plywood	0.0	0.2	0.2	0.0	0.2	0.1
Cardboard	0.0	0.0	0.0	0.0	0.0	0.0
Reused wood	2.3	14.7	12.1	2.4	14.8	12.5
Cement	4.5	1.4	2.0	4.2	1.6	2.1
Stone with lime/cement	1.4	0.2	0.5	1.5	0.2	0.4
Bricks	9.4	1.1	2.8	10.0	1.2	2.9
Cement blocks	1.6	0.2	0.5	1.5	0.1	0.4
Covered adobe	55.9	23.5	30.1	57.0	24.5	30.7
Wood planks/shingles	1.7	1.1	1.2	1.8	1.3	1.4
Other	0.2	0.1	0.1	0.1	0.1	0.1
Missing	0.7	1.3	1.2	0.6	1.5	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
<b>Main roof material</b>						
No roof	0.0	0.1	0.1	0.0	0.1	0.1
Thatch/palm leaf	0.0	0.0	0.0	0.0	0.0	0.0
Sod	0.3	0.3	0.3	0.3	0.3	0.3
Rustic mat	0.0	0.0	0.0	0.0	0.0	0.0
Palm/bamboo	0.0	0.0	0.0	0.0	0.0	0.0
Wood planks	0.0	0.0	0.0	0.0	0.1	0.0
Metal	87.5	59.8	65.4	87.6	60.1	65.4
Wood	0.2	0.1	0.1	0.1	0.1	0.1
Calamine/cement fiber	0.0	0.1	0.1	0.0	0.1	0.1
Ceramic tiles	9.9	37.3	31.7	9.5	37.0	31.8
Cement	1.1	0.6	0.7	1.2	0.6	0.7
Roofing shingles	0.5	0.4	0.4	0.7	0.3	0.4
Missing	0.6	1.3	1.1	0.5	1.3	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
<b>Rooms used for sleeping</b>						
One	32.5	21.7	23.9	19.1	13.6	14.6
Two	29.3	40.7	38.4	30.4	40.1	38.3
Three or more	37.9	37.4	37.5	50.4	46.1	46.9
Missing	0.3	0.2	0.2	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

(Continued...)



**Table 2.3—Continued**

Housing characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
<b>Cooking fuel</b>						
Electricity	0.3	0.1	0.1	0.4	0.1	0.1
LPG/natural gas/biogas	7.2	0.2	1.6	6.3	0.2	1.3
Kerosene	0.1	0.0	0.0	0.0	0.0	0.0
Coal/lignite	0.5	0.1	0.2	0.5	0.1	0.1
Charcoal	62.8	5.3	17.0	60.7	4.7	15.3
Wood	25.0	72.9	63.2	28.8	74.7	66.0
Straw/shrubs/grass	2.8	20.9	17.3	2.8	20.0	16.7
Agricultural crop	0.0	0.1	0.1	0.0	0.1	0.1
Animal dung	0.0	0.0	0.0	0.0	0.1	0.1
No food cooked in household	1.4	0.3	0.5	0.5	0.1	0.1
Missing	0.0	0.1	0.1	0.0	0.1	0.1
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Percentage using solid fuel for cooking <sup>1</sup>	91.1	99.4	97.7	92.9	99.6	98.3
Percentage using clean fuel for cooking <sup>2</sup>	7.5	0.2	1.7	6.6	0.2	1.4
Number of households/population	1,024	4,017	5,041	3,805	16,190	19,995

LPG = Liquefied petroleum gas

<sup>1</sup> Includes kerosene, coal/lignite, charcoal, wood, straw/shrubs/grass, agricultural crops, and animal dung<sup>2</sup> Includes electricity and LPG/natural gas/biogas**Table 2.4 Household possessions**

Percentage of households possessing various household effects, means of transportation, ownership of agricultural land and livestock/farm animals by residence, Rwanda MIS 2017

Possession	Residence		
	Urban	Rural	Total
<b>Household effects</b>			
Watch	38.2	11.8	17.2
Radio	62.0	36.9	42.0
Television	39.0	3.5	10.7
Mobile phone	88.3	56.1	62.6
Non-mobile telephone	0.8	0.4	0.5
Computer	13.0	0.4	3.0
Refrigerator	7.7	0.2	1.7
<b>Means of transport</b>			
Bicycle	7.5	13.3	12.1
Animal drawn cart	0.1	0.0	0.0
Motorcycle/scooter	2.9	1.1	1.5
Car/truck	5.4	0.2	1.3
Boat with a motor	0.1	0.0	0.0
Ownership of agricultural land	13.1	41.9	36.1
Ownership of farm animals <sup>1</sup>	18.5	60.5	51.9
Number	1,024	4,017	5,041

<sup>1</sup> Cows, bulls, other cattle, horses, donkeys, goats, sheep, chickens or other poultry

**Table 2.5 Wealth quintiles**

Percent distribution of the de jure population by wealth quintiles, and the Gini Coefficient, according to residence and region, Rwanda MIS 2017

Residence/region	Wealth quintile					Total	Number of persons	Gini coefficient
	Lowest	Second	Middle	Fourth	Highest			
<b>Residence</b>								
Urban	4.6	2.7	5.1	13.4	74.2	100.0	3,805	0.19
Rural	23.6	24.1	23.5	21.6	7.2	100.0	16,190	0.27
<b>Province</b>								
Kigali city	4.3	5.0	7.1	16.5	67.0	100.0	2,662	0.27
South	36.3	21.8	16.2	14.9	10.7	100.0	4,240	0.28
West	23.1	23.2	19.7	19.2	14.9	100.0	4,485	0.31
North	19.3	23.7	24.9	19.5	12.6	100.0	3,725	0.39
East	12.1	20.8	26.9	27.4	12.7	100.0	4,883	0.23
Total	20.0	20.0	20.0	20.0	20.0	100.0	19,995	0.30

**Table 2.6 Household population by age, sex, and residence**

Percent distribution of the de facto household population by age groups, according to sex and residence, Rwanda MIS 2017

Age	Urban			Rural			Male	Female	Total
	Male	Female	Total	Male	Female	Total			
<5	17.5	13.3	15.2	16.9	13.5	15.1	17.0	13.5	15.1
5-9	13.6	10.8	12.1	15.8	13.5	14.5	15.4	13.0	14.1
10-14	13.0	12.1	12.5	16.0	14.1	15.0	15.4	13.7	14.5
15-19	10.6	11.2	10.9	10.3	8.5	9.3	10.4	9.0	9.6
20-24	9.6	12.1	10.9	5.9	7.0	6.5	6.6	7.9	7.3
25-29	8.4	10.2	9.4	5.4	7.0	6.3	6.0	7.6	6.9
30-34	6.3	8.1	7.3	5.7	6.9	6.4	5.8	7.2	6.5
35-39	7.3	6.5	6.9	5.6	6.1	5.9	5.9	6.2	6.1
40-44	3.9	4.3	4.1	3.8	5.3	4.6	3.8	5.1	4.5
45-49	3.0	2.7	2.8	3.7	3.9	3.8	3.6	3.6	3.6
50-54	2.0	3.0	2.5	2.5	3.5	3.0	2.4	3.4	3.0
55-59	1.8	1.9	1.9	3.0	3.7	3.4	2.8	3.4	3.1
60-64	1.2	1.4	1.3	2.4	2.4	2.4	2.2	2.2	2.2
65-69	1.0	0.8	0.9	1.1	1.3	1.2	1.1	1.2	1.2
70-74	0.2	0.6	0.4	0.7	1.3	1.0	0.6	1.1	0.9
75-79	0.2	0.0	0.1	0.5	1.0	0.7	0.4	0.8	0.6
80 +	0.4	0.9	0.6	0.7	1.0	0.9	0.6	1.0	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Dependency age groups</b>									
0-14	44.0	36.3	39.8	48.7	41.1	44.6	47.8	40.2	43.7
15-64	54.2	61.4	58.1	48.4	54.3	51.5	49.5	55.7	52.8
65+	1.8	2.3	2.1	3.0	4.6	3.9	2.7	4.2	3.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Child and adult populations</b>									
0-17	51.0	43.3	46.8	55.8	47.0	51.1	54.9	46.3	50.3
18+	49.0	56.7	53.2	44.2	53.0	48.9	45.1	53.7	49.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adolescents 10-19	23.6	23.4	23.4	26.3	22.6	24.3	25.8	22.7	24.1
Number of persons	1,762	2,073	3,835	7,500	8,677	16,177	9,262	10,750	20,012

**Table 2.7.1 Household composition**

Percent distribution of households by sex of head of household and by household size, and mean size of households, according to residence, Rwanda MIS 2017

Characteristic	Residence		
	Urban	Rural	Total
<b>Household headship</b>			
Male	55.6	64.1	62.4
Female	44.4	35.9	37.6
Total	100.0	100.0	100.0
<b>Number of usual members</b>			
1	15.8	9.1	10.4
2	16.3	14.3	14.7
3	18.3	18.9	18.8
4	17.1	19.9	19.3
5	13.2	16.6	15.9
6	10.0	10.3	10.2
7	4.5	6.2	5.8
8	2.5	2.6	2.6
9+	2.4	2.1	2.1
Total	100.0	100.0	100.0
Mean size of households	3.7	4.0	4.0
Number of households	1,024	4,017	5,041

Note: Table is based on de jure household members, i.e., usual residents.

**Table 2.7.2 Mean number of household members**

Mean number of household members according to province, wealth index, and residence, Rwanda MIS 2017

Characteristic	Residence		
	Urban	Rural	Total
<b>Province</b>			
Kigali city	3.6	3.7	3.7
South	3.7	3.9	3.9
West	3.9	4.1	4.1
North	3.5	4.1	4.0
East	4.1	4.1	4.1
<b>Wealth quintile</b>			
Lowest	3.6	3.5	3.5
Second	3.6	3.9	3.9
Middle	4.1	4.3	4.2
Fourth	3.8	4.5	4.4
Highest	3.7	4.6	3.9
Total	3.7	4.0	4.0

**Table 2.8 Background characteristics of respondents**

Percent distribution of women age 15-49 by selected background characteristics, Rwanda MIS 2017

Background characteristic	Number of women		
	Weighted percent	Weighted number	Unweighted number
<b>Age</b>			
15-19	19.2	966	967
20-24	16.9	849	874
25-29	16.4	823	839
30-34	15.5	776	768
35-39	13.4	673	660
40-44	10.9	545	535
45-49	7.8	390	379
<b>Religion</b>			
Catholic	40.1	2,015	1,992
Protestant	42.7	2,143	2,143
Adventist	12.1	610	587
Muslim	2.3	116	155
Traditional	0.0	1	1
No religion	0.4	20	21
<b>Residence</b>			
Urban	22.8	1,143	1,321
Rural	77.2	3,879	3,701
<b>Province</b>			
Kigali city	16.1	809	983
South	20.3	1,019	1,095
West	22.1	1,111	1,040
North	19.0	952	928
East	22.5	1,131	976
<b>Education</b>			
No education	12.4	625	609
Primary	61.7	3,096	3,047
Secondary	22.9	1,149	1,192
More than secondary	3.0	151	174
<b>Wealth quintile</b>			
Lowest	18.8	942	909
Second	18.7	937	912
Middle	19.3	971	920
Fourth	19.4	975	946
Highest	23.8	1,197	1,335
Total 15-49	100.0	5,022	5,022

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

**Table 2.9 Educational attainment: Women**

Percent distribution of women age 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, Rwanda MIS 2017

Background characteristic	Highest level of schooling						Total	Median years completed	Number of women
	No education	Some primary	Completed primary <sup>1</sup>	Some secondary	Completed secondary <sup>2</sup>	More than secondary			
<b>Age</b>									
15-24	2.5	37.3	19.7	33.1	5.8	1.6	100.0	5.5	1,815
15-19	1.4	39.8	18.0	38.9	1.7	0.2	100.0	5.5	966
20-24	3.7	34.5	21.6	26.6	10.4	3.2	100.0	5.5	849
25-29	10.1	43.4	16.4	11.4	12.9	5.8	100.0	4.8	823
30-34	16.3	50.9	16.9	6.0	5.3	4.5	100.0	3.7	776
35-39	18.1	47.9	22.2	3.9	5.5	2.4	100.0	4.1	673
40-44	22.5	50.0	15.1	7.5	2.2	2.6	100.0	4.5	545
45-49	32.2	43.8	11.6	7.5	2.6	2.2	100.0	3.3	390
<b>Residence</b>									
Urban	5.5	27.0	16.4	25.3	15.2	10.6	100.0	6.7	1,143
Rural	14.5	48.6	18.4	14.2	3.5	0.8	100.0	4.4	3,879
<b>Province</b>									
Kigali city	4.7	29.6	20.6	21.5	12.7	10.8	100.0	5.9	809
South	17.7	45.4	14.6	15.8	4.5	2.0	100.0	4.4	1,019
West	12.5	47.0	17.5	15.2	6.3	1.4	100.0	4.5	1,111
North	13.0	42.1	21.5	16.8	4.9	1.6	100.0	4.9	952
East	12.8	50.4	16.4	15.4	4.0	1.0	100.0	4.4	1,131
<b>Wealth quintile</b>									
Lowest	24.9	53.8	13.2	7.4	0.7	0.0	100.0	3.2	942
Second	17.8	54.8	17.4	8.7	1.1	0.2	100.0	3.7	937
Middle	11.7	49.7	19.4	16.7	2.3	0.3	100.0	4.5	971
Fourth	8.3	42.4	22.4	19.6	6.3	1.1	100.0	5.2	975
Highest	2.4	23.4	17.3	27.9	17.6	11.4	100.0	7.5	1,197
Total	12.4	43.7	17.9	16.7	6.2	3.0	100.0	4.8	5,022

<sup>1</sup> Completed 6 grade at the primary level

<sup>2</sup> Completed 6 grade at the secondary level

**Table 2.10 Literacy: Women**

Percent distribution of women age 15-49 by level of schooling attended and level of literacy, and percentage literate, according to background characteristics, Rwanda MIS 2017

Background characteristic	No schooling, primary or secondary school							Total	Percentage literate <sup>1</sup>	Number of women
	Higher than secondary schooling	Can read a whole sentence	Can read part of a sentence	Cannot read at all	No card with required language	Blind/visually impaired	Missing			
<b>Age</b>										
15-24	1.6	82.7	8.3	7.3	0.0	0.0	0.1	100.0	92.7	1,815
15-19	0.2	85.2	8.1	6.3	0.0	0.0	0.1	100.0	93.6	966
20-24	3.2	79.9	8.5	8.4	0.0	0.0	0.0	100.0	91.6	849
25-29	5.8	68.1	10.7	15.0	0.0	0.0	0.4	100.0	84.6	823
30-34	4.5	59.5	12.5	22.9	0.4	0.0	0.3	100.0	76.5	776
35-39	2.4	63.7	10.6	22.7	0.2	0.0	0.4	100.0	76.7	673
40-44	2.6	62.3	11.9	22.8	0.2	0.0	0.3	100.0	76.7	545
45-49	2.2	54.6	9.6	33.1	0.0	0.2	0.2	100.0	66.5	390
<b>Residence</b>										
Urban	10.6	74.6	6.3	8.2	0.0	0.0	0.3	100.0	91.5	1,143
Rural	0.8	68.4	11.3	19.2	0.1	0.0	0.2	100.0	80.4	3,879
<b>Province</b>										
Kigali city	10.8	76.2	6.3	6.4	0.0	0.0	0.3	100.0	93.3	809
South	2.0	63.8	10.8	22.5	0.4	0.1	0.4	100.0	76.7	1,019
West	1.4	68.8	10.1	19.5	0.0	0.0	0.2	100.0	80.3	1,111
North	1.6	73.7	8.8	15.5	0.0	0.0	0.3	100.0	84.2	952
East	1.0	68.3	13.4	17.1	0.1	0.0	0.1	100.0	82.8	1,131
<b>Wealth quintile</b>										
Lowest	0.0	54.2	12.5	33.0	0.1	0.0	0.2	100.0	66.7	942
Second	0.2	61.0	14.1	24.2	0.2	0.1	0.1	100.0	75.4	937
Middle	0.3	71.7	12.6	15.0	0.2	0.0	0.2	100.0	84.5	971
Fourth	1.1	79.6	8.4	10.9	0.0	0.0	0.0	100.0	89.1	975
Highest	11.4	79.4	4.6	4.0	0.0	0.0	0.6	100.0	95.4	1,197
<b>Total</b>	<b>3.0</b>	<b>69.8</b>	<b>10.1</b>	<b>16.7</b>	<b>0.1</b>	<b>0.0</b>	<b>0.2</b>	<b>100.0</b>	<b>83.0</b>	<b>5,022</b>

<sup>1</sup> Refers to women who attended schooling higher than the secondary level and women who can read a whole sentence or part of a sentence

**Table 2.11 Household health insurance**

Percentage of households in which at least one member is covered by health insurance according to background characteristics, Rwanda MIS 2017

Background characteristic	Percentage of households with at least one member covered by health insurance	Number of households
<b>Residence</b>		
Urban	83.7	1,024
Rural	77.3	4,017
<b>Province</b>		
Kigali city	81.9	727
South	73.7	1,094
West	79.4	1,098
North	83.0	935
East	77.0	1,187
<b>Wealth quintile</b>		
Lowest	65.2	1,129
Second	74.2	1,034
Middle	80.1	943
Fourth	84.1	916
Highest	91.7	1,019
<b>Total</b>	<b>78.6</b>	<b>5,041</b>

### Key Findings

#### ***Ownership of insecticide-treated nets (ITNs):***

- 84% of households in Rwanda own at least one ITN.
- In North province about 9 in 10 households (92%) own at least one ITN.

#### ***Sources of ITNs:***

- The majority of ITNs (92%) were obtained from mass distribution campaigns. Another 4% were received at immunization visits, and 2% came from routine antenatal care visits.

#### ***Access to an ITN:***

- Nearly 7 in 10 people (72%) have access to an ITN. This means 72% of Rwanda's population could sleep under an ITN if every ITN in a household were used by two people.

#### ***Use of ITNs:***

- Sixty-four percent of the household population, 68% of children under 5, and 69% of pregnant women slept under an ITN the night before the survey.
- ITN use among the household population, children under age 5, and pregnant women increases with wealth.

This chapter describes the population coverage rates of some of the key malaria control interventions in Rwanda, including the ownership and use of insecticide-treated nets (ITNs). Malaria control efforts focus on scaling-up this intervention.

Insecticide-treated nets (ITNs) remain a key tool in the fight against malaria. Rwanda's national ITN objective (as explained in the Rwanda Malaria Control Extended National Strategic Plan 2013-2020) is to maintain universal coverage and achieve over 90% ownership and use through:

- Continuous distribution channels: Antenatal care (ANC) and expanded program for immunization clinics (EPIs);
- Universal coverage mass campaigns

### 3.1 OWNERSHIP OF INSECTICIDE-TREATED NETS

#### Ownership of insecticide-treated nets

Households that have at least one insecticide-treated net (ITN). An ITN is defined as a factory-treated net that does not require any further treatment. In the 2017 RMIS the definition of an ITN is synonymous with the definition of a long-lasting insecticidal net (LLIN) in surveys post-2010.

**Sample:** Households

#### Full household ITN coverage

Percentage of households with at least one ITN for every two people.

**Sample:** Households

An ITN is defined as a factory-treated net that does not require any further treatment. In the 2010 RDHS, 2013 RMIS, and 2014-2015 RDHS, the definition of an ITN included nets that had been soaked with insecticides within the past 12 months. In the most recent questionnaire changes, The DHS Program dropped questions on retreatment of nets. This was done because bed nets that require annual retreatment and the products used for retreatment are no longer distributed, and the distinction between ITNs and long-lasting insecticidal nets (LLINs) is no longer meaningful. For the 2017 RMIS, the current ITN was previously known as an LLIN in the 2010 RDHS, 2013 RMIS, and 2014-15 RDHS surveys.

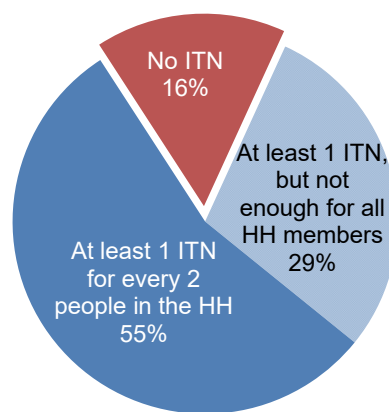
It is well understood that proper use of ITNs protects household members and the entire local community from malaria. The distribution and use of ITNs is one of the central interventions for preventing malaria infection in Rwanda. The Rwanda Malaria Control Extended National Strategic Plan 2013-2020 prioritizes increasing ITN ownership to 84% by the year 2020 (RBC 2017).

In addition to reaching all households across the country with ITN distribution, the national strategy aims to provide enough ITNs to cover all household residents. During universal mass campaign distributions, Rwanda distributes ITNs to households based on the number of household sleeping spaces. This is to adequately ensure that all sleeping spaces are covered and protected by a net.

The 2017 RMIS revealed that 84% of households in Rwanda own at least one ITN. Only 55% of households have one net for every two people who stayed in the household the night prior to the survey. Thus to meet strategic goals, the scope of distribution needs to expand to reach the 16% of households who do not own any ITNs. In addition, the quantity of ITNs distributed needs to increase to provide sufficient ITNs for the 29% of households that own at least one ITN but have an insufficient supply for the number of household residents (**Figure 3.1; Table 3.1**).

**Figure 3.1 Household ownership of ITNs**

*Percent distribution of households*





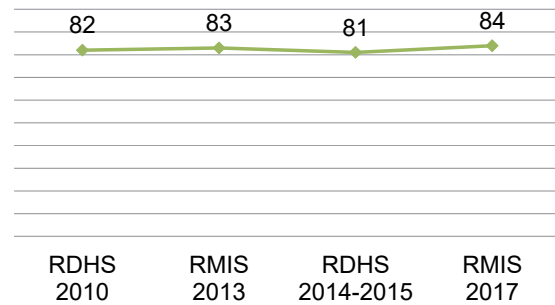
**Trends:** The percentage of households that own at least one ITN increased from 82% in the 2010 RDHS to 84% in the 2017 RMIS (**Figure 3.2**).

**Patterns by background characteristics**

- The percentage of households with at least one ITN increases from 78% in the lowest wealth quintile to 88% in the middle and fourth wealth quintile. It then slightly decreases to 86% in the highest wealth quintile (**Figure 3.3**).
- The percentage of households with at least one ITN is highest in North province (92%) and lowest in East province (75%) (**Figure 3.4**).

**Figure 3.2 Trends in ITN ownership**

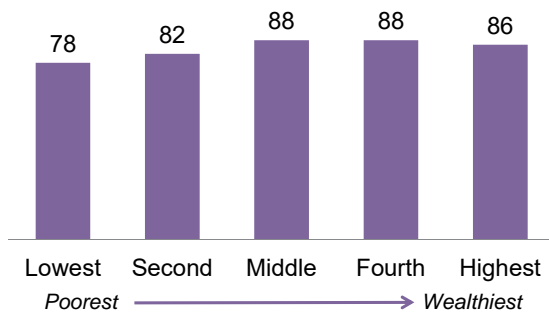
Percentage of households owning at least one insecticide-treated net (ITN)



Note: The definition of an ITN in the 2010 RDHS, 2013 RMIS, and 2014-15 RDHS included nets that had been soaked with insecticides within the past 12 months.

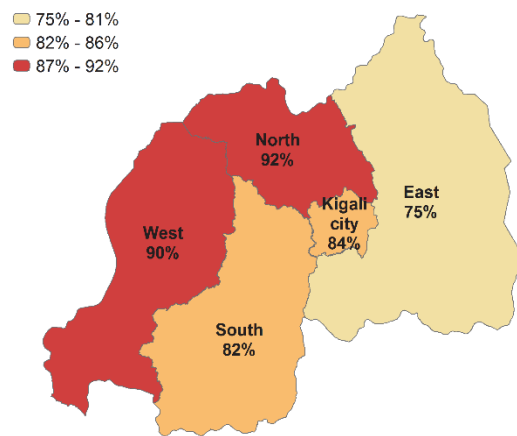
**Figure 3.3 ITN ownership by wealth**

Percentage of households with at least one ITN



**Figure 3.4 ITN ownership by province**

Percentage of households with at least one ITN

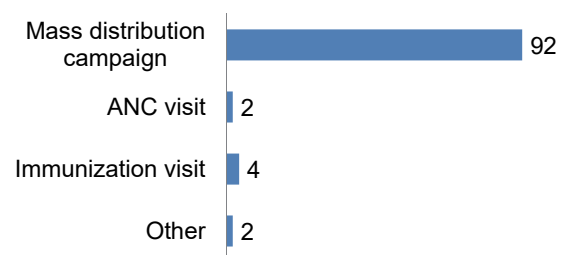


**Source of Nets**

The majority of ITNs (92%) were obtained from mass distribution campaigns. Another 4% were from immunization visits, 2% from routine antenatal care (ANC) visits, and 2% from other sources. (**Figure 3.5** and **Table 3.2**).

**Figure 3.5 Source of nets**

Percent distribution of ITNs in interviewed households



## 3.2 HOUSEHOLD ACCESS AND USE OF ITNS

### Access to an ITN

Percentage of the population that could sleep under an ITN if each ITN in the household were used by up to two people.

**Sample:** De facto household population

### Use of ITNs

Percentage of population that slept under an ITN the night before the survey.

**Sample:** De facto household population

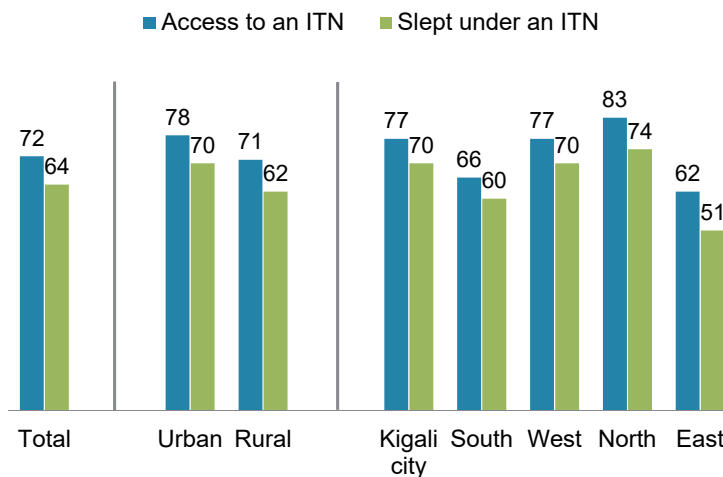
ITNs act as both a physical and a chemical barrier against mosquitoes. By reducing the vector population, ITNs may help to reduce malaria risk at the community level as well as protect the individuals who use them.

Access to an ITN is measured by the proportion of the population that could sleep under an ITN if each ITN in the household were used by up to two people. Comparing ITN access and ITN use indicators can help programs identify if there is a behavioral gap in which available ITNs are not being used. If the difference between these indicators is substantial, the program may need to focus on behavior change and how to identify the main drivers or barriers to ITN use to design an appropriate intervention. This analysis helps ITN programs determine whether they need to achieve higher ITN coverage, promote ITN use, or both.

The majority of Rwandans (72%) have access to an ITN. (Table 3.4). Sixty-four percent of the population reported using an ITN the night before the survey (Table 3.5). Comparing these two population-level indicators, it is evident that the proportion of the population using ITNs is similar to the proportion with access to an ITN (72% and 64%, respectively); there is very little gap between ITN access and ITN use at the population level (Figure 3.6). ITN use is very high among those with access. Across all provinces there is a gap between ITN access and ITN use. This ranges from a 6 percentage point gap in South province to an 11 percentage point gap between ITN access and ITN use in East province (Figure 3.6).

**Figure 3.6 Access to and use of ITNs**

*Percentage of the household population with access to an ITN and who slept under an ITN the night before the survey*



**Trends:** The percentage of household population that has access to an ITN increased from 64% in the 2010 RDHS to 72% in the 2017 RMIS. Additionally, the percentage of the household population that slept under an ITN the night before the survey increased from 58% in the 2010 RDHS to 64% in the 2017 RMIS. In previous surveys there was a narrow gap between access and use, while results from the 2017 survey show a wider gap (Figure 3.7).

In households with at least one ITN, 74% of the household population slept under an ITN the previous night (Table 3.5). Overall, 71% of all existing ITNs were used the night before the survey (Table 3.6).

#### Patterns by background characteristics

- People in urban areas have greater access to ITNs in the household than those in rural areas (78% versus 71%) (Table 3.4).
- Percentage of the household population that slept under an ITN the previous night ranges from 56% in the lowest wealth quintile to 73% in the highest wealth quintile (Table 3.5).
- ITN access ranges from 62% in the East province to 83% in the North province (Table 3.4, Figure 3.8).

