LIBERIA

Malaria Indicator Survey

2022

REPUBLIC OF LIBERIA

Liberia
Malaria Indicator Survey
2022

Final Report

Liberia National Malaria Control Program
Monrovia, Liberia

The DHS Program
ICF
Rockville, Maryland, USA

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The 2022 Liberia Malaria Indicator Survey (2022 LMIS) was implemented by the Liberia National Malaria Control Program of the Ministry of Health (MoH) in collaboration with the Liberia Institute of Statistics and Geo-Information Services (LISGIS). Financial support was provided by the United States Agency for International Development (USAID) through the President's Malaria Initiative (PMI), the Government of Liberia, and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). ICF provided technical assistance through The DHS Program, a USAID-funded project providing support and technical assistance in the implementation of population and health surveys in countries worldwide.

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ACKNOWLEDGMENTS

The 2022 Liberia Malaria Indicator Survey (2022 LMIS) is a nationally representative sample survey conducted in more than 4,000 households. The survey was implemented by the National Malaria Control Program (NMCP), with technical assistance from the Liberia Institute of Statistics and Geo-Information Services (LISGIS), from October 4 through December 12, 2022. The United States President's Malaria Initiative (PMI) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) provided financial support for the survey, while the University of Liberia School of Public Health and the Mother Pattern College of Health Sciences supported laboratory services. The 2022 LMIS is a follow-up to the 2005, 2009, 2011, and 2016 LMIS surveys and provides up-to-date estimates of basic demographic and malaria indicators.

The primary objective of the 2022 LMIS is to provide current information for policymakers, planners, researchers, and program managers. Indicators measured include ownership of, access to, and use of insecticide-treated nets (ITNs); coverage of intermittent preventive malaria treatment among pregnant women; prompt and effective malaria treatment practices among children under age 5; and malaria-related knowledge, attitudes, and practices in the general population. The survey also provides population-based prevalence estimates for anemia and malaria among children aged 6–59 months.

I am grateful to all of the individuals and institutions that made the 2022 LMIS possible. NMCP extends heartfelt gratitude to the various individuals and agencies in the government, donor communities, and universities that facilitated the successful implementation of the survey. Special thanks to the 2022 LMIS Technical Committee, made up of the Department of Planning of the Ministry of Health (MoH), LISGIS, the United Nations Development Programme, the World Health Organization (WHO), PMI, The DHS Program, GFATM, the Program Coordination Unit (PCU/MoH), and the County Health Teams.

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Finally, I wish to thank all the LMIS respondents for their patience and cooperation.

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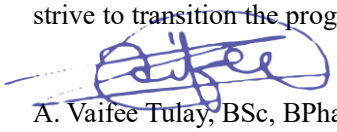
FOREWORD

Malaria is a grave public health concern in Liberia, accounting for 34% of outpatient visits, 47% of inpatient services, and 23% of hospital deaths (Health Facility Survey 2018). The Government of Liberia, with support from the U.S. President's Malaria Initiative and the Global Fund to Fight AIDS, Tuberculosis and Malaria , has made progress in reducing the malaria burden, especially among the vulnerable population. Despite the shock waves created by the COVID-19 pandemic, the fight against malaria has been very aggressive with more investment and new tools. The National Malaria Control Program (NMCP) is currently implementing its fourth National Strategic Plan (NSP 2021–2025); the overarching goal of the plan is to reduce the malaria burden by 75% by 2025. The plan is premised on the World Health Organization (WHO) Global Technical Strategy for Malaria 2016–2030 (WHO 2015a). Furthermore, a core strategic objective of the NSP 2021–2025 is to promote and maintain a culture of evidence-based decision making to improve malaria program performance at all levels. Under this strategic plan, the Government of Liberia, with support from its partners, has scaled up all malaria interventions, ranging from integrated vector management to prompt and effective case management. As a result of these increased investments, malaria indicators continue to improve. Critical malaria indicators such as reported malaria cases and deaths have declined.

The Malaria Indicator Surveys are used by NMCP and its partners to track progress with regards to malaria control. The results of this report offer compelling evidence to guide reviews of the NSP 2021–2025 at mid-term to reexamine the malaria situation and tailor future interventions cost effectively.

I want to congratulate the management of NMCP and our partners, both local and international, for their contribution to the fight against this disease, and I urge them to strengthen their efforts by investing more in WHO recommended strategies. Such efforts can help to ensure that we maintain the gains achieved as we strive to transition the program to elimination by 2030.



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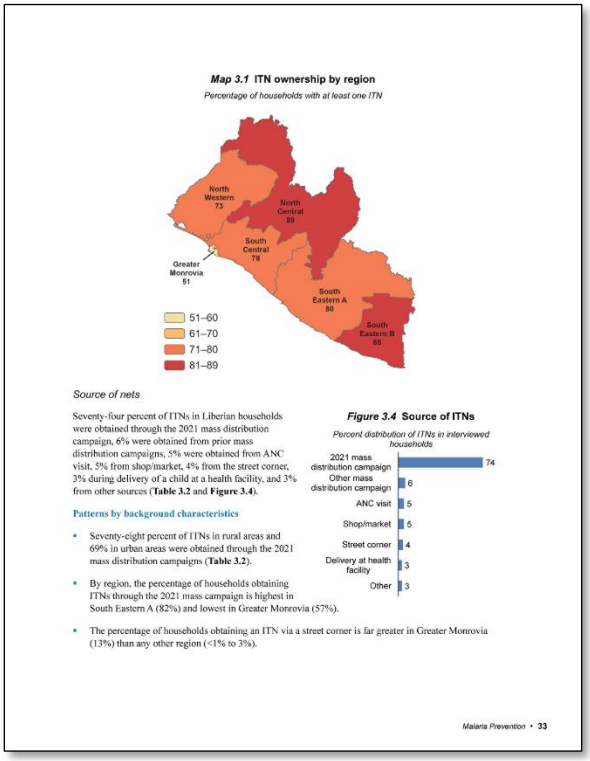
ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
AL	artemether/lumefantrine
ANC	antenatal care
ASAQ	artesunate/amodiaquine
CAPI	computer-assisted personal interviewing
CDC	U.S. Centers for Disease Control and Prevention
CSPro	Census and Survey Processing System
DHS	Demographic and Health Survey
EA	enumeration area
EQC	external quality control
g/dl	grams per deciliter
GPS	Global Positioning System
IPTp	intermittent preventive treatment (of malaria) in pregnancy
ITN	insecticide-treated net
JMP	Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene
LISGIS	Liberia Institute of Statistics and Geo-Information Services
LLIN	long-lasting insecticidal net
LMIS	Liberia Malaria Indicator Survey
LPG	liquefied petroleum gas
MADETS	Malaria Data Entry and Tracking System
MFDP	Ministry of Finance and Development Planning
MIS	Malaria Indicator Survey
MoH	Ministry of Health
NMCP	National Malaria Control Program
NPHC	National Population and Housing Census
PMI	U.S. President's Malaria Initiative
RDT	rapid diagnostic test
SBC	social behavior change
SDG	Sustainable Development Goal
SP	sulfadoxine-pyrimethamine
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VIP	ventilated improved pit-latrine
WHO	World Health Organization

READING AND UNDERSTANDING TABLES FROM THE 2022 LIBERIA MALARIA INDICATOR SURVEY (LMIS)

The following pages introduce the organization of 2022 LMIS tables, describe the background characteristics, and give a summary of sampling and understanding denominators. This section also provides exercises for users to practice interpreting LMIS tables.

The report is based on about 60 tables of data, and the tables are located at the end of each chapter instead of being embedded in the text. While the text and figures featured in each chapter highlight some of the most important findings from the tables, not every finding can be discussed or displayed graphically. For this reason, data users should be comfortable reading and interpreting LMIS tables.



Map 3.1 **ITN ownership by region**

Percentage of households with at least one ITN

Source of nets

Seventy-four percent of ITNs in Liberian households were obtained through the 2021 mass distribution campaign, 6% were obtained from prior mass distribution campaigns, 5% were obtained from ANC visit, 5% from shop/market, 4% from the street corner, 3% during delivery of a child at a health facility, and 3% from other sources (**Table 3.2** and **Figure 3.4**).

Figure 3.4 **Source of ITNs**

Percent distribution of ITNs in interviewed households

Patterns by background characteristics

- Seventy-eight percent of ITNs in rural areas and 69% in urban areas were obtained through the 2021 mass distribution campaigns (**Table 3.2**).
- By region, the percentage of households obtaining ITNs through the 2021 mass campaign is highest in South Eastern A (82%) and lowest in Greater Monrovia (57%).
- The percentage of households obtaining an ITN via a street corner is far greater in Greater Monrovia (13%) than any other region (<1% to 3%).

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Example 1 Prevalence of malaria in children

A Biomarker Measure Taken from All Eligible Respondents

Table 4.6 Prevalence of malaria in children 1

Percentage of children age 6–59 months classified in two tests as having malaria, according to background characteristics, Liberia MIS 2022

3 Background characteristic	2 Malaria prevalence according to RDT: RDT positive	Malaria prevalence according to RDT: Number of children	Malaria prevalence according to microscopy: Microscopy positive	Malaria prevalence according to microscopy: Number of children
Age in months				
6–8	5.1	176	1.3	176
9–11	5.2	125	4.5	125
12–17	8.8	336	3.5	336
18–23	12.4	299	9.6	298
24–35	18.9	572	10.4	575
36–47	20.9	629	11.3	629
48–59	26.4	664	16.3	664
Sex				
Male	19.2	1,439	10.8	1,441
Female	16.2	1,362	9.6	1,362
Mother's interview status				
Interviewed	17.0	2,180	9.8	2,183
Not interviewed[1]	20.3	621	11.8	620
Residence				
Urban	8.9	1,349	4.3	1,352
Rural	25.9	1,452	15.8	1,451
Region				
Greater Monrovia	4.1	629	0.7	632
North Western	19.5	254	11.5	254
South Central	17.3	501	11.3	501
South Eastern A	23.4	209	13.0	208
South Eastern B	32.8	174	18.5	174
North Central	22.2	1,034	13.3	1,034
Mother's education[2]				
No education	22.2	800	12.6	803
Elementary	22.4	620	13.9	620
Junior high	9.5	393	4.8	393
Senior high	5.9	290	2.4	290
Higher	0.6	77	5 0.6	77
Wealth quintile				
Lowest	25.7	745	17.9	745
Second	23.9	625	13.4	625
Middle	18.4	577	10.1	577
Fourth	6.9	503	1.6	503
Highest	4.4	351	1.0	354
Total	4 17.7	2,801	10.2	2,803

RDT = rapid diagnostic test (Bioline™ Malaria Ag P.f)
[1] Includes children whose mothers are deceased
[2] Excludes children whose mothers were not interviewed

Step 1: Read the title and subtitle—highlighted in orange in Example 1. They tell you the topic and the specific population group being described. In this case, the table is about children age 6–59 months who were tested for malaria.

Step 2: Scan the column headings—highlighted in green in Example 1. They describe how the information is categorized. In this table, the first column of data shows children who tested positive for malaria according to a rapid diagnostic test (RDT). The second column lists the number of children in the survey age 6–59 months who were tested for malaria using an RDT. The third column shows children who tested positive for malaria according to microscopy. The last column lists the number of children in the survey age 6–59 months who were tested for malaria using microscopy.

Step 3: Scan the row headings—the first vertical column highlighted in blue in Example 1. These show the different ways the data are divided into categories based on population characteristics. In this case, the table presents data on the prevalence of malaria by age, sex, mother's interview status, urban-rural residence, region, mother's educational level, and wealth quintile. Most of the tables in the LMIS report will be divided into these categories.

Step 4: Look at the row at the bottom of the table—highlighted in red in Example 1. These percentages represent the totals of children age 6–59 months who tested positive for malaria according to the different tests. In this case, 17.7%* of children age 6–59 months tested positive for malaria according to RDT, while 10.2% tested positive for malaria according to microscopy.

Step 5: Draw two imaginary lines, as shown on the table by the purple lines, to find out what percentage of children age 6–59 months whose mothers had more than a secondary education tested positive for malaria according to microscopy. This shows that 0.6% of children age 6–59 months whose mothers had more than a secondary education tested positive for malaria according to microscopy.

Step 6: Look at the patterns in the table. By looking at patterns by background characteristics, we can see how malaria prevalence varies across Liberia. Resources are often limited. Knowing how malaria prevalence varies across groups can help program planners and policymakers determine how to use resources effectively.

*In this document, data are presented exactly as they appear in the table—including decimal places. However, in the remainder of this report data are rounded to the nearest whole percentage point.

Practice: Use the table in Example 1 to answer the following questions about malaria prevalence *by RDT*:

a) Is malaria prevalence according to RDT higher among boys or girls?
b) Is there a clear pattern in RDT malaria prevalence by age?
c) What are the lowest and highest percentages (the range) of RDT malaria prevalence by region?
d) Is there a clear pattern in RDT malaria prevalence by mother's educational level?

Answers:
a) Boys: 19.2%.
b) Yes, malaria prevalence increases with age: 5.1% of children age 6–8 months were positive for malaria according to RDT, as compared with 26.4% of children age 48–59 months.
c) Malaria prevalence by microscopy is lowest in Greater Monrovia (4.1%) and highest in South Eastern B (32.8%).
d) Yes, malaria prevalence by RDT decreases with increasing mother's education; the highest prevalence is 22.4% among children whose mothers have a primary education, and the lowest prevalence is 0.6% among children whose mothers have more than a secondary education.

Example 2: Use of mosquito nets by pregnant women

A Question Asked of a Subgroup of Survey Respondents

Table 3.7 Use of mosquito nets by pregnant women 1

Percentage of pregnant women age 15–49 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, 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, Liberia MIS 2022

	2 Among pregnant women age 15–49 in all households			Among pregnant women age 15–49 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of pregnant women	Percentage who slept under an ITN[1] last night	Number of pregnant women
Residence					
Urban	43.4	38.8	233	64.7	139
Rural	68.9	68.9	196	76.0	177
Region					
Greater Monrovia	31.7	23.7	123	*	49
North Western	(34.4)	(34.4)	23	(47.6)	16
South Central	65.6	65.6	72	(76.0)	62
South Eastern A	60.0	57.4	29	69.5	24
South Eastern B	49.5	49.5	22	54.6	20
North Central	71.0	71.0	160	77.8	146
Education					
No education	62.7	61.3	125	73.2	105
Elementary	60.7	60.7	119	75.2	96
Junior high	38.4	35.8	95	53.1	64
Senior high	62.1	53.4	74	(83.4)	47
Higher	*	*	16	*	5
Wealth quintile					
Lowest	78.4	78.4	97	87.5	87
Second	57.3	57.3	88	61.9	81
Middle	65.4	62.4	92	73.3	78
Fourth	45.8	39.4	91	(62.5)	57
Highest	(12.8)	(9.4)	61	*	13
Total	55.0	52.6	3 428	71.0	3 317

a 4 b 4

Note: Table is based on women who stayed in the household the night before the interview. Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Step 1: Read the title and subtitle. In this case, the table is about two separate groups of pregnant women age 15–49: pregnant women in all households (a) and pregnant women in households with at least one ITN (b).

Step 2: Identify the two panels. First, identify the columns that refer to pregnant women age 15–49 in all households (a), and then isolate the columns that refer only to pregnant women age 15–49 in households with at least one ITN (b).

Step 3: Look at the first panel. How many pregnant women age 15–49 in all households were interviewed? 428. Now look at the second panel. How many pregnant women age 15–49 in households with at least one ITN were interviewed? 317. The second panel is a subset of the first panel.

Step 4: Look across the background characteristics rows and note any cells with asterisks or with percentages in parentheses. When these pregnant women are further divided into the background characteristic categories, there may be too few cases for the percentages to be reliable.

- What percentage of pregnant women age 15–49 in all households in North Western slept under an ITN the night before the survey? 34.4%. This percentage is in parentheses because there are between 25 and 49 pregnant women (unweighted) in this category. You should use this number with caution—it may not be reliable. (See Example 3 for more information on weighted and unweighted numbers.)

- What percentage of pregnant women age 15–49 in households with at least one ITN in Greater Monrovia slept under an ITN the night before the survey? There is no number in this cell—only an asterisk. This is because fewer than 25 pregnant women age 15–49 were interviewed in the survey. Results for this group are not reported. The subgroup is too small, and so the data are not reliable.

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 for the data to be reliable.

Example 3: Understanding Sampling Weights in LMIS Tables

A sample is a group of people who have been selected for a survey. In the LMIS, the sample is designed to represent the national population 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 2022 LMIS, the survey sample is representative at the national and regional levels and for urban and rural areas.

Table 2.11 Background characteristics of respondents

Percent distribution of women age 15–49 by selected background characteristics, Liberia MIS 2022

Background characteristic	Weighted percent	Weighted number	Unweighted number
Region			
Greater Monrovia	37.8	1,706	815
North Western	6.7	303	585
South Central	16.9	764	785
South Eastern A	6.5	292	717
South Eastern B	5.5	248	812
North Central	26.6	1,201	799
Total	100.0	4,513	4,513

3 2 1

To generate statistics that are representative of the country as a whole and of the six regions, the number of women surveyed in each region should contribute to the size of the total (national) sample in proportion to size of the region. However, if some regions have small populations, then a sample allocated in proportion to each region's population may not include sufficient women from each district for analysis. To solve this problem, regions with small populations are oversampled. For example, let's say that you have enough money to interview 4,513 women and want to produce results that are representative of Liberia as a whole and its regions (as in Table 2.11). However, the total population of Liberia is not evenly distributed among the regions: some regions, such as Greater Monrovia, are heavily populated while others, such as North Western, are not. Thus, North Western must be oversampled.

To get reliable statistics, a sampling statistician determines how many women should be interviewed in each region. The **blue column (1)** in the table above shows the actual number of women interviewed in each region. Within the regions, the number of women interviewed ranges from 585 in North Western to 815 in Greater Monrovia. The number of interviews is sufficient to get reliable results in each region.