### 3.3 USE OF ITNs BY CHILDREN AND PREGNANT WOMEN

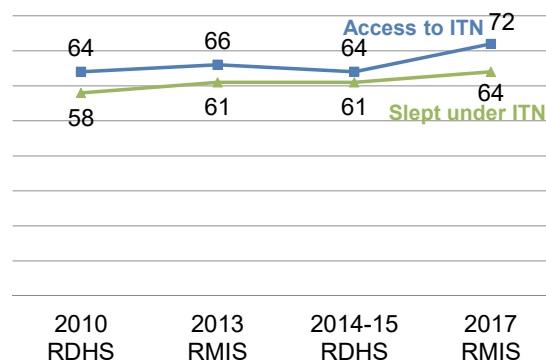
The entire population of Rwanda is at risk for malaria. Natural immunity to the disease is acquired over time for those living in high malaria transmission areas (Doolan et al. 2009). Children under 5 are prone to severe malaria infection due to lack of acquired immunity. For about 6 months following birth, antibodies acquired from the mother during pregnancy protect the child, but this maternal immunity gradually disappears when the child starts to develop his or her own immunity to malaria.

Age is an important factor in determining levels of acquired immunity to malaria, as acquired immunity does not prevent infection but rather protects against severe disease and death. The pace at which immunity develops depends on the exposure to malarial infection, and in high malaria-endemic areas, children are thought to attain a high level of immunity by their fifth birthday. Such children may experience episodes of malaria illness but usually do not suffer from the severe, life-threatening conditions.

Malaria transmission in Rwanda is stable, and adults usually acquire some degree of immunity; however, pregnancy suppresses immunity and women in their first pregnancies are at increased risk for severe malaria.

**Figure 3.7 Trends in ITN access and use**

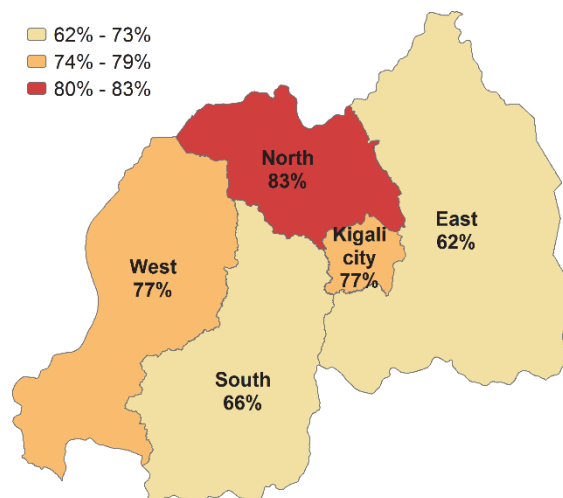
Percentage of the household population that have access to an ITN and percentage of the population that slept under an ITN the night before the survey



Note: The definition of an ITN in the 2010 RDHS, 2013 RMIS, and 2014-15 RDHS included nets that had been soaked with insecticides within the past 12 months.

**Figure 3.8 Access to ITNs by province**

Percent of the household population that could sleep under an ITN if each ITN in the household were used by up to 2 people



Malaria in pregnancy is frequently associated with the development of anemia, which interferes with the maternal-fetus exchange and can lead to low-birth-weight infants, placental parasitemia, fetal death, abortion, stillbirth, and prematurity (Shulman and Dorman 2003).

As stated in the Rwanda Malaria Control Extended National Strategic Plan 2013-2020, all children under 5 and all pregnant women should sleep under an ITN or LLIN every night to prevent malaria complications (RBC 2017). ITNs are distributed free to primipara during their antenatal visit, to children coming for measles vaccination at routine EPI services, and to the entire population during mass campaigns.

**Table 3.7** and **Table 3.8** show the percentage of children under 5 and the percentage of pregnant women who slept under an ITN the night before the survey. Overall, 68% of children in Rwanda under age 5 and 69% of pregnant women slept under an ITN the previous night (**Figure 3.9**).

In households with at least one ITN, 78% of children under age 5 and 82% of pregnant women slept under an ITN the night before the survey (**Table 3.7** and **Table 3.8**).

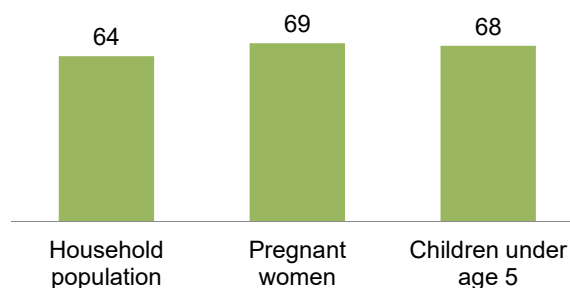
**Trends:** ITN use among children under age 5 decreased from 70% in 2010 to 68% in 2017. Similarly, the percentage of pregnant women who slept under an ITN the night before the survey decreased from 72% in 2010 to 69% in 2017 (**Figure 3.10**).

### Patterns by background characteristics

- ITN use among children under age 5 was highest in children age 12-23 months (73%) and lowest in children age 36-47 months (62%) (**Table 3.7**).
- ITN use among children under age 5 increases with wealth, ranging from 59% among children in the lowest wealth quintile to 80% among children in the highest wealth quintile (**Table 3.7**).
- A higher percentage of pregnant women slept under an ITN in urban areas (77%) compared with pregnant women in rural areas (66%) (**Table 3.8**).

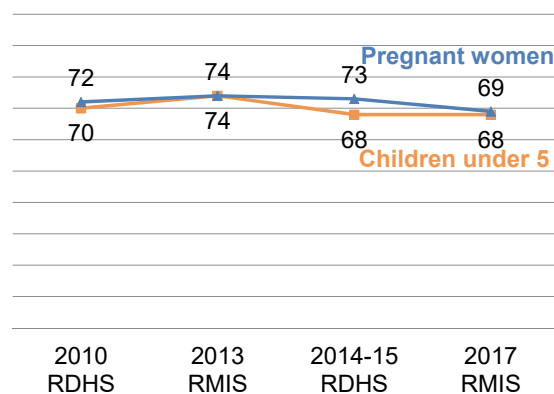
**Figure 3.9 ITN use by household population, pregnant women, and children under age 5**

*Percentage who slept under an ITN the night before the survey*



**Figure 3.10 Trends in use of ITNs by children and pregnant women**

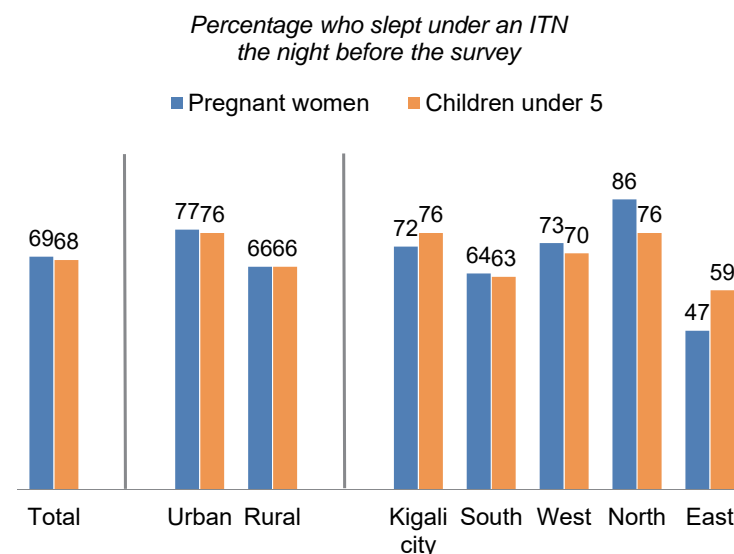
*Percentage of children and pregnant women using an ITN the night before the survey*



*Note: The definition of an ITN in the 2010 RDHS, 2013 RMIS, and 2014-15 RDHS included nets that had been soaked with insecticides within the past 12 months.*

- ITN use among pregnant women ranges from 86% in North province to 47% in East province. Additionally, ITN use among children under age 5 ranges from 76% in Kigali city and North province to 59% in the East province (**Figure 3.11**).

**Figure 3.11 ITN use by pregnant women and children under age 5 by residence and province**



### 3.4 CHARACTERISTICS OF NETS

Preferences for various social marketing goods significantly affect the consistent use of products. In consideration of this influence, the 2017 RMIS observed actual color of respondents' mosquito nets. Additionally, the survey also observed the shape of mosquito nets. In recent years, nets obtained through the public sector (mass distribution campaigns and/or routine distribution) have been white and blue. In assessing the color of the nets, 87% of the observed nets were white, 11% blue, and 1% green. In assessing the shape of the net, 94% of the observed nets were conical and 5% were rectangular (**Table 3.9**).

While sleeping under a mosquito net is important in preventing malaria, if the mosquito net is not well maintained and has large holes, the net is prone to the entry of mosquitos. Interviewers were instructed to observe if the mosquito net had at least one hole equal to or larger in size than that of a thumb. In total, 23% of the nets had a hole of that size (**Table 3.9**).

### 3.5 NET HANGING

Great effort is put into distributing nets across Rwanda through mass campaigns and continuous distribution mechanisms. However, even if all households at risk own an ITN, for the nets to be protective they must be properly hung in the household. Seventy-two percent of nets in Rwanda were hung in the household on the day of the survey. Among those not hung, 23% said that the net was too old, 22% said that they have too many nets, and 24% gave other reasons for non-use.

### LIST OF TABLES

For detailed information on malaria, see the following tables:

- Table 3.1 Household possession of mosquito nets**
- Table 3.2 Source of insecticide-treated nets (ITNs)**
- Table 3.3 Access to an insecticide-treated net (ITN)**
- Table 3.4 Access to an ITN by background characteristics**
- Table 3.5 Use of mosquito nets by persons in the household**
- Table 3.6 Use of existing ITNs**
- Table 3.7 Use of mosquito nets by children**
- Table 3.8 Use of mosquito nets by pregnant women**

- **Table 3.9 Physical characteristics of the mosquito nets**
- **Table 3.10 Nets not hung and the reasons for not hanging**

**Table 3.1 Household possession of mosquito nets**

Percentage of households with at least one mosquito net (treated or untreated) and insecticide-treated net (ITN); average number of nets and ITNs per household; and percentage of households with at least one net and ITN per two persons who stayed in the household last night, according to background characteristics, Rwanda MIS 2017

Background characteristic	Percentage of households with at least one mosquito net		Average number of nets per household		Number of households	Percentage of households with at least one net for every two persons who stayed in the household last night		Number of households with at least one person who stayed in the household last night
	Any mosquito net	Insecticide-treated mosquito net (ITN) <sup>1</sup>	Any mosquito net	Insecticide-treated mosquito net (ITN) <sup>1</sup>		Any mosquito net	Insecticide-treated mosquito net (ITN) <sup>1</sup>	
<b>Residence</b>								
Urban	86.4	84.3	2.1	2.0	1,024	66.8	64.3	1,024
Rural	86.4	84.0	1.9	1.8	4,017	55.6	52.8	4,015
<b>Province</b>								
Kigali city	86.4	84.2	2.1	2.0	727	66.2	63.5	727
South	83.9	81.7	1.7	1.6	1,094	51.9	49.7	1,094
West	90.5	89.5	2.1	2.0	1,098	60.7	58.9	1,098
North	92.6	91.6	2.2	2.2	935	70.0	67.3	932
East	79.8	75.3	1.7	1.5	1,187	46.3	41.7	1,187
<b>Wealth quintile</b>								
Lowest	80.1	77.8	1.4	1.4	1,129	48.1	45.9	1,127
Second	85.5	82.3	1.7	1.6	1,034	55.9	52.4	1,034
Middle	89.3	87.6	2.0	1.9	943	55.8	53.3	943
Fourth	90.0	88.0	2.2	2.1	916	60.4	57.6	916
Highest	88.3	86.1	2.4	2.3	1,019	70.5	67.4	1,019
Total	86.4	84.1	1.9	1.8	5,041	57.9	55.1	5,038

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).

**Table 3.2 Source of insecticide-treated nets (ITNs)**

Percent distribution of ITNs by source of net, according to background characteristics, Rwanda MIS 2017

Background characteristic	Mass distribution campaign	ANC visit	Immunization visit	Government health facility	Private health facility	Pharmacy	Shop/market	Community health worker	Religious institution	School	Other	Don't know/missing	Total	Number of ITNs
<b>Residence</b>														
Urban	92.3	1.3	1.8	0.6	0.0	1.0	0.3	0.3	0.0	0.0	2.0	0.3	100.0	2,088
Rural	91.9	2.1	4.3	0.3	0.0	0.2	0.0	0.1	0.0	0.0	0.7	0.4	100.0	7,120
<b>Province</b>														
Kigali city	92.2	1.0	1.7	0.9	0.0	1.0	0.6	0.2	0.0	0.0	1.9	0.5	100.0	1,429
South	88.2	2.9	5.1	0.9	0.0	0.6	0.0	0.1	0.0	0.0	1.2	1.1	100.0	1,752
West	93.9	1.5	3.2	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.7	0.2	100.0	2,207
North	93.5	1.9	3.9	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5	0.0	100.0	2,010
East	91.5	2.1	4.5	0.0	0.0	0.4	0.0	0.2	0.0	0.1	1.0	0.3	100.0	1,811
<b>Wealth quintile</b>														
Lowest	91.0	2.4	5.0	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.6	0.3	100.0	1,541
Second	91.3	2.5	4.7	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.7	0.2	100.0	1,679
Middle	92.6	2.3	3.3	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.8	0.8	100.0	1,800
Fourth	92.2	1.5	4.2	0.2	0.0	0.3	0.0	0.3	0.0	0.0	1.1	0.2	100.0	1,895
Highest	92.4	1.2	2.1	0.6	0.0	1.3	0.4	0.0	0.0	0.1	1.6	0.4	100.0	2,293
Total	92.0	1.9	3.7	0.4	0.0	0.4	0.1	0.1	0.0	0.0	1.0	0.4	100.0	9,209

ANC = Antenatal care

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).

**Table 3.3 Access to an insecticide-treated net (ITN)**

Percent distribution of the de facto household population by number of ITNs the household owns, according to number of persons who stayed in the household the night before the survey, Rwanda MIS 2017

Number of ITNs <sup>1</sup>	Number of persons who stayed in the household the night before the survey								Total
	1	2	3	4	5	6	7	8+	
<b>Number of ITNs<sup>1</sup></b>									
0	30.9	21.5	16.3	12.0	12.0	10.5	11.6	10.9	13.4
1	45.8	37.4	29.7	19.7	17.7	9.4	11.6	8.9	19.1
2	17.0	31.9	38.0	41.3	35.9	28.7	25.3	20.5	32.6
3	4.8	7.0	12.4	19.7	25.4	36.4	33.8	27.2	23.2
4	1.1	1.9	2.5	5.1	5.9	10.2	12.9	14.5	7.1
5	0.3	0.3	0.7	1.2	1.6	2.6	3.4	11.4	2.7
6	0.2	0.0	0.2	0.9	0.7	1.8	1.4	4.9	1.3
7	0.0	0.0	0.0	0.2	0.6	0.5	0.0	1.7	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	519	1,493	2,856	3,925	3,949	3,052	2,008	2,209	20,012
Percentage of the de facto population with access to an ITN <sup>1</sup>	69.1	78.5	73.8	78.1	70.2	73.7	64.4	61.9	71.9

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).

<sup>2</sup> Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

**Table 3.4 Access to an ITN by background characteristics**

Percentage of the de facto population with access to an ITN in the household, by background characteristics, Rwanda MIS 2017

Background characteristic	Percentage of the de facto population with access to an ITN <sup>1</sup>
<b>Residence</b>	
Urban	77.6
Rural	70.5
<b>Province</b>	
Kigali city	77.2
South	65.7
West	77.0
North	82.7
East	61.5
<b>Wealth quintile</b>	
Lowest	61.9
Second	68.7
Middle	74.2
Fourth	74.2
Highest	80.5
Total	71.9

<sup>1</sup> Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

**Table 3.5 Use of mosquito nets by persons in the household**

Percentage of the de facto household population who slept the night before the survey under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among the de facto household population in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Rwanda MIS 2017

Background characteristic	Household population			Household population in households with at least one ITN <sup>1</sup>	
	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN <sup>1</sup> last night	Number of persons	Percentage who slept under an ITN <sup>1</sup> last night	Number of persons
<b>Age</b>					
<5	70.0	68.0	3,060	77.8	2,674
5-14	58.9	57.0	5,666	64.8	4,983
15-34	63.8	62.0	6,093	73.1	5,169
35-49	74.3	72.3	2,838	82.5	2,487
50+	72.4	70.2	2,355	82.1	2,012
<b>Sex</b>					
Male	63.4	61.7	9,262	71.9	7,943
Female	67.9	65.8	10,750	75.4	9,382
<b>Residence</b>					
Urban	72.7	70.4	3,835	79.7	3,388
Rural	64.2	62.4	16,177	72.4	13,936
<b>Province</b>					
Kigali city	72.9	70.3	2,685	79.8	2,366
South	61.6	59.8	4,260	72.4	3,514
West	71.2	69.9	4,470	76.7	4,078
North	75.1	73.5	3,710	78.1	3,489
East	53.8	51.3	4,887	64.6	3,878
<b>Wealth quintile</b>					
Lowest	57.1	55.7	4,006	69.8	3,198
Second	59.8	58.0	3,988	68.7	3,367
Middle	67.6	65.9	3,988	73.3	3,584
Fourth	69.3	67.0	4,001	75.4	3,555
Highest	75.3	72.9	4,029	81.1	3,621
Total	65.9	63.9	20,012	73.8	17,325

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS; this was known as a long-lasting insecticidal net (LLIN).

**Table 3.6 Use of existing ITNs**

Percentage of insecticide-treated nets (ITNs) that were used by anyone the night before the survey, according to background characteristics, Rwanda MIS 2017

Background characteristic	Percentage of existing ITNs <sup>1</sup> used last night	Number of ITNs <sup>1</sup>
<b>Residence</b>		
Urban	73.4	2,088
Rural	70.4	7,120
<b>Province</b>		
Kigali city	73.9	1,429
South	75.7	1,752
West	68.9	2,207
North	70.9	2,010
East	67.0	1,811
<b>Wealth quintile</b>		
Lowest	70.0	1,541
Second	69.3	1,679
Middle	71.6	1,800
Fourth	70.4	1,895
Highest	73.1	2,293
Total	71.0	9,209

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).



**Table 3.7 Use of mosquito nets by children**

Percentage of children under age 5 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among children under age 5 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Rwanda MIS 2017

Background characteristic	Children under age 5 in all households			Children under age 5 in households with at least one ITN <sup>1</sup>	
	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN <sup>1</sup> last night	Number of children	Percentage who slept under an ITN <sup>1</sup> last night	Number of children
<b>Age in months</b>					
<12	72.4	70.9	621	82.0	537
12-23	75.0	73.1	663	80.9	600
24-35	72.2	70.1	572	79.9	502
36-47	65.0	62.3	615	72.9	526
48-59	64.7	63.1	589	72.9	509
<b>Sex</b>					
Male	69.8	68.4	1,596	78.6	1,389
Female	70.1	67.5	1,464	77.0	1,285
<b>Residence</b>					
Urban	78.1	75.5	584	84.9	519
Rural	68.0	66.2	2,476	76.1	2,155
<b>Province</b>					
Kigali city	78.2	75.6	425	83.0	387
South	65.4	63.0	591	75.4	494
West	71.5	70.2	731	77.5	662
North	78.5	76.4	554	81.2	521
East	61.2	59.3	759	74.0	609
<b>Wealth quintile</b>					
Lowest	60.6	59.2	668	72.3	546
Second	62.2	60.8	616	71.6	523
Middle	70.0	68.5	588	75.7	532
Fourth	75.5	72.9	610	82.0	542
Highest	83.0	80.2	579	87.4	531
Total	70.0	68.0	3,060	77.8	2,674

Note: Table is based on children who stayed in the household the night before the interview.

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).

**Table 3.8 Use of mosquito nets by pregnant women**

Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN); and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Rwanda MIS 2017

Background characteristic	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one ITN <sup>1</sup>	
	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN <sup>1</sup> last night	Number of pregnant women	Percentage who slept under an ITN <sup>1</sup> last night	Number of pregnant women
<b>Residence</b>					
Urban	83.5	77.4	72	90.7	61
Rural	68.3	66.1	271	79.8	224
<b>Province</b>					
Kigali city	78.4	71.6	53	82.3	46
South	67.8	64.1	74	77.0	62
West	73.2	73.2	82	85.8	70
North	87.3	86.0	67	93.3	62
East	51.9	47.2	66	(68.2)	46
<b>Education</b>					
No education	(69.9)	(69.9)	39	(83.4)	33
Primary	71.3	67.5	209	81.9	172
Secondary or higher	73.3	70.9	93	83.2	79
<b>Wealth quintile</b>					
Lowest	64.5	63.6	75	82.0	58
Second	68.3	64.5	76	74.3	66
Middle	67.8	63.8	62	(79.6)	49
Fourth	76.2	74.5	44	(92.2)	35
Highest	80.5	76.4	87	86.0	77
Total	71.5	68.5	342	82.1	285

Note: Table is based on women who stayed in the household the night before the interview.

<sup>1</sup> An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2010 DHS, 2013 MIS, and 2014-15 DHS, this was known as a long-lasting insecticidal net (LLIN).

**Table 3.9 Physical characteristics of the mosquito nets**

Percent distribution of the mosquito nets by color and shape of mosquito net, and percentage of mosquito nets that have at least one hole equal to or larger in size than a thumb, according to background characteristics, Rwanda MIS 2017

Background characteristic	Color of the net					Shape of the net		Percentage of mosquito nets with hole	Number of nets
	White	Green	Blue	Red	Other	Conical	Rectangle		
<b>Residence</b>									
Urban	92.6	0.3	6.7	0.0	0.1	97.1	2.9	16.4	2,166
Rural	85.6	1.3	12.8	0.0	0.0	93.5	6.1	25.1	7,519
<b>Province</b>									
Kigali city	97.6	0.2	1.8	0.0	0.1	97.2	2.8	16.5	1,494
South	65.9	1.6	32.3	0.0	0.0	93.3	6.0	25.9	1,835
West	95.0	0.4	3.9	0.0	0.1	95.0	4.8	18.2	2,275
North	94.2	1.7	3.7	0.0	0.0	93.2	6.5	13.9	2,080
East	82.5	1.3	15.9	0.1	0.0	93.6	6.2	40.8	2,000
<b>Wealth quintile</b>									
Lowest	83.1	1.4	15.3	0.1	0.1	94.1	5.4	27.2	1,612
Second	85.5	1.9	12.2	0.0	0.1	91.9	7.4	28.3	1,783
Middle	87.2	1.2	11.4	0.0	0.0	94.4	5.5	27.4	1,891
Fourth	85.6	1.0	12.8	0.0	0.0	93.8	6.2	21.0	1,999
Highest	92.3	0.2	7.1	0.0	0.1	96.8	3.0	15.1	2,400
Total	87.1	1.1	11.4	0.0	0.0	94.3	5.4	23.2	9,685

**Table 3.10 Nets not hung and the reasons for not hanging**

Percent of the mosquito nets that were hanged in the household and among the mosquito nets that were not hanged, percent distribution by the reason why there were not hanged, according to background characteristics, Rwanda MIS 2017

Background characteristic	Net hanged	Number of nets	Reason for not hanging the net						Number of nets not hanged	
			Have many nets	Use for other purposes	The net is being washed	Hang only in the evening	The net is too old	Other		Missing
<b>Residence</b>										
Urban	78.6	2,166	40.4	1.3	11.6	18.5	8.9	17.9	1.5	457
Rural	70.6	7,519	17.7	5.9	6.3	17.1	25.9	25.3	1.9	2,156
<b>Province</b>										
Kigali city	78.4	1,494	34.1	1.4	15.7	21.5	8.5	16.9	2.0	320
South	75.8	1,835	15.3	5.9	10.1	17.2	25.2	23.2	3.1	430
West	71.0	2,275	27.2	2.9	3.9	19.6	14.9	31.0	0.6	649
North	74.0	2,080	30.4	5.0	5.2	17.5	14.5	24.1	3.4	517
East	64.7	2,000	8.2	8.3	6.1	13.5	41.8	21.0	1.1	697
<b>Wealth quintile</b>										
Lowest	69.5	1,612	15.0	6.2	2.7	14.6	24.6	32.9	4.0	481
Second	69.6	1,783	12.4	5.1	5.7	17.4	32.8	25.2	1.4	531
Middle	70.9	1,891	17.8	6.7	6.0	16.9	27.4	24.8	0.5	536
Fourth	71.5	1,999	25.6	5.8	8.5	18.5	19.0	20.9	1.7	555
Highest	78.4	2,400	37.3	1.4	12.9	19.2	10.5	16.8	1.9	512
Total	72.4	9,685	21.6	5.1	7.2	17.4	22.9	24.0	1.8	2,614



### Key Findings

- **Fever prevalence:** Three in ten children under age 5 had fever in the 2 weeks before the survey (30%).
- **Care-seeking for fever:** Advice or treatment was sought for 56% of children with fever in the 2 weeks before the survey.
- **Source of advice or treatment:** Among children with recent fever for whom care was sought, 48% received advice or treatment from the public sector, 8% from the private sector, and only 1% elsewhere.
- **Testing:** 38% of children with recent fever received a finger or heel prick for testing.
- **Type of antimalarial drug used:** Among children under 5 with a recent fever who received an antimalarial, 99% received artemisinin combination therapy.

This chapter presents data useful for assessing how well fever management strategies are implemented. Specific topics include care seeking for febrile children, diagnostic testing of children with fever, and therapeutic use of antimalarial drugs.

## 4.1 CARE SEEKING FOR FEVER IN CHILDREN

### Care seeking for children under 5 with fever

Percentage of children under 5 with a fever in the 2 weeks before the survey for whom advice or treatment was sought from a health provider, a health facility, or a pharmacy.

**Sample:** Children under 5 with a fever in the 2 weeks before the survey

One of the key objectives of the Rwanda Malaria Control Extended National Strategic Plan 2013-2020 is to ensure that all suspected cases of malaria have access to confirmatory diagnosis and receive effective treatment (RBC 2017).

Fever is a key symptom of malaria and other acute infections in children. Fevers caused by malaria require prompt and effective treatment to prevent morbidity and mortality. Thirty percent of children under age 5 had fever in the 2 weeks preceding the survey. Advice or treatment was sought for 56% of the children with fever in the 2 weeks preceding the survey, and timely care seeking (the same or next day following fever onset) occurred for 36% of the febrile children (**Table 4.1**).

Among children with recent fever for whom care was sought, most received advice or treatment from the public health sector (48%); among these children seeking care from the public sector, 27% sought care from a government health center and 18% sought care from a community health worker. Only 8% sought advice from a private sector source (Table 4.2).

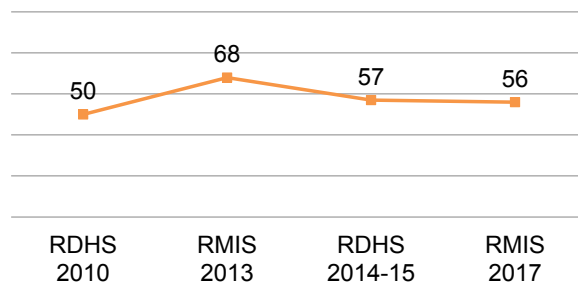
**Trends:** The percentage of children with recent fever for whom advice or treatment was sought has increased from 50% in the 2010 RDHS to 56% in the 2017 RMIS (Figure 4.1).

### Patterns by background characteristics

- The percentage of children under age 5 with fever decreases with increasing wealth quintile, dropping from 35% of children in the lowest wealth quintile to 25% of children in the highest wealth quintile (Table 4.1).
- The percentage of children under age 5 with fever ranges from 22% in North province to 38% in East province (Figure 4.2).
- The percentage of children with fever for whom advice or treatment was sought ranges from 44% of children in the lowest wealth quintile to 67% of children in the highest wealth quintile (Figure 4.3).

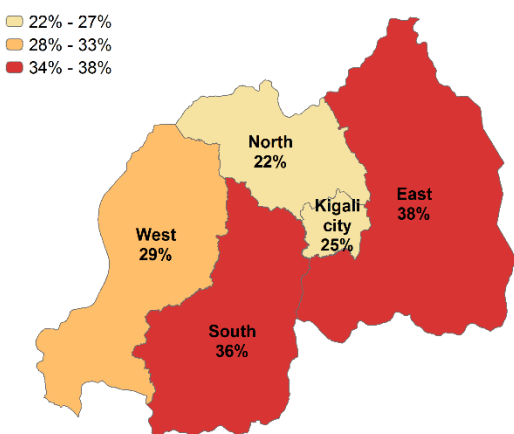
**Figure 4.1 Trend in care seeking for fever in children**

Percent of children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought



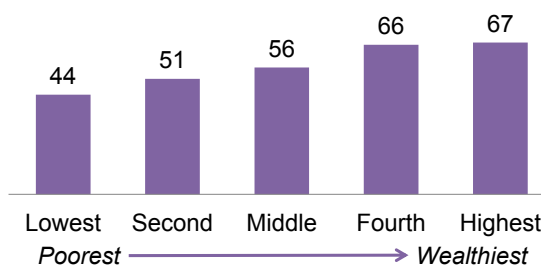
**Figure 4.2 Fever in children under age 5 by province**

Percentage of children under age 5 with a fever in the 2 weeks preceding the survey



**Figure 4.3 Care seeking for fever in children by household wealth**

Percentage of children under age 5 with fever for whom advice or treatment was sought



## 4.2 DIAGNOSTIC TESTING OF CHILDREN WITH FEVER

### Diagnosis of malaria in children under 5 with fever

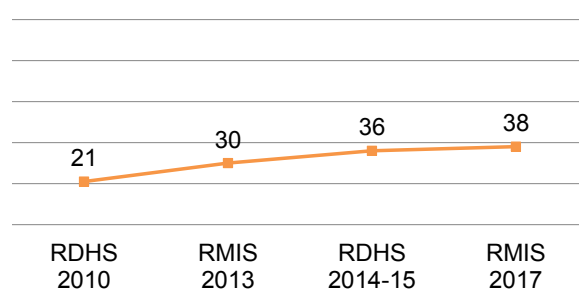
Percentage of children under age 5 with a fever in the 2 weeks before the survey who had blood taken from a finger or heel for testing. This is a proxy measure of diagnostic testing for malaria.

**Sample:** Children under 5 with a fever in the 2 weeks before the survey

The Rwanda Malaria Control Extended National Strategic Plan 2013-2020 recommends prompt parasitological confirmation by microscopy or, alternatively, by rapid diagnostic tests (RDTs) for all patients suspected of malaria before treatment is started (RBC 2017). Adherence to this policy cannot be directly measured through household surveys; however, the 2017 RMIS asked interviewed women with children under 5 who had a fever in the 2 weeks before the survey if the child had blood taken from a finger or heel for testing during the illness. This information is used as a proxy measure for adherence to the MOPDD policy of conducting diagnostic testing for all suspected malaria cases.

**Figure 4.4 Trend in diagnostic testing of children with fever**

*Among children under 5 with recent fever who had blood taken from a finger or heel for testing*



In the 2017 RMIS, 38% of children with a fever in the 2 weeks before the survey had blood taken from a finger or heel, presumably for malaria testing (**Table 4.1**).

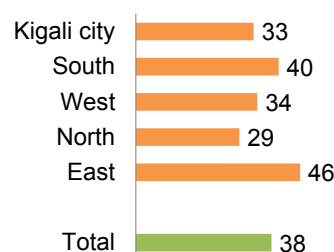
**Trends:** The percentage of children who had blood taken from a finger or heel for testing increased from 21% in the 2010 RDHS to 38% in the 2017 RMIS. This shows improved adherence to the malaria treatment policy of testing before treatment (**Figure 4.4**).

### Patterns by background characteristics

- Thirty-nine percent of children under age 5 with recent fever from urban areas had blood taken from a finger or heel for testing, compared with 38% in rural areas (**Table 4.1**).
- Forty-six percent of children under age 5 with recent fever in East province had blood taken from a finger or heel for testing, compared with only 29% in North province (**Figure 4.5**).

**Figure 4.5 Diagnostic testing of fever in children by province**

*Percent of children under age 5 with fever in the 2 weeks preceding the survey who had blood taken from a finger or heel for testing*



### 4.3 USE OF RECOMMENDED ANTIMALARIALS

#### Artemisinin-based combination therapy (ACT) for children under 5 with fever

Among children under 5 with a fever in the 2 weeks before the survey who took any antimalarial drugs, the percentage who took artemisinin-based combination therapy (ACT).

**Sample:** Children under 5 with a fever in the 2 weeks before the survey

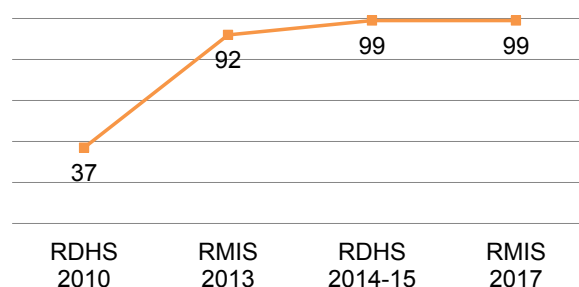
Artemisinin-based combination therapy (ACT) is the recommended first-line antimalarial drug for the treatment of uncomplicated malaria in Rwanda. This policy has been recommended since 2006.

According to the results shown in **Table 4.3**, most children under age 5 with recent fever who received an antimalarial took an ACT (99%). One percent of children with fever who received an antimalarial received a quinine injection or quinine pills. The distribution of antimalarial drug use by children under age 5 with recent fever did not vary substantially by background characteristics (**Table 4.3**).

**Trends:** There has been a large increase in the percentage of children under age 5 using ACTs among those with recent fever who received any antimalarials, from 37% in the 2010 RDHS to 92% in the 2013 RMIS to 99% in the 2014-15 RDHS and 2017 RMIS (**Figure 4.6**).

**Figure 4.6 Trends in ACT use**

*Among children under 5 with recent fever who took an antimalarial, percentage who received ACT*



#### LIST OF TABLES

For detailed information on malaria, see the following tables:

- **Table 4.1** Prevalence, diagnosis, and prompt treatment of children with fever
- **Table 4.2** Source of advice or treatment for children with fever
- **Table 4.3** Types of antimalarial drugs used



**Table 4.1 Prevalence, diagnosis, and prompt treatment of children with fever**

Percentage of children under age five with fever in the 2 weeks preceding the survey; and among children under age five with fever, the percentage for whom advice or treatment was sought, the percentage for whom advice or treatment was sought the same or next day following the onset of fever, and the percentage who had blood taken from a finger or heel, by background characteristics, Rwanda MIS 2017

Background characteristic	Children under age 5		Children under age 5 with fever			
	Percentage with fever in the 2 weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought <sup>1</sup>	Percentage for whom advice or treatment was sought the same or next day	Percentage who had blood taken from a finger or heel for testing	Number of children
<b>Age in months</b>						
<12	28.9	617	54.0	28.9	30.6	178
12-23	35.7	649	55.0	32.4	38.5	232
24-35	30.5	545	61.8	43.3	39.6	166
36-47	29.1	567	53.3	37.8	42.0	165
48-59	27.0	551	54.3	37.1	40.6	149
<b>Sex</b>						
Male	32.3	1,538	53.1	34.1	37.1	497
Female	28.3	1,392	58.8	37.3	39.4	393
<b>Residence</b>						
Urban	27.8	577	59.7	37.2	39.3	160
Rural	31.0	2,352	54.7	35.2	37.9	730
<b>Province</b>						
Kigali city	24.8	433	53.6	31.7	32.8	107
South	35.7	537	47.8	26.4	39.5	192
West	28.8	715	58.4	43.0	33.8	206
North	21.7	527	55.1	25.7	29.0	115
East	37.6	717	60.1	42.1	46.4	270
<b>Mother's education</b>						
No education	31.8	422	55.2	32.5	40.5	134
Primary	31.4	1,945	53.2	34.1	36.6	610
Secondary or higher	25.8	563	66.3	44.2	42.4	146
<b>Wealth quintile</b>						
Lowest	34.7	637	44.0	23.1	34.6	221
Second	32.3	572	51.2	29.2	35.3	185
Middle	32.4	566	56.4	36.2	35.8	184
Fourth	27.1	583	65.5	51.1	43.9	158
Highest	25.0	570	67.3	44.9	43.9	143
Total	30.4	2,929	55.6	35.5	38.1	890

<sup>1</sup> Excludes advice or treatment from a traditional practitioner

**Table 4.2 Source of advice or treatment for children with fever**

Percentage of children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought from specific sources; and among children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought, percentage for whom advice or treatment was sought from specific sources, Rwanda MIS 2017

Source	Percentage for whom advice or treatment was sought from each source:	
	Among children with fever	Among children with fever for whom advice or treatment was sought
<b>Public sector</b>	48.4	86.0
Provincial/district hospital	0.9	1.5
Health center	26.7	47.5
Health post	5.2	9.2
Outreach	0.2	0.4
Community health worker	18.4	32.7
<b>Private sector</b>	7.7	13.7
Polyclinic	0.4	0.7
Clinic	0.5	0.9
Dispensary	1.9	3.4
Pharmacy	4.9	8.7
<b>Other private sector</b>	1.3	2.3
Kiosk/shop	0.1	0.2
Traditional healer	0.8	1.4
Church	0.1	0.2
Friend/relative	0.2	0.4
Number of children	890	501

CHW = Community health worker

**Table 4.3 Types of antimalarial drugs used**

Among children under age 5 with fever in the 2 weeks preceding the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, Rwanda MIS 2017

Background characteristic	Percentage of children who took:						Number of children with fever who took anti-malarial drug
	Any ACT	Quinine pills	Quinine injection	Artesunate rectal	Artesunate injection	Other anti-malarial	
<b>Age in months</b>							
< 6	*	*	*	*	*	*	4
6-11	*	*	*	*	*	*	9
12-23	(95.0)	(2.7)	(0.0)	(0.0)	(2.2)	(0.0)	37
24-35	(98.4)	(0.0)	(0.0)	(1.6)	(0.0)	(0.0)	27
36-47	(100.0)	(0.0)	(2.0)	(0.0)	(0.0)	(0.0)	54
48-59	(100.0)	(0.0)	(0.0)	(3.9)	(0.0)	(0.0)	43
<b>Sex</b>							
Male	98.4	1.1	1.2	2.4	0.0	0.0	91
Female	99.0	0.0	0.0	0.0	1.0	0.0	83
<b>Residence</b>							
Urban	*	*	*	*	*	*	11
Rural	98.6	0.6	0.7	1.3	0.5	0.0	164
<b>Province</b>							
Kigali city	*	*	*	*	*	*	10
South	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	40
West	*	*	*	*	*	*	28
North	*	*	*	*	*	*	5
East	97.5	1.1	1.2	0.5	0.9	0.0	92
<b>Mother's education</b>							
No education	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	39
Primary	98.1	0.9	0.9	1.8	0.7	0.0	119
Secondary or higher	*	*	*	*	*	*	17
<b>Wealth quintile</b>							
Lowest	(97.4)	(2.6)	(2.8)	(0.0)	(0.0)	(0.0)	39
Second	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	44
Middle	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	44
Fourth	(97.4)	(0.0)	(0.0)	(0.0)	(2.6)	(0.0)	32
Highest	*	*	*	*	*	*	15
Total	98.7	0.6	0.6	1.2	0.5	0.0	175

ACT = Artemisinin-based combination therapy

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.



### Key Findings

- **Malaria in children 6-59 months:** 7% of children age 6-59 months tested positive for malaria via microscopy. Malaria prevalence in this age group ranges from 13% in the lowest wealth quintile to 2% in the highest wealth quintile.
- **Malaria in children age 5-14:** 11% of children age 5-14 tested positive for malaria. Malaria prevalence in this group is higher among children from rural areas (13%) compared with children from urban areas (3%).
- **Malaria in women age 15-49:** 5% of women age 15-49 in Rwanda tested positive for malaria. Malaria prevalence in women age 15-49 is twice as high in women with no education (6%) compared with women with secondary or higher education (3%).
- **Malaria in individuals age 15+:** 6% of individuals greater than age 15 tested positive for malaria. By province, malaria prevalence in individuals older than age 15 ranges from 12% in East province to 1% in North province.
- **Malaria in the general population:** 7% of individuals in Rwanda tested positive for malaria. By province, malaria prevalence in individuals ranges from 17% in East province to 1% in North province.

This chapter presents the prevalence of malaria among the population of Rwanda. During the survey all household members were eligible for testing. Results are presented for children age 6-59 months, children age 5-14, women age 15-49, all adults older than age 15, and for the general population (older than 6 months).

The chapter also gives trends in malaria prevalence over time. It is important to note the season in which data were collected when interpreting trends over time. Malaria transmission occurs year-round in Rwanda, but peaks from April to June and from October to December following distinct rainy seasons.

The 2017 RMIS was conducted in October through December of 2017 at the peak of malaria season. Normally a spike in malaria cases occurs during these months. The 2014-15 RDHS was conducted between November 2014 and April 2015. The 2010 RDHS was conducted between September 2010 and March 2011. Caution is urged when examining a change in malaria parasitemia over time.

Differences in malaria prevalence observed between the rapid diagnostic test (RDT) results and the microscopy results are expected. Microscopic detection of malaria parasites depends on the visualization of stained parasites under a microscope, whereas the diagnosis of malaria by RDT relies on the interaction between a parasite antigen present in the blood and an antibody in the RDT formulation. Therefore, direct comparisons of results from microscopy compared with those from rapid diagnostic testing should be avoided. The SD BIOLINE Malaria Ag P.f.PAN (HRP-2)<sup>TM</sup>, like many other commercially available RDTs, detects the *P. falciparum*-specific, histidine-rich protein-2 (HRP-2) rather than the parasite itself. Because HRP-2 remains in the blood for up to a month following parasite clearance with antimalarials (Moody 2002), in areas highly endemic for *P. falciparum*, its persistence often leads to higher malaria prevalence estimates detected when using RDTs compared with those measured using microscopy.

## 5.1 PREVALENCE OF MALARIA IN CHILDREN AGE 6-59 MONTHS

### Malaria prevalence in children age 6-59 months

Percentage of children age 6-59 months classified as infected with malaria according to microscopy results.

**Sample:** Children age 6-59 months

In Rwanda malaria transmission is high throughout the year, contributing to development of partial immunity within the first 2 years of life. However, many people, including children, may have malaria parasites in their blood without showing any signs of infection. Such asymptomatic infection not only contributes to further transmission of malaria but also increases the risk of anemia and other associated morbidity among the infected individuals.

Among eligible children age 6-59 months from interviewed households, 97% of children were tested for malaria using an RDT, and 99% were tested for malaria using microscopy after consent from their parent or responsible adult (**Table 5.1**).

In the 2017 RMIS, 7% of children age 6-59 months were positive for malaria parasites according to microscopy results (**Table 5.2**). Rapid diagnostic tests (RDTs) were done in conjunction with microscopy to facilitate treatment of infected children during the survey fieldwork. Results from these RDTs are also presented in Table 5.2 for reference. Twelve percent of children age 6-59 months tested positive for malaria antigens using RDTs.

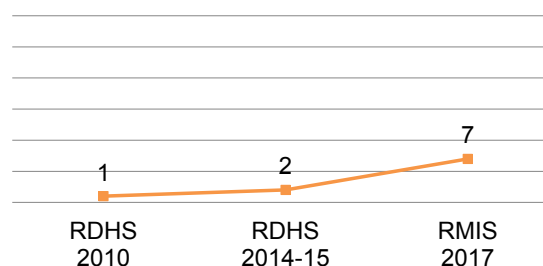
**Trends:** National malaria prevalence has increased 6 percentage points between the 2010 RDHS and the 2017 RMIS, from 1% in 2010 to 7% in 2017 (**Figure 5.1**).

### Patterns by background characteristics

- Malaria prevalence in children age 6-59 months decreases from 8% in children age 6-8 months to 6% in children age 24-35 months. It then increases to 9% in children age 36-47 months to 10% in children age 48-59 months.

**Figure 5.1 Trends in malaria prevalence in children age 6-59 months**

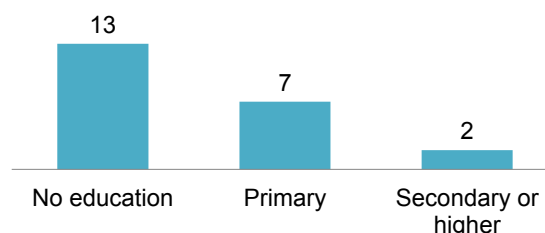
Percentage of children age 6-59 months who tested positive for malaria by microscopy



- Malaria prevalence in children age 6-59 months is higher among children whose mothers have no formal education (13%) than among those whose mothers had a secondary or higher education (2%) (**Figure 5.2**).

**Figure 5.2 Prevalence of malaria in children by mother's education**

Percentage of children 6-59 months who tested positive for malaria by microscopy

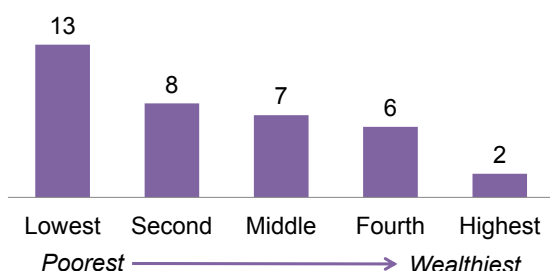


- Malaria prevalence in children age 6-59 months is nearly 4 times higher in rural children (8%) than in urban children (2%).

- Malaria prevalence in children age 6-59 months is higher among children in the lowest wealth quintile (13%) compared with children in the highest wealth quintile (2%) (**Figure 5.3**).

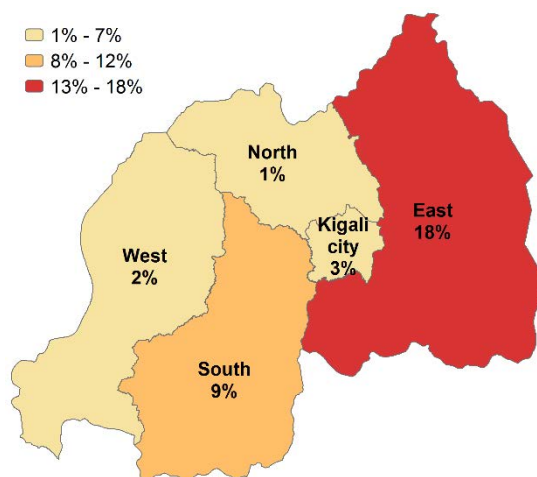
**Figure 5.3 Prevalence of malaria in children by household wealth**

Percentage of children 6-59 months who tested positive for malaria by microscopy



**Figure 5.4 Prevalence of malaria in children age 6-59 months by province**

Percentage of children age 6-59 months who tested positive for malaria by microscopy



## 5.2 PREVALENCE OF MALARIA IN CHILDREN AGE 5-14

### Malaria prevalence in children age 5-14

Percentage of children age 5-14 classified as infected with malaria according to microscopy results

**Sample:** Children age 5-14

Among eligible children age 5-14 from interviewed households, 98% of children were tested for malaria using an RDT, and 99% were tested for malaria using microscopy after consent from their parent or a responsible adult (**Table 5.3**).

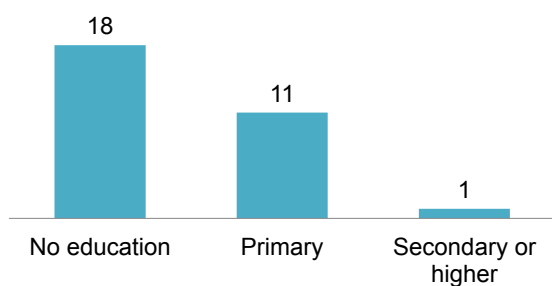
In the 2017 RMIS, 11% of children age 5-14 were positive for malaria parasites according to microscopy results (**Table 5.4**). Rapid diagnostic tests (RDTs) were done in conjunction with microscopy to facilitate treatment of infected children during the survey fieldwork. Results from these RDTs are also presented in Table 5.4 for reference. Fifteen percent of children age 5-14 tested positive for malaria antigens using RDTs.

### Patterns by background characteristics

- Generally, malaria prevalence remains stable across age groups in children age 5-14.
- Malaria prevalence in children age 5-14 is higher among children whose mothers have no formal education (18%) than among those whose mothers had a secondary or higher education (1%) (**Figure 5.5**).
- Malaria prevalence in children age 5-14 is higher among children from rural areas (13%) compared with children from urban areas (3%).
- Malaria prevalence in children age 5-14 is higher among children in the lowest wealth quintile (16%) than among those in the highest wealth quintiles (2%).
- By province, malaria prevalence in children age 5-14 ranges from 24% in East province to 1% in North province (**Figure 5.6**).

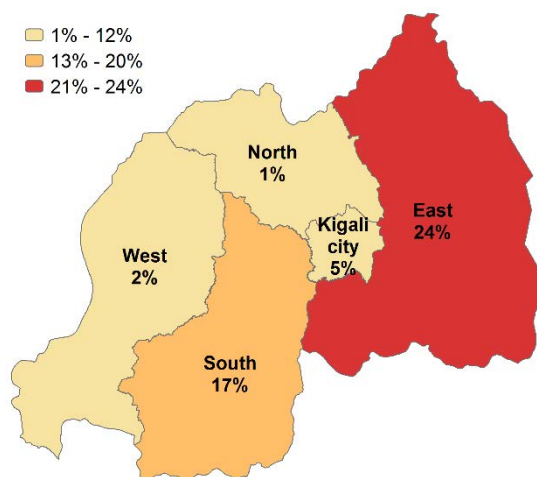
**Figure 5.5** Prevalence of malaria in children by mother's education

Percentage of children 5-14 who tested positive for malaria by microscopy



**Figure 5.6** Prevalence of malaria in children age 6-59 months by province

Percentage of children age 5-14 who tested positive for malaria by microscopy



## 5.3 PREVALENCE OF MALARIA IN WOMEN AGE 15-49

### Malaria prevalence in women age 15-49

Percentage of women age 15-49 classified as infected with malaria according to microscopy results.

**Sample:** Women age 15-49

Among eligible women age 15-49 from interviewed households, 97% were tested for malaria using an RDT, and 99% were tested for malaria using microscopy after consent (**Table 5.5**).



Five percent of women age 15-49 were positive for malaria parasites according to microscopy results (Table 5.6). Rapid diagnostic tests were done in conjunction with microscopy to facilitate treatment of infected individuals during the survey fieldwork. Results from these RDTs are also presented in Table 5.6 for reference. Six percent of women age 15-49 tested positive for malaria antigens using RDTs.

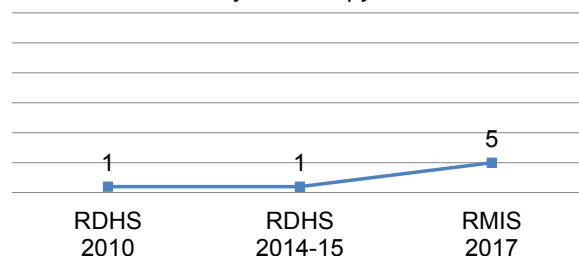
**Trends:** National malaria prevalence has increased 4 percentage points between the 2010 RDHS and the 2017 RMIS, from 1% in 2010 to 5% in 2017 (Figure 5.7).

#### Patterns by background characteristics

- Malaria prevalence in women age 15-49 is three times higher among women from rural areas (6%) compared with women from urban areas (2%).
- By province, malaria prevalence in women 15-49 ranges from 11% in East province to 1% in North province (Figure 5.8).
- Malaria prevalence in women age 15-49 is two times higher in women with no education (6%) than in women with secondary or higher education (3%).
- Malaria prevalence in women age 15-49 is higher in women in the lowest wealth quintile (8%) compared with women in the highest wealth quintile (2%).

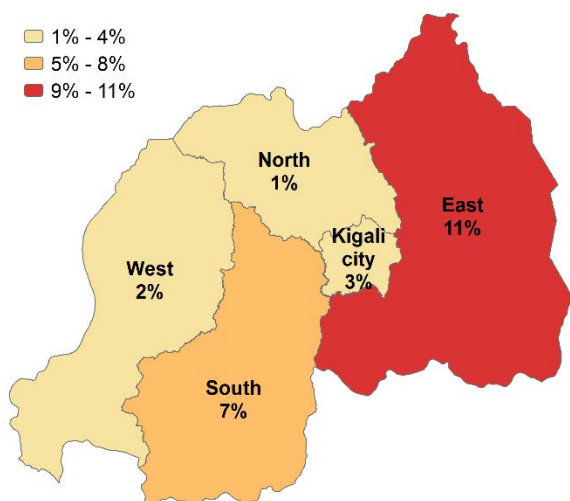
**Figure 5.7 Trends in malaria prevalence in women age 15-49**

Percentage of women age 15-49 who tested positive for malaria by microscopy



**Figure 5.8 Malaria prevalence in women age 15-49 by province**

Percentage of women age 15-49 who tested positive for malaria by microscopy



## 5.4 PREVALENCE OF MALARIA IN ALL INDIVIDUALS AGE 15+

### Malaria prevalence in individuals age 15+

Percentage of individuals (age 15+) classified as infected with malaria according to microscopy results.

**Sample:** Individuals age 15+

Among eligible individuals greater than age 15 from interviewed households, 96% were tested for malaria using an RDT, and 98% were tested using microscopy (Table 5.7).

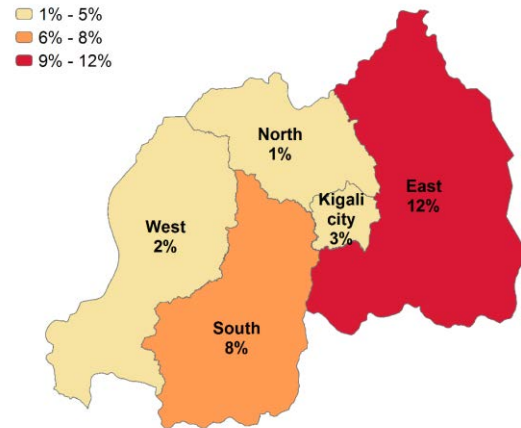
Six percent of individuals greater than age 15 were positive for malaria parasites according to microscopy results (Table 5.8). Rapid diagnostic tests were done in conjunction with microscopy to facilitate treatment of infected individuals during the survey fieldwork. Results from these RDTs are presented in Table 5.8. Seven percent of individuals older than age 15 tested positive for malaria antigens using RDTs.

### Patterns by background characteristics

- Malaria prevalence in individuals older than age 15 is 5 percentage points higher in rural areas (7%) than in urban areas (2%).
- By province, malaria prevalence in individuals older than age 15 ranges from 12% in East province to 1% in North province (**Figure 5.9**).
- Malaria prevalence generally decreases by wealth quintile, with 8% of individuals older than 15 in the lowest wealth quintile infected with malaria compared with only 2% of individuals in the highest wealth quintile.

**Figure 5.9 Malaria prevalence in individuals older than age 15 by province**

Percentage of individuals age 15+ who tested positive for malaria by microscopy



## 5.5 PREVALENCE OF MALARIA OF ALL HOUSEHOLD MEMBERS

### Malaria prevalence of all household members

Percentage of individuals (age 6 months and older) classified as infected with malaria according to microscopy results.

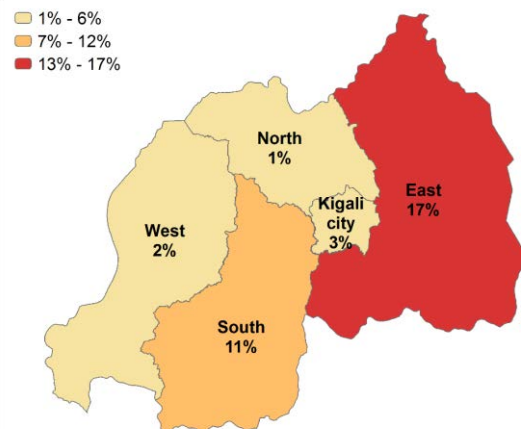
**Sample:** Individuals age 6 months and older

Among eligible individuals older than 6 months from interviewed households, 95% were tested for malaria using an RDT, while 97% were tested using microscopy (**Table 5.9**).

Seven percent of individuals older than 6 months were positive for malaria parasites according to microscopy results (**Table 5.10**). Rapid diagnostic tests were done in conjunction with microscopy to facilitate treatment of infected individuals during the survey fieldwork. Results from these RDTs are also presented in Table 5.10 for reference. Ten percent of individuals older than 6 months tested positive for malaria antigens using RDTs.

**Figure 5.10 Malaria prevalence in all household members by province**

Percentage of individuals greater than 6 months of age who tested positive for malaria by microscopy



### Patterns by background characteristics

- Malaria prevalence in individuals older than 6 months is 7 percentage points higher in rural areas (9%) than in urban areas (2%).
- By province, malaria prevalence in individuals older than 6 months ranges from 17% in East province to 1% in North province (**Figure 5.10**).

- Malaria prevalence generally decreases by wealth quintile, with 11% of individuals older than 6 months in the lowest wealth quintile infected with malaria compared with only 2% of individuals in the highest wealth quintile.