With this distribution of interviews, some regions are overrepresented and some are underrepresented. For example, the population in Greater Monrovia is 37.8% of the population in Liberia, while North Western's population contributes only 6.7% of the country's population. The population in Greater Monrovia is about five and a half times greater than that of North Western, but the blue column shows that the LMIS interviewed less than two times the number of women in Greater Monrovia (815) as in North Western (585). This unweighted distribution of women does not accurately represent the population.

To get statistics that are representative of Liberia, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) so that it resembles the true distribution in the country. Women from a small region, like North Western, should contribute only a small amount to the national total. Women from a large region, like Greater Monrovia, should contribute much more. Therefore, DHS statisticians mathematically calculate a "weight" that is used to adjust the number of women from each region so that each region's contribution to the total is proportional to the actual population of the region. 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 regional level. The total national sample size of 4,513 women has not changed after weighting, but the distribution of the women in the regions 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 Liberia, you would see that women in each region are contributing to the total sample with the same weight that they contribute to the population of the country. The weighted number of women in the survey now accurately

represents the proportion of women who live in Greater Monrovia and the proportion of women who live in North Western.

With sampling and weighting, it is possible to interview enough women to provide reliable statistics at national and regional levels. In general, only the weighted numbers are shown in each of the LMIS tables, so do not be surprised if these numbers seem low: they may represent a larger number of women interviewed.

LIBERIA


SIERRA LEONE
GUINEA
COTE D'IVOIRE
North Western
North Central
South Central
Greater
Monrovia
South Eastern A
South Eastern B
N
0
50
100
200
Kilometers

INTRODUCTION AND SURVEY METHODOLOGY 1

The 2022 Liberia Malaria Indicator Survey (LMIS) was implemented by the National Malaria Control Program (NMCP) in collaboration with the Liberia Institute of Statistics and Geo-Information Services (LISGIS) and with technical assistance from ICF. The U.S. President's Malaria Initiative (PMI) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) provided financial support. Data collection took place from October 4 to December 12, 2022.

1.1 SURVEY OBJECTIVES

The primary objective of the 2022 LMIS was to provide up-to-date estimates of basic demographic and health indicators for malaria. Specifically, the LMIS collected information on vector control interventions such as mosquito nets, intermittent preventive treatment of malaria in pregnant women, and care seeking for and treatment of fever in children. Also, young children were tested for malaria infection and anemia.

The information collected through the LMIS is intended to assist policymakers and program managers in designing and evaluating programs and strategies for improving the health of the country's population.

1.2 SAMPLE DESIGN

The LMIS followed a two-stage sample design and was intended to allow estimates of key indicators for the following domains:

- National level
- Urban and rural areas
- Geographical regions, consisting of the following groups of counties:
  - Greater Monrovia
  - North Western: Bomi, Grand Cape Mount, and Gbarpolu counties
  - South Central: Montserrado (excluding Greater Monrovia district), Margibi, and Grand Bassa counties
  - North Central: Bong, Nimba, and Lofa counties
  - South Eastern A: River Cess, Sinoe, and Grand Gedeh counties
  - South Eastern B: River Gee, Grand Kru, and Maryland counties

The first stage involved selecting sample points (clusters) consisting of enumeration areas (EAs) delineated within the sampling frame. A total of 150 clusters were randomly selected using probability proportional to size. Of these clusters, 70 were in urban areas and 80 in rural areas.

A household listing operation was undertaken by LISGIS in all of the selected EAs from August to September 2022 using a tablet computer-based CSPro application. The updated lists of households served as a sampling frame for the selection of households in the second stage. In the second stage, 30 households per cluster were systematically selected, resulting in a total sample size of 4,500 households. In instances where EAs were large (greater than 300 households), segmentation was carried out; one segment at random was selected for the survey, and 30 households were selected systematically from the segment. GPS points were also collected during the listing operation in order to verify that the listing took place in the correct locations.

Because of the approximately equal sample size in each region, the sample was 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.

The 2022 LMIS had originally planned to use the sampling frame of the 2022 National Population and Housing Census (NPHC). However, data collection for the NPHC was delayed until after the LMIS data collection began. This meant that there would not be a population reference for the new frame in the timeline needed for the LMIS, raising data quality concerns. Hence, the determination was made to utilize the sampling frame from the 2008 NPHC following numerous and extensive discussions among LISGIS, NMCP, and ICF.

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. With the parent's or guardian's consent, all children age 6–59 months were tested for anemia and for malaria infection.

1.3 QUESTIONNAIRES

Three questionnaires were used in the 2022 LMIS: the Household Questionnaire, the Woman's Questionnaire, and the Biomarker Questionnaire. The questionnaires were based on The DHS Program's model questionnaires and were adapted to reflect the population and health issues relevant to Liberia. Country-specific topics included questions about the 2021 mass insecticide-treated net (ITN) distribution campaign, the acceptability of the new malaria vaccine, and mass drug administration (seasonal malaria chemoprevention for children). The questionnaires were prepared in English, with some text adapted to Liberian English. The Household and Woman's Questionnaires were programmed into tablet computers to allow for computer-assisted personal interviewing (CAPI) for data collection purposes.

The Household Questionnaire listed all members of and visitors to the selected households. Basic demographic information was collected on each person listed, including age, sex, and relationship to the head of the household. The data on age and sex of household members and visitors who stayed in the household the night before the survey were used to identify women who were eligible for individual interviews and children who were eligible for biomarker collection. The Household Questionnaire also collected information on characteristics of the household's dwelling unit such as source of drinking water; type of toilet facilities; materials used for flooring, external walls, and roofing; ownership of various durable goods; and ownership of mosquito nets.

The Woman's Questionnaire was used to collect information from all eligible 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. These women were asked questions on the following topics:

- Background characteristics (including age, education, and media exposure)
- Reproduction (birth history and child mortality)
- Pregnancy and intermittent preventive treatment
- Fever in children
- Malaria knowledge and beliefs

The Biomarker Questionnaire was used to record results of anemia and malaria rapid diagnostic testing of children age 6–59 months.

Additionally, a self-administered Fieldworker Questionnaire was used to collect basic background information on team supervisors, interviewers, and biomarker technicians. Each interviewer, supervisor, and biomarker

technician completed the questionnaire after the final selection of fieldworkers and prior to commencement of fieldwork.

For the first time in an LMIS, enumerators used Android tablet computers for data collection. The tablet computers were equipped with Bluetooth® technology to enable remote electronic transfer of files, such as assignments from the team supervisor to the interviewers, individual questionnaires to survey team members, and completed questionnaires from interviewers to team supervisors. The CAPI data collection system employed in the 2022 LMIS was developed by The DHS Program with the mobile version of CSPro. The CSPro software was developed jointly by the U.S. Census Bureau, Serpro S.A., and The DHS Program.

The survey protocol was reviewed and approved by the Atlantic Center for Research & Evaluation Institutional Review Board, University of Liberia, and the ICF Institutional Review Board.

1.4 ANEMIA AND MALARIA TESTING

Blood samples for biomarker testing were collected via finger or heel pricks from children age 6–59 months. Each field team included two biomarker technicians who carried out the anemia and malaria testing and prepared the blood smears. They also provided malaria medications for children who tested positive for malaria with a rapid diagnostic test (RDT) in accordance with the approved treatment guidelines. The biomarker technicians requested informed consent for both tests from the child's parent or guardian before blood samples were collected.

Anemia testing. A single-use retractable, spring-loaded, sterile lancet was used to make a finger prick (or a heel prick in the case of children age 6–11 months), and a drop of blood from this site was then collected in a microcuvette. Hemoglobin analysis was carried out on site using a battery-operated portable HemoCue® 201+ device. Results were provided to the child's parent or guardian verbally and in writing and were recorded in the Biomarker Questionnaire. Parents of children with a hemoglobin level below 8 g/dl (classified as severe anemia) were provided with a referral and instructed to take the child to a nearby health facility for follow-up care.

Malaria testing using a rapid diagnostic test. Another drop of blood, taken from the same finger or heel prick that was used for anemia testing, was tested immediately using the Liberia-approved Abbott Bioline™ Malaria Ag P.f. (HRP-II) RDT. This qualitative test detects the histidine-rich protein II antigen of *Plasmodium falciparum* in human whole blood. The *P. falciparum* parasite, transmitted by the *Anopheles* mosquito, is the major cause of malaria in Liberia. 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 biomarker technicians were trained to perform the RDT in the field in accordance with the manufacturer's instructions. RDT results were available in 15 minutes and recorded as either positive or negative, with faint test lines considered positive. As with anemia testing, RDT results were provided to the child's parent or guardian verbally and in written form and were recorded on the Biomarker Questionnaire.

Children who tested positive for malaria according to the RDT and who had been treated with artemisinin-based combination therapy (ACT) within 2 weeks before the day of the interview were referred to a health facility if they continued to have a fever 2 days after the last dose of ACT. In addition, children who tested positive according to the RDT and met at least one of the following two criteria—a hemoglobin level below 8 g/dl or symptoms indicative of severe illness—were considered to have severe malaria and were referred to a health facility for immediate treatment and care. Children who tested positive for uncomplicated malaria were offered a full course of medication according to the standard treatment guidelines in Liberia. Age-appropriate doses of ACT (artemether-lumefantrine) were provided to the parent/guardian, along with instructions on how to administer the medicine to the child.

Malaria testing by microscopy. In addition to the RDT, thick blood smears were prepared in the field. Each blood smear slide was given a barcode label, with a duplicate affixed to the Biomarker Questionnaire. An additional copy of the barcode label was affixed to a microscope slide transmittal form to track blood smears from the field to the laboratory. The slides were dried in a dust-free environment and stored in slide boxes. The thick smear slides were collected regularly from the field and transported to one of 12 staining laboratories nearest to the place of collection, where they were stained with Giemsa stain. The slides were then transported to the University of Liberia A.M. Dogliotti College of Medicine laboratory in Monrovia for storage and microscopic reading.

The blood smears were examined to determine the presence or absence of *Plasmodium* parasites and to determine parasite density. Blood smears were considered negative if no parasites were found after 100 high-powered fields had been examined. If parasites were present, the microscopist counted both asexual parasites and white blood cells. All stained slides were read by two independent microscopists. Slides with discordant results were reanalyzed by a third microscopist to determine the final result. Slides were tracked from their arrival in the lab through the examination process using the Malaria Data Entry and Tracking System (MADETS), a CSPro application developed by The DHS Program.

The microscopy results were quality checked through internal and external quality control processes. Routine internal quality control was performed following laboratory standard operating procedures. External quality control was conducted by the Mother Patern College of Health Sciences, which independently read 10% of the slides (287 in total). The external quality control testing yielded 98% (282 out of the 287 slides) agreement between the University of Liberia lab and Mother Patern lab results. More information is provided in Appendix C, Tables C.10 and C.11.

1.5 PREPARATION FOR MICROSCOPY

During the survey design for the 2022 LMIS, NMCP strongly recommended that malaria microscopy be included to generate an internationally comparable estimate of malaria prevalence. Prior to 2022, microscopy was last included in the 2011 LMIS. During the 2009 and 2011 LMIS surveys, the China-Liberia Malaria Center at JFK Hospital was responsible for slide reading. However, the lack of laboratory space and poor slide quality in the 2011 survey led to the decision to omit microscopy from the 2016 survey. The capacity of any Liberian laboratories to conduct malaria microscopy as part of the 2022 LMIS was unknown. To assess capacity, laboratories were evaluated on several criteria to make a final determination of microscopy readiness. These criteria included staff microscopy training and certification, laboratory infrastructure, and supply availability. After the assessment, laboratories at the University of Liberia A.M. Dogliotti College of Medicine and the Mother Patern College of Health Sciences were selected to lead slide reading and external quality control (EQC), respectively.

In an effort to improve the quality of the microscopy blood smears by reducing the risk of their auto-fixation prior to staining and help ensure that the inclusion of microscopy in the 2022 LMIS would be successful, NMCP and ICF devised a strategy to identify staining sites throughout the country to which microscopy blood smears would be transferred from the field immediately after the closure of each cluster, stained with Giemsa, and then transported to the lab at the University of Liberia for slide reading.

To identify appropriate staining sites for the 2022 LMIS, the capacity of 40 health facility labs to serve as staining sites was assessed in May and June 2022. The assessment criteria were jointly prepared by ICF and NMCP. The report of the assessment team was reviewed, and 12 health facilities were selected and approved as staining sites.

Twenty-four lab technicians were selected from the 12 designated staining sites (two technicians from each site) and invited to a training session at the University of Liberia Medical Campus in Monrovia. The training was divided into two 4-day sessions, each with 12 participants. The sessions were held September 5–8 and September 9–13, 2022 (excluding Sunday). Five regional biomarker coordinators from NMCP also participated in the first training session. The topics included blood collection and preparation of thick blood smears, preparation of Giemsa stock and working stains, preparation of phosphate buffer solution and correcting fluids, quality control of working Giemsa stain and phosphate buffered water at pH 7.2, an overview of Romanowsky stains and introduction to staining using Giemsa stain, use of a slide transmittal sheet to monitor the movement of slides, and hands-on staining of thick blood smears.

Another critical aspect of ensuring the successful inclusion of microscopy in the 2022 LMIS concerned identifying microscopists with expertise in blood smear reading and training them on aspects of malaria microscopy relevant for the survey. Twelve medical laboratory scientists were recruited for the 2022 LMIS basic malaria microscopy training through a rigorous selection process. The 12-day training was held at the University of Liberia A.M. Dogliotti College of Medicine from September 16–29, 2022. Training topics included malaria microscopy challenges; the life cycle of the malaria parasite; microscope function, use, and maintenance; morphological characteristics of malaria parasites; malaria parasite counting techniques; parasite detection and species identification; low-density infections; an overview of staining and the effects of staining on malaria parasites; the qualities of a good microscopist; use of the transmittal sheet; an overview of the MADETS program; discussion of discordant results; and an overview of EQC. Out of the 12 trainees, five were selected as readers for the central lab and two for the EQC lab. Selection was based on final evaluation scores.

Subsequently, the ICF data processing specialist trained two microscopy lab data clerks on the use of MADETS for the tracking of blood smears on their arrival at the lab through the entry of microscopy results and the process of selection of slides for EQC.

The data processing specialist also conducted virtual training with the EQC data entry clerks on November 7, 2022, to prepare the lab computer and the MADETS program for EQC.

1.6 Training of Trainers and Pretest

On July 26 and 27, 2022, NMCP organized a training of trainers attended by 18 NMCP and Ministry of Health (MoH) staff members who were designated to serve as survey coordinators as well as several other staff with roles in the survey. Survey objectives were discussed, and the pretest agenda was prepared.

The pretest training was designed to prepare the trainers and coordinators for the subsequent main training of fieldworkers by ensuring that they were well versed with respect to the LMIS questionnaires and survey procedures. In addition to the NMCP and MoH staff who were being trained to serve as survey coordinators during data collection, NMCP recruited six individuals (three men and three women) to serve as interviewers during the pretest training and six nurses or lab technicians (two women and four men) to serve as biomarker technicians. At least one representative from LISGIS also attended the training. The training was divided into two separate sections. One focused on training interviewers and coordinators, and the other focused on training biomarker technicians. The classroom portion of the pretest training was held from July 29 to August 8 at the Fisebu Lodge in Jacob Town, Greater Monrovia.

The training of coordinators and interviewers focused on interview techniques, questionnaire content, and procedures for completing the LMIS questionnaires using the CAPI system. The biomarker training included training on completing the Biomarker Questionnaire, testing for anemia and malaria, and preparing malaria blood smears. Participants in both sections worked in groups using various training techniques, including

interactive question-and-answer sessions, case studies, and role-plays. Before starting the fieldwork practice, participants were given ample opportunities to practice administering the questionnaires and collecting biomarkers among children.

Field practice took place over 3 days in three clusters: one in Monrovia, one in Bomi County, and one in Margibi County. Care was taken to identify clusters that were not selected to be part of the LMIS sample and that were easily accessible by vehicle. Each cluster included 30 households. In total, 90 households and 137 women were interviewed. Biomarker specimens were collected from 67 children. Following the field practice, a debriefing session was held. Modifications to the questionnaires and training materials were made based on lessons learned from the exercise.

1.7 Training of Field Staff

The main training for the 2022 LMIS was held at the Kailondo Lodge in Greater Monrovia from September 14–27, 2022. All interviewer and biomarker technician candidates were recruited through a competitive process. An advertisement was posted on the Executive Mansion website seeking applications from qualified Liberians for interviewer and biomarker technician positions. Over 300 applications were received through a dedicated email account. The applications were sorted, and individuals who met the requirements (in terms of basic qualifications and experience) were shortlisted.

Shortlisted candidates went through a rigorous interviewing process by a panel composed of NMCP, MoH, and USAID staff. Among the 50 interviewer candidates selected, most had previous survey fieldwork experience, and some had experience gained through previous rounds of the LDHS and LMIS. All 33 biomarker technician candidates selected were either nurses or laboratory technicians. Seventeen coordinators, most of whom had attended the pretest training in some capacity, and one new replacement supported the training.

The interviewer training sessions included discussions of concepts, procedures, and methodologies for conducting the LMIS survey. Participants were guided through the questionnaires using various training techniques such as role-plays, group discussions, in-class exercises, case studies, and presentations. The training also included discussions of the CAPI system, demonstrations of the CAPI menus, practice in conducting interviews through the CAPI system, and practice entering biomarker data from the Biomarker Questionnaire into the CAPI system.

The biomarker training utilized a variety of learning tools including plenary lectures, videos, demonstrations on the process of biomarker collection, and instructions and practice on how to fill out the questionnaires, transmittal sheets, referrals, and brochures. Biomarker candidates received training on using rapid test kits to test for malaria, conducting anemia testing, preparing blood smears on slides for malaria microscopy, and drying and packaging blood smears for transport. In addition, trainees had the opportunity for hands-on practice with adults as well as children. Both the interviewer and biomarker training sessions lasted for 12 days and were held simultaneously in separate rooms.

Field practice took place over 3 days in 16 clusters (one cluster per team). Care was taken to identify clusters that were not selected to be part of the LMIS sample and that were easily accessible by vehicle. Each cluster included 30 households. In total, 480 households and 662 women were interviewed. Biomarkers were collected from 522 children.