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For detailed information on malaria, see the following tables:

- **Table 5.1 Coverage of testing in children age 6-59 months**
- **Table 5.2 Prevalence of malaria in children age 6-59 months**
- **Table 5.3 Coverage of testing for malaria in children age 5-14**
- **Table 5.4 Prevalence of malaria in children age 5-14**
- **Table 5.5 Coverage of testing for malaria in women age 15-49**
- **Table 5.6 Prevalence of malaria in women age 15-49**
- **Table 5.7 Coverage of testing for malaria in all adults age 15+**
- **Table 5.8 Prevalence of malaria in all adults age 15+**
- **Table 5.9 Coverage of testing in all household members**
- **Table 5.10 Prevalence of malaria in all household members**

**Table 5.1 Coverage of testing in children age 6-59 months**

Percentage of eligible children age 6-59 months who were tested for malaria, by background characteristics (unweighted), Rwanda MIS 2017

Background characteristic	Percentage tested for:		
	Malaria with RDT	Malaria by microscopy	Number of children
<b>Age in months</b>			
6-8	92.4	95.8	144
9-11	98.0	98.7	153
12-17	98.5	99.7	340
18-23	97.5	98.8	325
24-35	97.1	99.1	581
36-47	97.5	99.5	608
48-59	98.0	99.7	588
<b>Sex</b>			
Male	97.4	98.9	1,423
Female	97.4	99.4	1,316
<b>Mother's interview status</b>			
Interviewed	97.5	99.2	2,465
Not interviewed	96.7	98.9	274
<b>Residence</b>			
Urban	96.9	98.5	606
Rural	97.6	99.3	2,133
<b>Province</b>			
Kigali city	96.4	98.6	442
South	97.3	98.8	591
West	98.1	99.7	622
North	95.9	98.8	489
East	98.8	99.7	595
<b>Mother's education<sup>1</sup></b>			
No education	98.0	99.4	345
Primary	97.5	99.5	1,641
Secondary or higher	97.1	97.9	479
<b>Wealth quintile</b>			
Lowest	96.6	99.1	580
Second	97.4	99.1	548
Middle	97.8	99.4	501
Fourth	98.1	100.0	532
Highest	97.2	98.3	578
Total	97.4	99.2	2,739

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

<sup>1</sup> Excludes children whose mothers were not interviewed

**Table 5.2 Prevalence of malaria in children age 6-59 months**

Percentage of children age 6-59 months classified in two tests as having malaria, by background characteristics, Rwanda MIS 2017

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
<b>Age in months</b>				
6-8	11.2	136	7.6	139
9-11	7.3	151	2.5	152
12-17	9.2	333	5.9	338
18-23	10.7	317	4.8	320
24-35	9.6	558	6.0	569
36-47	13.1	604	9.2	613
48-59	15.9	577	9.5	587
<b>Sex</b>				
Male	11.4	1,393	7.2	1,411
Female	12.2	1,283	7.2	1,307
<b>Mother's interview status</b>				
Interviewed	11.3	2,422	6.8	2,459
Not interviewed	16.5	254	11.2	258
<b>Residence</b>				
Urban	2.9	516	2.0	522
Rural	13.9	2,160	8.4	2,196
<b>Province</b>				
Kigali city	6.9	367	3.1	373
South	14.4	522	8.7	530
West	3.1	640	1.8	650
North	1.3	484	0.7	498
East	28.5	663	18.4	667
<b>Mother's education<sup>1</sup></b>				
No education	16.9	352	12.9	357
Primary	11.8	1,628	6.7	1,657
Secondary or higher	4.9	442	2.1	445
<b>Wealth quintile</b>				
Lowest	18.0	572	13.3	586
Second	15.0	537	7.7	546
Middle	11.1	518	7.1	526
Fourth	10.6	543	5.6	551
Highest	3.4	506	1.5	509
Total	11.8	2,676	7.2	2,718

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

<sup>1</sup> Excludes children whose mothers were not interviewed

**Table 5.3 Coverage of testing for malaria in children age 5-14**

Percentage of eligible children age 5-14 years who were tested for malaria, by background characteristics (unweighted), Rwanda MIS 2017

Background characteristic	Percentage tested for:		
	Malaria with RDT	Malaria by microscopy	Number of children
<b>Age</b>			
5-6	98.3	99.8	1,087
7-8	97.9	99.1	1,097
9-10	97.6	99.0	1,167
11-12	96.6	99.0	1,189
13-14	97.3	98.9	1,021
<b>Sex</b>			
Male	97.6	98.9	2,763
Female	97.5	99.4	2,798
<b>Mother's interview status</b>			
Interviewed	98.5	99.8	404
Not interviewed	97.5	99.1	5,157
<b>Residence</b>			
Urban	98.1	99.0	1,056
Rural	97.4	99.2	4,505
<b>Province</b>			
Kigali city	97.9	99.2	763
South	96.8	98.4	1,329
West	97.4	98.8	1,208
North	97.3	99.5	988
East	98.4	99.9	1,273
<b>Mother's education<sup>1</sup></b>			
No education	98.0	100.0	51
Primary	98.3	99.7	294
Secondary or higher	100.0	100.0	59
<b>Wealth quintile</b>			
Lowest	96.3	98.5	1,176
Second	97.9	99.3	1,096
Middle	98.1	99.0	1,097
Fourth	97.7	99.8	1,171
Highest	97.8	99.2	1,021
Total	97.5	99.2	5,561

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

<sup>1</sup> Excludes children whose mothers were not interviewed

**Table 5.4 Prevalence of malaria in children age 5-14**

Percentage of children age 5-14 classified in two tests as having malaria, by background characteristics, Rwanda MIS 2017

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
<b>Age</b>				
5-6	14.7	1,089	11.6	1,103
7-8	16.1	1,092	10.6	1,104
9-10	16.2	1,159	11.6	1,174
11-12	14.4	1,184	11.1	1,211
13-14	14.1	1,012	11.2	1,030
<b>Sex</b>				
Male	15.0	2,762	11.7	2,796
Female	15.2	2,773	10.8	2,827
<b>Mother's interview status</b>				
Interviewed	13.0	406	10.6	411
Not interviewed	15.3	5,130	11.3	5,211
<b>Residence</b>				
Urban	3.7	922	2.8	927
Rural	17.4	4,614	12.9	4,695
<b>Province</b>				
Kigali city	8.2	649	5.4	658
South	20.6	1,188	17.2	1,206
West	3.8	1,237	2.3	1,256
North	2.5	1,024	1.2	1,045
East	32.4	1,438	23.7	1,457
<b>Mother's education<sup>1</sup></b>				
No education	21.4	50	17.9	51
Primary	14.0	296	11.3	300
Secondary or higher	1.4	60	1.4	60
<b>Wealth quintile</b>				
Lowest	20.2	1,161	16.4	1,186
Second	19.2	1,124	15.4	1,136
Middle	15.8	1,123	11.1	1,132
Fourth	13.7	1,193	9.4	1,220
Highest	4.8	934	2.3	947
<b>Total</b>	<b>15.1</b>	<b>5,536</b>	<b>11.2</b>	<b>5,622</b>

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)<sup>1</sup> Excludes children whose mothers were not interviewed

**Table 5.5 Coverage of testing for malaria in women age 15-49**

Percentage of eligible women 15-49 who were tested for malaria, by background characteristics (unweighted), Rwanda MIS 2017

Background characteristic	Percentage tested for:		
	Malaria with RDT	Malaria by microscopy	Number of women
<b>Age</b>			
15-19	96.3	98.2	990
20-24	97.0	98.3	886
25-29	97.2	97.9	851
30-34	97.5	99.1	774
35-39	97.3	99.1	665
40-44	96.0	98.2	544
45-49	97.9	99.7	386
<b>Currently pregnant</b>			
Pregnant	98.5	99.4	340
Not pregnant or not sure	97.4	99.1	4,686
<b>Residence</b>			
Urban	96.5	97.4	1,341
Rural	97.1	98.9	3,755
<b>Province</b>			
Kigali city	95.9	97.0	1,003
South	96.1	97.7	1,123
West	97.8	99.6	1,052
North	97.3	99.6	931
East	97.8	98.9	987
<b>Education</b>			
No education	97.5	99.3	609
Primary	97.6	99.3	3,047
Secondary or higher	97.2	98.6	1,366
<b>Wealth quintile</b>			
Lowest	97.1	99.2	922
Second	96.5	98.3	931
Middle	97.4	99.0	930
Fourth	97.3	98.9	957
Highest	96.7	97.6	1,356
<b>Total</b>	<b>97.0</b>	<b>98.5</b>	<b>5,096</b>

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

**Table 5.6 Prevalence of malaria in women age 15-49**

Percentage of women age 15-49 years classified in two tests as having malaria, by background characteristics, Rwanda MIS 2017

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of women	Microscopy positive	Number of women
<b>Age</b>				
15-19	7.4	944	5.7	961
20-24	6.4	825	5.6	835
25-29	7.1	803	5.7	807
30-34	5.1	753	3.8	764
35-39	5.0	651	3.6	663
40-44	6.7	529	5.6	539
45-49	5.2	384	3.4	390
<b>Currently pregnant</b>				
Pregnant	7.3	338	5.0	340
Not pregnant or not sure	6.2	4,509	4.9	4,579
<b>Residence</b>				
Urban	2.4	1,112	1.5	1,117
Rural	7.4	3,775	5.9	3,843
<b>Province</b>				
Kigali city	5.2	784	2.9	788
South	7.8	980	7.1	996
West	2.4	1,090	2.1	1,108
North	1.1	929	0.6	949
East	13.7	1,105	10.9	1,119
<b>Education</b>				
No education	6.9	601	5.8	611
Primary	7.1	2,987	5.4	3,035
Secondary or higher	3.5	1,255	2.9	1,270
<b>Wealth quintile</b>				
Lowest	9.3	917	8.1	935
Second	7.5	910	5.6	927
Middle	7.1	943	5.4	958
Fourth	5.8	950	4.7	965
Highest	2.7	1,168	1.6	1,175
Total	6.3	4,887	4.9	4,959

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)



**Table 5.7 Coverage of testing for malaria in all adults age 15+**

Percentage of all eligible adults age 15+ who were tested for malaria, by background characteristics (unweighted), Rwanda MIS 2017

Background characteristic	Percentage tested for:		
	Malaria with RDT	Malaria by microscopy	Number of adults aged 15+
<b>Age</b>			
15-19	95.4	97.3	1,921
20-24	95.9	97.0	1,508
25-29	96.0	96.7	1,408
30-34	97.0	98.3	1,311
35-39	97.0	98.5	1,218
40-44	95.9	97.4	880
45-49	96.8	98.3	711
50-54	97.4	98.5	583
55-59	97.2	98.8	603
60+	96.8	98.3	1,142
<b>Currently pregnant</b>			
Pregnant	97.5	98.4	667
Not pregnant or not sure	96.6	98.0	10,441
<b>Residence</b>			
Urban	95.6	96.6	2,670
Rural	96.6	98.1	8,615
<b>Province</b>			
Kigali city	95.1	96.3	1,948
South	95.1	96.7	2,658
West	97.5	98.8	2,324
North	96.7	98.4	2,038
East	97.4	98.7	2,317
<b>Wealth quintile</b>			
Lowest	96.5	98.0	2,093
Second	95.7	97.8	2,161
Middle	96.4	97.6	2,160
Fourth	97.4	98.5	2,104
Highest	95.9	97.1	2,767
Total	96.4	97.8	11,285

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

**Table 5.8 Prevalence of malaria in all adults age 15+**

Percentage of all adults age 15+ who were classified in two tests as having malaria, by background characteristics, Rwanda MIS 2017

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of adults age 15+	Microscopy positive	Number of adults age 15+
<b>Age</b>				
15-19	9.9	1,862	7.6	1,895
20-24	6.8	1,399	6.3	1,415
25-29	6.4	1,326	5.2	1,335
30-34	5.4	1,272	4.3	1,288
35-39	5.4	1,183	4.5	1,201
40-44	7.4	869	6.1	880
45-49	5.7	702	4.3	711
50-54	6.2	574	5.3	579
55-59	5.4	606	4.0	616
60+	5.6	1,106	5.1	1,124
<b>Currently pregnant</b>				
Pregnant	7.1	662	4.5	668
Not pregnant or not sure	6.6	10,092	5.5	10,228
<b>Residence</b>				
Urban	2.5	2,224	1.5	2,235
Rural	7.8	8,675	6.5	8,809
<b>Province</b>				
Kigali city	5.2	1,526	2.7	1,535
South	9.1	2,331	7.5	2,367
West	2.4	2,413	1.9	2,444
North	1.4	2,036	1.4	2,067
East	13.6	2,593	11.9	2,630
<b>Wealth quintile</b>				
Lowest	9.9	2,072	8.1	2,099
Second	7.1	2,131	6.3	2,178
Middle	7.3	2,170	6.5	2,196
Fourth	6.7	2,116	5.4	2,140
Highest	3.1	2,410	1.8	2,430
Total	6.7	10,899	5.5	11,044

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

**Table 5.9 Coverage of testing in all household members**

Percentage of eligible household members who were tested for malaria, according to background characteristics (unweighted), Rwanda MIS 2017

Background characteristic	Percentage tested for:		Number of household members
	Malaria with RDT	Malaria by microscopy	
<b>Sex</b>			
Male	94.6	95.9	9,132
Female	95.9	97.6	10,769
<b>Residence</b>			
Urban	94.9	95.9	4,402
Rural	95.4	97.1	15,499
<b>Province</b>			
Kigali city	94.3	95.6	3,208
South	94.6	96.1	4,641
West	95.9	97.3	4,226
North	95.4	97.3	3,566
East	96.2	97.4	4,260
<b>Wealth quintile</b>			
Lowest	94.8	96.6	3,916
Second	95.1	96.8	3,866
Middle	95.6	96.8	3,814
Fourth	96.1	97.6	3,866
Highest	95.0	96.1	4,439
Total	95.3	96.8	19,901

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)

**Table 5.10 Prevalence of malaria in all household members**

Percentage of all household members classified in two tests as having malaria, by background characteristics, Rwanda MIS 2017

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of household members	Microscopy positive	Number of household members
<b>Sex</b>				
Male	10.7	8,787	8.2	8,890
Female	9.1	10,324	6.7	10,493
<b>Residence</b>				
Urban	2.9	3,663	1.9	3,684
Rural	11.5	15,449	8.7	15,700
<b>Province</b>				
Kigali city	6.2	2,542	3.4	2,565
South	13.2	4,041	10.5	4,102
West	2.9	4,291	2.0	4,351
North	1.7	3,544	1.3	3,610
East	21.5	4,695	16.5	4,755
<b>Wealth quintile</b>				
Lowest	14.2	3,805	11.4	3,872
Second	11.8	3,792	9.2	3,860
Middle	10.3	3,812	7.9	3,855
Fourth	9.4	3,853	6.6	3,910
Highest	3.6	3,851	1.9	3,887
Total	9.9	19,111	7.4	19,384

RDT = rapid diagnostic test (SD BIOLINE Malaria Ag P.f.PAN (HRP-II)<sup>TM</sup>)



### Key Findings

#### ***Knowledge of malaria symptoms, causes, and prevention:***

- 81% of women age 15-49 recognized fever as a symptom of malaria.
- 87% of women age 15-49 reported mosquito bites as a cause of malaria.
- More than half of women (54%) said use of mosquito nets prevents malaria.

#### ***Knowledge of treatment by provider:***

- Women who reported that community health workers provide treatment ranged from a high of 60% of women in East province to a low of 22% of women in North province.

#### ***Exposure to malaria messages:***

- Women age 15-49 heard or saw a message about malaria in the past 6 months most often from the radio (41%).

This chapter provides data on the basic knowledge of causes, symptoms, treatment, and prevention of malaria among women age 15-49. In addition, this chapter provides information about women's exposure to malaria messages in the media over the past 6 months.

## 6.1 KNOWLEDGE OF MALARIA CAUSES, SYMPTOMS, AND PREVENTION

Perceptions, beliefs, and attitudes about malaria are often overlooked in malaria control efforts. Understanding who knows the causes and symptoms of malaria, as well as how to use successful mosquito avoidance practices, are key steps in finding and targeting vulnerable populations and ensuring the sustainability of malaria control efforts. Failure to consider knowledge, attitudes, and practices about malaria contributes to the failure of programs to achieve sustainable control.

Eighty-one percent of women age 15-49 in Rwanda recognized fever as a symptom of malaria, and 87% reported mosquito bites as a cause of malaria. However, only 54% reported mosquito nets as a malaria prevention method (**Table 6.1**).

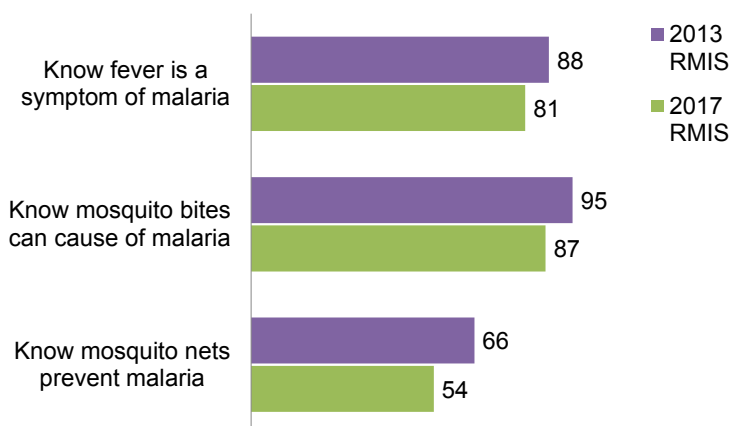
**Trends:** In general, women’s knowledge of malaria, including its symptoms, causes, and prevention, decreased from 2013 to 2017. Most notably, the percentage of women who know mosquito nets are a form of prevention declined from 66% in the 2013 RMIS to 54% in the 2017 RMIS (Figure 6.1).

### Patterns by background characteristics

- The percentage of women who report mosquito bites as a cause of malaria ranges from 91% in East province and Kigali city to 84% in South province.
- Urban women (85%) are more likely than rural women (80%) to recognize fever as a symptom of malaria.
- The percentage of women who reported sleeping under a mosquito net to protect against malaria ranged from 58% in East and West provinces to 44% in Kigali city.

**Figure 6.1 Trends in Malaria Knowledge**

Percentage of women age 15-49 who have heard of malaria and know symptoms, causes, and prevention methods



## 6.2 KNOWLEDGE OF PLACE OF TREATMENT FOR MALARIA

Prompt testing for and treatment of malaria is a key pillar in the Rwanda Malaria Control Extended National Strategic Plan 2013-2020 (RBC 2017). Women who wish treatment for themselves or their children must know where to go for care. Among women who reported treatment resources, 88% listed a health center/post, 42% a community health worker, 13% a hospital, and 7% a private sector facility (Table 6.2).

### Patterns by background characteristics

- Women who reported that malaria treatment can be received from a community health worker ranged from 60% of women in East province to 22% of women in North province.
- Seventeen percent of women in urban areas reported that malaria treatment can be received from a private sector facility compared with 4% of women in rural areas.

## 6.3 EXPOSURE TO MALARIA MESSAGES

### Exposure to communication messages

Percentage of women age 15-49 who recall seeing or hearing a message about malaria through various sources in the past 6 months

**Sample:** Women age 15-49 who have seen or heard messages or information about malaria in the last 6 months

The effectiveness of social and behavioral change communications is notoriously difficult to assess. Success is often measured by the percentage of the target population who recall hearing or seeing messages. Exposure is

the critical first step in increasing knowledge of malaria prevention methods, as well as attitudes and practices about malaria.

The most common way that women age 15-49 heard or saw a message about malaria in the past 6 months was from the radio (41%). This was followed by a community health worker (30%) and community event (19%), while poster/billboard and television only accounted for 7% and 5%, respectively (**Table 6.3**).

### Patterns by background characteristics

- Exposure to malaria messages from a community event ranged from 25% in East province to 11% in South province (**Table 6.3**).
- Fourteen percent of women in urban areas were exposed to malaria messages from television compared with 3% of rural women.
- Twenty-six percent of women age 15-49 who heard a malaria message on the radio had no education compared with 53% of women with secondary or higher education.

### LIST OF TABLES

For detailed information on malaria, see the following tables:

- **Table 6.1** General knowledge of malaria
- **Table 6.2** Knowledge of place of treatment for malaria
- **Table 6.3** Media exposure to malaria messages

**Table 6.1 General knowledge of malaria**

Among women age 15-49, the percentages who can recognize fever as a sign of malaria, report mosquito bites as a cause of malaria, and report that sleeping under a mosquito net can protect against malaria, according to background characteristics, Rwanda MIS 2017

Background characteristic	Percentage who recognize fever as a symptom of malaria	Percentage who report mosquito bites as a cause of malaria	Percentage who report that sleeping under a mosquito net can protect against malaria	Number of women
<b>Residence</b>				
Urban	84.8	91.3	53.0	1,143
Rural	80.0	86.1	53.6	3,879
<b>Province</b>				
Kigali city	86.7	91.3	44.3	809
South	76.6	83.8	56.6	1,019
West	78.5	84.7	57.6	1,111
North	80.0	86.5	47.8	952
East	84.5	90.6	57.9	1,131
<b>Education</b>				
No education	75.0	79.6	53.7	625
Primary	80.8	87.6	54.6	3,096
Secondary or higher	84.6	90.3	50.7	1,301
<b>Wealth quintile</b>				
Lowest	74.3	80.7	56.6	942
Second	79.2	85.7	54.2	937
Middle	79.7	86.7	55.7	971
Fourth	85.2	90.5	51.4	975
Highest	85.5	91.5	50.3	1,197
Total	81.1	87.3	53.5	5,022

**Table 6.2 Knowledge of place of treatment for malaria**

Percentage of women age 15-49 who reported that malaria treatment can be received from a specific provider, according to background characteristics, Rwanda MIS 2017

Background characteristic	Hospital	Health center/post	Outreach	Community health worker	Other public sector	Private sector	Other sector	Number of women
<b>Residence</b>								
Urban	15.6	89.6	2.4	41.1	0.0	16.8	0.1	1,143
Rural	12.0	87.4	2.1	42.6	0.1	3.5	0.4	3,879
<b>Province</b>								
Kigali city	12.5	90.2	1.7	40.1	0.0	15.5	0.0	809
South	9.8	84.4	2.7	52.3	0.1	5.9	0.4	1,019
West	12.5	88.6	2.8	34.1	0.1	4.7	0.4	1,111
North	19.9	86.3	2.4	22.2	0.0	2.2	0.5	952
East	10.3	90.1	1.2	59.4	0.2	6.0	0.4	1,131
<b>Education</b>								
No education	8.4	83.8	1.4	36.7	0.0	2.3	0.6	625
Primary	12.1	88.5	2.0	42.3	0.1	4.8	0.4	3,096
Secondary or higher	16.9	88.4	2.8	44.6	0.1	12.4	0.1	1,301
<b>Wealth quintile</b>								
Lowest	11.0	83.9	3.1	38.4	0.1	3.8	0.5	942
Second	10.4	85.4	2.3	39.8	0.2	3.8	0.6	937
Middle	13.7	89.0	2.0	43.6	0.0	3.1	0.1	971
Fourth	12.0	90.5	2.0	45.3	0.0	3.9	0.4	975
Highest	16.2	90.0	1.6	43.5	0.1	15.6	0.3	1,197
Total	12.9	87.9	2.2	42.2	0.1	6.5	0.4	5,022

**Table 6.3 Media exposure to malaria messages**

Percentage of women age 15-49 who have seen or heard a message about malaria in the past 6 months through specific sources of media, according to background characteristics, Rwanda MIS 2017

Background characteristic	Radio	Television	Poster/Billboard	Community health worker	Community event	Anywhere else	Number of women
<b>Age</b>							
15-19	40.9	6.2	9.7	22.9	10.6	16.4	966
20-24	38.4	4.9	7.9	24.7	15.0	13.8	849
25-29	41.6	6.4	7.7	29.9	19.0	13.2	823
30-34	42.4	5.1	6.7	32.2	23.7	15.8	776
35-39	42.6	5.8	5.6	32.4	24.4	15.2	673
40-44	42.2	4.5	5.2	35.9	24.4	15.5	545
45-49	41.4	3.4	4.5	37.8	27.7	10.9	390
<b>Residence</b>							
Urban	47.0	13.6	8.8	21.2	14.4	14.5	1,143
Rural	39.5	3.0	6.7	32.1	20.9	14.7	3,879
<b>Province</b>							
Kigali city	48.4	16.0	10.1	24.6	19.2	13.2	809
South	32.6	2.5	4.3	21.6	11.0	16.7	1,019
West	36.9	2.6	4.7	30.3	18.0	13.2	1,111
North	47.6	5.1	8.6	32.3	23.9	14.4	952
East	42.8	3.4	8.9	37.5	24.7	15.5	1,131
<b>Education</b>							
No education	25.5	1.1	0.8	26.9	15.9	9.1	625
Primary	39.7	2.6	5.4	31.4	21.2	14.4	3,096
Secondary or higher	52.5	14.2	14.4	26.7	16.8	18.0	1,301
<b>Wealth quintile</b>							
Lowest	23.1	0.8	2.9	24.0	15.7	11.8	942
Second	32.3	0.4	3.3	30.7	18.5	15.1	937
Middle	42.1	1.9	6.8	35.0	22.2	16.2	971
Fourth	50.8	3.2	10.3	36.0	23.5	14.6	975
Highest	54.0	17.5	11.3	23.7	17.5	15.4	1,197
Total	41.2	5.4	7.2	29.6	19.4	14.7	5,022



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## A.1 INTRODUCTION

The 2017 Rwanda Malaria Indicator Survey (RMIS) is a nationwide survey with a nationally representative sample of approximately 5,041 households. The survey provides information on key malaria control indicators, such as the proportion of households having at least one bed net and at least one insecticide-treated net (ITN). It looks at the proportion under age 5 who slept under a bed net the previous night, and under an ITN, and tests for the prevalence of malaria among all household members. Among pregnant women, the survey assesses the proportion of pregnant women who slept under a bed net the previous night.

In Rwanda, there are five provinces divided into 30 districts. In addition to reporting the survey estimates for the country as a whole and for urban and rural areas separately, the survey reports estimates for each of the five provinces. The 30 districts are distributed over the five provinces as follows:

Kigali city: Nyarugenge, Gasabo, Kicukiro

South: Nyanza, Gisagara, Nyaruguru, Huye, Nyamagabe, Ruhango, Muhanga, Kamonyi

West: Karongi, Rutsiro, Rubavu, Nyabihu, Ngororero, Rusizi, Nyamasheke

North: Rulindo, Gakenke, Musanze, Burera, Gicumbi

East: Rwamagana, Nyagatare, Gatsibo, Kayonza, Kirehe, Ngoma, Bugesera

## A.2 SAMPLE FRAME

The sampling frame used for the 2017 RMIS is the Rwanda Population and Housing Census (RPHC), which was conducted in 2012. The sampling frame is a complete list of enumeration areas (EAs) covering the whole country, provided by the National Institute of Statistics of Rwanda (NISR). An EA is a natural village, or a part of a village, created for the RPHC 2012, and which served as a counting unit for the census. Each EA appears with identification information, administrative information, and a measure of size, which is the number of residential households within the EA. Each EA is also classified into one of the four types of residence: urban, semi-urban, peri-urban, and rural. The urban and the semi-urban are grouped together as “urban” areas, and the peri-urban and rural are grouped together as “rural” areas. Each EA also has accompanying cartographic identifiers, which delineate geographic location, boundaries, main access, and land marks both inside and outside the EA that help to identify each EA.

**Table A.1** indicates the percentage distribution of households by province, district, and by type of residence. The province size varies from 12.0% (Kigali city) to 24.7% (East and South province). In Rwanda, 17.4% of the households are in urban areas. The percentage of urban areas is highest in Kigali city (76.3%) and is smallest in East province (7.5%).

**Table A.1 Distribution of residential households by province, district, and residence**

Distribution of residential households in the sampling frame by province, district, and residence, Rwanda MIS 2017

Province	District	Number of households in frame			Percent urban	Percentage of total households in the frame
		Urban	Rural	Total		
Kigali city	Nyarugenge	53,512	17,369	70,881	75.5	2.9
	Gasabo	100,235	41,718	141,953	70.6	5.9
	Kicukiro	68,538	9,980	78,518	87.3	3.2
<b>Kigali city Total</b>		<b>222,285</b>	<b>69,067</b>	<b>291,352</b>	<b>76.3</b>	<b>12.0</b>
South	Nyanza	6,533	68,514	75,047	8.7	3.1
	Gisagara	1,242	75,995	77,237	1.6	3.2
	Nyaruguru	1,395	59,895	61,290	2.3	2.5
	Huye	11,350	67,002	78,352	14.5	3.2
	Nyamagabe	4,933	70,093	75,026	6.6	3.1
	Ruhango	6,517	70,034	76,551	8.5	3.2
	Muhanga	10,445	63,296	73,741	14.2	3.0
	Kamonyi	9,624	71,482	81,106	11.9	3.3
<b>South Total</b>		<b>52,039</b>	<b>546,311</b>	<b>598,350</b>	<b>8.7</b>	<b>24.7</b>
West	Karongi	5,904	67,847	73,751	8.0	3.0
	Rutsiro	1,457	69,813	71,270	2.0	2.9
	Rubavu	34,345	54,702	89,047	38.6	3.7
	Nyabihu	8,671	57,551	66,222	13.1	2.7
	Ngororero	3,021	76,209	79,230	3.8	3.3
	Rusizi	13,314	70,442	83,756	15.9	3.5
	Nyamasheke	1,389	80,914	82,303	1.7	3.4
<b>West Total</b>		<b>68,101</b>	<b>477,478</b>	<b>545,579</b>	<b>12.5</b>	<b>22.5</b>
North	Rulindo	2,087	65,364	67,451	3.1	2.8
	Gakenke	2,505	77,257	79,762	3.1	3.3
	Musanze	23,262	61,520	84,782	27.4	3.5
	Burera	1,504	72,197	73,701	2.0	3.0
	Gicumbi	5,629	80,796	86,425	6.5	3.6
<b>North Total</b>		<b>34,987</b>	<b>357,134</b>	<b>392,121</b>	<b>8.9</b>	<b>16.2</b>
East	Rwamagana	6,615	67,585	74,200	8.9	3.1
	Nyagatare	12,128	94,622	106,750	11.4	4.4
	Gatsibo	5,877	90,254	96,131	6.1	4.0
	Kayonza	7,433	70,735	78,168	9.5	3.2
	Kirehe	2,359	75,331	77,690	3.0	3.2
	Ngoma	3,360	76,585	79,945	4.2	3.3
	Bugesera	7,238	78,237	85,475	8.5	3.5
<b>East Total</b>		<b>45,010</b>	<b>553,349</b>	<b>598,359</b>	<b>7.5</b>	<b>24.7</b>
<b>Rwanda</b>		<b>422,422</b>	<b>2,003,339</b>	<b>2,425,761</b>	<b>17.4</b>	<b>100.0</b>

Source: The 2012 RPHC provided by the NISR

**Table A.2** indicates the distribution of EAs and their average size in number of households by province, district, and by type of residence. There is a total of 16,640 EAs, excluding 88 institutional EAs; among them 2,554 are in urban areas, and 14,086 are in rural areas. The average EA size is 146 households; the urban EAs are larger, with an average of 165 households per EA; the rural EAs are smaller, with an average size of 142 households per EA. The EA size is adequate for being a primary sampling unit (PSU) with a sample take of 30 households per EA.