On October 1, 2022, all staff who participated in or monitored field practice attended a half-day debriefing. Each team was tasked with providing feedback on their experience, including identifying questions that were not well understood or for which additional clarification was required.

All participants were evaluated at intervals through in-class exercises, quizzes, and observations made during field practice. Twelve team supervisors were selected from the pool of interviewer candidates based on their performance and previous experience. The team supervisors and regional and national coordinators received additional training on providing logistical support, managing field teams, observing interviews, keeping an inventory of supplies, and monitoring the collection of biomarker data using a procedural or technical checklist. They also received training on performing supervisory activities with the CAPI system, data quality control procedures, and fieldwork coordination and management. The former included assigning households and receiving completed interviews from the interviewers, recognizing and dealing with error messages, receiving system updates, distributing updates to interviewers, scanning transmittal sheets, implementing revisit questionnaires, resolving duplicated cases, and closing clusters. Furthermore, they were trained on transferring completed interviews daily to the central office via SyncCloud.

1.8 FIELDWORK

Fieldworkers were grouped into 12 teams, each team consisting of one supervisor, two biomarker technicians, two interviewers, and one logistician (who was responsible for transporting microscopy slides from clusters to staining sites). Fieldwork began on October 4, 2022, in Montserrado. All 12 teams spent the first 10 days in Montserrado County and then moved to the remaining counties once all Montserrado County clusters were completed.

Data collection was completed on December 12, 2022. Over the course of data collection, field teams were closely monitored by six teams of LMIS coordinators, each consisting of one biomarker coordinator, one data quality coordinator, and one community coordinator. SyncCloud was used to upload data from the field in real time and to produce field check tables from the completed interviews sent to the central office, allowing remote monitoring of fieldwork by NMCP and ICF. Regular feedback was sent to the field teams.

1.9 DATA PROCESSING

The processing of the 2022 LMIS data began immediately after the start of fieldwork. As data collection was being completed in each cluster, all electronic data files were transferred via SyncCloud to the NMCP central office in Monrovia. Data files were registered and checked for inconsistencies, incompleteness, and outliers. The field teams were alerted of any inconsistencies and errors. Secondary editing carried out in the central office involved resolving inconsistencies and coding open-ended questions. Data entry and editing were carried out using the CSPro software package. Concurrent processing of the data offered a distinct advantage because it maximized the likelihood of the data being error-free and accurate. Secondary editing of the data was completed in January 2023.

1.10 RESPONSE RATES

Table 1.1 shows response rates for the 2022 LMIS. A total of 4,486 households were selected for the survey, of which 4,338 were occupied and 4,306 were successfully interviewed, yielding a response rate of 99%. In the interviewed households, 4,598 women age 15–49 were identified for individual interviews. Interviews were completed with 4,513 women, yielding a response rate of 98%.

Table 1.1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Liberia MIS 2022

Result	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	2,070	2,416	4,486
Households occupied	1,999	2,339	4,338
Households interviewed	1,972	2,334	4,306
Household response rate[1]	98.6	99.8	99.3
Interviews with women age 15–49			
Number of eligible women	2,353	2,245	4,598
Number of eligible women interviewed	2,284	2,229	4,513
Eligible women response rate[2]	97.1	99.3	98.2

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

HOUSING, HOUSEHOLD POPULATION, AND RESPONDENT CHARACTERISTICS 2

Key Findings

- ***Source of drinking water:*** 85% of Liberian households use an improved source of drinking water.
- ***Sanitation:*** Overall, 51% of households use improved toilet facilities, 14% use unimproved facilities, and 36% engage in open defecation.
- ***Electricity:*** 32% of households have access to electricity (52% of urban households and 6% of rural households).
- ***Household composition:*** The average household size is 5.0 persons; 33% of households are female headed.
- ***Literacy:*** Overall, 54% of women in Liberia are literate.
- ***Mobile phone ownership:*** 62% of women own a mobile phone and 24% own a smartphone.

Information on the socioeconomic characteristics of the household population in the 2022 LMIS provides a context for interpreting demographic and health indicators and gives an indication of the representativeness of the survey. The information also sheds light on the living conditions of the population.

This chapter presents information on sources of drinking water, type of sanitation facility, housing characteristics and household possessions, use of clean fuels and technologies related to cooking, wealth, and the composition of the household population. The chapter also presents information on characteristics of the survey respondents such as age, education, literacy, exposure to mass media, internet usage, and mobile phone ownership. These 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

Improved sources of drinking water

Include piped water, public taps, standpipes, tube wells, boreholes, protected dug wells and springs, rainwater, water delivered via a tanker truck or a cart with a small tank, and bottled water.

Sample: Households and de jure population[1]

Improved sources of water protect against outside contamination so that water is more likely to be safe to drink. **Table 2.1** shows that 85% of households use an improved source of drinking water; 49% use tube wells, boreholes, or hand pumps, while 23% use bottled water or mineral water in sachet and 7% use protected dug wells. However, 1 in 10 households use surface water as their source of drinking water.

[1] The household, de jure, and de facto populations are defined in Section 2.8.

Twenty-two percent of households have water on the premises, 72% take 30 minutes or less (round trip) to obtain drinking water, and 4% take more than 30 minutes to obtain water.

Trends: The percentage of households using an improved drinking water source increased from 68% in the 2007 LDHS to 76% in the 2013 LDHS and remained stable at 84–85% in the 2016 LMIS, 2019–20 LDHS, and 2022 LMIS.

Patterns by background characteristics

- The percentage of households using improved sources of drinking water is higher in urban areas (94%) than in rural areas (75%). Also, there are differences between urban and rural areas with respect to the primary source of drinking water. Thirty-nine percent of urban households rely on bottled water/mineral water in sachet for drinking water, as compared with 2% of rural households. In contrast, 64% of rural households rely on a tube well/borehole/hand pump, compared with 37% of urban households.
- The percentage of households with drinking water on the premises is higher in urban areas (29%) than in rural areas (14%).

2.2 Drinking Water Service Ladder

Drinking water service ladder

Safely managed

Drinking water from an improved water source that is located on the premises, available when needed, and free from fecal and priority chemical contamination.

Basic

Drinking water from an improved source, provided either water is on the premises or round-trip collection time is 30 minutes or less.

Limited

Drinking water from an improved source, and round-trip collection time is more than 30 minutes.

Unimproved

Drinking water from an unprotected dug well or unprotected spring.

Surface water

Drinking water directly from a river, dam, lake, pond, stream, canal, or irrigation canal.

Sample: De jure population

Building off the classification of drinking water sources as improved or unimproved, the Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (JMP) has devised a five-rung drinking water service ladder to benchmark and compare progress towards achieving Sustainable Development Goal (SDG) targets (WHO/UNICEF 2018). Improvements to water and sanitation infrastructure are considered a high-level national target in the government's Pro-Poor Agenda for Prosperity and Development (MFDP 2018). The 2022 LMIS captured information on four out of the five rungs. Because the survey did not include testing of drinking water for fecal or chemical contamination, safely managed and basic drinking water services cannot be distinguished and are grouped together in **Table 2.2** as "at least basic service."

Overall, 80% of the household population has at least basic drinking water service, 5% has limited service, 6% uses an unimproved source, and 9% uses surface water (**Table 2.2**).

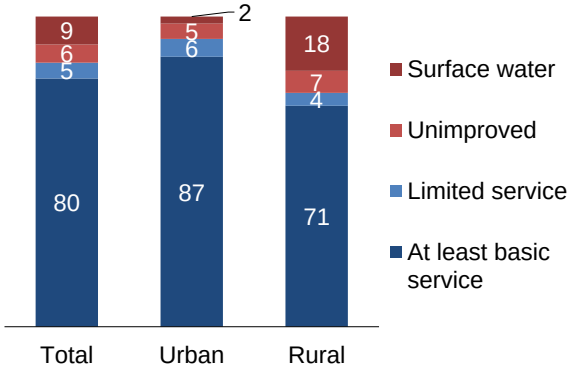
Trends: The percentage of the population with at least basic drinking water service increased from 65% in the 2007 LDHS to 69% in the 2011 LMIS and remained stable at 80%–81% in the 2016 LMIS and the 2022 LMIS. The percentage of household members using surface water as their drinking water source has declined slightly over time, from 13% in the 2007 LDHS and 12% in the 2011 LMIS to 11% in the 2016 LMIS and 9% in the 2022 LMIS.

Patterns by background characteristics

- Eighty-seven percent of urban residents have at least basic drinking water service, as compared with 71% of rural residents (**Figure 2.1**).
- The percentage of the population with at least basic drinking water service ranges from 57% in South Eastern A to 92% in Greater Monrovia.
- Use of surface water decreases with increasing wealth, from 31% in the lowest wealth quintile to less than 1% in the highest quintile.

Figure 2.1 **Household population drinking water service by residence**

Percent distribution of de jure population by drinking water service ladder



2.3 SANITATION

Improved toilet facilities

Flush/pour flush toilets that flush water and waste to a piped sewer system, septic tank, pit latrine, or unknown destination; ventilated improved pit (VIP) latrines; pit latrines with slabs; or composting toilets.

Sample: Households and de jure population

Nationally, 51% of households use improved toilet facilities, 14% use unimproved facilities, and 36% engage in open defecation (**Table 2.3**). Among households with a toilet facility, 47% report that their facility is located inside their own yard/plot, while 29% report that the facility is located in their own dwelling.

Trends: The percentage of households using improved toilet facilities increased from 28% in the 2007 LDHS and 33% in the 2011 LMIS to 51% in the 2022 LMIS.

Patterns by background characteristics

- A greater percentage of households in urban areas than rural areas use improved sanitation facilities (72% versus 24%). In urban households, the most commonly used improved toilet facilities are flush or pour flush to septic tank facilities (42%); in rural households, the most commonly used improved facilities are pit latrines with slabs (9%).
- Use of open defecation is markedly higher among rural households (64%) than urban households (13%).

2.4 SANITATION SERVICE LADDER

Sanitation service ladder

Safely managed

Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite.

Basic

Use of improved facilities that are not shared with other households.

Limited

Use of improved facilities shared by two or more households.

Unimproved

Use of pit latrines without a slab or platform, hanging latrines, or bucket latrines.

Open defecation

Disposal of human feces in fields, forests, bushes, open bodies of water, beaches, or other open spaces or with solid waste.

Sample: De jure population

The JMP has also devised a five-rung sanitation service ladder to benchmark and compare progress towards achieving SDG targets related to sanitation. The 2022 LMIS captured information about four of the five rungs but cannot distinguish between safely managed and basic sanitation services. For this reason, safely managed and basic sanitation services are grouped together in **Table 2.4** as "at least basic service."

Overall, 22% of the household population has at least basic service, 27% has limited service, 16% relies on an unimproved sanitation facility, and 36% uses open defecation (**Table 2.4**).

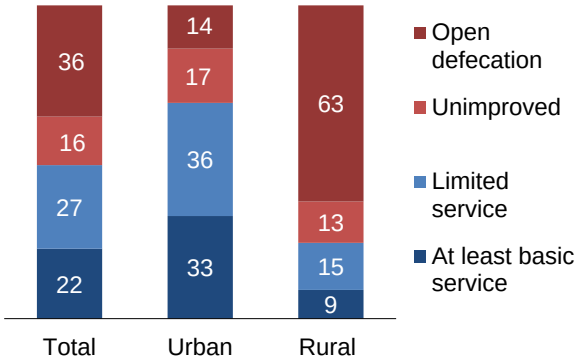
Trends: The percentage of the population using at least basic sanitation facilities increased from 11% in the 2007 LDHS to 20% in the 2016 MIS and 22% in the 2022 LMIS. Over this same period, the percentage of the population relying on open defecation decreased from 55% to 36%.

Patterns by background characteristics

- Differences in sanitation service vary widely by residence; 33% of the urban population has basic service, as compared with 9% of the rural population. Conversely, 63% of the rural population and 14% of the urban population engage in open defecation (**Figure 2.2**).
- By region, the percentage of the household population with at least basic service ranges from 7% in North Western and South Eastern B to 37% in Greater Monrovia.
- The percentage of the population engaging in open defecation is highest in North Western (63%) and lowest in Greater Monrovia (4%).

Figure 2.2 **Household population sanitation service by residence**

Percent distribution of de jure population by sanitation service ladder



- Use of open defecation decreases with increasing wealth; 88% of those in the lowest wealth quintile engage in open defecation, compared with 2% of those in the highest quintile.

2.5 HOUSING CHARACTERISTICS

The 2022 LMIS collected data on household features such as access to electricity, housing construction materials, number of rooms used for sleeping, and type of cooking technology and fuel. These data, along with information on ownership of household durable goods, source of drinking water, and sanitation, contribute to the creation of the household wealth index and provide information that may factor into other health indicators.

2.5.1 Construction Materials

Concrete is the most common flooring material, used by 48% of Liberian households (**Table 2.5**). A higher percentage of urban households (60%) than rural households (32%) have concrete floors. Earth/sand is the second most common flooring material, used by 40% of households; unlike concrete, however, use of earth/sand is much more common in rural households than urban households (65% versus 20%).

Most households in Liberia (91%) have metal/zinc roofing, with only a modest difference observed in urban and rural households (95% and 86%, respectively). The most common exterior wall material is cement (31%), followed by mud with sticks (29%) and cement blocks (12%).

2.5.2 Rooms Used for Sleeping

The number of rooms a household uses for sleeping is an indicator of socioeconomic level and of crowding in the household, which can facilitate the spread of disease. Thirty-five percent of households use three or more rooms for sleeping, 27% use two rooms, and 38% use only one room (**Table 2.5**).

2.6 USE OF CLEAN FUELS AND TECHNOLOGIES FOR COOKING

Primary reliance on clean fuels and technologies

The percentage of the population using clean fuels and technologies for cooking, where clean cooking fuels and technologies are defined as follows: stoves/cookers using electricity, liquefied petroleum gas (LPG)/natural gas/biogas, solar, and alcohol/ethanol

Sample: Households and de jure population

Thirty-two percent of households have access to electricity, including 52% of urban households and 6% of rural households (**Table 2.6**).

WHO guidelines for indoor air quality (WHO 2014a) highlight the importance of addressing both fuel and technology for protecting public health. The guidelines identify and promote technologies and fuels that are efficient and recommend against the use of technologies that rely on solid fuels such as coal and wood as well as kerosene, a nonsolid but highly polluting fuel. In Liberia, only 1% of households use clean cooking fuels or technologies for cooking (2% in urban areas and less than 1% in rural areas). Forty-eight percent of households use a manufactured solid fuel stove, and 46% rely on a three-stone stove or open fire for cooking.

The most common solid fuels used by households for cooking are wood and fire coal/charcoal (48% each).

2.7 HOUSEHOLD WEALTH

2.7.1 Household Durable Goods

The 2022 LMIS collected information on possession of household goods and means of transportation, ownership of agricultural land, and ownership of farm animals (**Table 2.7**). Eighty-four percent of households own a mobile phone. Possession of a mobile phone is more common in urban households (91%) than rural households (75%). Approximately 5 in 10 households have a radio (48%), and 23% of households have a television. Fourteen percent of households have a refrigerator, and 8% have a computer. Three percent of households own a bicycle, 16% own a motorcycle or scooter, and 5% own a car or truck.

Overall, 32% of households own agricultural land and 39% own farm animals. As expected, more households in rural areas than urban areas own agricultural land (45% and 21%, respectively) and farm animals (55% and 25%, respectively).

2.7.2 Wealth Index

Wealth index

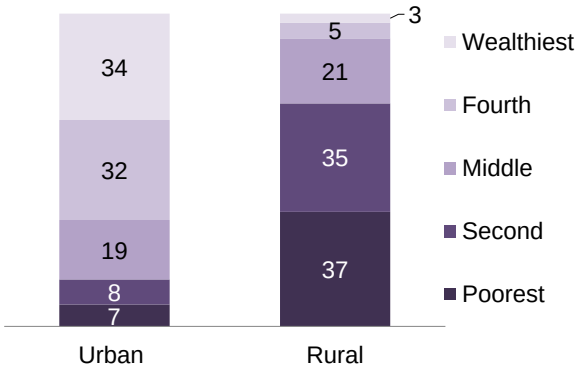
Households are given scores based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics such as source of drinking water, toilet facilities, and flooring materials. These scores are derived using principal component analysis. National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

Sample: Households

The distribution of the household population by wealth quintile indicates the degree to which wealth is evenly distributed among the population. **Table 2.8** shows the distribution of the de jure household population by wealth quintile, according to residence and region. A majority of the urban population falls in the upper two wealth quintiles, while a majority of the rural population falls in the bottom two quintiles (**Figure 2.3**). Thirty-four percent of urban residents are in the highest wealth quintile, while 7% are in the lowest wealth quintile. In contrast, 3% of rural residents are in the highest wealth quintile and 37% are in the lowest quintile.

***Figure 2.3* Household wealth by residence**

Percent distribution of de jure population by wealth quintiles



The concentration of wealth differs substantially by region. The percentages of the population in the lowest wealth quintile are greatest in North Central and South Eastern A (33% and 32%, respectively). Greater Monrovia has the greatest percentage of residents in the highest wealth quintile (53%).

2.8 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.

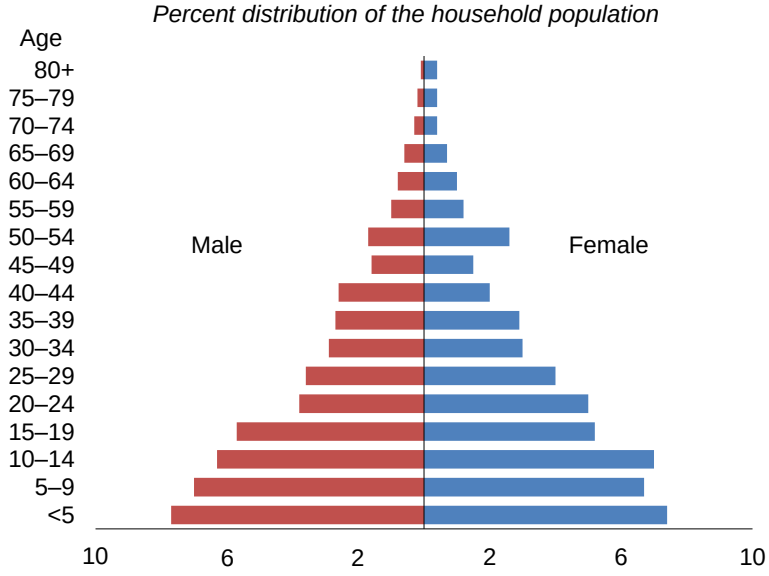
Table 2.9 shows the distribution of the de facto household population in the 2022 LMIS by 5-year age groups, according to sex and residence. A total of 20,982 people stayed overnight in the 4,306 households interviewed in the survey. Nationally, 45% of the population falls into the 0–14 and 65 or above dependency age groups. Overall, 49% of household residents are age 0–17, and 24% are classified as adolescents (age 10–19). Differences between urban and rural residence are generally small.

The population pyramid in **Figure 2.4** shows the population distribution by sex and 5-year age groups. The broad base of the pyramid indicates that Liberia's population is young, with 42% of the population under age 15.

Table 2.10 presents the distribution of households by sex of head of household and household size, and mean size of households, according to residence. Nationally, 67% of households are headed by men and 33% are headed by women. On average, households consist of 5.0 persons in both urban and rural areas.

Figure 2.4 **Population pyramid**

Percent distribution of the household population



2.9 BASIC CHARACTERISTICS OF SURVEY RESPONDENTS

A total of 4,513 women age 15–49 were interviewed with the Woman's Questionnaire; their background characteristics are presented in **Table 2.11**. Eighty-seven percent of respondents are Christian and 12% are Muslim. Six out of 10 women (61%) live in urban areas.

2.10 EDUCATIONAL ATTAINMENT

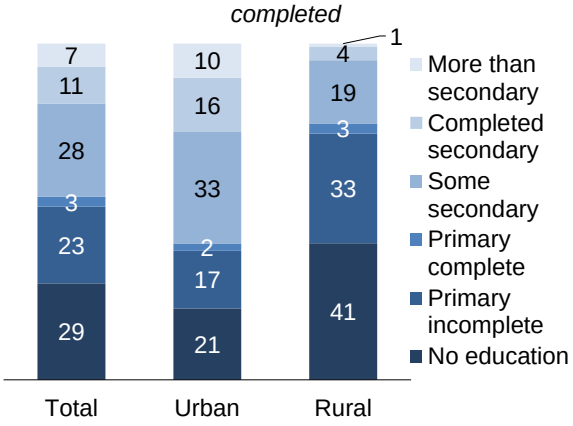
Studies have consistently shown that educational attainment has a strong effect on health behaviors and attitudes. In general, the higher the level of education that a woman attains, the more knowledgeable she is about use of health care services for herself, her children, and her family.

Table 2.12 shows the percent distribution of women age 15–49 by highest formal level of schooling attended or completed, and median years completed, according to background characteristics. Overall, 29% of women have no formal education, 23% have some primary education, 3% completed primary education but have not gone further, 28% have some secondary education, and 11% have completed secondary education. An additional 7% have attended or completed more than secondary education (**Figure 2.5**). Nationally, women have completed a median of 5.4 years of education.

Trends: Median years of education among Liberian women increased from 2.0 years in the 2009 LMIS and 4.2 years in the 2016 LMIS to 5.4 years in the 2022 LMIS. Over this same time period, the percentage of women with no education declined from 42% to 29%.

***Figure 2.5* Education of survey respondents by residence**

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



Patterns by background characteristics

- The median number of years of education completed generally falls with increasing age, from 7.3 years among women age 15–24 to 0.6 years among women age 35–39. The median number of years cannot be calculated for women age 40–49 because more than half of women in this age group have no education.
- By residence, the percentage of women with more than a secondary education is higher in urban areas than rural areas (10% versus 1%). The median number of years of education completed is 8.0 among urban women and 1.2 among rural women.
- The percentage of women with no formal education ranges from 15% in Greater Monrovia to 41% in North Central.

2.11 LITERACY

Literacy

Respondents who had attended higher than secondary school were assumed to be literate. All other respondents were considered literate if they could read aloud all or part of a sentence shown to them.

Sample: Women age 15–49

The ability to read and write is an important personal asset, allowing individuals increased opportunities in life. Knowing the distribution of the literate population can help those involved in health communication plan how to reach women with their messages. The 2022 LMIS assessed the ability to read among women who had never been to school or who had attended only the primary level by asking them to read a simple, short sentence or part of the sentence.

Table 2.13 shows that, overall, 54% of women in Liberia are literate. Forty-six percent of women cannot read at all.

Trends: The percentage of women who are literate increased from 40% in the 2009 LMIS to 54% in the 2022 LMIS.

Patterns by background characteristics

- Literacy is highest in the 15–19 age group (72%) and decreases with increasing age.
- Literacy varies by place of residence; 66% of women in urban areas are literate, as compared with 34% of women in rural areas.
- By region, the percentage of respondents who are literate ranges from 36% in North Central to 74% in Greater Monrovia.

2.12 Mass Media Exposure

Exposure to mass media

Respondents were asked how often they read a newspaper, listened to the radio, or watched television. Those who responded *at least once a week* are considered regularly exposed to that form of media.

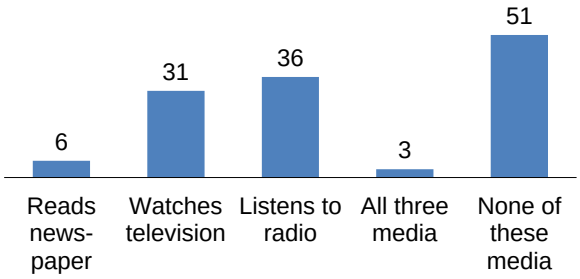
Sample: Women age 15–49

Mass media (for example, television, newspapers, magazines, and radio) is a means of communication capable of reaching large numbers of people in a short time. Exposure to mass media is key to information dissemination and knowledge expansion. All women were asked how often they listen to a radio or watch television, and women who were literate were asked how often they read a newspaper or magazine.

Six percent of women read a newspaper at least once a week, 31% watch television at least once a week, and 36% listen to the radio at least once a week (**Table 2.14** and **Figure 2.6**). Three percent of women are exposed to all three media sources at least once a week; 51% access none of the three media sources at least once a week.

***Figure 2.6* Exposure to mass media**

Percentage of women age 15–49 who are exposed to media on a weekly basis



Patterns by background characteristics

- The percentage of women accessing none of the three media sources at least once a week is higher in rural areas than in urban areas (71% versus 39%).
- The percentage of women with no access to any of the three media sources ranges from 25% in Greater Monrovia to 84% in North Central.
- Access to all three media sources increases with increasing wealth, from less than 1% among women in the lowest three wealth quintiles to 10% among women in the highest quintile.

2.13 Mobile Phone Ownership and Internet Usage

Use of the internet

Respondents were asked if they have ever used the internet from any device, if they used the internet in the last 12 months, and, if so, how often they used it during the last month.

Sample: Women age 15–49

The internet has become an important means of sharing information and transacting business. It has increasingly connected citizens both economically and socially and is one of the defining factors in our information dissemination capability. One of the critical ways in which the internet is accessed is via smartphones. To this end, the 2022 LMIS asked respondents about smartphone ownership and use of the internet from any device.

More than half of women (62%) own a mobile phone, and 24% own a smartphone. Thirty-eight percent of women have ever used the internet, with 33% using the internet in the last 12 months (**Table 2.15**). Among women who have used the internet in the last 12 months, 50% use it almost every day.

Patterns by background characteristics

- Seventy percent of women in urban areas own a mobile phone, and 33% own a smartphone. The corresponding percentages among women in rural areas are 48% and 9%.
- The percentage of women who own a smartphone increases with increasing household wealth, from 3% in the lowest wealth quintile to 53% in the highest quintile.
- Forty-eight percent of urban women have used the internet in the last 12 months, as compared with 10% of rural women.
- By region, the percentage of women who use the internet almost every day ranges from 18% in South Eastern B to 56% in Greater Monrovia.

List of Tables

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

- **Table 2.1 Household drinking water**
- **Table 2.2 Drinking water service ladder**
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- **Table 2.4 Sanitation service ladder**
- **Table 2.5 Household characteristics: Construction materials and rooms used for sleeping**
- **Table 2.6 Household characteristics: Electricity, cooking technology, and cooking fuel**
- **Table 2.7 Household possessions**
- **Table 2.8 Wealth quintiles**
- **Table 2.9 Household population by age, sex, and residence**
- **Table 2.10 Household composition**
- **Table 2.11 Background characteristics of respondents**
- **Table 2.12 Educational attainment**
- **Table 2.13 Literacy**
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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, Liberia MIS 2022

Characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Source of drinking water						
Improved source	**94.2**	**74.5**	**85.4**	**92.8**	**75.4**	**85.1**
Piped into dwelling/yard/plot	1.3	0.1	0.7	1.3	0.1	0.8
Piped to neighbor	3.9	0.0	2.2	3.5	0.0	2.0
Public tap/standpipe	3.1	2.4	2.8	3.2	2.2	2.7
Tube well/borehole/hand pump	37.1	63.9	49.0	43.0	64.9	52.7
Protected dug well	9.1	4.7	7.1	10.2	5.2	8.0
Protected spring	0.2	1.1	0.6	0.2	0.8	0.4
Rainwater	0.0	0.0	0.0	0.0	0.0	0.0
Tanker truck/cart with small tank	0.4	0.0	0.2	0.5	0.0	0.3
Bottled water/mineral water in sachet	39.2	2.3	22.8	31.0	2.2	18.2
Unimproved source	**3.8**	**6.7**	**5.1**	**4.9**	**7.1**	**5.9**
Unprotected dug well	2.5	3.0	2.7	3.8	3.4	3.6
Unprotected spring	1.3	3.7	2.4	1.1	3.7	2.3
Surface water	**2.0**	**18.8**	**9.5**	**2.3**	**17.5**	**9.0**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Time to obtain drinking water (round trip)						
Water on premises[1]	29.1	13.9	22.3	26.7	13.3	20.7
30 minutes or less	64.8	80.9	71.9	66.5	80.8	72.9
More than 30 minutes	4.6	4.0	4.4	5.4	5.0	5.2
Don't know	1.5	1.1	1.3	1.5	0.9	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	2,388	1,918	4,306	12,012	9,610	21,622

[1] Includes water piped to a neighbor and those reporting a round-trip collection time of zero minutes

Table 2.2 Drinking water service ladder

Percent distribution of de jure population by drinking water service ladder, according to background characteristics, Liberia MIS 2022

Background characteristic	At least basic service[1]	Limited service[2]	Unimproved[3]	Surface water	Total	Number of persons
Residence						
Urban	87.0	5.8	4.9	2.3	100.0	12,012
Rural	71.2	4.2	7.1	17.5	100.0	9,610
Region						
Greater Monrovia	91.5	4.8	3.7	0.0	100.0	6,715
North Western	75.7	4.9	9.0	10.4	100.0	1,652
South Central	71.2	2.4	6.5	19.9	100.0	3,740
South Eastern A	57.4	10.3	7.5	24.9	100.0	1,537
South Eastern B	74.1	11.0	2.1	12.8	100.0	1,241
North Central	80.7	4.7	7.3	7.3	100.0	6,738
Wealth quintile						
Lowest	52.5	3.5	12.8	31.1	100.0	4,324
Second	80.2	3.9	5.1	10.7	100.0	4,339
Middle	87.0	6.3	4.4	2.4	100.0	4,316
Fourth	87.5	8.8	2.8	0.9	100.0	4,319
Highest	92.8	2.9	4.3	0.0	100.0	4,324
Total	80.0	5.1	5.9	9.0	100.0	21,622

Note: Service ladder concept/definitions are based on the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (JMP).
[1] Defined as drinking water from an improved source, provided either water is on the premises or round-trip collection time is 30 minutes or less. Includes safely managed drinking water, which is not shown separately.
[2] Drinking water from an improved source, and round-trip collection time is more than 30 minutes or is unknown
[3] Drinking water from an unprotected dug well or unprotected spring

Table 2.3 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities, and percent distribution of households and de jure population with a toilet/latrine facility by location of the facility, according to residence, Liberia MIS 2022

Type and location of toilet/ latrine facility	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Improved sanitation facility	**72.0**	**24.0**	**50.6**	**68.8**	**24.2**	**49.0**
Flush/pour flush to piped sewer system	1.2	0.1	0.7	1.0	0.2	0.6
Flush/pour flush to septic tank	41.8	6.4	26.0	38.7	6.0	24.2
Flush/pour flush to pit latrine	13.5	5.2	9.8	13.7	6.1	10.3
Flush/pour flush, don't know where	0.0	0.1	0.1	0.0	0.1	0.0
Ventilated improved pit (VIP) latrine	5.0	2.9	4.1	5.7	2.7	4.4
Pit latrine with slab	10.3	9.2	9.8	9.7	9.0	9.3
Composting toilet	0.1	0.1	0.1	0.0	0.1	0.1
Unimproved sanitation facility	**15.0**	**12.2**	**13.7**	**17.3**	**13.2**	**15.5**
Flush/pour flush not to sewer/ septic tank/pit latrine	0.4	0.5	0.4	0.4	0.4	0.4
Pit latrine without slab/open pit	8.5	9.8	9.0	8.5	10.8	9.5
Bucket	0.8	0.2	0.5	0.8	0.1	0.5
Hanging toilet/hanging latrine	5.1	1.7	3.6	7.2	1.9	4.9
Other	0.3	0.0	0.2	0.3	0.0	0.2
Open defecation (no facility/ bush/field)	**13.0**	**63.9**	**35.7**	**13.8**	**62.6**	**35.5**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/ population	2,388	1,918	4,306	12,012	9,610	21,622
Location of toilet facility						
In own dwelling	34.7	12.0	29.0	33.8	11.0	27.9
In own yard/plot	43.7	55.9	46.8	44.5	60.4	48.6
Elsewhere	21.5	32.1	24.2	21.7	28.6	23.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/ population with a toilet/latrine facility	2,076	693	2,769	10,349	3,597	13,946

Table 2.4 Sanitation service ladder

Percent distribution of de jure population by type of sanitation service, according to background characteristics, Liberia MIS 2022

Background characteristic	At least basic service[1]	Limited service[2]	Unimproved[3]	Open defecation	Total	Number of persons
Residence						
Urban	32.7	36.1	17.3	13.8	100.0	12,012
Rural	9.2	15.0	13.2	62.6	100.0	9,610
Region						
Greater Monrovia	37.0	38.3	20.3	4.3	100.0	6,715
North Western	6.5	21.4	9.1	63.0	100.0	1,652
South Central	20.8	23.6	6.0	49.6	100.0	3,740
South Eastern A	15.6	22.5	19.3	42.5	100.0	1,537
South Eastern B	6.9	24.8	38.6	29.7	100.0	1,241
North Central	16.6	19.6	12.4	51.4	100.0	6,738
Wealth quintile						
Lowest	0.8	5.0	6.2	88.1	100.0	4,324
Second	9.5	21.5	16.2	52.7	100.0	4,339
Middle	17.8	31.4	23.3	27.5	100.0	4,316
Fourth	21.4	50.2	20.9	7.4	100.0	4,319
Highest	61.8	25.6	10.9	1.6	100.0	4,324
Total	22.3	26.7	15.5	35.5	100.0	21,622

Note: Service ladder concept/definitions are based on the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (JMP).

[1] Defined as use of improved facilities that are not shared with other households. Includes safely managed sanitation service, which is not shown separately.