**Table A.2 Distribution of enumeration areas by province, district, and residence**

Distribution of the enumeration areas in the sampling frame and average number of residential households per enumeration area, by province, district, and residence, Rwanda MIS 2017

Province	District	Number of enumeration areas in frame*			Average number of residential households in enumeration area		
		Urban	Rural	Total	Urban	Rural	Total
Kigali city	Nyarugenge	396	122	518	135	142	137
	Gasabo	585	262	847	171	159	168
	Kicukiro	473	72	545	145	139	144
<b>Kigali city Total</b>		<b>1,454</b>	<b>456</b>	<b>1,910</b>	<b>153</b>	<b>151</b>	<b>153</b>
South	Nyanza	36	432	468	181	159	160
	Gisagara	9	533	542	138	143	143
	Nyaruguru	8	391	399	174	153	154
	Huye	64	486	550	177	138	142
	Nyamagabe	31	525	556	159	134	135
	Ruhango	40	511	551	163	137	139
	Muhanga	49	361	410	213	175	180
	Kamonyi	41	386	427	235	185	190
<b>South Total</b>		<b>278</b>	<b>3,625</b>	<b>3,903</b>	<b>187</b>	<b>151</b>	<b>153</b>
West	Karongi	35	511	546	169	133	135
	Rutsiro	9	482	491	162	145	145
	Rubavu	203	375	578	169	146	154
	Nyabihu	44	445	489	197	129	135
	Ngororero	16	484	500	189	157	158
	Rusizi	83	543	626	160	130	134
	Nyamasheke	8	602	610	174	134	135
<b>West Total</b>		<b>398</b>	<b>3,442</b>	<b>3,840</b>	<b>171</b>	<b>139</b>	<b>142</b>
North	Rulindo	11	492	503	190	133	134
	Gakenke	17	603	620	147	128	129
	Musanze	116	405	521	201	152	163
	Burera	10	582	592	150	124	124
	Gicumbi	34	611	645	166	132	134
<b>North Total</b>		<b>188</b>	<b>2,693</b>	<b>2,881</b>	<b>186</b>	<b>133</b>	<b>136</b>
East	Rwamagana	39	467	506	170	145	147
	Nyagatare	59	635	694	206	149	154
	Gatsibo	28	643	671	210	140	143
	Kayanza	35	426	461	212	166	170
	Kirehe	17	613	630	139	123	123
	Ngoma	20	510	530	168	150	151
	Bugesera	38	576	614	190	136	139
<b>East Total</b>		<b>236</b>	<b>3,870</b>	<b>4,106</b>	<b>191</b>	<b>143</b>	<b>146</b>
<b>Rwanda</b>		<b>2554</b>	<b>14,086</b>	<b>16,640</b>	<b>165</b>	<b>142</b>	<b>146</b>

\*Excluding 88 institutional EAs

### A.3 SAMPLE DESIGN AND IMPLEMENTATION

The sample for the 2017 RMIS is a stratified sample selected in two stages from the sampling frame. Stratification was achieved by separating each province into districts; each district forms a sampling stratum. In total, 30 sampling strata were created. Samples were selected independently in each sampling stratum, by a two-stage selection process. In the first stage, 170 clusters were selected with a stratified probability-proportional-to-size sampling procedure, according to the sample allocation given in Table 5. Implicit stratification and proportional allocation would be achieved at urban/rural and lower administrative unit levels by sorting the sampling frame within the explicit stratum according to type of residence and administrative unit

in different levels. This would be done before sample selection and by using a probability- proportional-to-size selection at the first stage of sampling.

After the first-stage selection and before the main survey, a household listing operation was carried out in all selected clusters. The household listing operation consisted of (1) visiting each of the 170 selected clusters to draw a location map and a detailed sketch map and (2) recording on the household listing forms all residential households found in the cluster with the address and the name of the head of the household. The resulting list of households served as the sampling frame in the second stage. Some of the selected clusters were large in size in the household listing operation. To minimize the task of household listing, the selected clusters with an estimated number of households greater than 300 were segmented. Only one segment was selected for the survey with probability proportional to the segment size. The methodology and the detailed household listing procedure are addressed in the household listing manual.

At the second stage, a fixed number of 30 households were selected from the newly established household listing for each selected cluster. Household selection was performed in the central office prior to the survey. The survey interviewers conducted interviews only in the preselected households. No replacements and no changes of the preselected households were allowed in the implementing stages in order to prevent bias.

**Table A3** below shows the sample allocation of clusters and households by district and by province. Because of the budget and implementing constraints, the sample allocation is an equal size allocation at district level with small variations across provinces: 5 clusters and 150 households per district except for the districts in Kigali city and in North province where, because of their small number of districts, where 10 clusters and 300 households are allocated to each district in Kigali city, and 6 clusters and 180 households are allocated to each district in North province.

**Table A.3 Sample allocation of enumeration areas and households**

Sample allocation of enumeration areas and selected households by region, according to residence, Rwanda 2017

Province	District	Number of clusters	Number of households	Number of households per province
Kigali city	Gasabo	10	300	900
	Kicukiro	10	300	
	Nyarugenge	10	300	
South	Gisagara	5	150	1,200
	Huye	5	150	
	Kamonyi	5	150	
	Muhanga	5	150	
	Nyamagabe	5	150	
	Nyanza	5	150	
	Nyaruguru	5	150	
	Ruhango	5	150	
West	Karongi	5	150	1,050
	Ngororero	5	150	
	Nyabihu	5	150	
	Nyamasheke	5	150	
	Rubavu	5	150	
	Rusizi	5	150	
	Rutsiro	5	150	
North	Burera	6	180	900
	Gakenke	6	180	
	Gicumbi	6	180	
	Musanze	6	180	
	Rulindo	6	180	
East	Bugesera	5	150	1,050
	Gatsibo	5	150	
	Kayonza	5	150	
	Kirehe	5	150	
	Ngoma	5	150	
	Nyagatare	5	150	
	Rwamagana	5	150	
<b>Rwanda</b>		170	5,100	5,100

**Table A.4** shows the distribution of households and eligible women age 15-49 by results of the household and individual interviews, and household, eligible women's and overall women's response rates, by type of residence and by province.

**Table A.4 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's response rates, according to residence and province (unweighted), Rwanda MIS 2017

Result	Residence		Province					Total
	Urban	Rural	Kigali city	South	West	North	East	
<b>Selected households</b>								
Completed (C)	98.1	99.2	97.6	99.2	98.8	99.4	99.5	98.9
Household present but no competent respondent at home (HP)	0.4	0.2	0.6	0.1	0.4	0.1	0.2	0.3
Refused (R)	0.4	0.0	0.4	0.1	0.0	0.0	0.0	0.1
Dwelling not found (DNF)	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Household absent (HA)	0.4	0.4	0.3	0.6	0.7	0.2	0.2	0.4
Dwelling vacant/address not a dwelling (DV)	0.5	0.1	1.0	0.0	0.1	0.0	0.0	0.2
Other (O)	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	1,200	3,896	900	1,199	1,047	900	1,050	5,096
Household response rate (HRR) <sup>1</sup>	99.1	99.8	99.0	99.7	99.6	99.8	99.8	99.6
<b>Eligible women</b>								
Completed (EWC)	98.7	98.7	98.3	97.6	99.0	99.8	99.0	98.7
Not at home (EWNH)	0.5	0.3	0.6	0.6	0.2	0.0	0.4	0.4
Postponed (EWP)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Refused (EWR)	0.3	0.0	0.3	0.1	0.0	0.0	0.0	0.1
Partly completed (EWPC)	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
Incapacitated (EWI)	0.1	0.6	0.2	1.1	0.7	0.1	0.3	0.5
Other (EWO)	0.4	0.3	0.6	0.5	0.0	0.1	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	1,339	3,749	1,000	1,122	1,050	930	986	5,088
Eligible women response rate (EWRR) <sup>2</sup>	98.7	98.7	98.3	97.6	99.0	99.8	99.0	98.7
Overall women response rate (ORR) <sup>3</sup>	97.7	98.5	97.3	97.3	98.7	99.6	98.8	98.3

<sup>1</sup> Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$100 * C$$

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

<sup>2</sup> The eligible women's response rate (EWRR) is equivalent to the percentage of interviews completed (EWC)

<sup>3</sup> The overall women's response rate (ORR) is calculated as:

$$ORR = HRR * EWRR / 100$$

## A.4 SAMPLE PROBABILITIES AND SAMPLING WEIGHTS

Because of the nonproportional allocation of the sample to the different reporting domains, sampling weights will be required for any analysis using RMIS 2017 data to ensure the actual representability of the sample. Because the 2017 RMIS sample is a two-stage stratified cluster sample, sampling weights will be calculated based on sampling probabilities, which will be calculated separately for each sampling stage and for each cluster. We use the following notations:

$P_{1hi}$ : sampling probability of the  $i^{th}$  EA in stratum  $h$

$P_{2hi}$ : sampling probability within the  $i^{th}$  cluster for households

$P_{hi}$ : overall sampling probability of any households of the  $i^{th}$  cluster in stratum  $h$



Let  $a_h$  be the number of clusters selected in stratum  $h$  for the RMIS 2017,  $M_{hi}$  the number of households according to the sampling frame in the  $i^{\text{th}}$  cluster, and  $\sum M_{hi}$  the total number of structures in the stratum  $h$ . The probability of selecting the  $i^{\text{th}}$  cluster in stratum  $h$  for the RMIS 2017 is calculated as follows:

$$P_{1hi} = \frac{a_h M_{hi}}{\sum M_{hi}}$$

Let  $L_{hi}$  and  $g_{hi}$  ( $g_{hi}=30$  for all  $h$  and  $i$  for RMIS 2017) be the number of households listed and selected in the  $i^{\text{th}}$  cluster in stratum  $h$ . The probability for selecting a household in the  $i^{\text{th}}$  cluster is calculated as follows:

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

The overall selection probability of each household in cluster  $i$  of stratum  $h$  is therefore the production of the selection probabilities:

$$P_{hi} = P_{1hi} \times P_{2hi} = \frac{a_h g_{hi} M_{hi}}{L_{hi} \sum M_{hi}}$$

The sampling 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 will be constructed to facilitate the calculation of sampling weights. Household sampling weights and the women's individual sampling weights are obtained by adjusting the above-calculated weight to compensate for household nonresponse and women's individual nonresponse, respectively. These weights will be further normalized at the national level to produce unweighted cases equal to weighted cases for both households and individual women at the national level. The normalized weights are valid for estimation of proportions and means at any aggregation levels, but not valid for estimation of totals.



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 Rwanda MIS 2017 (2017 RMIS) 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 2017 RMIS is only one of many samples that could have been selected from the same population, using the same design and expected 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.

A 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 percent of all possible samples of identical size and design.

If the sample of respondents had been selected as a simple random sample, it would have been possible to use straightforward formulas for calculating sampling errors. However, the 2017 RMIS sample is the result of a multi-stage stratified design, and, consequently, it was necessary to use more complex formulas. The computer software used to calculate sampling errors for the 2017 RMIS is a SAS program. This program used the Taylor linearization method of variance estimation for survey estimates that are means, proportions, or ratios.

The Taylor linearization method treats any percentage or average 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  $h^{\text{th}}$  stratum,  
 $y_{hi}$  is the sum of the weighted values of variable  $y$  in the  $i^{\text{th}}$  cluster in the  $h^{\text{th}}$  stratum,  
 $x_{hi}$  is the sum of the weighted number of cases in the  $i^{\text{th}}$  cluster in the  $h^{\text{th}}$  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 calculated; it 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. The relative standard error and confidence limits for the estimates are also calculated.

Sampling errors for the RMIS 2017 are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for the country 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 to 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 ( $R \pm 2SE$ ), for each variable. The DEFT is considered undefined when the standard error considering simple random sample is zero (when the estimate is close to 0 or 1). In the case of the total fertility rate, the number of unweighted cases is not relevant, as there is no known unweighted value for woman-years of exposure to child-bearing.

The confidence interval, for example, as calculated for children under age 5 who “*Had a fever in last 2 weeks*” can be interpreted as follows: the overall proportion from the national sample is 0.304, and its standard error is 0.012. Therefore, to obtain the 95% confidence limits, one adds and subtracts twice the standard error to the sample estimate, that is,  $0.304 \pm 2 \times 0.012$ . There is a high probability (95%) that the *true* average proportion of children under 5 who had fever in the last 2 weeks is between 0.279 and 0.328.

For the total sample, the value of the DEFT, averaged over all variables, is 1.607. This means that, due to multi-staging and clustering of the sample, the average standard error is increased by a factor of 1.607 over that in an equivalent simple random sample.

**Table B.1 List of indicators for sampling errors, Rwanda MIS 2017**

VARIABLE	Type of Estimate	Base Population
HOUSEHOLDS		
Proportion of households having at least one bed net of any type	Proportion	All households interviewed
Average number of any bed net per household	Mean	All households interviewed
Proportion of households having at least one ITN	Proportion	All households interviewed
Average number of ITNs per household	Mean	All households interviewed
CHILDREN UNDER FIVE		
Slept under any bed net last night	Proportion	All children under age 5
Slept under an ITN last night	Proportion	All children under age 5
Had a fever in last 2 weeks	Proportion	All children under age 5
Sought medical treatment for fever	Proportion	Children under age 5 had fever
Received medical treatment for fever	Proportion	Children under age 5 had fever
Received ACT treatment for fever	Proportion	Children under age 5 had fever
Prevalence of malaria (RDT) (6-59 months)	Proportion	All children under age 5 who were tested
Prevalence of malaria (microscopy test) (6-59 months)	Proportion	All children under age 5 who were tested
Prevalence of malaria (RDT) (age 5-14)	Proportion	All children 5-14 who were tested
Prevalence of malaria (microscopy) (age 5-14)	Proportion	All children 5-14 who were tested
ADULTS		
Prevalence of malaria (RDT) (age 15+)	Proportion	All adults 15+ years who were tested
Prevalence of malaria (microscopy) (age 15+)	Proportion	All adults 15+ years who were tested
WOMEN AND PREGNANT WOMEN		
Slept under any bed net last night	Proportion	Pregnant women 15-49
Slept under an ITN last night	Proportion	Pregnant women 15-49

**Table B.2 Sampling errors: Total sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weight ed (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.864	0.007	5041	5041	1.457	0.008	0.850	0.878
Average number of any bed nets per household	1.921	0.030	5041	5041	1.672	0.016	1.861	1.982
Proportion of households having at least one ITN	0.841	0.008	5041	5041	1.507	0.009	0.825	0.856
Average number of ITNs per household	1.827	0.030	5041	5041	1.684	0.016	1.767	1.887
Proportion of households having at least one ITN per two people	0.551	0.012	5040	5038	1.646	0.021	0.528	0.574
CHILDREN								
Slept under any bed net last night	0.700	0.015	3055	3060	1.524	0.021	0.670	0.729
Slept under an ITN last night	0.680	0.014	3055	3060	1.487	0.021	0.651	0.709
Had a fever in last 2 weeks	0.304	0.012	2883	2929	1.377	0.041	0.279	0.328
Sough for medical treatment for fever	0.563	0.020	870	890	1.136	0.035	0.524	0.602
Received ACT treatment for fever	0.994	0.006	157	174	1.038	0.006	0.982	1.006
Prevalence of malaria (RDT)	0.118	0.013	2668	2676	1.870	0.111	0.092	0.144
Prevalence of malaria (microscopy)	0.072	0.009	2716	2718	1.729	0.131	0.053	0.091
Prevalence of malaria (RDT) (age 5-14)	0.151	0.013	5424	5536	2.043	0.085	0.125	0.177
Prevalence of malaria (microscopy) (age 5-14)	0.112	0.009	5514	5622	1.758	0.083	0.094	0.131
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.067	0.006	10874	10899	2.070	0.087	0.055	0.079
Prevalence of malaria (microscopy) (age 15+)	0.055	0.005	11032	11044	2.126	0.097	0.044	0.066
PREGNANT WOMEN								
Slept under any bed net last night	0.715	0.027	340	342	1.128	0.038	0.660	0.770
Slept under an ITN last night	0.685	0.029	340	342	1.141	0.042	0.627	0.742

**Table B.3 Sampling errors: Urban sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.864	0.008	1177	1024	0.832	0.010	0.847	0.881
Average number of any bed nets per household	2.116	0.045	1177	1024	1.046	0.021	2.026	2.206
Proportion of households having at least one ITN	0.843	0.009	1177	1024	0.872	0.011	0.825	0.862
Average number of ITNs per household	2.040	0.043	1177	1024	1.004	0.021	1.954	2.126
Proportion of households having at least one ITN per two people	0.643	0.013	1177	1024	0.955	0.021	0.616	0.669
CHILDREN								
Slept under any bed net last night	0.781	0.020	676	584	1.079	0.026	0.741	0.820
Slept under an ITN last night	0.755	0.021	676	584	1.121	0.028	0.712	0.798
Had a fever in last 2 weeks	0.278	0.027	660	577	1.500	0.098	0.224	0.332
Sough for medical treatment for fever	0.597	0.028	184	160	0.755	0.047	0.540	0.653
Received ACT treatment for fever	na	na	12	11	na	na	na	na
Prevalence of malaria (RDT)	0.029	0.008	587	516	1.066	0.266	0.014	0.045
Prevalence of malaria (microscopy)	0.020	0.010	597	522	1.588	0.490	0.000	0.039
Prevalence of malaria (RDT) (age 5-14)	0.037	0.010	1036	922	1.346	0.271	0.017	0.056
Prevalence of malaria (microscopy) (age 5-14)	0.028	0.007	1045	927	1.111	0.244	0.014	0.041
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.025	0.007	2553	2224	2.199	0.297	0.010	0.040
Prevalence of malaria (microscopy) (age 15+)	0.015	0.004	2578	2235	1.529	0.260	0.007	0.023
PREGNANT WOMEN								
Slept under any bed net last night	0.835	0.029	78	72	0.710	0.035	0.777	0.893
Slept under an ITN last night	0.774	0.041	78	72	0.895	0.053	0.692	0.857

**Table B.4 Sampling errors: Rural sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.864	0.008	3864	4017	1.471	0.009	0.847	0.880
Average number of any bed nets per household	1.872	0.035	3864	4017	1.752	0.019	1.802	1.941
Proportion of households having at least one ITN	0.840	0.009	3864	4017	1.506	0.011	0.822	0.858
Average number of ITNs per household	1.772	0.034	3864	4017	1.755	0.019	1.704	1.840
Proportion of households having at least one ITN per two people	0.528	0.014	3863	4015	1.692	0.026	0.500	0.555
CHILDREN								
Slept under any bed net last night	0.680	0.017	2379	2476	1.580	0.025	0.646	0.715
Slept under an ITN last night	0.662	0.017	2379	2476	1.539	0.026	0.628	0.697
Had a fever in last 2 weeks	0.310	0.013	2223	2352	1.245	0.041	0.284	0.336
Sough for medical treatment for fever	0.555	0.021	686	730	1.092	0.039	0.513	0.598
Received ACT treatment for fever	0.994	0.006	145	163	1.015	0.006	0.981	1.007
Prevalence of malaria (RDT)	0.139	0.015	2081	2160	1.820	0.111	0.108	0.170
Prevalence of malaria (microscopy)	0.084	0.011	2119	2196	1.676	0.132	0.062	0.107
Prevalence of malaria (RDT) (age 5-14)	0.174	0.014	4388	4614	1.930	0.082	0.145	0.202
Prevalence of malaria (microscopy) (age 5-14)	0.129	0.010	4469	4695	1.627	0.080	0.108	0.149
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.078	0.007	8321	8675	1.890	0.084	0.065	0.091
Prevalence of malaria (microscopy) (age 15+)	0.065	0.006	8454	8809	1.991	0.094	0.053	0.078
PREGNANT WOMEN								
Slept under any bed net last night	0.683	0.032	262	271	1.104	0.046	0.620	0.746
Slept under an ITN last night	0.661	0.032	262	271	1.101	0.049	0.596	0.725

**Table B.5 Sampling errors: Kigali city sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.864	0.015	878	727	1.318	0.018	0.834	0.895
Average number of any bed nets per household	2.054	0.072	878	727	1.516	0.035	1.909	2.199
Proportion of households having at least one ITN	0.842	0.016	878	727	1.302	0.019	0.810	0.874
Average number of ITNs per household	1.965	0.064	878	727	1.345	0.033	1.837	2.093
Proportion of households having at least one ITN per two people	0.635	0.023	878	727	1.401	0.036	0.590	0.681
CHILDREN								
Slept under any bed net last night	0.782	0.032	497	425	1.505	0.041	0.718	0.845
Slept under an ITN last night	0.756	0.034	497	425	1.563	0.045	0.688	0.825
Had a fever in last 2 weeks	0.248	0.038	499	433	1.927	0.153	0.172	0.325
Sough for medical treatment for fever	0.545	0.042	136	107	0.932	0.077	0.461	0.628
Received ACT treatment for fever	na	na	12	10	na	na	na	1.000
Prevalence of malaria (RDT)	0.069	0.016	426	367	1.277	0.234	0.037	0.101
Prevalence of malaria (microscopy)	0.031	0.014	436	373	1.620	0.460	0.002	0.059
Prevalence of malaria (RDT) (age 5-14)	0.082	0.040	747	649	3.183	0.485	0.002	0.162
Prevalence of malaria (microscopy) (age 5-14)	0.054	0.020	757	658	2.158	0.365	0.015	0.093
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.052	0.013	1852	1526	2.294	0.256	0.025	0.079
Prevalence of malaria (microscopy) (age 15+)	0.027	0.007	1875	1535	1.781	0.266	0.013	0.041
PREGNANT WOMEN								
Slept under any bed net last night	0.784	0.083	62	53	1.609	0.106	0.618	0.951
Slept under an ITN last night	0.716	0.089	62	53	1.579	0.125	0.537	0.895

**Table B.6 Sampling errors: South sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.839	0.013	1189	1094	1.232	0.016	0.813	0.865
Average number of any bed nets per household	1.677	0.064	1189	1094	1.880	0.038	1.549	1.805
Proportion of households having at least one ITN	0.817	0.015	1189	1094	1.295	0.018	0.787	0.846
Average number of ITNs per household	1.601	0.064	1189	1094	1.922	0.040	1.472	1.729
Proportion of households having at least one ITN per two people	0.497	0.025	1189	1094	1.734	0.051	0.447	0.548
CHILDREN								
Slept under any bed net last night	0.654	0.029	654	591	1.348	0.044	0.596	0.712
Slept under an ITN last night	0.630	0.030	654	591	1.370	0.047	0.571	0.690
Had a fever in last 2 weeks	0.357	0.025	583	537	1.205	0.070	0.307	0.408
Sough for medical treatment for fever	0.483	0.038	201	192	1.122	0.079	0.407	0.559
Received ACT treatment for fever	na	na	40	40	na	na	na	na
Prevalence of malaria (RDT)	0.144	0.027	575	522	1.655	0.186	0.090	0.197
Prevalence of malaria (microscopy)	0.087	0.021	584	530	1.625	0.238	0.046	0.129
Prevalence of malaria (RDT) (age 5-14)	0.206	0.031	1287	1188	2.213	0.151	0.144	0.268
Prevalence of malaria (microscopy) (age 5-14)	0.172	0.026	1308	1206	2.079	0.150	0.121	0.224
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.091	0.013	2529	2331	2.030	0.146	0.065	0.118
Prevalence of malaria (microscopy) (age 15+)	0.075	0.010	2569	2367	1.758	0.136	0.055	0.096
PREGNANT WOMEN								
Slept under any bed net last night	0.678	0.052	81	74	1.006	0.077	0.573	0.782
Slept under an ITN last night	0.641	0.059	81	74	1.108	0.092	0.523	0.759

**Table B.7 Sampling errors: West sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.905	0.013	1034	1098	1.374	0.014	0.880	0.930
Average number of any bed nets per household	2.073	0.073	1034	1098	1.839	0.035	1.928	2.218
Proportion of households having at least one ITN	0.895	0.012	1034	1098	1.303	0.014	0.870	0.919
Average number of ITNs per household	2.011	0.072	1034	1098	1.837	0.036	1.867	2.154
Proportion of households having at least one ITN per two people	0.589	0.029	1034	1098	1.865	0.049	0.532	0.646
CHILDREN								
Slept under any bed net last night	0.715	0.031	694	731	1.575	0.043	0.654	0.777
Slept under an ITN last night	0.702	0.029	694	731	1.479	0.042	0.644	0.761
Had a fever in last 2 weeks	0.288	0.023	667	715	1.289	0.080	0.242	0.334
Sough for medical treatment for fever	0.604	0.040	194	206	1.059	0.066	0.525	0.684
Received ACT treatment for fever	na	na	24	28	na	na	na	na
Prevalence of malaria (RDT)	0.031	0.011	610	640	1.414	0.356	0.009	0.054
Prevalence of malaria (microscopy)	0.018	0.007	620	650	1.292	0.383	0.004	0.032
Prevalence of malaria (RDT) (age 5-14)	0.038	0.010	1176	1237	1.508	0.253	0.019	0.057
Prevalence of malaria (microscopy) (age 5-14)	0.023	0.006	1194	1256	1.224	0.259	0.011	0.035
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.024	0.006	2265	2413	1.773	0.265	0.011	0.037
Prevalence of malaria (microscopy) (age 15+)	0.019	0.005	2297	2444	1.654	0.259	0.009	0.029
PREGNANT WOMEN								
Slept under any bed net last night	0.732	0.051	76	82	1.013	0.070	0.629	0.834
Slept under an ITN last night	0.732	0.051	76	82	1.013	0.070	0.629	0.834

**Table B.8 Sampling errors: North sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.926	0.013	895	935	1.544	0.015	0.899	0.953
Average number of any bed nets per household	2.226	0.053	895	935	1.285	0.024	2.120	2.331
Proportion of households having at least one ITN	0.916	0.014	895	935	1.520	0.015	0.888	0.945
Average number of ITNs per household	2.150	0.046	895	935	1.137	0.021	2.058	2.243
Proportion of households having at least one ITN per two people	0.673	0.016	894	932	0.993	0.023	0.642	0.704
CHILDREN								
Slept under any bed net last night	0.785	0.029	540	554	1.441	0.037	0.728	0.842
Slept under an ITN last night	0.764	0.026	540	554	1.286	0.034	0.711	0.817
Had a fever in last 2 weeks	0.217	0.017	510	527	0.907	0.080	0.183	0.252
Sough for medical treatment for fever	0.551	0.068	107	115	1.415	0.123	0.415	0.686
Received ACT treatment for fever	na	na	5	5	na	na	na	na
Prevalence of malaria (RDT)	0.013	0.005	469	484	0.917	0.435	0.002	0.023
Prevalence of malaria (microscopy)	0.007	0.004	483	498	1.064	0.582	0.000	0.015
Prevalence of malaria (RDT) (age 5-14)	0.025	0.016	961	1024	2.528	0.641	0.000	0.056
Prevalence of malaria (microscopy) age 5-14)	0.012	0.008	983	1045	2.023	0.656	0.000	0.029
ADULTS								
Prevalence of malaria (RDT) (age 15+)	0.014	0.004	1971	2036	1.378	0.300	0.006	0.023
Prevalence of malaria (microscopy) (age 15+)	0.014	0.004	2005	2067	1.525	0.292	0.006	0.022
PREGNANT WOMEN								
Slept under any bed net last night	0.873	0.045	61	67	1.076	0.051	0.784	0.962
Slept under an ITN last night	0.860	0.045	61	67	1.039	0.052	0.770	0.950

**Table B.9 Sampling errors: East sample, Rwanda MIS 2017**

Variable	Value (R)	Standard error (SE)	Number of cases		Design effect (DEFT)	Relative error (SE/R)	Confidence limits	
			Un- weighted (N)	Weighted (WN)			Lower (R-2SE)	Upper (R+2SE)
HOUSEHOLDS								
Proportion of households having at least one bed net of any type	0.798	0.020	1045	1187	1.586	0.025	0.759	0.838
Average number of any bed nets per household	1.685	0.059	1045	1187	1.488	0.035	1.566	1.804
Proportion of households having at least one ITN	0.753	0.024	1045	1187	1.766	0.031	0.706	0.800
Average number of ITNs per household	1.525	0.066	1045	1187	1.733	0.043	1.393	1.658
Proportion of households having at least one ITN per two people	0.417	0.025	1045	1187	1.643	0.060	0.367	0.467
CHILDREN								
Slept under any bed net last night	0.612	0.036	670	759	1.652	0.060	0.539	0.685
Slept under an ITN last night	0.593	0.037	670	759	1.664	0.063	0.519	0.668
Had a fever in last 2 weeks	0.376	0.026	624	717	1.261	0.070	0.324	0.429
Sough for medical treatment for fever	0.601	0.036	232	270	1.050	0.061	0.528	0.674
Received ACT treatment for fever	0.989	0.012	76	91	0.990	0.012	0.965	1.012
Prevalence of malaria (RDT)	0.285	0.042	588	663	2.005	0.149	0.201	0.370
Prevalence of malaria (microscopy)	0.184	0.030	593	667	1.715	0.165	0.123	0.245
Prevalence of malaria (RDT) (age 5-14s)	0.324	0.030	1253	1438	1.758	0.091	0.265	0.384
Prevalence of malaria (microscopy) (age 5-14)	0.237	0.022	1272	1457	1.432	0.091	0.194	0.281
ADULTS								
Prevalence of malaria (RDT) (15+ years)	0.136	0.016	2257	2593	1.920	0.118	0.104	0.168
Prevalence of malaria (microscopy) (age 15+)	0.119	0.016	2286	2630	2.016	0.134	0.087	0.151
PREGNANT WOMEN								
Slept under any bed net last night	0.519	0.071	60	66	1.091	0.136	0.378	0.660
Slept under an ITN last night	0.472	0.071	60	66	1.103	0.151	0.329	0.614



**Table C.1 Household age distribution**

Single-year age distribution of the de facto household population by sex (weighted), Rwanda MIS 2017

Age	Female		Male		Age	Female		Male	
	Number	Percent	Number	Percent		Number	Percent	Number	Percent
0	285	2.6	324	3.5	36	122	1.1	121	1.3
1	308	2.9	344	3.7	37	143	1.3	106	1.1
2	284	2.6	289	3.1	38	117	1.1	85	0.9
3	296	2.8	310	3.3	39	107	1.0	87	0.9
4	276	2.6	309	3.3	40	147	1.4	67	0.7
5	263	2.4	271	2.9	41	88	0.8	53	0.6
6	280	2.6	274	3.0	42	104	1.0	93	1.0
7	292	2.7	280	3.0	43	111	1.0	65	0.7
8	268	2.5	263	2.8	44	98	0.9	75	0.8
9	291	2.7	335	3.6	45	100	0.9	89	1.0
10	305	2.8	282	3.0	46	76	0.7	50	0.5
11	333	3.1	295	3.2	47	83	0.8	63	0.7
12	293	2.7	317	3.4	48	62	0.6	63	0.7
13	273	2.5	278	3.0	49	69	0.6	67	0.7
14	272	2.5	253	2.7	50	66	0.6	54	0.6
15	268	2.5	224	2.4	51	83	0.8	43	0.5
16	168	1.6	191	2.1	52	74	0.7	39	0.4
17	226	2.1	246	2.7	53	65	0.6	40	0.4
18	149	1.4	182	2.0	54	79	0.7	48	0.5
19	157	1.5	117	1.3	55	70	0.6	60	0.6
20	181	1.7	147	1.6	56	81	0.8	41	0.4
21	195	1.8	128	1.4	57	68	0.6	66	0.7
22	139	1.3	116	1.3	58	81	0.8	42	0.5
23	192	1.8	134	1.5	59	62	0.6	52	0.6
24	147	1.4	88	0.9	60	58	0.5	55	0.6
25	185	1.7	125	1.4	61	59	0.5	47	0.5
26	161	1.5	111	1.2	62	41	0.4	38	0.4
27	159	1.5	107	1.2	63	40	0.4	28	0.3
28	164	1.5	108	1.2	64	40	0.4	32	0.3
29	152	1.4	102	1.1	65	34	0.3	37	0.4
30	175	1.6	105	1.1	66	26	0.2	12	0.1
31	145	1.3	121	1.3	67	28	0.3	19	0.2
32	159	1.5	137	1.5	68	29	0.3	15	0.2
33	165	1.5	82	0.9	69	18	0.2	16	0.2
34	127	1.2	94	1.0	70+	316	2.9	155	1.7
35	176	1.6	150	1.6	Total	10,750	100.0	9,262	100.0

Note: The de facto population includes all residents and nonresidents who stayed in the household the night before the interview.

**Table C.2 Age distribution of eligible and interviewed women**

De facto household population of women age 10-54, number and percent distribution of interviewed women age 15-49, and percentage of eligible women who were interviewed (weighted), by 5-year age groups, Rwanda MIS 2017

Age group	Household population of women age 10-54	Interviewed women age 15-49		Percentage of eligible women interviewed
		Number	Percentage	
10-14	1,475	-	-	-
15-19	969	952	19.2	98.3
20-24	854	845	17.0	98.9
25-29	821	809	16.3	98.6
30-34	770	766	15.5	99.4
35-39	665	661	13.3	99.3
40-44	548	539	10.9	98.4
45-49	390	384	7.7	98.3
50-54	367	-	-	-
15-49	5,017	4,955	100.0	98.8

Note: The de facto population includes all residents and nonresidents who stayed in the household the night before the interview. Weights for both household population of women and interviewed women are household weights. Age is based on the Household Questionnaire.  
na = Not applicable

**Table C.3 Completeness of reporting**

Percentage of observations missing information for selected demographic and health questions (weighted), Rwanda MIS 2017

Subject	Percentage with information missing	Number of cases
Month only (births in the 15 years preceding the survey)	0.54	3,448
Month and year (births in the 15 years preceding the survey)	0.85	3,448
Age at death (deceased children born in the 15 years preceding the survey)	0.00	3,448
Respondent's education (all women age 15-49)	0.24	5,022
Malaria (children age 6 months to 14 years)	0.80	8,423
Malaria (adults 15+ years)	2.14	11,285

<sup>1</sup> Both year and age missing

**Table C.4 Births by calendar years**

Number of births, percentage with complete birth date, sex ratio at birth, and calendar year ratio by calendar year, according to living, dead, and total children (weighted), Rwanda MIS 2017

Calendar year	Number of births			Percentage with year and month of birth given			Sex ratio at birth <sup>1</sup>			Calendar year ratio <sup>2</sup>		
	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total
2017	547	6	553	99.6	100.0	99.6	114.0	81.3	113.6	-	-	-
2016	662	18	680	99.8	100.0	99.8	113.7	642.3	117.8	-	-	-
2015	543	19	562	99.5	92.1	99.2	107.3	139.0	108.2	88.2	123.9	89.1
2014	568	13	581	99.1	81.2	98.8	102.7	94.0	102.5	104.6	83.7	104.0
2013	544	12	556	98.4	77.8	98.0	117.4	265.9	119.3	101.3	98.4	101.3
2012	505	11	516	99.3	100.0	99.3	105.0	229.7	106.6	185.8	186.4	185.8
2013-2017	2,865	67	2,932	99.3	90.3	99.1	110.9	187.3	112.2	-	-	-
2012	505	11	516	99.3	100.0	99.3	105.0	229.7	106.6	-	-	-
All	3,370	78	3,448	99.3	91.7	99.1	110.0	192.6	111.4	-	-	-

NA = Not applicable

<sup>1</sup> (Bm/Bf)x100, where Bm and Bf are the numbers of male and female births, respectively

<sup>2</sup> [2Bx/(Bx-1+Bx+1)]x100, where Bx is the number of births in calendar year x

**Table C.5 Household composition**

Percent distribution of households by sex of head of household and by household size, and mean size of household, according to province, Rwanda MIS 2017

Characteristic	Province					Total
	Kigali city	South	West	North	East	
<b>Household headship</b>						
Male	53.7	60.3	63.3	66.2	65.7	62.3
Female	46.3	39.7	36.7	33.8	34.3	37.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
<b>Number of usual members</b>						
1	15.0	9.0	10.1	10.6	9.2	10.5
2	17.8	14.9	14.2	14.7	13.3	14.8
3	20.0	21.8	17.9	16.8	17.5	18.8
4	16.0	20.2	18.6	20.6	20.0	19.3
5	12.6	16.2	15.4	16.9	17.5	15.9
6	8.9	10.0	11.3	10.1	10.4	10.2
7	5.0	4.9	6.1	5.7	7.1	5.8
8	2.5	1.4	4.3	2.2	2.5	2.6
9+	2.1	1.7	2.1	2.4	2.5	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mean size of households	3.7	3.9	4.1	4.0	4.1	4.0
Number of households	740	1,123	1,108	939	1,201	5,111

Note: Table is based on de jure household members, that is., usual residents.



# PERSONS INVOLVED IN THE 2017 RWANDA MALARIA INDICATOR SURVEY

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## Appendix **D**

### **Steering Committee**

KAENDI Munguti  
GASANA Michel  
PIERCFIELD Emily  
UWALIRAYE Parfait  
TUYISHIME Albert  
UMULISA Noella  
MWIKARAGO Ivan Emil  
MBITUYUMUREMYI Aimable  
MURINDAHABI Monique  
UWIMANA Aline  
UYIZEYE Didier  
MUNYANEZA Tharcisse

### **Survey Management Team**

MURINDAHABI Monique  
UWIMANA Aline  
UYIZEYE Didier  
MUNYANEZA Tharcisse  
MUKANSIGAYE Jeanne

### **Coordinators**

MBITUYUMUREMYI Aimable  
UWIMANA Aline  
UYIZEYE Didier  
TUYISHIME Albert  
MURINDAHABI Monique  
MUSANABAGANWA Clarisse  
MUNYANEZA Tharcisse  
MUHIRUKAZI Yvette  
NYABUGANDE Aimable  
HABANABAKIZE Epaphrodite  
KABERA Michee  
KAYIJUKA Protais  
TWAHIRWA Maurice  
MUNYESHAKA Xaverina  
MUCACA Jean Bosco

### **Interns**

INGABIRE Sandra

ILIZA Nadia

### **Data Collectors**

MUKAGATERA Josée	MUPENZI Angelique
DUSABEYEZU Domina	MUSABEMUNGU Issa
GAHUNGA Nadia	MUSABYEYEZU Marie
GAKWAYA Richard	MUTESI Ronnah
GASHAGAZA Liliane	MUZIRANENGE Alice
GATARAHIYA Aloys	NDUWAYO Clemence
HABUMUREMYI Serge	NIYITEGEKA Sylvestre
IDUHOZE Yvonne	RUTUNGIRWA Amon
KABANDAHO Egide	NYIRAMUHOZA Immaculee
KAMIKAZI Christella	NYIRIHIRWE Eugene
KWIZERA Etienne	RUGAZA NDAHI Oussein
MANZI Camille	TUYISENGE Amede
MUJEJIMANA Jacqueline	TUYISHIME Sylvie
MUKAGAKWAYA Francine	TWAMBAZIMANA Marie Louise
MUKAMWIZA Illuminee	UMULISA Christine
MUKANDAYISABA Elyse Clemence	UMUTONIWASE Jacqueline
MUKANDEKEZI Dorothee	UWABYAYE Odette
MUKANGIRA Francine	UWAMAHHORO Vestine
MUKARWEGO Alice	UWAMAHHORO Jacqueline
MUKASEKURU Francoise	UWAMAHHORO Jean Damascene
MUNGANYIKI Claudine	UWAMAHHORO Delphine
MUNYAMPUNDU Theogene	UWINGABIRE Liliane
MUNYANEZA Thacien	

### **Data Entry Clerks**

Didier UYIZEYE	Data Processing Programmer
Omar MURENGEZI	Supervisor
Beata BENIMANA	Data Entry Clerk
David NSORO	Data Entry Clerk
Junior Nepo KAMATARI	Data Entry Clerk
Jacqueline UWASE	Data Entry Clerk
Euphrosine NYIRAZITONI	Data Entry Clerk
Magnifique UMUTONIWASE	Data Entry Clerk
Corine UMWALI	Data Entry Clerk
M. Vestine KWERERE	Coding and Verification
Jacques RUBAYITA	Coding and Verification

### **Laboratory Technicians**

NYUMBAYIRE J.M.V  
BINTU Clementine  
NYANGEZI Eric  
HATANGIMANA Ignace  
NTIRUSHWA Etienne  
UMUTONI Cecile  
TUYISENGE Josiane  
UWINGENEYE Francine  
KWIZERA Marie Louise  
MUHIRWA Clement  
KOMEZUSENGE Jean Damascene

### **Laboratory Data Entry**

MANZI Jean Pierre  
MPAMO Clemence

### **Laboratory Field Technicians**

HAHIRWUSENGA Pierre Celestin  
HAVUGIMANA Jean Damascene  
KAMAYIRESE Eric Noel  
KAYIBANDA Leon Charles  
MAPENZI Carine  
MBARUSHIMANA Innocent  
MUHIRE Pierre  
MUKANKUBANA Mariane  
NYIOMUKESHA Angelique

GAHONGAYIRE Fatuma  
NTUYENABO Calliope  
NYAMBARIZA Angelo  
NYIRAMIRYANGO Claudine  
NYIRABANANIYE Christine  
UWINEZA Chantal

**Report Authors**

KABERA Michee	NYABUGANDE Aimable
UWIMANA Aline	MUYIRUKAZI Yvette
UYIZEYE Didier	MURINDAHABI R Monique
HABANABAKIZE Epaphrodite	MBITUYUMUREMYI Aimable

**ICF**

Dr. Rathavuth HONG  
Mr. Bernard BARRERE  
Dr. Ruilin REN  
Dr. Dean GARRETT  
Mr. Guillermo ROJAS  
Ms. Claudia MARCHENA  
Ms. Cameron TAYLOR  
Ms. Nancy JOHNSON  
Mr. Christopher GRAMER  
Ms. Natalie SHATTUCK  
Mr. Tom FISH  
Ms. Sarah BALIAN  
Mr. Fabrice NKODO  
Mr. Nsoya Sam LUBWAWA







MALARIA INDICATOR SURVEY  
 HOUSEHOLD QUESTIONNAIRE

RWANDA  
 MALARIA & OTHER PARASITIC DISEASES DIVISION

IDENTIFICATION										
PLACE NAME _____										
NAME OF HOUSEHOLD HEAD _____										
CLUSTER NUMBER .....				<table border="1" style="width: 100%; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>						
HOUSEHOLD NUMBER .....				<table border="1" style="width: 100%; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>						
INTERVIEWER VISITS										
	1	2	3	FINAL VISIT						
DATE	_____	_____	_____	DAY <table border="1" style="width: 40px; height: 20px; float: right;"></table>						
				MONTH <table border="1" style="width: 40px; height: 20px; float: right;"></table>						
INTERVIEWER'S NAME	_____	_____	_____	YEAR <table border="1" style="width: 60px; height: 20px; float: right;"></table>						
RESULT*	_____	_____	_____	INT. NO. <table border="1" style="width: 60px; height: 20px; float: right;"></table>						
				RESULT* <table border="1" style="width: 40px; height: 20px; float: right;"></table>						
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS <table border="1" style="width: 40px; height: 20px; float: right;"></table>						
TIME	_____	_____								
*RESULT CODES: 1 COMPLETED 2 NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT 3 ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME 4 POSTPONED 5 REFUSED 6 DWELLING VACANT OR ADDRESS NOT A DWELLING 7 DWELLING DESTROYED 8 DWELLING NOT FOUND 9 OTHER _____ (SPECIFY)				TOTAL PERSONS IN HOUSEHOLD <table border="1" style="width: 40px; height: 20px; float: right;"></table>  TOTAL ELIGIBLE WOMEN <table border="1" style="width: 40px; height: 20px; float: right;"></table>  LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE <table border="1" style="width: 40px; height: 20px; float: right;"></table>						
LANGUAGE OF QUESTIONNAIRE**	<table border="1" style="width: 20px; height: 20px;">0</table> <table border="1" style="width: 20px; height: 20px;">1</table>	LANGUAGE OF INTERVIEW**	<table border="1" style="width: 20px; height: 20px;"></table> <table border="1" style="width: 20px; height: 20px;"></table>	NATIVE LANGUAGE OF RESPONDENT**	<table border="1" style="width: 20px; height: 20px;"></table> <table border="1" style="width: 20px; height: 20px;"></table>	TRANSLATOR USED (YES = 1, NO = 2)	<table border="1" style="width: 20px; height: 20px;"></table>			
LANGUAGE OF QUESTIONNAIRE**	<b>ENGLISH</b>		**LANGUAGE CODES: 01 ENGLISH 02 KINYARWANDA							
SUPERVISOR			OFFICE EDITOR		KEYED BY					
NAME _____			NUMBER <table border="1" style="width: 40px; height: 20px;"></table>		NUMBER <table border="1" style="width: 40px; height: 20px;"></table>					
			NUMBER <table border="1" style="width: 40px; height: 20px;"></table>		NUMBER <table border="1" style="width: 40px; height: 20px;"></table>					

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INTRODUCTION AND CONSENT

Hello. My name is \_\_\_\_\_. I am working with Ministry of Health. We are conducting a survey about malaria all over Rwanda. The information we collect will help the government to plan health services. Your household was selected for the survey. I would like to ask you some questions about your household. The questions usually take about 15 to 20 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. In case you need more information about the survey, you may contact the person listed on this card.

Do you have any questions?  
May I begin the interview now?

SIGNATURE OF INTERVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

RESPONDENT AGREES  
TO BE INTERVIEWED . . . 1

RESPONDENT DOES NOT AGREE  
TO BE INTERVIEWED . . . 2 → END



100	RECORD THE TIME.	HOURS ..... <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>				
		MINUTES ..... <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>				

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	IF AGE 15 OR OLDER	ELIGIBILITY			INSURANCE		WEALTH LEVEL
				5	6		MARITAL STATUS	8	9	10	11	12	
1	2	3	4	5	6	7	7A	8	9	10	11	12	13
	<p>Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.</p> <p>AFTER LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE.</p> <p>THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.</p>	<p>What is the relationship of (NAME) to the head of the household?</p> <p>SEE CODES BELOW.</p>	<p>Is (NAME) male or female?</p>	<p>Does (NAME) usually live here?</p>	<p>Did (NAME) stay here last night?</p>	<p>How old is (NAME)?</p> <p>IF 95 OR MORE, RECORD '95'.</p>	<p>What is (NAME's) current marital status?</p> <p>1 = MARRIED OR LIVING TOGETHER 2 = DIVORCED/SEPARATED 3 = WIDOWED 4 = NEVER-MARRIED AND NEVER LIVED TOGETHER</p>	<p>CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49</p>	<p>CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-14</p>	<p>CIRCLE LINE NUMBER OF ALL MEMBERS AGE 15+</p>	<p>Is (NAME) covered by any health insurance?</p> <p>CODE FOR Q. 12</p> <p>1= MUTUELLE / COMMUNITY HEALTH INSURANCE 2= RAMA 3= MMI 4=PRIVATE/ COMMERCIAL 5=OTHER 8= DON'T KNOW</p>	<p>What is (NAME) main type of health insurance?</p>	<p>What is (NAME) wealth level?</p> <p>RESPONSE IS '1, 2, 3 OR 4. IF DON'T KNOW RECORD '8'</p>
01		<input type="text"/>	M F 1 2	Y N 1 2	Y N 1 2	IN YEARS <input type="text"/>	<input type="checkbox"/>	01	01	01	Y N DK 1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
02		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	02	02	02	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
03		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	03	03	03	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
04		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	04	04	04	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
05		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	05	05	05	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
06		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	06	06	06	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
07		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	07	07	07	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
08		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	08	08	08	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
09		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	09	09	09	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
10		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	10	10	10	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>

2A) Just to make sure that I have a complete listing: are there any other people such as small children or infants that we have not listed? YES  → ADD TO TABLE NO

2B) Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends who usually live here? YES  → ADD TO TABLE NO

2C) Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed? YES  → ADD TO TABLE NO

- CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD**
- 01 = HEAD
  - 02 = WIFE OR HUSBAND
  - 03 = SON OR DAUGHTER
  - 04 = SON-IN-LAW OR DAUGHTER-IN-LAW
  - 05 = GRANDCHILD
  - 06 = PARENT
  - 07 = PARENT-IN-LAW
  - 08 = BROTHER OR SISTER
  - 09 = OTHER RELATIVE
  - 10 = ADOPTED/FOSTER/STEPCHILD
  - 11 = NOT RELATED
  - 98 = DON'T KNOW

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	IF AGE 15 OR OLDER	ELIGIBILITY			INSURANCE		WEALTH LEVEL
				7A	8		9	10	11	12	13		
1	2	3	4	5	6	7	7A	8	9	10	11	12	13
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.  AFTER LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE.  THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household?  SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)?  IF 95 OR MORE, RECORD '95'.	What is (NAME's) current marital status?  1 = MARRIED OR LIVING TOGETHER 2 = DIVORCED/SEPARATED 3 = WIDOWED 4 = NEVER-MARRIED AND NEVER LIVED TOGETHER	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-14	CIRCLE LINE NUMBER OF ALL MEMBERS AGE 15+	Is (NAME) covered by any health insurance?  <b>CODE FOR Q. 12</b> 1= MUTUELLE / COMMUNITY HEALTH INSURANCE 2= RAMA 3= MMI 4=PRIVATE/ COMMERCIAL 5=OTHER 8= DON'T KNOW	What is (NAME) main type of health insurance?	What is (NAME) wealth level?  RESPONSE IS '1, 2, 3 OR 4. IF DON'T KNOW RECORD '8'
11		<input type="text"/>	M F 1 2	Y N 1 2	Y N 1 2	IN YEARS <input type="text"/>	<input type="checkbox"/>	11	11	11	Y N DK 1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
12		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	12	12	12	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
13		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	13	13	13	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
14		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	14	14	14	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
15		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	15	15	15	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
16		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	16	16	16	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
17		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	17	17	17	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
18		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	18	18	18	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
19		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	19	19	19	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>
20		<input type="text"/>	1 2	1 2	1 2	<input type="text"/>	<input type="checkbox"/>	20	20	20	1 2 8 ↓ NEXT LINE	<input type="checkbox"/>	<input type="checkbox"/>

TICK HERE IF CONTINUATION SHEET USED

**CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD**

- 01 = HEAD
- 02 = WIFE OR HUSBAND
- 03 = SON OR DAUGHTER
- 04 = SON-IN-LAW OR DAUGHTER-IN-LAW
- 05 = GRANDCHILD
- 06 = PARENT
- 07 = PARENT- 07 = PARENT-IN-LAW
- 08 = BROTHEI 08 = BROTHER OR SISTER
- 09 = OTHER R 09 = OTHER RELATIVE
- 10 = ADOPTEI 10 = ADOPTED/FOSTER/STEPCHILD
- 11 = NOT REL 11 = NOT RELATED
- 98 = DON'T K 98 = DON'T KNOW

**CODE FOR Q. 12**

- 1= MUTUELLE / COMMUNITY HEALTH INSURANCE
- 2= RAMA
- 3= MMI
- 4=PRIVATE/ COMMERCIAL
- 5=OTHER
- 8= DON'T KNOW





**HOUSEHOLD CHARACTERISTICS**

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP																		
105	What kind of toilet facility do members of your household usually use?  IF NOT POSSIBLE TO DETERMINE, ASK PERMISSION TO OBSERVE THE FACILITY.	<b>FLUSH OR POUR FLUSH TOILET</b> FLUSH TO PIPED SEWER SYSTEM ..... 11 FLUSH TO SEPTIC TANK ..... 12 FLUSH TO PIT LATRINE ..... 13 FLUSH TO SOMEWHERE ELSE ..... 14 FLUSH, DON'T KNOW WHERE ..... 15  <b>PIT LATRINE</b> VENTILATED IMPROVED PIT LATRINE ..... 21 PIT LATRINE WITH SLAB ..... 22 PIT LATRINE WITHOUT SLAB/OPEN PIT .. 23  COMPOSTING TOILET ..... 31 BUCKET TOILET ..... 41 HANGING TOILET/HANGING LATRINE ..... 51 NO FACILITY/BUSH/FIELD ..... 61  OTHER _____ 96 (SPECIFY)	→ 108																		
106	Do you share this toilet facility with other households?	YES ..... 1 NO ..... 2	→ 108																		
107	Including your own household, how many households use this toilet facility?	NO. OF HOUSEHOLDS IF LESS THAN 10 ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">0</td><td style="width: 20px;"></td></tr></table> 10 OR MORE HOUSEHOLDS ..... 95 DON'T KNOW ..... 98	0																		
0																					
108	What type of fuel does your household mainly use for cooking?	ELECTRICITY ..... 01 LPG ..... 02 NATURAL GAS ..... 03 BIOGAS ..... 04 KEROSENE ..... 05 COAL, LIGNITE ..... 06 CHARCOAL ..... 07 WOOD ..... 08 STRAW/SHRUBS/GRASS ..... 09 AGRICULTURAL CROP ..... 10 ANIMAL DUNG ..... 11  NO FOOD COOKED IN HOUSEHOLD ..... 95 OTHER _____ 96 (SPECIFY)																			
109	How many rooms in this household are used for sleeping?	ROOMS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table>																			
110	Does this household own any livestock, herds, other farm animals, or poultry?	YES ..... 1 NO ..... 2	→ 112																		
111	How many of the following animals does this household own? IF NONE, RECORD '00'. IF 95 OR MORE, RECORD '95'. IF UNKNOWN, RECORD '98'.  a) Cows (traditional)? b) Milk cows (modern)? c) Bulls? d) Goats? e) Sheep? f) Chickens or other poultry? g) Pigs? h) Rabbits? i) Horses, donkeys, or mules?	a) COWS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> b) MILK COWS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> c) BULLS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> d) GOATS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> e) SHEEPS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> f) CHICKENS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> g) PIGS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> h) RABBITS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table> i) HORSES/DONKEYS/MULES ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px;"></td><td style="width: 20px;"></td></tr></table>																			



MOSQUITO NETS

		NET #1	NET #2	NET #3
121	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD.  IF MORE THAN 3 NETS, USE ADDITIONAL QUESTIONNAIRE(S).	OBSERVED ..... 1 NOT OBSERVED ..... 2	OBSERVED ..... 1 NOT OBSERVED ..... 2	OBSERVED ..... 1 NOT OBSERVED ..... 2
121A	CHECK THE YEAR OF MANUFACTURING	YEAR ..... [ ][ ][ ][ ] NOT AVAILABLE .. 9998	YEAR ..... [ ][ ][ ][ ] NOT AVAILABLE .. 9998	YEAR ..... [ ][ ][ ][ ] NOT AVAILABLE .. 9998
122	How many months ago did your household get the mosquito net?  IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS [ ][ ] AGO ..... MORE THAN 36 MONTHS AGO ..... 95 NOT SURE ..... 98	MONTHS [ ][ ] AGO ..... MORE THAN 36 MONTHS AGO ..... 95 NOT SURE ..... 98	MONTHS [ ][ ] AGO ..... MORE THAN 36 MONTHS AGO ..... 95 NOT SURE ..... 98
123	OBSERVE OR ASK BRAND/TYPE OF MOSQUITO NET.  IF BRAND IS UNKNOWN AND YOU CANNOT OBSERVE THE NET, SHOW PICTURES OF TYPICAL NET TYPES/BRANDS TO RESPONDENT.	<b>LONG-LASTING INSECTICIDE-TREATED NET (LLIN)</b> TANA ..... 11 DCT ..... 12 OLYSET ..... 13 OTHER/DON'T KNOW BRAND ..... 16 (SKIP TO 126) ← OTHER TYPE ..... 96 DON'T KNOW TYPE .. 98	<b>LONG-LASTING INSECTICIDE-TREATED NET (LLIN)</b> TANA ..... 11 DCT ..... 12 OLYSET ..... 13 OTHER/DON'T KNOW BRAND ..... 16 (SKIP TO 126) ← OTHER TYPE ..... 96 DON'T KNOW TYPE .. 98	<b>LONG-LASTING INSECTICIDE-TREATED NET (LLIN)</b> TANA ..... 11 DCT ..... 12 OLYSET ..... 13 OTHER/DON'T KNOW BRAND ..... 16 (SKIP TO 126) ← OTHER TYPE ..... 96 DON'T KNOW TYPE .. 98
124	Since you got the net, was it ever soaked or dipped in a liquid to kill or repel mosquitoes?	YES ..... 1 NO ..... 2 (SKIP TO 126) ← NOT SURE ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 126) ← NOT SURE ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 126) ← NOT SURE ..... 8
125	How many months ago was the net last soaked or dipped?  IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS [ ][ ] AGO ..... MORE THAN 24 MONTHS AGO ..... 95 NOT SURE ..... 98	MONTHS [ ][ ] AGO ..... MORE THAN 24 MONTHS AGO ..... 95 NOT SURE ..... 98	MONTHS [ ][ ] AGO ..... MORE THAN 24 MONTHS AGO ..... 95 NOT SURE ..... 98
126	Did you get the net through a mass distribution campaign, during an antenatal care visit, or during an immunization visit?	YES, THROUGH A MASS DIST. CAMPAIGN ..... 1 YES, ANC ..... 2 YES, IMMUNIZATION VISIT ..... 3 (SKIP TO 127A) ← NO ..... 4	YES, [NAME OF MASS DIST. CAMPAIGN] ..... 1 YES, ANC ..... 2 YES, IMMUNIZATION VISIT ..... 3 (SKIP TO 127A) ← NO ..... 4	YES, [NAME OF MASS DIST. CAMPAIGN] ..... 1 YES, ANC ..... 2 YES, IMMUNIZATION VISIT ..... 3 (SKIP TO 127A) ← NO ..... 4
127	Where did you get the net?	GOVERNMENT HEALTH FACILITY ..... 01 PRIVATE HEALTH FACILITY ..... 02 PHARMACY ..... 03 SHOP/MARKET ..... 04 CHW ..... 05 RELIGIOUS INSTITUTION ..... 06 SCHOOL ..... 07 OTHER ..... 96 DON'T KNOW ..... 98	GOVERNMENT HEALTH FACILITY ..... 01 PRIVATE HEALTH FACILITY ..... 02 PHARMACY ..... 03 SHOP/MARKET ..... 04 CHW ..... 05 RELIGIOUS INSTITUTION ..... 06 SCHOOL ..... 07 OTHER ..... 96 DON'T KNOW ..... 98	GOVERNMENT HEALTH FACILITY ..... 01 PRIVATE HEALTH FACILITY ..... 02 PHARMACY ..... 03 SHOP/MARKET ..... 04 CHW ..... 05 RELIGIOUS INSTITUTION ..... 06 SCHOOL ..... 07 OTHER ..... 96 DON'T KNOW ..... 98