[2] Defined as use of improved facilities shared by two or more households

[3] Use of flush/pour flush toilet not to sewer, septic tank, or pit latrine; pit latrine without a slab/open pit; hanging toilet/latrine; or bucket

Table 2.5 Household characteristics: Construction materials and rooms used for sleeping

Percent distribution of households and de jure population by housing construction materials and rooms used for sleeping, according to residence, Liberia MIS 2022

	Households			Population		
Characteristic	Urban	Rural	Total	Urban	Rural	Total
Flooring material						
Earth, sand	20.4	65.1	40.3	24.1	63.7	41.7
Dung	0.0	0.4	0.2	0.0	0.3	0.2
Wood/planks	0.1	0.0	0.1	0.1	0.0	0.1
Parquet or polished wood	0.1	0.0	0.1	0.2	0.0	0.1
Floor mat, linoleum, vinyl	6.6	0.6	3.9	4.9	0.5	2.9
Ceramic tiles/terrazo	11.8	2.1	7.5	11.6	2.2	7.4
Concrete/cement	60.3	31.5	47.5	58.8	33.1	47.4
Carpet	0.4	0.1	0.2	0.1	0.0	0.1
Other	0.3	0.1	0.2	0.3	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Roof material						
No roof	0.0	0.6	0.3	0.0	0.6	0.3
Thatch/palm leaf	1.6	9.3	5.1	2.1	8.2	4.8
Rustic mat	0.0	0.5	0.2	0.0	0.3	0.1
Palm/bamboo	0.2	1.3	0.7	0.2	1.1	0.6
Wood planks	0.1	0.3	0.2	0.1	0.4	0.3
Cardboard	0.1	0.1	0.1	0.0	0.0	0.0
Tarpaulin/plastic	0.0	0.0	0.0	0.0	0.0	0.0
Zinc/metal/aluminum	94.7	86.0	90.8	94.4	87.6	91.4
Wood	0.1	0.6	0.3	0.1	0.6	0.3
Calamine/cement fiber	0.3	0.1	0.2	0.4	0.1	0.2
Ceramic tiles	0.4	0.0	0.2	0.3	0.0	0.2
Concrete/cement	2.3	1.1	1.8	2.2	0.9	1.7
Asbestos sheets/roofing shingles	0.0	0.0	0.0	0.0	0.0	0.0
Decra zinc	0.1	0.0	0.0	0.1	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Wall material						
Cane/palm/trunks	0.0	0.0	0.0	0.0	0.0	0.0
Dirt	2.5	6.1	4.1	3.8	6.1	4.8
Straw/thatch mats	0.1	0.8	0.4	0.1	0.7	0.4
Mud and sticks	10.6	50.7	28.5	10.4	48.6	27.4
Stone with mud	3.6	10.9	6.9	4.3	12.0	7.8
Uncovered adobe	0.2	0.2	0.2	0.3	0.3	0.3
Plywood	0.1	0.0	0.1	0.4	0.0	0.2
Cardboard/plastic	0.0	0.0	0.0	0.0	0.0	0.0
Cement	42.0	16.7	30.7	41.3	17.2	30.5
Stone with lime/cement	3.0	2.0	2.6	2.7	2.0	2.4
Bricks	4.8	4.8	4.8	4.4	4.8	4.6
Cement blocks	18.5	4.6	12.3	16.9	4.3	11.3
Covered adobe	4.5	1.0	2.9	5.2	1.2	3.4
Zinc/metal	9.9	2.2	6.5	10.2	2.6	6.8
Other	0.1	0.0	0.1	0.1	0.0	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Rooms used for sleeping						
One	42.3	33.4	38.3	26.7	20.4	23.9
Two	27.6	26.6	27.2	27.2	24.9	26.1
Three or more	30.0	40.0	34.5	46.1	54.7	49.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/ population	2,388	1,918	4,306	12,012	9,610	21,622

Table 2.6 Household characteristics: Electricity, cooking technology, and cooking fuel

Percent distribution of households and de jure population by access to electricity and cooking fuels and technologies, according to residence, Liberia MIS 2022

	Households			Population		
Characteristic	Urban	Rural	Total	Urban	Rural	Total
Electricity						
Yes	52.2	6.4	31.8	50.1	6.7	30.8
No	47.8	93.6	68.2	49.9	93.3	69.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Main cooking technology						
Clean fuels and technologies	2.2	0.0	1.2	1.0	0.0	0.6
Electric stove	1.0	0.0	0.6	0.6	0.0	0.3
Solar cooker	0.1	0.0	0.1	0.0	0.0	0.0
LPG/natural gas stove	1.0	0.0	0.5	0.4	0.0	0.2
Biogas stove	0.1	0.0	0.0	0.0	0.0	0.0
Other fuels and technologies	95.5	98.7	96.9	98.4	99.7	99.0
Liquid fuel stove not using alcohol/ethanol	0.1	0.0	0.0	0.0	0.0	0.0
Manufactured solid fuel stove	74.0	14.7	47.6	72.3	14.1	46.4
Traditional solid fuel stove	0.4	7.6	3.6	0.4	7.4	3.5
Three-stone stove/open fire	21.1	76.4	45.7	25.7	78.2	49.0
No food cooked in household	2.3	1.3	1.8	0.6	0.3	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Cooking fuel						
Clean fuels and technologies[1]	2.2	0.0	1.2	1.0	0.0	0.6
Solid fuels for cooking	95.2	98.7	96.8	97.9	99.7	98.7
Fire coal/charcoal	74.0	14.9	47.7	72.2	14.3	46.5
Wood	20.5	82.2	48.0	24.7	83.7	50.9
Straw/shrubs/grass	0.0	0.0	0.0	0.0	0.0	0.0
Processed biomass (pellets) or woodchips	0.7	1.7	1.1	1.0	1.7	1.3
Other fuels	0.3	0.0	0.2	0.4	0.0	0.2
Kerosene/paraffin	0.3	0.0	0.2	0.4	0.0	0.2
No food cooked in household	2.3	1.3	1.8	0.6	0.3	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/ population	2,388	1,918	4,306	12,012	9,610	21,622

LPG = liquefied petroleum gas
[1] Includes stoves/cookers using electricity, LPG/natural gas/biogas, solar, and alcohol/ethanol

Table 2.7 Household possessions

Percentage of households possessing various household effects, means of transportation, agricultural land, and livestock/farm animals by residence, Liberia MIS 2022

Possession	Residence		Total
	Urban	Rural	
Household effects			
Radio	52.3	42.9	48.1
Television	36.9	4.7	22.5
Mobile phone	91.2	74.6	83.8
Computer	12.3	1.9	7.6
Non-mobile telephone	0.6	0.6	0.6
Ice box (refrigerator)	22.4	3.1	13.8
Generator	11.0	4.8	8.3
Table	79.8	66.3	73.8
Chairs	77.0	58.8	68.9
Cupboard	41.5	11.0	27.9
Mattress	93.5	81.8	88.3
Sewing machine	5.2	2.1	3.9
Bench or stool	65.2	81.3	72.3
Watch	42.2	22.3	33.3
Means of transportation			
Bicycle	4.7	1.6	3.3
Motorcycle/scooter	17.6	14.8	16.4
Car/truck	7.2	1.9	4.9
Boat or canoe	0.7	2.3	1.4
Wheelbarrow	23.4	10.9	17.9
Tricycle or kehkeh	1.4	0.6	1.0
Ownership of agricultural land	20.7	45.1	31.5
Ownership of farm animals[1]	25.2	55.4	38.6
Number of households	2,388	1,918	4,306

[1] Milk cows, bulls, pigs, goats, sheep, chickens, ducks, guinea fowl, guinea pigs, or rabbits

Table 2.8 Wealth quintiles

Percent distribution of the de jure population by wealth quintiles, and the Gini coefficient, according to residence and region, Liberia MIS 2022

Residence/region	Wealth quintile					Total	Number of persons	Gini coefficient[1]
	Lowest	Second	Middle	Fourth	Highest			
Residence								
Urban	6.7	8.4	19.4	31.6	33.9	100.0	12,012	0.21
Rural	36.6	34.7	20.7	5.4	2.6	100.0	9,610	0.33
Region								
Greater Monrovia	0.0	0.0	8.0	39.2	52.8	100.0	6,715	0.16
North Western	23.5	29.4	35.1	9.4	2.6	100.0	1,652	0.26
South Central	25.9	17.8	23.3	20.7	12.3	100.0	3,740	0.37
South Eastern A	31.9	23.4	22.2	15.5	7.0	100.0	1,537	0.40
South Eastern B	22.0	32.6	33.7	8.5	3.2	100.0	1,241	0.27
North Central	32.7	36.0	23.3	6.1	1.9	100.0	6,738	0.24
Total	20.0	20.1	20.0	20.0	20.0	100.0	21,622	0.31

[1] The Gini coefficient indicates the level of concentration of wealth, with 0 representing an equal wealth distribution and 1 representing a totally unequal distribution.

Table 2.9 Household population by age, sex, and residence

Percent distribution of the de facto household population by various age groups and percentage of the de facto household population age 10–19, according to sex and residence, Liberia MIS 2022

	Urban			Rural			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	14.4	12.9	13.6	17.6	16.6	17.1	15.9	14.5	15.2
5–9	13.5	12.1	12.8	15.1	14.4	14.8	14.3	13.1	13.7
10–14	12.6	14.3	13.5	13.3	12.7	13.0	12.9	13.6	13.3
15–19	12.2	11.4	11.8	10.9	8.6	9.7	11.6	10.2	10.9
20–24	8.6	10.9	9.8	6.8	8.4	7.6	7.8	9.8	8.8
25–29	8.2	9.0	8.6	6.3	6.0	6.1	7.3	7.7	7.5
30–34	7.1	6.2	6.7	4.6	5.3	4.9	6.0	5.8	5.9
35–39	5.7	5.5	5.6	5.6	5.9	5.7	5.6	5.7	5.7
40–44	6.0	3.8	4.8	4.7	4.2	4.4	5.4	4.0	4.7
45–49	2.7	2.5	2.6	4.1	3.2	3.7	3.4	2.8	3.1
50–54	3.1	4.6	3.9	3.8	5.6	4.7	3.4	5.0	4.2
55–59	1.8	1.9	1.8	2.2	2.8	2.5	2.0	2.3	2.1
60–64	1.5	1.8	1.6	2.0	2.1	2.1	1.7	1.9	1.8
65–69	1.2	1.2	1.2	1.3	1.5	1.4	1.2	1.4	1.3
70–74	0.5	0.6	0.5	0.8	0.9	0.9	0.7	0.7	0.7
75–79	0.5	0.7	0.6	0.4	0.8	0.6	0.5	0.7	0.6
80+	0.3	0.6	0.4	0.3	1.0	0.7	0.3	0.7	0.5
Don't know	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dependency age groups									
0–14	40.6	39.3	39.9	46.1	43.8	44.9	43.1	41.2	42.1
15–64	56.9	57.7	57.3	51.0	52.0	51.5	54.2	55.2	54.7
65+	2.4	3.0	2.7	2.9	4.2	3.5	2.6	3.5	3.1
Don't know	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Child and adult populations									
0–17	47.9	46.0	46.9	52.9	48.6	50.8	50.2	47.1	48.6
18+	52.0	54.0	53.0	47.1	51.4	49.2	49.8	52.9	51.3
Don't know	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adolescents 10–19	24.8	25.7	25.3	24.2	21.3	22.8	24.5	23.8	24.2
Number of persons	5,544	6,149	11,692	4,682	4,607	9,289	10,226	10,755	20,982

Table 2.10 Household composition

Percent distribution of households by sex of head of household and by household size and mean size of households, according to residence, Liberia MIS 2022

	Residence		
Characteristic	Urban	Rural	Total
Household headship			
Male	66.9	66.7	66.8
Female	33.1	33.3	33.2
Total	100.0	100.0	100.0
Number of usual members			
1	8.1	8.0	8.1
2	12.0	9.1	10.7
3	14.9	15.3	15.1
4	15.9	15.3	15.7
5	14.0	15.9	14.9
6	10.6	12.1	11.3
7	7.7	7.3	7.5
8	6.1	6.0	6.0
9+	10.6	10.9	10.7
Total	100.0	100.0	100.0
Mean size of households	5.0	5.0	5.0
Number of households	2,388	1,918	4,306

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

Table 2.11 Background characteristics of respondents

Percent distribution of women age 15–49 by selected background characteristics, Liberia MIS 2022

Background characteristic	Weighted percent	Weighted number	Unweighted number
Age			
15–19	21.6	977	990
20–24	21.1	952	887
25–29	17.0	769	718
30–34	12.8	578	550
35–39	12.3	554	607
40–44	8.9	402	424
45–49	6.2	282	337
Religion			
Christian	86.6	3,908	3,876
Muslim	11.5	521	550
Traditional religion	0.6	27	21
No religion	1.3	57	64
Other	0.0	1	2
Language			
Bassa	15.1	682	674
Gbandi	1.8	82	87
Belle	0.2	7	6
Dey	0.2	7	13
Gio	9.2	415	231
Gola	2.3	102	131
Grebo	7.5	338	736
Kissi	4.5	202	142
Kpelle	21.5	968	860
Krahn	3.8	170	223
Kru	3.7	166	287
Lorma	4.3	192	120
Mandingo	2.5	111	83
Mano	5.9	265	181
Mende	1.7	79	119
Sapo	0.6	27	43
Vai	3.6	164	181
None/only English	10.6	477	330
Other	1.3	58	66
Residence			
Urban	61.4	2,771	2,284
Rural	38.6	1,742	2,229
Region			
Greater Monrovia	37.8	1,706	815
North Western	6.7	303	585
South Central	16.9	764	785
South Eastern A	6.5	292	717
South Eastern B	5.5	248	812
North Central	26.6	1,201	799
Education			
No education	28.6	1,290	1,413
Elementary	25.8	1,165	1,342
Junior high	18.8	848	816
Senior high	20.3	916	725
Higher	6.5	295	217
Wealth quintile			
Lowest	17.6	794	1,054
Second	16.9	764	941
Middle	18.3	827	1,018
Fourth	23.0	1,037	824
Highest	24.2	1,091	676
Total	100.0	4,513	4,513

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

Table 2.12 Educational attainment

Percent distribution of women age 15–49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, Liberia MIS 2022

Background characteristic	Highest level of schooling						Total	Median years completed	Number of women
	No education	Some primary	Completed primary[1]	Some secondary	Completed secondary[2]	More than secondary			
Age									
15–24	12.3	27.7	3.7	41.5	11.1	3.7	100.0	7.3	1,929
15–19	9.8	35.8	4.3	43.5	5.8	0.9	100.0	6.9	977
20–24	14.9	19.3	3.0	39.5	16.6	6.7	100.0	8.0	952
25–29	25.0	20.0	1.6	25.0	16.6	11.8	100.0	6.7	769
30–34	36.9	20.0	1.6	19.4	14.4	7.7	100.0	3.3	578
35–39	46.1	21.2	2.1	13.8	9.3	7.5	100.0	0.6	554
40–44	58.2	16.6	0.5	10.3	6.0	8.4	100.0	a	402
45–49	55.9	22.7	3.1	9.8	4.0	4.4	100.0	a	282
Residence									
Urban	20.8	17.3	2.4	33.3	16.2	10.1	100.0	8.0	2,771
Rural	40.9	32.9	2.7	18.9	3.7	0.9	100.0	1.2	1,742
Region									
Greater Monrovia	15.0	13.5	1.6	36.3	19.7	13.9	100.0	9.4	1,706
North Western	40.1	31.2	3.0	19.0	5.6	1.2	100.0	2.4	303
South Central	34.9	25.9	3.7	22.0	9.5	4.0	100.0	3.6	764
South Eastern A	25.0	30.1	4.6	25.1	11.1	4.1	100.0	4.6	292
South Eastern B	33.6	28.6	3.4	26.9	6.2	1.3	100.0	4.0	248
North Central	40.8	30.8	2.2	22.2	3.2	0.8	100.0	0.8	1,201
Wealth quintile									
Lowest	51.4	34.4	2.5	10.3	1.3	0.1	100.0	a	794
Second	39.1	30.9	4.0	22.4	3.1	0.4	100.0	2.2	764
Middle	32.5	28.5	3.0	28.5	6.6	1.0	100.0	4.0	827
Fourth	20.3	16.5	2.5	37.9	16.9	5.8	100.0	8.0	1,037
Highest	9.5	12.3	1.2	33.9	22.8	20.3	100.0	10.4	1,091
Total	28.6	23.3	2.5	27.7	11.4	6.5	100.0	5.4	4,513

[1] Completed grade 6 at the primary level
[2] Completed grade 12 at the secondary level
a = Omitted because less than 50% of the respondents have completed 1 year of school

Table 2.13 Literacy

Percent distribution of women age 15–49 by level of schooling attended and level of literacy, and percentage literate, according to background characteristics, Liberia MIS 2022

Background characteristic	Higher than secondary schooling	No schooling, primary or secondary school: Can read a whole sentence	Can read part of a sentence	Cannot read at all	No card with required language	Blind/ visually impaired	Total	Percentage literate[1]	Number of women
Age									
15–24	3.7	44.0	21.5	30.6	0.1	0.0	100.0	69.3	1,929
15–19	0.9	46.5	24.7	27.8	0.1	0.0	100.0	72.1	977
20–24	6.7	41.6	18.1	33.5	0.2	0.0	100.0	66.4	952
25–29	11.8	29.1	16.5	42.3	0.3	0.0	100.0	57.4	769
30–34	7.7	25.1	12.9	53.3	0.3	0.7	100.0	45.7	578
35–39	7.5	15.9	11.6	64.6	0.3	0.2	100.0	34.9	554
40–44	8.4	11.8	8.9	70.5	0.4	0.0	100.0	29.1	402
45–49	4.4	11.5	10.4	73.1	0.6	0.0	100.0	26.3	282
Residence									
Urban	10.1	39.9	16.2	33.3	0.4	0.1	100.0	66.2	2,771
Rural	0.9	16.2	17.0	65.8	0.1	0.1	100.0	34.0	1,742
Region									
Greater Monrovia	13.9	45.3	14.9	25.4	0.4	0.2	100.0	74.1	1,706
North Western	1.2	23.5	16.2	59.1	0.0	0.0	100.0	40.9	303
South Central	4.0	26.3	14.6	55.0	0.0	0.2	100.0	44.8	764
South Eastern A	4.1	29.3	19.1	47.4	0.2	0.0	100.0	52.4	292
South Eastern B	1.3	28.2	14.6	55.1	0.7	0.0	100.0	44.1	248
North Central	0.8	15.5	19.9	63.6	0.3	0.0	100.0	36.1	1,201
Wealth quintile									
Lowest	0.1	9.6	14.9	75.3	0.1	0.1	100.0	24.6	794
Second	0.4	16.2	20.7	62.2	0.5	0.0	100.0	37.3	764
Middle	1.0	26.9	15.3	56.2	0.0	0.5	100.0	43.3	827
Fourth	5.8	42.8	18.0	33.0	0.3	0.0	100.0	66.6	1,037
Highest	20.3	47.7	14.2	17.4	0.4	0.0	100.0	82.2	1,091
Total	6.5	30.7	16.5	45.9	0.3	0.1	100.0	53.8	4,513

[1] Refers to women who attended schooling higher than the secondary level and women with less schooling who can read a whole sentence or part of a sentence

Table 2.14 Exposure to mass media

Percentage of women age 15–49 who are exposed to specific media on a weekly basis, according to background characteristics, Liberia MIS 2022