MOSQUITO NETS

		NET #1	NET #2	NET #3
127A	OBSERVE IF THE NET HAVE AT LEAST ONE HOLE EQUAL TO OR LARGER THAN THE THUMB	YES ..... 1 NO ..... 2	YES ..... 1 NO ..... 2	YES ..... 1 NO ..... 2
127B	OBSERVE THE SHAPE OF THE MOSQUITO NET.	CONICAL ..... 1 RECTANGULAR ..... 2	CONICAL ..... 1 RECTANGULAR ..... 2	CONICAL ..... 1 RECTANGULAR ..... 2
127C	OBSERVE THE COLOUR OF THE NET	WHITE ..... 1 GREEN ..... 2 BLUE ..... 3 RED ..... 4 OTHER ..... 6 (SPECIFY)	WHITE ..... 1 GREEN ..... 2 BLUE ..... 3 RED ..... 4 OTHER ..... 6 (SPECIFY)	WHITE ..... 1 GREEN ..... 2 BLUE ..... 3 RED ..... 4 OTHER ..... 6 (SPECIFY)
127D	OBSERVED IF THE NET IS HANGED	YES ..... 1 (SKIP TO 128) ← NO ..... 2	YES ..... 1 (SKIP TO 128) ← NO ..... 2	YES ..... 1 (SKIP TO 128) ← NO ..... 2
127E	Why don't you hange this net?	HAVE MANY NETS ..... 1 USE FOR OTHER PURPOSES ..... 2 THE NET IS BEING WASHED ..... 3 HANG ONLY IN THE EVENING ..... 4 THE NET IS TOO OLD .. 5 OTHER ..... 6 (SPECIFY)	HAVE MANY NETS ..... 1 USE FOR OTHER PURPOSES ..... 2 THE NET IS BEING WASHED ..... 3 HANG ONLY IN THE EVENING ..... 4 THE NET IS TOO OLD .. 5 OTHER ..... 6 (SPECIFY)	HAVE MANY NETS ..... 1 USE FOR OTHER PURPOSES ..... 2 THE NET IS BEING WASHED ..... 3 HANG ONLY IN THE EVENING ..... 4 THE NET IS TOO OLD .. 5 OTHER ..... 6 (SPECIFY)
128	Did anyone sleep under this mosquito net last night?	YES ..... 1 (SKIP TO 129) ← NO ..... 2 NOT SURE ..... 8	YES ..... 1 (SKIP TO 129) ← NO ..... 2 NOT SURE ..... 8	YES ..... 1 (SKIP TO 129) ← NO ..... 2 NOT SURE ..... 8
128A	Why no one sleep under this net last night?	TOO HOT ..... 1 TOO COLD ..... 2 NET USED FOR OTHER PURPOSES ..... 3 NET NOT HANGED ..... 4 BUGS IN NET ..... 5 OTHER ..... 6 (SPECIFY)	TOO HOT ..... 1 TOO COLD ..... 2 NET USED FOR OTHER PURPOSES ..... 3 NET NOT HANGED ..... 4 BUGS IN NET ..... 5 OTHER ..... 6 (SPECIFY)	TOO HOT ..... 1 TOO COLD ..... 2 NET USED FOR OTHER PURPOSES ..... 3 NET NOT HANGED ..... 4 BUGS IN NET ..... 5 OTHER ..... 6 (SPECIFY)
129	Who slept under this mosquito net last night?  RECORD THE PERSON'S NAME AND LINE NUMBER FROM HOUSEHOLD SCHEDULE.	NAME _____ LINE NO. .... [ ] [ ]	(SKIP TO 130) NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]
		NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]
		NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]
		NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]	NAME _____ LINE NO. .... [ ] [ ]

MOSQUITO NETS

		NET #1	NET #2	NET #3
129A	Which material of the net do you prefer?	POLYESTHER ..... 1 POLYETHYLENE ..... 2	POLYESTHER ..... 1 POLYETHYLENE ..... 2	POLYESTHER ..... 1 POLYETHYLENE ..... 2
129B	How many times did you wash this mosquito net since you have it	TIMES WASHED <input type="text"/> <input type="text"/> 95+ TIMES 95 DON'T KNOW 98	TIMES WASHED <input type="text"/> <input type="text"/> 95+ TIMES 95 DON'T KNOW 98	TIMES WASHED <input type="text"/> <input type="text"/> 95+ TIMES 95 DON'T KNOW 98
130		GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO TO 121 IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE NETS, GO TO 131.

ADDITIONAL HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP								
131	<p>OBSERVE MAIN MATERIAL OF THE FLOOR OF THE DWELLING.</p> <p>RECORD OBSERVATION.</p>	<p><b>NATURAL FLOOR</b>            EARTH/SAND ..... 11            DUNG ..... 12</p> <p><b>RUDIMENTARY FLOOR</b>            WOOD PLANKS ..... 21            PALM/BAMBOO ..... 22</p> <p><b>FINISHED FLOOR</b>            PARQUET OR POLISHED WOOD ..... 31            VINYL OR ASPHALT STRIPS ..... 32            CERAMIC TILES ..... 33            CEMENT ..... 34            CARPET ..... 35</p> <p>OTHER _____ 96            (SPECIFY)</p>									
132	<p>OBSERVE MAIN MATERIAL OF THE ROOF OF THE DWELLING.</p> <p>RECORD OBSERVATION.</p>	<p><b>NATURAL ROOFING</b>            NO ROOF ..... 11            THATCH/PALM LEAF ..... 12            SOD ..... 13</p> <p><b>RUDIMENTARY ROOFING</b>            RUSTIC MAT ..... 21            PALM/BAMBOO ..... 22            WOOD PLANKS ..... 23            CARDBOARD ..... 24</p> <p><b>FINISHED ROOFING</b>            METAL ..... 31            WOOD ..... 32            CALAMINE/CEMENT FIBER ..... 33            CERAMIC TILES ..... 34            CEMENT ..... 35            ROOFING SHINGLES ..... 36</p> <p>OTHER _____ 96            (SPECIFY)</p>									
133	<p>OBSERVE MAIN MATERIAL OF THE EXTERIOR WALLS OF THE DWELLING.</p> <p>RECORD OBSERVATION.</p>	<p><b>NATURAL WALLS</b>            NO WALLS ..... 11            CANE/PALM/TRUNKS ..... 12            DIRT ..... 13</p> <p><b>RUDIMENTARY WALLS</b>            BAMBOO WITH MUD ..... 21            STONE WITH MUD ..... 22            UNCOVERED ADOBE ..... 23            PLYWOOD ..... 24            CARDBOARD ..... 25            REUSED WOOD ..... 26</p> <p><b>FINISHED WALLS</b>            CEMENT ..... 31            STONE WITH LIME/CEMENT ..... 32            BRICKS ..... 33            CEMENT BLOCKS ..... 34            COVERED ADOBE ..... 35            WOOD PLANKS/SHINGLES ..... 36</p> <p>OTHER _____ 96            (SPECIFY)</p>									
134	<p>RECORD THE TIME.</p>	<p>HOURS ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table></p> <p>MINUTES ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table></p>									

INTERVIEWER'S OBSERVATIONS  
TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

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COMMENTS ON SPECIFIC QUESTIONS:

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ANY OTHER COMMENTS:

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SUPERVISOR'S OBSERVATIONS

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EDITOR'S OBSERVATIONS

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MALARIA INDICATOR SURVEY  
 WOMAN'S QUESTIONNAIRE

RWANDA  
 MALARIA & OTHER PARASITIC DISEASES DIVISION

IDENTIFICATION										
PLACE NAME _____										
NAME OF HOUSEHOLD HEAD _____										
CLUSTER NUMBER .....				<table border="1" style="width: 100px; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> </table>						
HOUSEHOLD NUMBER .....				<table border="1" style="width: 100px; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> </table>						
NAME AND LINE NUMBER OF WOMAN _____										
INTERVIEWER VISITS										
	1	2	3	FINAL VISIT						
DATE	_____	_____	_____	DAY <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td></tr></table>						
INTERVIEWER'S NAME	_____	_____	_____	MONTH <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td></tr></table>						
RESULT*	_____	_____	_____	YEAR <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td><td> </td></tr></table>						
NEXT VISIT: DATE	_____	_____		INT. NO. <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td><td> </td></tr></table>						
TIME	_____	_____		RESULT* <table border="1" style="width: 40px; height: 20px;"><tr><td> </td></tr></table>						
				TOTAL NUMBER OF VISITS <table border="1" style="width: 40px; height: 20px;"><tr><td> </td></tr></table>						
*RESULT CODES: 1 COMPLETED      4 REFUSED 2 NOT AT HOME      5 PARTLY COMPLETED      7 OTHER _____ SPECIFY 3 POSTPONED      6 INCAPACITATED										
LANGUAGE OF QUESTIONNAIRE** <table border="1" style="width: 20px; height: 20px;"><tr><td>0</td></tr></table> <table border="1" style="width: 20px; height: 20px;"><tr><td>1</td></tr></table>		0	1	LANGUAGE OF INTERVIEW** <table border="1" style="width: 20px; height: 20px;"><tr><td> </td></tr></table> <table border="1" style="width: 20px; height: 20px;"><tr><td> </td></tr></table>				NATIVE LANGUAGE OF RESPONDENT** <table border="1" style="width: 20px; height: 20px;"><tr><td> </td></tr></table> <table border="1" style="width: 20px; height: 20px;"><tr><td> </td></tr></table>		
0										
1										
LANGUAGE OF QUESTIONNAIRE** <b>ENGLISH</b>		**LANGUAGE CODES: 01 ENGLISH 02 KINYARWANDA								
SUPERVISOR		OFFICE EDITOR		KEYED BY						
NAME _____		NUMBER <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td><td> </td><td> </td></tr></table>						NUMBER <table border="1" style="width: 40px; height: 20px;"><tr><td> </td><td> </td></tr></table>		

(1) This section should be adapted for country-specific survey design.  
 Note: Brackets [ ] indicate items that should be adapted on a country-specific basis.

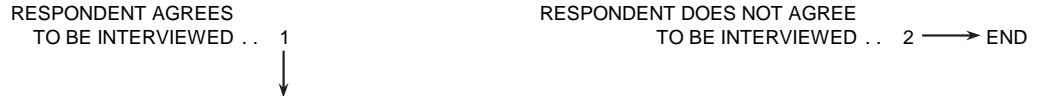
INTRODUCTION AND CONSENT

Hello. My name is \_\_\_\_\_. I am working with the Ministry of Health. We are conducting a survey about malaria all over Rwanda. The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 10 to 20 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.

Do you have any questions?  
May I begin the interview now?

SIGNATURE OF INTERVIEWER \_\_\_\_\_ DATE \_\_\_\_\_



NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOURS ..... <input type="text"/> <input type="text"/> MINUTES ..... <input type="text"/> <input type="text"/>	
102	In what month and year were you born?	MONTH ..... <input type="text"/> <input type="text"/> DON'T KNOW MONTH ..... 98 YEAR ..... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW YEAR ..... 9998	
103	How old were you at your last birthday?  COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT.	AGE IN COMPLETED YEARS ..... <input type="text"/> <input type="text"/>	
104	Have you ever attended school?	YES ..... 1 NO ..... 2	→ 108
105	What is the highest level of school you attended: primary, secondary, or higher?	PRIMARY ..... 1 POST-PRIMARY/VOCATIONAL ..... 2 SECONDARY ..... 3 TERTIARY ..... 4 PRE-PRIMARY ..... 5	
106	What is the highest grade/form/year you completed at that level?  IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE/FORM/YEAR ..... <input type="text"/> <input type="text"/>	
107	CHECK 105:  PRE-PRIMARY <input type="checkbox"/> PRIMARY <input type="checkbox"/> POST-PRIMARY/ VOCATIONAL SECONDARY ↓	HIGHER <input type="checkbox"/>	→ 109
108	Now I would like you to read this sentence to me.  SHOW CARD TO RESPONDENT.  IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?	CANNOT READ AT ALL ..... 1 ABLE TO READ ONLY PART OF THE SENTENCE ..... 2 ABLE TO READ WHOLE SENTENCE ..... 3 NO CARD WITH REQUIRED LANGUAGE ..... 4 (SPECIFY LANGUAGE) _____ BLIND/VISUALLY IMPAIRED ..... 5	

**SECTION 1. RESPONDENT'S BACKGROUND**

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
109	What is your religion?	CATHOLIC ..... 1 PROTESTANT ..... 2 ADVENTIST ..... 3 MUSLIM ..... 4 TRADITIONAL ..... 5 OTHER ..... 6 _____ SPECIFY NO RELIGION ..... 7	
109A	Have you ever heard an illness called malaria?	YES ..... 1 NO ..... 2	→ 201
109B	Can you tell me the main sign or symptom of malaria?  MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)	FEVER ..... A FEELING COLD ..... B HEADACHE ..... C NAUSEA AND VOMITING ..... D DIARRHEA ..... E DIZZINESS ..... F LOSS OF APPETITE ..... G BODY ACHE OR JOINT PAIN ..... H PALE EYES ..... I SALTY TASTING PALMS ..... J BODY WEAKNESS ..... K REFUSING TO EAT OR DRINK ..... L OTHER ..... X _____ SPECIFY	
109C	In your opinion, what causes malaria?  MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)	MOSQUITO BITES ..... A EATING IMMATURE SUGACANE ..... B EATING DIRTY FOOD ..... C DRINKING DIRTY WATER ..... D GETTING SOAKED WITH RAIN ..... E COLD OR CHANGING WEATHER ..... F WITCHCRAFT ..... G OTHER ..... X _____ SPECIFY DON'T KNOW ..... Z	
109D	How can someone protect themselves against malaria?  MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)	SLEEP UNDER A MOSQUITO NET ..... A SLEEP UNDER A INSECTICIDE TREATED MOSQUITO NET ..... B USE MOSQUITO REPELLANT ..... C AVOID MOSQUITO BITES ..... D TAKE PREVENTIVE MEDICATION ..... E SPRAY HOUSE WITH INSECTICIDE ..... F USE MOSQUITO COILS ..... G CUT THE GRASS AROUND THE HOUSE ..... H FILL IN PUDDLES (STAGNANT WATER) ..... I KEEP HOUSE SURROUNDINGS CLEAN ..... J BURN LEAVES ..... K DON'T DRINK DIRTY WATER ..... L DON'T EAT BAD FOOD ..... M PUT MOSQUITO SCREENS ON THE WINDOWS ..... N DON'T GET SOAKED WITH RAIN ..... O OTHER ..... X _____ SPECIFY DON'T KNOW ..... Z	

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP																					
109E	<p>Where can someone receive treatment for malaria?</p> <p>MULTIPLE RESPONSES POSSIBLE PROBE ONCE (ANYTHING ELSE?)</p>	<p>PUBLIC/AGREE SECTOR</p> <p>REF. HOSPITAL ..... A</p> <p>DIST. HOSPITAL ..... B</p> <p>HEALTH CENTER ..... C</p> <p>HEALTH POST ..... D</p> <p>OUTREACH ..... E</p> <p>COMMUNITY HEALTH WORKER .. F</p> <p>OTHER PUBLIC FACILITY ..... G</p> <p align="center">_____ (SPECIFY)</p> <p>PRIVATE MED. SECTOR</p> <p>POLYCLINIC ..... H</p> <p>CLINIC ..... I</p> <p>DISPENSARY ..... J</p> <p>PHARMACY ..... K</p> <p>OTHER PRIVATE MEDICAL FACILITY ..... L</p> <p align="center">_____ (SPECIFY)</p> <p>OTHER SOURCE</p> <p>KIOSK ..... M</p> <p>TRADITIONAL PRACTITIONER .. N</p> <p>CHURCH ..... O</p> <p>FRIEND/RELATIVE ..... P</p> <p>OTHER ..... X</p> <p align="center">_____ (SPECIFY)</p> <p>DON'T KNOW ..... Z</p>																						
111	<p>In the past six months, have you seen or heard any messages about malaria?</p>	<p>YES ..... 1</p> <p>NO ..... 2</p>	<p>→ 201</p>																					
112	<p>Have you seen or heard these messages:</p> <p>a) On the radio?</p> <p>b) On the television?</p> <p>c) On a poster or billboard?</p> <p>d) From a community health worker?</p> <p>e) At a community event?</p> <p>f) Anywhere else?</p>	<table border="0"> <tr> <td></td> <td align="right">YES</td> <td align="right">NO</td> </tr> <tr> <td>RADIO .....</td> <td align="right">1</td> <td align="right">2</td> </tr> <tr> <td>TELEVISION .....</td> <td align="right">1</td> <td align="right">2</td> </tr> <tr> <td>POSTER/BILLBOARD .....</td> <td align="right">1</td> <td align="right">2</td> </tr> <tr> <td>COMMUNITY HEALTH WORKER .....</td> <td align="right">1</td> <td align="right">2</td> </tr> <tr> <td>COMMUNITY EVENT .....</td> <td align="right">1</td> <td align="right">2</td> </tr> <tr> <td>ANYWHERE ELSE .....</td> <td align="right">1</td> <td align="right">2</td> </tr> </table>		YES	NO	RADIO .....	1	2	TELEVISION .....	1	2	POSTER/BILLBOARD .....	1	2	COMMUNITY HEALTH WORKER .....	1	2	COMMUNITY EVENT .....	1	2	ANYWHERE ELSE .....	1	2	
	YES	NO																						
RADIO .....	1	2																						
TELEVISION .....	1	2																						
POSTER/BILLBOARD .....	1	2																						
COMMUNITY HEALTH WORKER .....	1	2																						
COMMUNITY EVENT .....	1	2																						
ANYWHERE ELSE .....	1	2																						

**SECTION 2. REPRODUCTION**

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES ..... 1 NO ..... 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES ..... 1 NO ..... 2	→ 204
203	a) How many sons live with you? b) And how many daughters live with you? IF NONE, RECORD '00'.	a) SONS AT HOME ..... <input type="text"/> <input type="text"/> b) DAUGHTERS AT HOME ..... <input type="text"/> <input type="text"/>	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES ..... 1 NO ..... 2	→ 206
205	a) How many sons are alive but do not live with you? b) And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	a) SONS ELSEWHERE ..... <input type="text"/> <input type="text"/> b) DAUGHTERS ELSEWHERE ..... <input type="text"/> <input type="text"/>	
206	Have you ever given birth to a boy or girl who was born alive but later died?  IF NO, PROBE: Any baby who cried, who made any movement, sound, or effort to breathe, or who showed any other signs of life even if for a very short time?	YES ..... 1 NO ..... 2	→ 208
207	a) How many boys have died? b) And how many girls have died? IF NONE, RECORD '00'.	a) BOYS DEAD ..... <input type="text"/> <input type="text"/> b) GIRLS DEAD ..... <input type="text"/> <input type="text"/>	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL BIRTHS ..... <input type="text"/> <input type="text"/>	
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL ____ births during your life. Is that correct?  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                         YES  <input type="checkbox"/>                          ↓                     </div> <div style="text-align: center;">                         NO <input type="checkbox"/>                          ↓                          PROBE AND                          CORRECT 201-208                          AS NECESSARY.                     </div> </div>		
210	CHECK 208:  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">                         ONE OR MORE                          BIRTHS <input type="checkbox"/>                          ↓                     </div> <div style="text-align: center;">                         NO BIRTHS <input type="checkbox"/> → 225                     </div> </div>		
211	Now I'd like to ask you about your more recent births. How many births have you had in 2012-2017?  RECORD NUMBER OF LIVE BIRTHS IN 2012-2015	TOTAL IN 2012-2015 ..... <input type="text"/> <input type="text"/> NONE ..... 00	→ 225

**SECTION 2. REPRODUCTION**

<p>212 Now I would like to record the names of all your births in 2012-2017, whether still alive or not, starting with the most recent one you had.                  RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2012-2017. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. IF THERE ARE MORE THAN 5 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE STARTING WITH THE SECOND ROW.</p>								
213	214	215	216	217	218 IF ALIVE:	219 IF ALIVE:	220 IF ALIVE:	221
What name was given to your (most recent/ previous) baby?  RECORD NAME.  BIRTH HISTORY NUMBER.	Is (NAME) a boy or a girl?	Were any of these births twins?	On what day, month, and year was (NAME) born?	Is (NAME) still alive?	How old was (NAME) at (NAME)'s last birthday?  RECORD AGE IN COMPLETED YEARS.	Is (NAME) living with you?	RECORD HOUSEHOLD LINE NUMBER OF CHILD. RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD.	Were there any other live births between (NAME) and (NAME OF PREVIOUS BIRTH), including any children who died after birth?
01	BOY 1  GIRL 2	SING 1  MULT 2	DAY <input type="text"/> <input type="text"/>  MONTH <input type="text"/> <input type="text"/>  <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> YEAR	YES 1  NO 2 ↓ (NEXT BIRTH)	AGE IN YEARS  <input type="text"/> <input type="text"/>	YES 1  NO 2	HOUSEHOLD LINE NUMBER  <input type="text"/> <input type="text"/> ↓ (NEXT BIRTH)	
02	BOY 1  GIRL 2	SING 1  MULT 2	DAY <input type="text"/> <input type="text"/>  MONTH <input type="text"/> <input type="text"/>  <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> YEAR	YES 1  NO 2 ↓ (SKIP TO 221)	AGE IN YEARS  <input type="text"/> <input type="text"/>	YES 1  NO 2	HOUSEHOLD LINE NUMBER  <input type="text"/> <input type="text"/>	YES 1 (ADD BIRTH) ↙  NO 2 (NEXT BIRTH) ↙
03	BOY 1  GIRL 2	SING 1  MULT 2	DAY <input type="text"/> <input type="text"/>  MONTH <input type="text"/> <input type="text"/>  <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> YEAR	YES 1  NO 2 ↓ (SKIP TO 221)	AGE IN YEARS  <input type="text"/> <input type="text"/>	YES 1  NO 2	HOUSEHOLD LINE NUMBER  <input type="text"/> <input type="text"/>	YES 1 (ADD BIRTH) ↙  NO 2 (NEXT BIRTH) ↙
04	BOY 1  GIRL 2	SING 1  MULT 2	DAY <input type="text"/> <input type="text"/>  MONTH <input type="text"/> <input type="text"/>  <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> YEAR	YES 1  NO 2 ↓ (SKIP TO 221)	AGE IN YEARS  <input type="text"/> <input type="text"/>	YES 1  NO 2	HOUSEHOLD LINE NUMBER  <input type="text"/> <input type="text"/>	YES 1 (ADD BIRTH) ↙  NO . . . . 2 (NEXT BIRTH) ↙
05	BOY 1  GIRL 2	SING 1  MULT 2	DAY <input type="text"/> <input type="text"/>  MONTH <input type="text"/> <input type="text"/>  <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> YEAR	YES 1  NO 2 ↓ (SKIP TO 221)	AGE IN YEARS  <input type="text"/> <input type="text"/>	YES 1  NO 2	HOUSEHOLD LINE NUMBER  <input type="text"/> <input type="text"/>	YES 1 (ADD BIRTH) ↙  NO . . . . 2 (NEXT BIRTH) ↙

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
222	Have you had any live births since the birth of (NAME OF MOST RECENT BIRTH)?"	YES ..... 1 (RECORD BIRTH(S) IN TABLE) ← NO ..... 2	
223	COMPARE 211 WITH NUMBER OF BIRTHS IN BIRTH HISTORY  NUMBERS ARE SAME <input type="checkbox"/> ↓	NUMBERS ARE DIFFERENT <input type="checkbox"/> (PROBE AND RECONCILE) ←	
224	CHECK 216: ENTER THE NUMBER OF BIRTHS IN 2012-2017	NUMBER OF BIRTHS ..... <input type="text"/> NONE ..... 0	
225	Are you pregnant now?	YES ..... 1 NO ..... 2 UNSURE ..... 8	→ 227
226	How many months pregnant are you?  RECORD NUMBER OF COMPLETED MONTHS.	MONTHS ..... <input type="text"/> <input type="text"/>	
227 (1)	CHECK 224:  ONE OR MORE BIRTHS IN 2012-2017 <input type="checkbox"/> (GO TO 301) ←	NO BIRTHS IN 2012-2017 <input type="checkbox"/> Q. 224 IS BLANK <input type="checkbox"/>	→ 429 → 429

SECTION 2. FOOTNOTES

(1) Year of fieldwork is assumed to be 2017. For fieldwork beginning in 2018, all references to calendar years should be increased by one; for example, 2012 should be changed to 2013, 2013 should be changed to 2014, and similarly for all years throughout the questionnaire.

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	RECORD THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH FROM 213 AND 217,	<p align="center">MOST RECENT BIRTH</p> <p>NAME _____</p> <p>LIVING <input type="checkbox"/>                  DEAD <input type="checkbox"/></p> <p style="text-align: center;">↓    ↓</p>	
302	<p>Now I would like to ask you some questions about your last pregnancy that resulted in a live birth.</p> <p>When you got pregnant with (NAME), did you see anyone for antenatal care for this pregnancy?</p>	<p>YES ..... 1</p> <p>NO ..... 2</p>	→ 307
303	<p>Whom did you see?</p> <p>Anyone else?</p> <p>PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.</p>	<p><b>HEALTH PERSONNEL</b></p> <p>DOCTOR ..... A</p> <p>NURSE/MIDWIFE ..... B</p> <p>AUXILIARY MIDWIFE ..... C</p> <p><b>OTHER PERSON</b></p> <p>TRADITIONAL BIRTH ATTENDANT ..... D</p> <p>COMMUNITY/VILLAGE HEALTH WORKER .. E</p> <p>OTHER _____ X</p> <p align="center">(SPECIFY)</p>	
307	<p>CHECK 216 AND 217:</p> <p align="center">ONE OR MORE LIVING CHILDREN BORN IN 2012-2017 <input type="checkbox"/></p> <p align="center">(GO TO 401) ←</p>	<p>NO LIVING CHILDREN BORN IN 2012-2017 <input type="checkbox"/></p>	→ 429

SECTION 3. FOOTNOTES

- (1) Coding categories to be developed locally; however, the broad categories must be maintained. Additions to the codes under the private medical sector heading may include religious affiliated sources and NGO sources.
- (2) Year of fieldwork is assumed to be 2017. For fieldwork beginning in 2018, all references to calendar years should be increased by one; for example, 2011 should be changed to 2012, 2012 should be changed to 2013, 2013 should be changed to 2014, and similarly for all years throughout the questionnaire.