Background characteristic	Reads a newspaper at least once a week	Watches television at least once a week	Listens to the radio at least once a week	Accesses all three media at least once a week	Accesses none of the three media at least once a week	Number of women
Age						
15–19	6.9	31.7	29.3	2.5	53.1	977
20–24	7.9	36.0	34.8	3.7	48.2	952
25–29	7.1	36.9	43.3	3.4	43.3	769
30–34	7.0	26.3	37.7	4.0	52.4	578
35–39	4.5	25.4	33.7	3.2	57.4	554
40–44	4.8	24.2	36.7	2.5	55.5	402
45–49	3.3	24.8	36.9	2.3	54.8	282
Residence						
Urban	9.8	43.1	42.8	5.0	38.7	2,771
Rural	1.1	11.5	24.1	0.3	70.9	1,742
Region						
Greater Monrovia	12.7	58.1	50.3	7.0	25.3	1,706
North Western	2.3	16.8	28.5	1.3	62.8	303
South Central	4.0	27.0	41.8	1.6	48.3	764
South Eastern A	6.9	23.5	33.5	1.7	53.2	292
South Eastern B	3.5	14.7	31.8	0.8	60.8	248
North Central	0.7	3.5	13.9	0.1	84.3	1,201
Education						
No education	0.2	14.2	26.8	0.2	67.8	1,290
Elementary	1.6	18.4	24.0	0.5	65.3	1,165
Junior high	6.0	39.1	37.7	2.6	43.1	848
Senior high	13.7	49.5	49.9	5.4	29.7	916
Higher	31.8	72.3	69.0	21.4	11.9	295
Wealth quintile						
Lowest	0.3	4.5	19.6	0.1	79.2	794
Second	1.0	9.5	23.3	0.1	72.6	764
Middle	2.1	16.0	28.0	0.4	63.8	827
Fourth	7.7	38.8	42.0	3.0	39.5	1,037
Highest	16.9	69.0	55.5	9.8	17.3	1,091
Total	6.4	30.9	35.6	3.2	51.2	4,513

Table 2.15 Mobile phone ownership and internet usage

Percentage of women age 15–49 who own any mobile phone, who own a smartphone, who have ever used the internet, and who have used the internet in the last 12 months, and among women who have used the internet in the last 12 months, percent distribution by frequency of internet use in the last month, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage who own any mobile phone	Percentage who own a smartphone	Ever used the internet	Used the internet in the last 12 months	Number of women	Among respondents who have used the internet in the last 12 months, percentage who, in the last month, used the internet: Almost every day	At least once a week	Less than once a week	Not at all	Total	Number of women
Age											
15–19	47.6	16.1	35.4	30.6	977	44.6	29.6	15.9	9.9	100.0	299
20–24	66.6	30.7	49.6	44.0	952	52.9	25.1	14.2	7.8	100.0	419
25–29	69.6	30.6	46.5	41.9	769	58.8	22.0	12.1	7.1	100.0	322
30–34	60.8	19.1	32.5	29.0	578	43.3	33.1	14.0	9.6	100.0	167
35–39	67.6	23.4	29.8	26.9	554	50.2	24.0	14.9	10.8	100.0	149
40–44	67.2	23.9	29.8	25.8	402	39.0	44.1	14.0	2.9	100.0	104
45–49	58.4	16.5	20.0	16.4	282	(48.8)	(28.1)	(17.7)	(5.3)	100.0	46
Residence											
Urban	70.4	32.9	53.5	47.9	2,771	53.3	26.5	12.7	7.5	100.0	1,327
Rural	48.4	9.0	12.7	10.2	1,742	26.0	34.9	25.9	13.2	100.0	178
Region											
Greater Monrovia	79.3	40.2	66.4	60.2	1,706	56.1	25.6	11.5	6.8	100.0	1,027
North Western	54.1	12.0	17.0	14.3	303	19.8	36.2	26.1	18.0	100.0	43
South Central	55.7	21.0	30.0	25.9	764	45.5	31.5	15.5	7.5	100.0	198
South Eastern A	63.1	24.1	36.3	30.5	292	51.9	25.8	9.4	12.9	100.0	89
South Eastern B	64.5	13.8	23.8	20.4	248	18.3	29.2	27.1	25.4	100.0	51
North Central	42.3	6.7	10.5	8.1	1,201	24.4	36.7	32.2	6.7	100.0	97
Education											
No education	44.4	8.1	10.3	8.5	1,290	34.9	31.5	17.7	15.9	100.0	109
Elementary	49.3	10.3	18.7	14.6	1,165	27.8	30.0	29.0	13.2	100.0	171
Junior high	64.6	21.2	44.1	38.3	848	33.5	35.8	18.8	11.8	100.0	325
Senior high	89.5	47.8	76.9	69.6	916	55.8	26.1	11.9	6.1	100.0	637
Higher	95.2	76.7	93.7	89.5	295	77.5	17.3	3.1	2.1	100.0	263
Wealth quintile											
Lowest	32.4	2.6	5.2	3.7	794	(3.9)	(24.4)	(44.4)	(27.3)	100.0	29
Second	46.5	6.4	10.0	7.7	764	19.7	29.6	32.9	17.9	100.0	59
Middle	58.9	13.3	24.2	19.2	827	26.9	36.3	20.1	16.7	100.0	158
Fourth	74.7	29.9	53.5	46.2	1,037	43.1	33.6	14.4	8.9	100.0	478
Highest	84.4	53.0	76.3	71.5	1,091	63.2	22.0	10.4	4.5	100.0	780
Total	61.9	23.7	37.8	33.4	4,513	50.1	27.5	14.2	8.2	100.0	1,505

Note: Figures in parentheses are based on 25–49 unweighted cases.

MALARIA PREVENTION 3

Key Findings

- ***Ownership of insecticide-treated nets (ITNs):*** Nationally, 72% of Liberian households have at least one ITN.
- ***Source of nets:*** 74% of ITNs were obtained through the 2021 mass distribution campaign.
- ***ITN access:*** 52% of the de facto household population could sleep under an ITN if each ITN were used by up to two people.
- ***ITN use:*** 44% of the household population, 50% of children under age 5, and 53% of pregnant women slept under an ITN the night before the survey.
- ***Intermittent preventive treatment during pregnancy (IPTp):*** 93% of women with a live birth in the 2 years preceding the survey reported having taken one or more doses of sulfadoxine-pyrimethamine (SP)/Fansidar; 80% reported taking two or more doses, and 63% reported taking three or more doses.

This chapter describes the population coverage rates of some of the key malaria control interventions in Liberia, including ownership, source, and use of mosquito nets and prophylactic use of antimalarial drugs among pregnant women. This is in line with the 2021–2025 Surveillance, Monitoring, Evaluation and Operational Research Plan, the objective of which is for 90% or more of households to have at least one long-lasting insecticidal net (LLIN) for every two persons by the year 2025 (NMCP 2020a).

3.1 OWNERSHIP AND COVERAGE 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.

Sample: Households

Full household ITN coverage

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

Sample: Households (with at least one person who stayed in the household the night before the survey)

ITNs repel and kill mosquitoes, thus providing protection against mosquito bites and reducing the transmission of malaria parasites. When high coverage of ITNs is achieved, ITNs help decrease malaria risk at the individual level as well as at the community level by reducing the vector population. The distribution and use of ITNs is one of the core interventions for preventing malaria infection in Liberia. ITNs are distributed for

free through mass campaigns, routine services provided to pregnant women such as antenatal care (ANC) visits, and school distribution (NMCP 2020a). They may also be purchased.

Nationally, 75% of households have at least one mosquito net, while 72% have at least one ITN. This implies that almost all mosquito nets owned by households in Liberia are ITNs. The average number of ITNs per household is 1.5 (**Table 3.1**).

One in three households have at least one ITN for every two persons who stayed in the household the night preceding the survey. In other words, 33% of households own enough ITNs to cover all household members if it is assumed that one net is shared by two people (**Table 3.1** and **Figure 3.1**). Thus, to ensure sufficient household coverage of one net per two persons, the scope of distribution needs to expand to reach the 28% of households that do not own any ITNs. In addition, the quantity of ITNs distributed needs to increase to provide sufficient ITNs for the 39% of households that own at least one ITN but have an insufficient supply for the number of household members (**Figure 3.1**).

Trends: The percentage of households that own at least one ITN increased from 47% in the 2009 LMIS to 72% in the 2022 LMIS (**Figure 3.2**).

Patterns by background characteristics

- Household ownership of ITNs is higher in rural areas (86%) than in urban areas (62%) (**Table 3.1**).
- ITN ownership generally decreases as wealth increases; 84% of households in the lowest wealth quintile own an ITN, as compared with 53% of households in the highest wealth quintile (**Figure 3.3**).

Figure 3.1 Household coverage of ITNs

Percent distribution of households

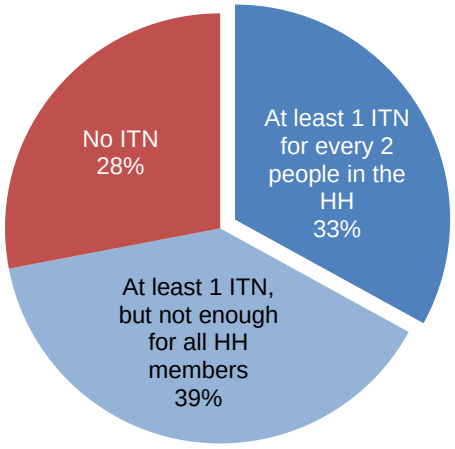
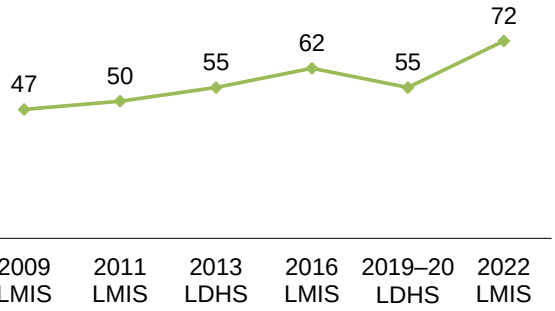


Figure 3.2 Trends in household ownership of ITNs

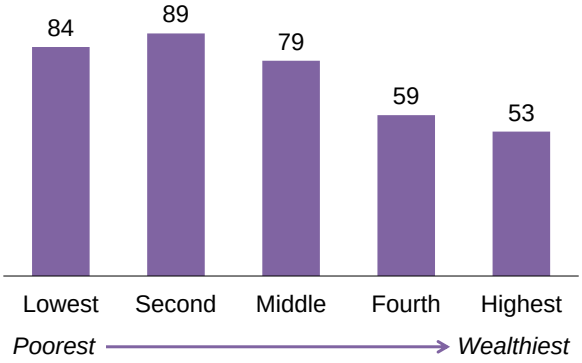
Percentage of households owning at least one insecticide-treated net (ITN)



Note: The definition of an ITN in surveys conducted prior to 2016 included nets that had been soaked with insecticides within the last 12 months.

Figure 3.3 ITN ownership by household wealth

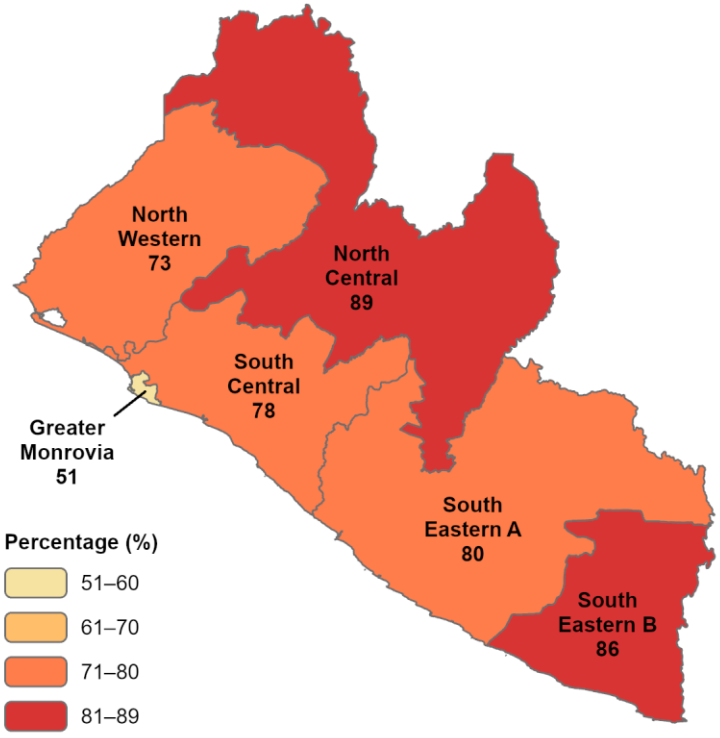
Percentage of households with at least one ITN



- By region, household ownership of ITNs is highest in North Central (89%) and lowest in Greater Monrovia (51%) (**Map 3.1**).

Map 3.1 **ITN ownership by region**

Percentage of households with at least one ITN

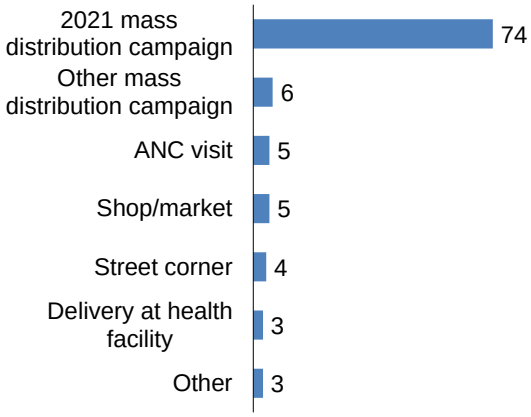


Source of Nets

Seventy-four percent of ITNs in Liberian households were obtained through the 2021 mass distribution campaign, 6% were obtained during prior mass distribution campaigns, 5% were obtained at an ANC visit, 5% were obtained from a shop/market, 4% were obtained on a street corner, 3% were obtained during the delivery of a child at a health facility, and 3% were obtained from other sources (**Table 3.2** and **Figure 3.4**).

Figure 3.4 **Source of ITNs**

Percent distribution of ITNs in interviewed households



Patterns by background characteristics

- Seventy-eight percent of ITNs in rural areas and 69% in urban areas were obtained through the 2021 mass distribution campaign (**Table 3.2**).
- By region, the percentage of households obtaining ITNs through the 2021 mass campaign is highest in South Eastern A (82%) and lowest in Greater Monrovia (57%).
- The percentage of households obtaining an ITN on a street corner is much higher in Greater Monrovia (13%) in than any of the other regions (less than 1% to 3%).

3.2 HOUSEHOLD ACCESS TO AND USE OF INSECTICIDE-TREATED NETS

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

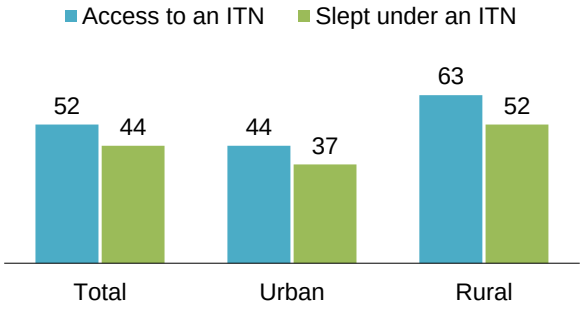
Sample: De facto household population

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 behavioral gaps. Such gaps indicate that available ITNs are not being used. If the difference between these indicators is substantial, the program may need to focus on behavior change and on how to identify the main drivers of or barriers to ITN use to design appropriate interventions. These data help ITN programs determine whether they need to achieve higher ITN coverage, promote ITN use, or both.

Nationally, 52% of the de facto household population in Liberia that stayed in the household the night before the survey could sleep under an ITN if each ITN were used by up to two people (**Table 3.3**). Forty-four percent of the population slept under an ITN the night before the survey (**Table 3.4**). Thus, there is a difference of 8 percentage points between ITN access and ITN use at the population level (**Figure 3.5**).

Figure 3.5 **Access to and use of ITNs**

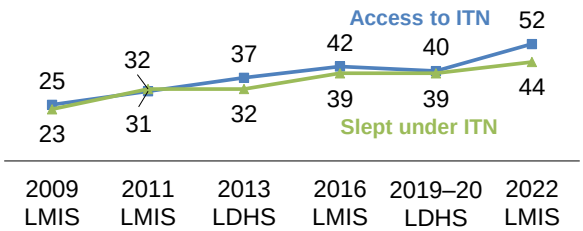
Percentage of the household population with access to an ITN and percentage that slept under an ITN the night before the survey



Among the population in households with at least one ITN, 57% slept under an ITN the night before the survey (**Table 3.4**). Overall, 65% of ITNs were used the night before the survey (**Table 3.5**).

Figure 3.6 **Trends in ITN access and use**

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



Note: The definition of an ITN in surveys conducted in 2016 and earlier included nets that had been soaked with insecticides within the last 12 months.

Trends: The percentage of the household population with access to an ITN rose from 25% in the 2009 LMIS to 42% in the 2016 LMIS and 52% in the 2022 LMIS. In parallel, the percentage of the household population that slept under an ITN the night before the survey increased from 23% in the 2009 LMIS to 39% in the 2016 LMIS and 44% in the 2022 LMIS (**Figure 3.6**).

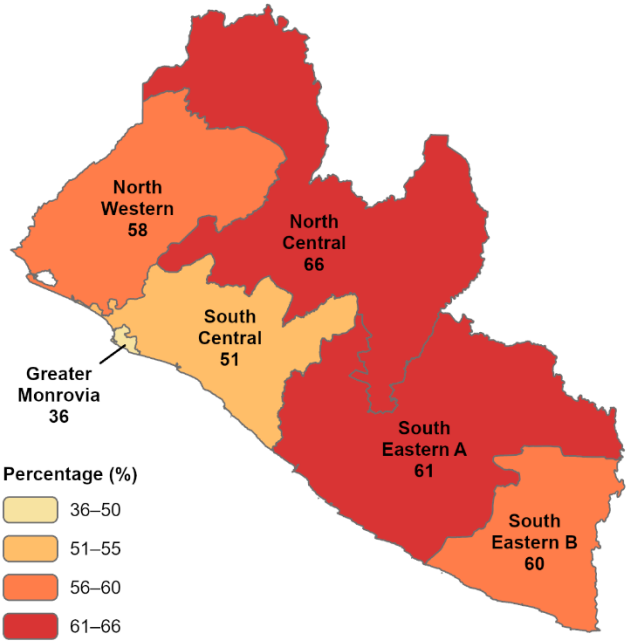
Patterns by background characteristics

- Both access to and use of ITNs are higher in rural areas than in urban areas. However, there is a larger difference in access and use in rural areas (11 percentage points) than in urban areas (7 percentage points) (**Figure 3.5**).