**SECTION 4. FEVER IN CHILDREN**

401	<p>CHECK 213: RECORD THE BIRTH HISTORY NUMBER IN 402 AND THE NAME AND SURVIVAL STATUS IN 403 FOR EACH BIRTH IN 2012-2017. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE MOST RECENT BIRTH. IF THERE ARE MORE THAN 2 BIRTHS, USE ADDITIONAL QUESTIONNAIRE(S).</p> <p>Now I would like to ask some questions about the health of your children born since January 2010. (We will talk about each separately.)</p>		
402	BIRTH HISTORY NUMBER FROM 213 IN BIRTH HISTORY.	<p align="center">MOST RECENT BIRTH</p> BIRTH HISTORY NUMBER ..... <input type="text"/> <input type="text"/>	<p align="center">NEXT MOST RECENT BIRTH</p> BIRTH HISTORY NUMBER ..... <input type="text"/> <input type="text"/>
403	FROM 213 AND 217:	<p>NAME _____</p> <p>LIVING <input type="checkbox"/>      DEAD <input type="checkbox"/></p> <p>↓      (SKIP TO 428) ←</p>	<p>NAME _____</p> <p>LIVING <input type="checkbox"/>      DEAD <input type="checkbox"/></p> <p>↓      (SKIP TO 428) ←</p>
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES ..... 1 NO ..... 2 (SKIP TO 428) ← DON'T KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 428) ← DON'T KNOW ..... 8
405	At any time during the illness, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8
406	Did you seek advice or treatment for the illness from any source?	YES ..... 1 NO ..... 2 (SKIP TO 411) ←	YES ..... 1 NO ..... 2 (SKIP TO 411) ←
407 (2)	<p>Where did you seek advice or treatment?</p> <p>Anywhere else?</p> <p>PROBE TO IDENTIFY THE TYPE OF SOURCE.</p> <p>IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE(S).</p> <p>_____</p> <p align="center">(NAME OF PLACE)</p>	<p><b>PUBLIC SECTOR</b></p> REF. HOSPITAL .. A PROV./DIST. HOSPITAL .. B HEALTH CENTER ..... C HEALTH POST ..... D OUTREACH ..... E COMMUNITY HEALTH WORKER ..... F OTHER PUBLIC FACILITY ..... G _____ (SPECIFY) <p><b>PRIVATE MEDICAL SECTOR</b></p> POLYCLINIC ..... H CLINIC ..... I DISPENSARY ..... J PHARMACY ..... K OTHER PRIVATE MEDICAL FACILITY ..... L _____ (SPECIFY) <p><b>OTHER SOURCE</b></p> KIOSK/SHOP ..... M TRADITIONAL HEALER . N CHURCH ..... O FRIEND/RELATIVE ..... P OTHER _____ X (SPECIFY)	<p><b>PUBLIC SECTOR</b></p> REF. HOSPITAL .. A PROV./DIST. HOSPITAL .. B HEALTH CENTER ..... C HEALTH POST ..... D OUTREACH ..... E COMMUNITY HEALTH WORKER ..... F OTHER PUBLIC FACILITY ..... G _____ (SPECIFY) <p><b>PRIVATE MEDICAL SECTOR</b></p> POLYCLINIC ..... H CLINIC ..... I DISPENSARY ..... J PHARMACY ..... K OTHER PRIVATE MEDICAL FACILITY ..... L _____ (SPECIFY) <p><b>OTHER SOURCE</b></p> KIOSK/SHOP ..... M TRADITIONAL HEALER . N CHURCH ..... O FRIEND/RELATIVE ..... P OTHER _____ X (SPECIFY)

**SECTION 4. FEVER IN CHILDREN**

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME _____	NEXT MOST RECENT BIRTH NAME _____
408	CHECK 407:	TWO OR MORE CODES CIRCLED <input type="checkbox"/> ONLY ONE CODE CIRCLED <input type="checkbox"/> (SKIP TO 410) ←	TWO OR MORE CODES CIRCLED <input type="checkbox"/> ONLY ONE CODE CIRCLED <input type="checkbox"/> (SKIP TO 410) ←
409	Where did you first seek advice or treatment?  USE LETTER CODE FROM 407	FIRST PLACE ..... <input type="checkbox"/>	FIRST PLACE ..... <input type="checkbox"/>
410	How many days after the illness began did you first seek advice or treatment for (NAME)? IF THE SAME DAY RECORD '00'.	DAYS ..... <input type="text"/> <input type="text"/>	DAYS ..... <input type="text"/> <input type="text"/>
411	At any time during the illness, did (NAME) take any drugs for the illness?	YES ..... 1 NO ..... 2 (SKIP TO 428) ← DON'T KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 428) ← DON'T KNOW ..... 8
412 (3)	What drugs did (NAME) take?  Any other drugs?  RECORD ALL MENTIONED.	<b>ANTIMALARIAL DRUGS</b> ARTEMISININ COMBINATION THERAPY (ACT) ..... A QUININE PILLS ..... B INJECTION/IV ..... C ARTESUNATE RECTAL ..... D INJECTION/IV ..... E  OTHER ANTIMALARIAL _____ F (SPECIFY)  <b>ANTIBIOTIC DRUGS</b> PILL/SYRUP ..... G INJECTION/IV ..... H  <b>OTHER DRUGS</b> ASPIRIN ..... I ACETAMINOPHEN ..... J IBUPROFEN ..... K  OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	<b>ANTIMALARIAL DRUGS</b> ARTEMISININ COMBINATION THERAPY (ACT) ..... A QUININE PILLS ..... B INJECTION/IV ..... C ARTESUNATE RECTAL ..... D INJECTION/IV ..... E  OTHER ANTIMALARIAL _____ F (SPECIFY)  <b>ANTIBIOTIC DRUGS</b> PILL/SYRUP ..... G INJECTION/IV ..... H  <b>OTHER DRUGS</b> ASPIRIN ..... I ACETAMINOPHEN ..... J IBUPROFEN ..... K  OTHER _____ X (SPECIFY) DON'T KNOW ..... Z
413	CHECK 412: ANY CODE A-F CIRCLED?	YES <input type="checkbox"/> NO <input type="checkbox"/> (SKIP TO 428) ←	YES <input type="checkbox"/> NO <input type="checkbox"/> (SKIP TO 428) ←

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH		NEXT MOST RECENT BIRTH	
		NAME _____		NAME _____	
414	CHECK 412: ARTEMISININ COMBINATION THERAPY ('A') GIVEN	CODE 'A' CIRCLED <input type="checkbox"/> ↓	CODE 'A' NOT CIRCLED <input type="checkbox"/> (SKIP TO 416) ←	CODE 'A' CIRCLED <input type="checkbox"/> ↓	CODE 'A' NOT CIRCLED <input type="checkbox"/> (SKIP TO 416) ←
415	How long after the fever started did (NAME) first take an artemisinin combination therapy?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8		

**SECTION 4. FEVER IN CHILDREN**

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH		NEXT MOST RECENT BIRTH					
		NAME _____		NAME _____					
416	CHECK 412: QUININE ('B' OR 'C') GIVEN	CODE 'B' OR 'C' CIRCLED <input type="checkbox"/> ↓	CODE 'B' OR 'F' NOT CIRCLED <input type="checkbox"/> (SKIP TO 418) ←	CODE 'B' OR 'C' CIRCLED <input type="checkbox"/> ↓	CODE 'B' OR 'F' NOT CIRCLED <input type="checkbox"/> (SKIP TO 418) ←				
417	How long after the fever started did (NAME) first take Quinine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8				
418	CHECK 412: ARTESUNATE ('D' OR 'E') GIVEN	CODE 'D' OR 'E' CIRCLED <input type="checkbox"/> ↓	CODE 'D' OR 'E' NOT CIRCLED <input type="checkbox"/> (SKIP TO 420) ←	CODE 'D' OR 'E' CIRCLED <input type="checkbox"/> ↓	CODE 'D' OR 'E' NOT CIRCLED <input type="checkbox"/> (SKIP TO 420) ←				
419	How long after the fever started did (NAME) first take artesunate?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8				
420	CHECK 412: OTHER ANTIMALARIAL ('F') GIVEN	CODE 'F' CIRCLED <input type="checkbox"/> ↓	CODE 'F' NOT CIRCLED <input type="checkbox"/> (SKIP TO 428) ←	CODE 'F' CIRCLED <input type="checkbox"/> ↓	CODE 'F' NOT CIRCLED <input type="checkbox"/> (SKIP TO 428) ←				
421	How long after the fever started did (NAME) first take (OTHER ANTIMALARIAL)?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER FEVER ..... 2 THREE OR MORE DAYS AFTER FEVER ..... 3 DON'T KNOW ..... 8				
428		GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 429.	GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 429.						
429	RECORD THE TIME.	HOURS .....	MINUTES .....	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table>					

**SECTION 4. FOOTNOTES**

- (1) Year of fieldwork is assumed to be 2017. For fieldwork beginning in 2018, all references to calendar years should be increased by one; for example, 2011 should be changed to 2012, 2012 should be changed to 2013, 2013 should be changed to 2014, and similarly for all years throughout the questionnaire.
- (2) Coding categories to be developed locally; however, the broad categories must be maintained. Additions to the codes under the private medical sector heading may include religious affiliated sources and NGO sources.
- (3) Coding categories to be developed locally and revised based on the pretest. All antimalarials commonly used in the country should be included in the response categories. Common brand names of drugs, such as Bayer, Tylenol or Paracetamol, should be added to the response categories for aspirin, acetaminophen, or ibuprofen as appropriate.

INTERVIEWER'S OBSERVATIONS  
TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

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COMMENTS ON SPECIFIC QUESTIONS:

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ANY OTHER COMMENTS:

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SUPERVISOR'S OBSERVATIONS

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EDITOR'S OBSERVATIONS

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MALARIA INDICATOR SURVEY  
 MODEL BIOMARKER QUESTIONNAIRE

[NAME OF COUNTRY]  
 [NAME OF ORGANIZATION]

IDENTIFICATION (1)												
PLACE NAME _____												
NAME OF HOUSEHOLD HEAD _____												
CLUSTER NUMBER .....				<table border="1" style="width: 100%; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>								
HOUSEHOLD NUMBER .....				<table border="1" style="width: 100%; height: 20px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>								
FIELDWORKER VISITS												
	1	2	3	FINAL VISIT								
DATE	_____	_____	_____	DAY <table border="1" style="width: 40px; height: 20px; float: right;"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>								
FIELDWORKER'S NAME	_____	_____	_____	MONTH <table border="1" style="width: 40px; height: 20px; float: right;"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>								
				YEAR <table border="1" style="width: 60px; height: 20px; float: right;"> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>								
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS <table border="1" style="width: 40px; height: 20px; float: right;"> <tr><td> </td></tr> </table>								
	_____	_____										
TIME	_____	_____										
NOTES: _____ _____ _____ _____ _____				TOTAL ELIGIBLE CHILDREN <table border="1" style="width: 40px; height: 20px; float: right;"> <tr><td> </td><td> </td></tr> </table>								
				TOTAL ELIGIBLE ADULTS <table border="1" style="width: 40px; height: 20px; float: right;"> <tr><td> </td><td> </td></tr> </table>								
LANGUAGE OF QUESTIONNAIRE** <table border="1" style="width: 40px; height: 20px; text-align: center;"> <tr><td>0</td><td>1</td></tr> </table>		0	1	LANGUAGE OF INTERVIEW** <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table>				NATIVE LANGUAGE OF RESPONDENT** <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table>				
0	1											
LANGUAGE OF QUESTIONNAIRE** <b>ENGLISH</b>		**LANGUAGE CODES: 01 ENGLISH      03 LANGUAGE 3      05 LANGUAGE 5 02 LANGUAGE 2      04 LANGUAGE 4      06 LANGUAGE 6										
SUPERVISOR		OFFICE EDITOR		KEYED BY								
NAME _____		NUMBER <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>						NUMBER <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table>				
		NUMBER <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table>				NUMBER <table border="1" style="width: 40px; height: 20px;"> <tr><td> </td><td> </td></tr> </table>						

Note: Brackets [ ] indicate items that should be adapted on a country-specific basis.

MALARIA TESTING FOR CHILDREN AGE 6 months-14 years

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 1	CHILD 2	CHILD 3
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED OR 5 YEARS AND OLDER ASK: What is (NAME)'s date of birth?	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
104 (2)	CHECK 103 AND CALCULATE IF THE CHILD IS LESS THAN 15 YEARS OLD	YES ..... 1 NO ..... 2 (SKIP TO 130) ←	YES ..... 1 NO ..... 2 (SKIP TO 130) ←	YES ..... 1 NO ..... 2 (SKIP TO 130) ←
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2
106	LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD FROM COLUMN 1 OF HOUSEHOLD SCHEDULE.	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)
109	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT.	<p>As part of this survey, we are asking children all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria.</p> <p>We ask that all children born in 2003 or later take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in the malaria test?</p>		
110	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ... 99994	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ... 99994	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ... 99994



		REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←
115	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE MALARIA PAMPHLET.	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6
118 (4)	Does (NAME) suffer from any of the following illnesses or symptoms:	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2
118A	CHECK 118: ANY 'YES' CIRCLED?	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←
119	CHECK 115:	CODE '1' IS CIRCLED CODE '2 OR 6' IS CIRCLED ↓ (SKIP TO 130) ←	CODE '1' IS CIRCLED CODE '2 OR 6' IS CIRCLED ↓ (SKIP TO 130) ←	CODE '1' IS CIRCLED CODE '2 OR 6' IS CIRCLED ↓ (SKIP TO 130) ←
121 (5)	In the past two weeks has (NAME) taken or is taking Coartem given by a doctor or health center to treat the malaria?  VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←

122	<b>SEVERE ILLNESS REFERRAL</b>  RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	(NAME OF CHILD) has symptoms of severe illness. The malaria treatment I have will not help your child, and I cannot give you the medication. Your child is very ill and must be taken to a health facility right away.  (SKIP TO 130)		
123 (5)	ALREADY TAKING COARTEM REFERRAL STATEMENT	You have told me that (NAME OF CHILD) had already received Coartem for malaria. Therefore, I cannot give you additional Coartem. However, the test shows that he/she has malaria. If your child has a fever for two days after the last dose of Coartem, you should take the child to the nearest health facility for further examination.  (SKIP TO 130)		
124 (2)	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called Coartem is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6
126	CHECK 125: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←
127 (5)	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	[INSERT DOSAGE INSTRUCTIONS]  ALSO TELL THE PARENT/OTHER ADULT: If [NAME] has a high fever, fast or difficult breathing, is not able to drink or breastfeed, gets sicker or does not get better in two days, you should take him/her to a health professional for treatment right away.		
130	GO BACK TO 106 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

MALARIA TESTING FOR CHILDREN AGE 6 months-14 years

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 4	CHILD 5	CHILD 6
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED OR 5 YEARS AND OLDER ASK: What is (NAME)'s date of birth?	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	DAY ..... <input type="text"/> <input type="text"/> MONTH ..... <input type="text"/> <input type="text"/> YEAR ... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
104	CHECK 103 AND CALCULATE IF THE CHILD IS LESS THAN 15 YEARS OLD	YES ..... 1 NO ..... 2 (SKIP TO 130) ←	YES ..... 1 NO ..... 2 (SKIP TO 130) ←	YES ..... 1 NO ..... 2 (SKIP TO 130) ←
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2	0-5 MONTHS ..... 1 (SKIP TO 130) ← OLDER ..... 2
106	LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD FROM COLUMN 1 OF HOUSEHOLD SCHEDULE.	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)
109	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT.	<p>As part of this survey, we are asking children all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria.</p> <p>We ask that all children born in 2003 or later take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in the malaria test?</p>		
110	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3	GRANTED ..... 1 REFUSED ..... 2 ← (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NOT PRESENT/OTHER . 3
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE.	PUT THE 1ST BAR CODE LABEL HERE.	PUT THE 1ST BAR CODE LABEL HERE.

		NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 118) ←
115	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE MALARIA PAMPHLET.	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6
118 (4)	Does (NAME) suffer from any of the following illnesses or symptoms:	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2
118A	CHECK 118: ANY 'YES' CIRCLED?	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←	NO YES <input type="checkbox"/> ↓ (SKIP TO 122) ←
119	CHECK 115:	CODE '1' IS CIRCLED CODE '2 OR 3' IS CIRCLED ↓ (SKIP TO 130) ←	CODE '1' IS CIRCLED CODE '2 OR 3' IS CIRCLED ↓ (SKIP TO 130) ←	CODE '1' IS CIRCLED CODE '2 OR 3' IS CIRCLED ↓ (SKIP TO 130) ←
121 (5)	In the past two weeks has (NAME) taken or is taking Coartem given by a doctor or health center to treat the malaria?  VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←	YES ..... 1 (SKIP TO 123) ←  NO ..... 2 (SKIP TO 124) ←

122	<b>SEVERE ILLNESS REFERRAL</b>  RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	(NAME OF CHILD) has symptoms of severe illness. The malaria treatment I have will not help your child, and I cannot give you the medication. Your child is very ill and must be taken to a health facility right away.  (SKIP TO 130)		
123 (5)	ALREADY TAKING COARTEM REFERRAL STATEMENT	You have told me that (NAME OF CHILD) had already received Coartem for malaria. Therefore, I cannot give you additional Coartem. However, the test shows that he/she has malaria. If your child has a fever for two days after the last dose of Coartem, you should take the child to the nearest health facility for further examination.  (SKIP TO 130)		
124 (2)	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called Coartem is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6
126	CHECK 125: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130) ←
127 (5)	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	[INSERT DOSAGE INSTRUCTIONS]  ALSO TELL THE PARENT/OTHER ADULT: If [NAME] has a high fever, fast or difficult breathing, is not able to drink or breastfeed, gets sicker or does not get better in two days, you should take him/her to a health professional for treatment right away.		
130	GO BACK TO 106 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

MALARIA TESTING FOR ADULTS AGE 15+

201	CHECK COLUMN 10 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ADULTS 15+ YEARS IN QUESTION 202; IF MORE THAN SIX ADULTS, USE ADDITIONAL QUESTIONNAIRE(S).			
		ADULT 1	ADULT 2	ADULT 3
202	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 10; NAME FROM COLUMN 2	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____
203	CHECK HOUSEHOLD QUESTIONNAIRE: AGE FROM COLUMN 7.	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←
204	CHECK HOUSEHOLD QUESTIONNAIRE: MARITAL STATUS: FROM COLUMN 7A.	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←
205	LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD FROM COLUMN 1 OF HOUSEHOLD SCHEDULE.	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)
206	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT IDENTIFIED IN 205 AS RESPONSIBLE FOR NEVER IN UNION ADULT AGE 15-17.	<p>As part of this survey, we are asking adults all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria.</p> <p>We ask that all adults aged 15 or older take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF ADULT) to participate in the malaria test?</p>		
207	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
208	ASK CONSENT FOR MALARIA TEST FROM RESPONDENT.	<p>As part of this survey, we are asking people all over the country to take a Malaria test. Malaria is a serious health problem that caused by a parasite transmitted by a mosquito bite This survey will assist the government to develop programs to prevent and treat Malaria. For the Malaria testing, we will need a few drops of blood from a finger. The equipment used to take the blood is clean and completely safe. It has never been used before and will be thrown away after each test. The blood will be tested for Malaria immediately, and the result will be told to you right away. The result will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes to the test, or you can say no. It is up to you to decide. Will you take the Malaria test?</p>		

208A	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
209 PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).				
210	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
211	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←

212	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE MALARIA PAMPHLET.	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6
213	CHECK 212:	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223)	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223)	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223)
214	In the past two weeks has you taken or is taking Coartem given by a doctor or health center to treat the malaria?  VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 215)  NO ..... 2 (SKIP TO 216)	YES ..... 1 (SKIP TO 215)  NO ..... 2 (SKIP TO 216)	YES ..... 1 (SKIP TO 215)  NO ..... 2 (SKIP TO 216)
215	ALREADY TAKING [FIRST LINE MEDICATION] REFERRAL STATEMENT	You have told me that you had already received Coartem for malaria. Therefore, I cannot give you additional Coartem. However, the test shows that you has malaria. If you has a fever for two days after the last dose of Coartem, you should go to the nearest health facility for further examination.  (SKIP TO 223)		
216	CHECK HOUSEHOLD QUESTIONNAIRE: SEX FROM COLUMN 4.	FEMALE ..... 1 MALE ..... 2 (GO TO 218)	FEMALE ..... 1 MALE ..... 2 (GO TO 218)	FEMALE ..... 1 MALE ..... 2 (GO TO 218)
217	Are you currently pregnant?	YES ..... 1 (GO TO 222)  NO ..... 2	YES ..... 1 (GO TO 222)  NO ..... 2	YES ..... 1 (GO TO 222)  NO ..... 2
218	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that you has malaria. We can give you free medicine. The medicine is called Coartem is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to take the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
219	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 _____ (SIGN) REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) REFUSED ..... 2 OTHER ..... 6
220	CHECK 119: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223)	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223)	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223)
221	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO ADULT.	[INSERT DOSAGE INSTRUCTIONS]  ALSO TELL THE ADULT: If you have a high fever, fast or difficult breathing, is not able to drink, gets sicker or does not get better in two days, you should go to see a health professional for treatment right away.		
222	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	The test shows that you has malaria. However, you have told me that you are currently pregnant. Therefore, I cannot give you Coartem. You should go to the nearest health facility for further examination and treatment.		
223	GO BACK TO 202 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE ADULT, END INTERVIEW.			



MALARIA TESTING FOR ADULTS AGE 15+

201	CHECK COLUMN 10 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ADULTS 15+ YEARS IN QUESTION 202; IF MORE THAN SIX ADULTS, USE ADDITIONAL QUESTIONNAIRE(S).																								
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:33%;"></th> <th style="width:33%; text-align:center;">ADULT 4</th> <th style="width:33%; text-align:center;">ADULT 5</th> <th style="width:33%; text-align:center;">ADULT 6</th> </tr> </thead> <tbody> <tr> <td>202</td> <td>CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 10; NAME FROM COLUMN 2</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> NAME _____</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> NAME _____</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> NAME _____</td> </tr> <tr> <td>203</td> <td>CHECK HOUSEHOLD QUESTIONNAIRE: AGE FROM COLUMN 7.</td> <td>15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←</td> <td>15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←</td> <td>15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←</td> </tr> <tr> <td>204</td> <td>CHECK HOUSEHOLD QUESTIONNAIRE: MARITAL STATUS: FROM COLUMN 7A.</td> <td>CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←</td> <td>CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←</td> <td>CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←</td> </tr> <tr> <td>205</td> <td>LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD FROM COLUMN 1 OF HOUSEHOLD SCHEDULE.</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> (RECORD '00' IF NOT LISTED)</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> (RECORD '00' IF NOT LISTED)</td> <td>LINE NUMBER ..... <input type="text"/><input type="text"/> (RECORD '00' IF NOT LISTED)</td> </tr> </tbody> </table>		ADULT 4	ADULT 5	ADULT 6	202	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 10; NAME FROM COLUMN 2	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	LINE NUMBER ..... <input type="text"/> <input type="text"/> NAME _____	203	CHECK HOUSEHOLD QUESTIONNAIRE: AGE FROM COLUMN 7.	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←	15-17 YEARS ..... 1 18+ YEARS ..... 2 (GO TO 208) ←	204	CHECK HOUSEHOLD QUESTIONNAIRE: MARITAL STATUS: FROM COLUMN 7A.	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←	CODE 4 (NEVER IN UNION) ..... 1 OTHER ..... 2 (GO TO 208) ←	205	LINE NUMBER OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD FROM COLUMN 1 OF HOUSEHOLD SCHEDULE.	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)	LINE NUMBER ..... <input type="text"/> <input type="text"/> (RECORD '00' IF NOT LISTED)
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206	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT IDENTIFIED IN 205 AS RESPONSIBLE FOR NEVER IN UNION ADULT AGE 15-17.	<p>As part of this survey, we are asking adults all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria.</p> <p>We ask that all adults aged 15 or older take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF ADULT) to participate in the malaria test?</p>																							
207	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>																					
208	ASK CONSENT FOR MALARIA TEST FROM RESPONDENT.	<p>As part of this survey, we are asking people all over the country to take a Malaria test. Malaria is a serious health problem that caused by a parasite transmitted by a mosquito bite This survey will assist the government to develop programs to prevent and treat Malaria. For the Malaria testing, we will need a few drops of blood from a finger. The equipment used to take the blood is clean and completely safe. It has never been used before and will be thrown away after each test. The blood will be tested for Malaria immediately, and the result will be told to you right away. The result will be kept strictly confidential and will not be shared with anyone other than members of our survey team.</p> <p>Do you have any questions? You can say yes to the test, or you can say no. It is up to you to decide. Will you take the Malaria test?</p>																							

208A	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	GRANTED ..... 1 REFUSED ..... 2 (SKIP TO 223) ← NOT PRESENT/OTHER . 3  (SIGN AND ENTER YOUR FIELDWORKER NUMBER) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
209 PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).				
210	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	<div style="border: 2px dashed black; padding: 5px; text-align: center;">           PUT THE 1ST BAR CODE LABEL HERE.         </div> NOT PRESENT ... 99994 REFUSED ..... 99995 OTHER ..... 99996  PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
211	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←	TESTED ..... 1 NOT PRESENT ..... 2 REFUSED ..... 3 OTHER ..... 6 (SKIP TO 223) ←

212	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE MALARIA PAMPHLET.	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6	POSITIVE ..... 1 NEGATIVE ..... 2 OTHER ..... 6
213	CHECK 212:	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223) ←	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223) ←	CODE '1' IS CIRCLED <input type="checkbox"/> CODE '2 OR 6' IS CIRCLED <input type="checkbox"/> (SKIP TO 223) ←
214	In the past two weeks has you taken or is taking Coartem given by a doctor or health center to treat the malaria?  VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 215) ←  NO ..... 2 (SKIP TO 216) ←	YES ..... 1 (SKIP TO 215) ←  NO ..... 2 (SKIP TO 216) ←	YES ..... 1 (SKIP TO 215) ←  NO ..... 2 (SKIP TO 216) ←
215	ALREADY TAKING [FIRST LINE MEDICATION] REFERRAL STATEMENT	You have told me that you had already received Coartem for malaria. Therefore, I cannot give you additional Coartem. However, the test shows that you has malaria. If you has a fever for two days after the last dose of Coartem, you should go to the nearest health facility for further examination.  (SKIP TO 223)		
216	CHECK HOUSEHOLD QUESTIONNAIRE: SEX FROM COLUMN 4.	FEMALE ..... 1 MALE ..... 2 (GO TO 218) ←	FEMALE ..... 1 MALE ..... 2 (GO TO 218) ←	FEMALE ..... 1 MALE ..... 2 (GO TO 218) ←
217	Are you currently pregnant?	YES ..... 1 (GO TO 222) ←  NO ..... 2	YES ..... 1 (GO TO 222) ←  NO ..... 2	YES ..... 1 (GO TO 222) ←  NO ..... 2
218	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that you has malaria. We can give you free medicine. The medicine is called Coartem is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to take the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
219	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6	ACCEPTED MEDICINE . 1 _____ (SIGN) ← REFUSED ..... 2 OTHER ..... 6
220	CHECK 119: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223) ←	ACCEPTED MEDICINE . 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 223) ←
221	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO ADULT.	[INSERT DOSAGE INSTRUCTIONS]  ALSO TELL THE ADULT: If you have a high fever, fast or difficult breathing, is not able to drink, gets sicker or does not get better in two days, you should go to see a health professional for treatment right away.		
222	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	The test shows that you has malaria. However, you have told me that you are currently pregnant. Therefore, I cannot give you Coartem. You should go to the nearest health facility for further examination and treatment.		
223	GO BACK TO 202 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			



















#### BIOMARKER: FOOTNOTES

- (1) This section should be adapted for country-specific survey design.
- (2) Year of fieldwork is assumed to be 2017. For fieldwork beginning in 2018, all references to calendar years should be increased by one; for example, 2012 should be changed to 2013, 2013 should be changed to 2014, and similarly for all years throughout the questionnaire.
- (3) This question should be deleted in surveys that do not collect blood smears.
- (4) This is a list of generic symptoms indicative of severe malaria. Symptoms should be revised according to the country's national malaria treatment guidelines.
- (5) The referral statement should be revised to reflect the country's national malaria treatment guidelines in reference to antimalarial treatment failure.

## ADDITIONAL DHS PROGRAM RESOURCES

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<b>The DHS Program Website</b> – Download free DHS reports, standard documentation, key indicator data, and training tools, and view announcements.	DHSprogram.com		
<b>STATcompiler</b> – Build custom tables, graphs, and maps with data from 90 countries and thousands of indicators.	Statcompiler.com		
<b>DHS Program Mobile App</b> – 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		
<b>DHS Program User Forum</b> – Post questions about DHS data, and search our archive of FAQs.	userforum.DHSprogram.com		
<b>Tutorial Videos</b> – 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		
<b>Datasets</b> – Download DHS datasets for analysis.	DHSprogram.com/Data		
<b>Spatial Data Repository</b> – Download geographically-linked health and demographic data for mapping in a geographic information system (GIS).	spatialdata.DHSprogram.com		
<b>Social Media</b> – Follow The DHS Program and join the conversation. Stay up to date through:			
 <b>Facebook</b> www.facebook.com/DHSprogram		 <b>LinkedIn</b> www.linkedin.com/company/dhs-program	
 <b>YouTube</b> www.youtube.com/DHSprogram		 <b>Blog</b> Blog.DHSprogram.com	
 <b>Twitter</b> www.twitter.com/DHSprogram	