- The percentage of household residents with access to an ITN is inversely correlated with household wealth; access ranges from 34% among those in the highest wealth quintile to 65% among those in the second wealth quintile (**Table 3.3**).
- ITN access among the de facto population ranges from 36% in Greater Monrovia to 66% in North Central (**Map 3.2**).
- The percentage of the household population that slept under an ITN the night before the survey is highest in North Central (59%) and lowest in Greater Monrovia (30%) (**Map 3.3**).
- There are only minimal differences in use of existing ITNs according to household wealth (**Table 3.5**).
- Use of existing ITNs is highest in North Central (72%) and lowest in North Western (52%).

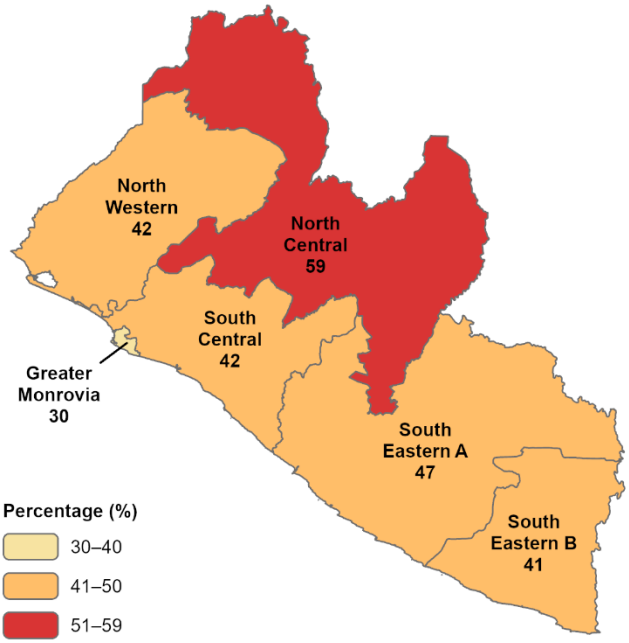
Map 3.2 ITN access by region

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



Map 3.3 ITN use by household population

Percentage of the household population that slept under an ITN the previous night



3.3 Use of Insecticide-Treated Nets by Children and Pregnant Women

Malaria is endemic in Liberia, and transmission occurs year-round. Pregnant women and children under age 5 are the populations most at risk. While ITN mass distribution campaigns target the general population, Liberia also conducts routine distribution campaigns through health facilities that target pregnant women and children under age 5.

Fifty percent of children under age 5 and 53% of pregnant women slept under an ITN the night before the survey (**Table 3.6** and **Figure 3.7**).

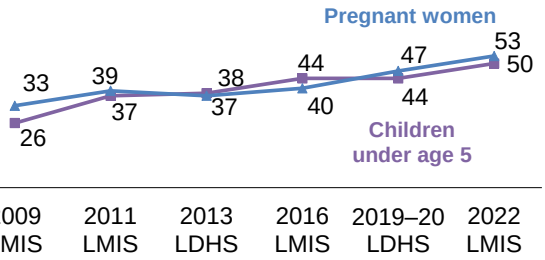
Trends: The percentage of children under age 5 who slept under an ITN the night before the survey rose from 26% in the 2009 LMIS to 44% in the 2016 LMIS and 50% in the 2022 LMIS; similarly, the percentage of pregnant women who slept under an ITN increased from 33% in the 2009 LMIS and 40% in the 2016 LMIS to 53% in the 2022 LMIS.

Patterns by background characteristics

- A higher percentage of children in rural areas (55%) than urban areas (45%) slept under an ITN the night before the survey (**Table 3.6**).

Figure 3.7 **ITN use 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 surveys conducted in 2016 and earlier included nets that had been soaked with insecticides within the last 12 months.

- The percentage of children who slept under an ITN the night before the survey is highest in North Central (59%) and lowest in Greater Monrovia (42%).
- A higher percentage of pregnant women in rural areas (69%) than urban areas (39%) slept under an ITN the night before the survey (**Table 3.7**).

3.4 Reasons Mosquito Nets Were Not Used

Table 3.8 presents reasons given by respondents for not using mosquito nets the night before the survey. This information is important to NMCP and other stakeholders for identifying barriers to net use. Overall, 34% of ITNs were not used the night before the survey.

The main reasons given for not using an ITN the night before the survey were that the net was not hung or was stored away (26%), the net was not in good condition or was torn (25%), and the net was an extra net or was being saved for later (24%).

Patterns by background characteristics

- The percentage of ITNs that were not used the night before the survey varies little according to household wealth.
- The percentage of ITNs that were not used the night before the survey because they were not hung up or were stored away is higher in rural areas (29%) than urban areas (22%).
- By region, the percentage of ITNs that were not used because they were extra nets or being saved for later is highest in North Central (33%) and lowest in Greater Monrovia (11%).

3.5 Malaria in Pregnancy

Malaria infection during pregnancy is a major public health problem in Liberia, with substantial risks for the mother, her fetus, and the neonate. The World Health Organization (WHO) recommends a package of interventions for reducing the negative health effects associated with malaria in pregnancy: prompt diagnosis

and treatment of confirmed infections, use of ITNs, and intermittent preventive treatment of malaria in pregnancy (IPTp) (WHO 2014b).

The 2022 LMIS assessed use of antenatal care services for the last birth in the 2 years preceding the survey and IPTp usage during the pregnancy for the last birth in the 2 years preceding the survey among women age 15–49.

3.5.1 Antenatal Care Coverage

Antenatal care (ANC) from a skilled provider

Pregnancy care received from skilled providers, such as doctors, nurses, midwives, and physician assistants.

Sample: Women age 15–49 who had a live birth in the 2 years before the survey

Health care services during pregnancy and childbirth and after delivery are important for the survival and well-being of both the mother and the infant. Ensuring access to a continuum of care for women during the antenatal, intrapartum, and postpartum periods is critical for maternal and newborn survival and is a priority of the Ministry of Health.

Access to quality ANC services during pregnancy can help prevent maternal death. ANC visits allow providers to identify and manage infections as well as obstetric complications and to provide preventive injections, medications, and supplements to women. During ANC visits, women receive education about health behaviors during pregnancy, counseling on pregnancy danger signs, and information on family planning.

Overall, 98% of women received antenatal care from a skilled provider for their most recent live birth in the last 2 years (**Table 3.9**). Twenty-three percent received care from a doctor and 75% received care from a nurse/midwife/midman. Less than 1% of women received care from a trained traditional midwife, and 2% did not receive antenatal care.

3.5.2 Timing and Number of Antenatal Care Visits

Eighty-four percent of women had at least four ANC visits for their most recent live birth in the 2 years preceding the survey. Seventy-one percent of women had their first antenatal care visit before their fourth month of pregnancy (during their first trimester). Among those who received ANC, the median number of months pregnant at the first visit was 3.2 (**Table 3.10**).

Patterns by background characteristics

- The percentage of women who had four or more ANC visits increases with age at birth, from 77% among women under age 20 to 87% among women age 35–49.
- By region, the percentage of women who had four or more ANC visits is highest in North Central and South Eastern B (89% each) and lowest in South Central (77%).

3.5.3 Intermittent Preventive Treatment

Intermittent preventive treatment (IPTp) during pregnancy (IPTp3+)

Percentage of women who took at least three doses of sulfadoxine-pyrimethamine (SP)/Fansidar during their last pregnancy.

Sample: Women age 15–49 with a live birth in the 2 years before the survey

Intermittent preventive treatment of malaria in pregnancy (IPTp) is a full therapeutic course of antimalarial medicine given to pregnant women at routine antenatal care visits to prevent malaria. IPTp helps prevent maternal malaria episodes, maternal and fetal anemia, placental parasitemia, low birth weight, and neonatal mortality.

Sulfadoxine-pyrimethamine (SP), also known as Fansidar, is the recommended drug for IPTp in Liberia. The Ministry of Health has been implementing IPTp, defined as provision of at least three doses of SP/Fansidar during routine antenatal care visits in the second and third trimesters of pregnancy (IPTp3+), for several years. The goal is to protect the mother and her child from malaria. The National Malaria Control Program adopted the 2012 WHO recommendation to administer one dose of SP/Fansidar at each ANC visit after the first trimester, with at least 1 month between doses (WHO 2012a; WHO 2012b). The household survey indicator used to measure coverage of this intervention is the percentage of women with a live birth in the 2 years preceding the survey who received three or more doses of SP/Fansidar (IPTp3+).

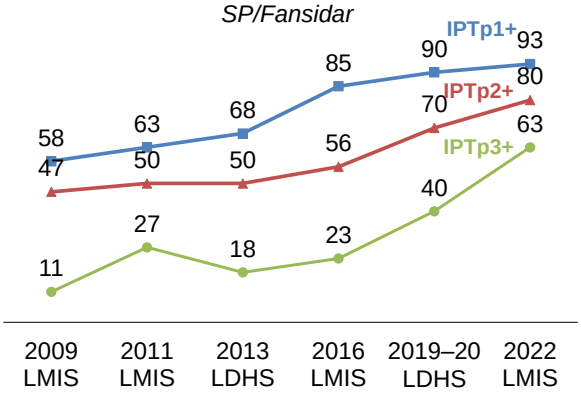
Ninety-three percent of women with a live birth in the 2 years preceding the survey reported having taken one or more doses of SP/Fansidar; 80% reported taking two or more doses, and 63% reported taking three or more doses (**Table 3.11**).

Among women with a live birth in the 2 years preceding the survey who took IPTp only one or two times during their pregnancy, the most commonly cited reasons for taking fewer than the recommended number of doses were that IPTp was not given to them (28%) and that they were not aware they had to take more doses (24%) (**Table 3.12**).

Trends: The percentage of women with a live birth in the last 2 years who received any IPTp has increased markedly over time, from 58% in the 2009 LMIS to 93% in the 2022 LMIS. Over the same time frame, the percentage who received IPTp3+ rose from 11% to 63% (**Figure 3.8**).

Figure 3.8 **Trends in IPTp use by pregnant women**

Percentage of women with a live birth in the 2 years before the survey who received at least 1, 2, or 3 doses of SP/Fansidar



Patterns by background characteristics

- The percentage of women with a live birth in the 2 years preceding the survey who received three or more doses of SP/Fansidar is higher in rural areas (69%) than in urban areas (57%) (**Table 3.11**).
- Eighty-three percent of women in South Eastern B received three or more doses of SP/Fansidar, as compared with 55% of women in Greater Monrovia.

LIST OF TABLES

For detailed information on malaria prevention, see the following tables:

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, Liberia MIS 2022

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[1]		Number of households with at least one person who stayed in the household last night
	Any mosquito net	Insecticide-treated mosquito net (ITN)[2]	Any mosquito net	Insecticide-treated mosquito net (ITN)[2]		Any mosquito net	Insecticide-treated mosquito net (ITN)[2]	
Residence								
Urban	65.0	61.6	1.3	1.3	2,388	27.9	26.8	2,379
Rural	86.3	85.7	1.9	1.9	1,918	41.1	40.3	1,897
Region								
Greater Monrovia	56.1	51.4	1.0	0.9	1,434	23.6	22.1	1,430
North Western	74.0	72.8	1.6	1.5	383	41.3	39.4	378
South Central	78.6	77.7	1.5	1.4	741	29.0	28.6	738
South Eastern A	81.1	80.1	1.9	1.9	301	43.1	42.0	300
South Eastern B	86.6	85.5	1.7	1.7	241	38.2	37.9	240
North Central	89.8	89.2	2.2	2.2	1,206	43.2	42.8	1,190
Wealth quintile								
Lowest	84.8	84.4	1.8	1.8	881	40.8	40.5	876
Second	89.4	89.1	2.1	2.1	803	42.8	42.4	796
Middle	81.1	78.9	1.8	1.8	821	38.6	37.7	810
Fourth	62.1	58.8	1.1	1.1	975	29.8	28.2	973
Highest	56.9	52.6	1.1	1.0	826	17.4	16.0	821
Total	74.5	72.3	1.6	1.5	4,306	33.7	32.8	4,276

[1] De facto household members
[2] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.2 Source of mosquito nets

Percent distribution of insecticide-treated nets (ITNs), non-ITNs, and all mosquito nets by source of net, according to background characteristics, Liberia MIS 2022

Background characteristic	2021 mass distri-bution campaign	ANC visit	Delivery at a health facility	School distri-bution	Govern-ment health facility	Shop/ market	Religious institution	Street corner	Neighbor/ friend/ relative	Other mass distri-bution	Other	Don't know	Total	Number of mosquito nets
						ITNS[1]								
Residence														
Urban	69.2	5.3	2.6	0.2	0.7	7.7	0.3	6.5	2.6	4.1	0.7	0.2	100.0	3,029
Rural	77.9	4.4	3.0	0.2	0.7	2.3	0.0	1.6	1.5	8.3	0.1	0.0	100.0	3,574
Region														
Greater Monrovia	57.3	3.1	1.7	0.2	1.0	15.6	0.0	13.4	4.1	2.4	0.9	0.3	100.0	1,337
North Western	70.5	4.4	2.7	0.0	1.0	2.4	0.0	0.3	0.8	17.7	0.2	0.0	100.0	589
South Central	75.2	6.9	3.8	0.8	0.4	4.8	0.0	2.7	2.5	2.3	0.4	0.1	100.0	1,064
South Eastern A	81.8	3.0	3.8	0.1	1.0	0.9	0.0	0.5	2.1	5.9	0.3	0.4	100.0	565
South Eastern B	71.4	10.1	5.5	0.2	1.2	0.6	0.4	0.6	3.5	6.7	0.0	0.1	100.0	416
North Central	81.2	4.5	2.3	0.1	0.5	1.3	0.3	1.5	0.8	7.4	0.2	0.0	100.0	2,633
Wealth quintile														
Lowest	80.3	4.6	3.3	0.2	0.1	1.5	0.1	0.8	1.0	7.5	0.4	0.0	100.0	1,611
Second	80.4	4.6	2.8	0.3	0.8	0.7	0.0	1.1	1.2	7.9	0.1	0.0	100.0	1,699
Middle	72.4	7.0	2.9	0.0	0.5	3.7	0.4	2.4	1.7	8.1	0.5	0.3	100.0	1,439
Fourth	66.8	3.2	2.5	0.5	0.8	10.9	0.1	8.8	3.7	2.2	0.4	0.2	100.0	1,049
Highest	59.0	3.6	1.8	0.1	2.0	13.7	0.0	12.1	4.2	3.0	0.3	0.1	100.0	805
Total	73.9	4.8	2.8	0.2	0.7	4.8	0.1	3.9	2.0	6.3	0.4	0.1	100.0	6,603
						NON-ITNS								
Total	na	na	na	na	na	36.8	0.0	40.1	6.1	15.1	1.5	0.4	100.0	192
						ALL MOSQUITO NETS								
Total	71.8	4.7	2.7	0.2	0.7	5.7	0.1	4.9	2.1	6.6	0.4	0.1	100.0	6,795

na = not applicable
ANC = antenatal care
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

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

Percentage of the de facto population with access to an ITN in the household, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage of the de facto population with access to an ITN[1,2]	Number of persons
Residence		
Urban	44.3	11,692
Rural	62.6	9,289
Region		
Greater Monrovia	35.6	6,577
North Western	57.6	1,572
South Central	51.0	3,647
South Eastern A	60.6	1,475
South Eastern B	59.8	1,188
North Central	65.8	6,522
Wealth quintile		
Lowest	63.1	4,189
Second	64.7	4,228
Middle	58.0	4,128
Fourth	42.4	4,180
Highest	34.2	4,256
Total	52.4	20,982

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).
[2] Percentage of the de facto household population that could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.4 Use of mosquito nets by persons in the household

Percentage of the de facto household population that slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, and among the de facto household population in households with at least one ITN, percentage that slept under an ITN the night before the survey, according to background characteristics, Liberia MIS 2022

	Household population			Household population in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of persons	Percentage who slept under an ITN[1] last night	Number of persons
Age					
<5	52.1	50.3	3,192	62.8	2,556
5–14	40.3	39.4	5,647	50.4	4,411
15–34	39.7	38.3	6,937	52.8	5,035
35–49	52.5	50.6	2,832	67.1	2,137
50+	55.8	54.1	2,365	67.6	1,893
Don't know	*	*	9	*	6
Sex					
Male	42.6	41.3	10,226	54.1	7,809
Female	47.8	46.3	10,755	60.5	8,231
Residence					
Urban	39.2	37.1	11,692	55.0	7,885
Rural	53.0	52.4	9,289	59.7	8,154
Region					
Greater Monrovia	32.8	29.6	6,577	51.4	3,781
North Western	43.5	41.9	1,572	53.6	1,230
South Central	42.7	42.3	3,647	53.4	2,890
South Eastern A	47.7	47.4	1,475	57.9	1,208
South Eastern B	41.7	41.4	1,188	48.1	1,022
North Central	59.9	59.3	6,522	65.4	5,909
Wealth quintile					
Lowest	54.4	54.1	4,189	62.0	3,657
Second	55.9	55.6	4,228	61.4	3,824
Middle	48.5	47.0	4,128	56.7	3,428
Fourth	37.4	34.8	4,180	54.9	2,647
Highest	30.3	28.0	4,256	48.0	2,483
Total	45.3	43.9	20,982	57.4	16,039

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

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.5 Use of existing ITNs

Percentage of insecticide-treated nets (ITNs) that were used by anyone the night before the survey, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage of existing ITNs[1] used last night	Number of ITNs[1]
Residence		
Urban	66.2	3,029
Rural	64.7	3,574
Region		
Greater Monrovia	66.9	1,337
North Western	52.3	589
South Central	62.7	1,064
South Eastern A	58.3	565
South Eastern B	53.9	416
North Central	72.0	2,633
Wealth quintile		
Lowest	65.8	1,611
Second	66.2	1,699
Middle	65.0	1,439
Fourth	64.4	1,049
Highest	64.9	805
Total	65.4	6,603

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.6 Use of mosquito nets by children

Percentage of children under age 5 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, 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, Liberia MIS 2022

	Children under age 5 in all households			Children under age 5 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of children	Percentage who slept under an ITN[1] last night	Number of children
Age in months					
<12	56.2	52.3	635	66.4	501
12–23	57.4	56.2	650	67.3	542
24–35	51.7	51.0	587	63.3	473
36–47	44.7	43.2	644	57.1	487
48–59	50.6	48.9	677	59.8	554
Sex					
Male	52.3	50.3	1,628	62.7	1,305
Female	51.9	50.3	1,564	62.9	1,251
Residence					
Urban	48.5	45.4	1,601	62.8	1,157
Rural	55.8	55.2	1,591	62.8	1,399
Region					
Greater Monrovia	46.8	41.7	788	65.9	499
North Western	49.0	47.2	274	59.1	219
South Central	47.5	47.1	566	60.2	443
South Eastern A	47.2	47.1	230	57.1	190
South Eastern B	53.8	53.2	193	59.1	174
North Central	59.5	58.7	1,141	64.9	1,033
Wealth quintile					
Lowest	55.2	54.9	801	63.3	696
Second	56.9	56.4	708	61.3	651
Middle	52.6	51.6	648	62.2	537
Fourth	44.2	38.8	589	60.8	376
Highest	48.7	45.7	446	68.8	297
Total	52.1	50.3	3,192	62.8	2,556

Note: Table is based on children who stayed in the household the night before the interview.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.7 Use of mosquito nets by pregnant women

Percentage of pregnant women age 15–49 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, 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, Liberia MIS 2022

	Among pregnant women age 15–49 in all households			Among pregnant women age 15–49 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of pregnant women	Percentage who slept under an ITN[1] last night	Number of pregnant women
Residence					
Urban	43.4	38.8	233	64.7	139
Rural	68.9	68.9	196	76.0	177
Region					
Greater Monrovia	31.7	23.7	123	*	49
North Western	(34.4)	(34.4)	23	(47.6)	16
South Central	65.6	65.6	72	(76.0)	62
South Eastern A	60.0	57.4	29	69.5	24
South Eastern B	49.5	49.5	22	54.6	20
North Central	71.0	71.0	160	77.8	146
Education					
No education	62.7	61.3	125	73.2	105
Elementary	60.7	60.7	119	75.2	96
Junior high	38.4	35.8	95	53.1	64
Senior high	62.1	53.4	74	(83.4)	47
Higher	*	*	16	*	5
Wealth quintile					
Lowest	78.4	78.4	97	87.5	87
Second	57.3	57.3	88	61.9	81
Middle	65.4	62.4	92	73.3	78
Fourth	45.8	39.4	91	(62.5)	57
Highest	(12.8)	(9.4)	61	*	13
Total	55.0	52.6	428	71.0	317

Note: Table is based on women who stayed in the household the night before the interview. Figures in parentheses are based on 25–49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.8 Main reason mosquito net was not used the night before the survey

Among ITNs, non-ITNs, and all mosquito nets, percentage that were not used by anyone the night before the survey, and among mosquito nets that were not used by anyone the night before the survey, percent distribution by the main reason each net was not used, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage of nets not used the night before the survey	Total number of mosquito nets	Main reason each net was not used the night before the survey															Number of mosquito nets not used the night before the survey
			Too hot	Don't like net shape, color, and/or size	Don't like smell	Unable to hang net	Slept outdoors	Usual user didn't sleep in household last night	No mosquitoes/no malaria	Extra net/ saving for later	Not hung up/ stored away	Difficult to breathe	Not in good condition/ torn	Itching/ skin irritation	Took down to wash	Other	Total	
								ITNS[1]										
Residence																		
Urban	33.1	3,029	8.3	1.9	0.9	3.7	0.8	7.9	0.6	20.0	21.5	1.5	26.2	2.3	2.5	1.9	100.0	1,002
Rural	35.1	3,574	3.1	0.1	0.1	1.6	1.6	4.7	2.4	27.8	28.9	0.6	23.8	0.5	2.4	2.4	100.0	1,254
Region																		
Greater Monrovia	31.9	1,337	10.7	2.1	0.6	3.7	0.8	6.0	0.0	11.2	19.0	2.7	31.9	5.5	2.8	3.1	100.0	427
North Western	47.6	589	4.5	1.5	0.0	4.7	1.8	3.0	3.0	29.9	25.0	0.8	23.1	0.0	1.0	1.7	100.0	280
South Central	37.1	1,064	8.9	0.4	0.5	3.2	0.3	2.4	3.4	17.6	39.6	0.3	19.1	0.0	2.3	2.0	100.0	395
South Eastern A	41.5	565	1.9	1.6	0.3	0.9	1.0	5.2	4.1	26.5	32.7	0.6	17.7	0.6	5.6	1.2	100.0	235
South Eastern B	46.0	416	4.4	0.2	0.3	3.1	0.3	3.3	2.3	25.3	24.6	0.3	25.3	0.7	5.8	4.1	100.0	191
North Central	27.7	2,633	2.1	0.2	0.4	1.1	2.2	10.4	0.0	32.6	20.1	0.8	26.8	0.5	1.0	1.7	100.0	728
Wealth quintile																		
Lowest	34.0	1,611	2.2	0.0	0.0	2.1	1.4	6.5	2.1	29.4	23.6	0.4	27.2	0.2	2.2	2.7	100.0	548
Second	33.5	1,699	2.1	0.1	0.5	1.9	1.5	6.0	1.1	29.2	28.0	0.7	23.7	0.9	2.4	1.8	100.0	569
Middle	34.8	1,439	5.0	0.8	0.8	1.4	1.7	5.8	2.7	27.4	26.1	0.4	24.0	0.0	2.8	1.2	100.0	501
Fourth	34.9	1,049	10.7	3.5	0.7	4.4	0.1	4.8	1.0	15.4	30.5	2.3	19.2	1.9	2.6	2.8	100.0	366
Highest	33.8	805	12.4	1.1	0.0	4.3	1.2	7.8	0.3	10.4	17.3	2.3	32.1	5.9	2.2	2.7	100.0	272
Total	34.2	6,603	5.4	0.9	0.4	2.5	1.2	6.1	1.6	24.4	25.6	1.0	24.9	1.3	2.4	2.2	100.0	2,256
								NON-ITNS										
Total	27.8	192	(14.4)	(0.0)	(0.0)	(2.3)	(0.0)	(1.7)	(1.2)	(8.7)	(15.8)	(0.0)	(51.7)	(0.0)	(0.7)	(3.5)	100.0	53
								ALL MOSQUITO NETS										
Total	34.0	6,795	5.6	0.9	0.4	2.5	1.2	6.0	1.6	24.0	25.4	1.0	25.5	1.3	2.4	2.2	100.0	2,310

Note: Figures in parentheses are based on 25–49 unweighted cases.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.9 Antenatal care

Percent distribution of women age 15–49 who had a live birth in the 2 years preceding the survey by antenatal care (ANC) provider during the pregnancy for the most recent live birth and percentage receiving antenatal care from a skilled provider for the most recent live birth, according to background characteristics, Liberia MIS 2022

Background characteristic	Antenatal care provider					No ANC	Total	Percentage receiving antenatal care from a skilled provider[1]	Number of women
	Doctor	Nurse/midwife/ midman	Physician assistant	Trained traditional midwife	Other				
Age at birth									
<20	19.3	77.5	0.4	0.1	1.0	1.8	100.0	97.1	267
20–34	23.8	74.1	0.0	0.3	0.3	1.5	100.0	97.9	702
35–49	22.6	76.1	0.0	0.6	0.0	0.7	100.0	98.7	141
Residence									
Urban	31.7	66.7	0.0	0.0	0.2	1.4	100.0	98.4	603
Rural	11.6	85.2	0.2	0.6	0.7	1.6	100.0	97.1	506
Region									
Greater Monrovia	36.2	62.7	0.0	0.0	0.0	1.1	100.0	98.9	307
North Western	13.6	82.9	1.2	0.0	0.0	2.3	100.0	97.7	89
South Central	17.2	78.3	0.0	0.7	1.6	2.1	100.0	95.6	220
South Eastern A	29.9	65.0	0.0	1.9	0.0	3.2	100.0	94.9	76
South Eastern B	8.1	91.2	0.3	0.0	0.0	0.4	100.0	99.6	65
North Central	17.3	81.3	0.0	0.0	0.4	1.0	100.0	98.6	352
Education									
No education	18.1	77.9	0.3	0.5	0.8	2.5	100.0	96.3	346
Elementary	17.9	79.4	0.1	0.3	0.7	1.7	100.0	97.3	343
Junior high	22.9	76.3	0.0	0.0	0.0	0.8	100.0	99.2	210
Senior high	34.4	65.4	0.0	0.2	0.0	0.0	100.0	99.8	175
Higher	(52.0)	(48.0)	(0.0)	(0.0)	(0.0)	(0.0)	100.0	(100.0)	34
Wealth quintile									
Lowest	14.3	79.7	0.0	0.7	1.4	3.8	100.0	94.0	253
Second	17.8	80.9	0.0	0.3	0.0	0.9	100.0	98.7	221
Middle	15.5	83.1	0.5	0.2	0.6	0.1	100.0	99.1	230
Fourth	33.3	64.7	0.0	0.0	0.0	2.0	100.0	98.0	220
Highest	35.5	64.5	0.0	0.0	0.0	0.0	100.0	100.0	185
Total	22.6	75.2	0.1	0.3	0.4	1.5	100.0	97.8	1,109

Note: If more than one source of ANC was mentioned, only the provider with the highest qualifications is considered in this tabulation. Figures in parentheses are based on 25–49 unweighted cases.

[1] Skilled provider includes doctor, nurse, midwife/midman, and physician assistant.

Table 3.10 Number of antenatal care visits and timing of first visit

Percent distribution of women age 15–49 who had a live birth in the 2 years preceding the survey by number of antenatal care (ANC) visits during the pregnancy for the most recent live birth and by the timing of the first visit, and among women with ANC, median months pregnant at first visit, according to background characteristics, Liberia MIS 2022

Background characteristic	Number of ANC visits								Number of months pregnant at time of first ANC visit								
	None	1	2–3	4–7	8+	Don't know	Total	4+ ANC visits	No ante-natal care	<4	4–6	7+	Don't know	Total	Number of women	Median months pregnant at first visit (for those with ANC)	Number of women with ANC
Age at birth																	
<20	1.8	3.5	16.4	63.3	13.7	1.3	100.0	77.0	1.8	60.3	34.7	2.9	0.3	100.0	267	3.6	262
20–34	1.5	1.5	11.0	64.6	21.1	0.4	100.0	85.7	1.5	74.2	22.6	1.2	0.5	100.0	702	3.0	691
35–49	0.7	0.4	12.1	54.6	32.2	0.0	100.0	86.8	0.7	71.0	26.4	1.9	0.0	100.0	141	3.2	140
Birth order																	
1	1.7	2.4	14.5	63.7	17.2	0.5	100.0	80.9	1.7	64.7	31.1	2.3	0.2	100.0	316	3.4	310
2–3	1.0	2.2	11.5	61.3	23.0	1.1	100.0	84.3	1.0	75.9	21.1	1.2	0.8	100.0	401	3.1	398
4–5	2.2	0.8	11.0	63.9	22.0	0.0	100.0	86.0	2.2	70.3	25.4	2.1	0.0	100.0	228	3.2	223
6+	1.4	1.2	12.6	64.6	20.2	0.0	100.0	84.9	1.4	68.6	29.0	1.1	0.0	100.0	164	3.2	162
Residence																	
Urban	1.4	2.3	11.1	61.5	23.2	0.7	100.0	84.6	1.4	71.7	25.3	1.0	0.6	100.0	603	3.1	595
Rural	1.6	1.3	14.0	64.9	17.8	0.3	100.0	82.7	1.6	69.0	26.9	2.5	0.0	100.0	506	3.3	498
Region																	
Greater Monrovia	1.1	3.0	11.3	51.7	32.4	0.5	100.0	84.1	1.1	77.7	20.2	0.0	1.0	100.0	307	2.9	304
North Western	2.3	0.0	14.5	52.8	29.0	1.4	100.0	81.8	2.3	79.4	17.1	1.1	0.0	100.0	89	2.8	87
South Central	2.1	3.7	16.9	55.7	21.1	0.4	100.0	76.8	2.1	60.2	32.2	5.1	0.3	100.0	220	3.2	215
South Eastern A	3.2	2.1	17.2	64.3	13.3	0.0	100.0	77.6	3.2	65.3	27.7	3.9	0.0	100.0	76	3.4	74
South Eastern B	0.4	0.2	10.5	66.4	22.5	0.0	100.0	88.9	0.4	67.2	30.8	1.4	0.2	100.0	65	3.2	65
North Central	1.0	0.3	9.4	79.2	9.5	0.6	100.0	88.7	1.0	70.0	28.2	0.7	0.0	100.0	352	3.4	348
Education																	
No education	2.5	1.2	11.6	65.1	19.2	0.3	100.0	84.3	2.5	68.2	26.8	2.5	0.0	100.0	346	3.2	337
Elementary	1.7	3.0	14.0	64.4	16.0	0.9	100.0	80.4	1.7	69.9	25.3	2.6	0.5	100.0	343	3.3	338
Junior high	0.8	0.1	11.4	58.9	28.7	0.1	100.0	87.7	0.8	76.4	22.4	0.0	0.3	100.0	210	3.0	208
Senior high	0.0	1.3	11.3	67.0	19.5	0.9	100.0	86.5	0.0	65.1	33.4	0.6	0.9	100.0	175	3.2	175
Higher	(0.0)	(8.9)	(16.9)	(32.7)	(41.5)	(0.0)	100.0	(74.1)	(0.0)	(90.3)	(9.7)	(0.0)	(0.0)	100.0	34	(2.0)	34
Wealth quintile																	
Lowest	3.8	2.2	14.8	63.2	15.0	1.0	100.0	78.1	3.8	69.6	22.6	3.9	0.0	100.0	253	3.2	243
Second	0.9	0.8	12.5	72.5	12.4	0.8	100.0	85.0	0.9	68.6	28.8	1.6	0.1	100.0	221	3.2	219
Middle	0.1	1.6	15.5	68.8	13.8	0.1	100.0	82.6	0.1	69.5	28.8	1.6	0.0	100.0	230	3.3	230
Fourth	2.0	2.6	7.1	54.2	33.3	0.7	100.0	87.6	2.0	74.2	21.8	0.6	1.4	100.0	220	3.1	215
Highest	0.0	1.6	11.5	54.7	32.2	0.0	100.0	86.9	0.0	70.6	29.0	0.0	0.4	100.0	185	3.0	185
Total	1.5	1.8	12.4	63.0	20.7	0.5	100.0	83.8	1.5	70.5	26.0	1.7	0.4	100.0	1,109	3.2	1,093

Note: Figures in parentheses are based on 25–49 unweighted cases.

Table 3.11 Use of intermittent preventive treatment (IPTp) by women during pregnancy

Percentage of women age 15–49 with a live birth in the 2 years preceding the survey who, during the pregnancy that resulted in the last live birth, received one or more doses of SP/Fansidar, received two or more doses of SP/Fansidar, and received three or more doses of SP/Fansidar, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage who received one or more doses of SP/Fansidar	Percentage who received two or more doses of SP/Fansidar	Percentage who received three or more doses of SP/Fansidar	Number of women with a live birth in the 2 years preceding the survey
Birth order				
1	90.0	78.2	63.2	316
2–3	95.7	82.8	60.8	401
4–5	94.1	78.4	65.2	228
6+	93.3	78.3	62.4	164
Residence				
Urban	93.4	76.6	57.3	603
Rural	93.4	83.9	69.0	506
Region				
Greater Monrovia	94.5	74.7	55.2	307
North Western	93.6	85.7	73.7	89
South Central	93.7	79.7	61.9	220
South Eastern A	95.1	87.9	71.7	76
South Eastern B	97.4	91.8	82.6	65
North Central	91.1	79.2	61.2	352
Education				
No education	93.5	81.6	66.4	346
Elementary	91.8	81.4	59.3	343
Junior high	94.0	75.5	59.8	210
Senior high	94.3	78.9	65.6	175
Higher	(100.0)	(81.1)	(60.3)	34
Wealth quintile				
Lowest	88.8	80.5	66.3	253
Second	96.7	84.8	66.7	221
Middle	96.3	80.3	59.0	230
Fourth	89.8	70.4	57.7	220
Highest	96.2	84.1	63.2	185
Total	93.4	79.9	62.6	1,109

Note: Figures in parentheses are based on 25–49 unweighted cases.

Table 3.12 Reasons for taking fewer than the recommended number of doses of SP/Fansidar

Among women with a live birth in the 2 years preceding the survey who took SP/Fansidar only one or two times during the pregnancy for their most recent live birth, reason why they took fewer than the recommended number of doses, according to residence, Liberia MIS 2022

Reason for taking SP/Fansidar only one or two times[1]	Residence		Total
	Urban	Rural	
Facility too far	2.2	12.0	5.7
Had no money	2.1	3.9	2.7
Side effects	3.8	0.0	2.4
Not aware had to take more	26.8	19.6	24.2
Did not want to take	7.0	5.5	6.4
Not given	26.5	30.7	28.0
Not available	8.2	13.5	10.1
Other	10.7	9.6	10.3
Don't know	23.6	13.5	20.0
Number of women who took SP/Fansidar less than three times	283	157	440

Note: Table excludes women who reported receiving no SP/Fansidar.
[1] Percentages may add to more than 100% since women can report more than one reason.

MALARIA IN CHILDREN 4

Key Findings

- ***Fever prevalence:*** 36% of children under age 5 had a fever in the 2 weeks preceding the survey.
- ***Care seeking for fever:*** Advice or treatment was sought for 60% of children with a fever in the 2 weeks preceding the survey; 27% of children with a recent fever received timely care following fever onset.
- ***Source of advice or treatment:*** Among children with a recent fever for whom care was sought, 46% received advice or treatment from the public sector, 38% from the private sector (non-NGO), less than 1% from the public sector (NGO), and 14% elsewhere.
- ***Testing:*** 45% of children with a recent fever had blood taken from a finger or heel for testing.
- ***Type of antimalarial drug used:*** Among children under age 5 with a recent fever who took an antimalarial drug, 81% received artemisinin-based combination therapy (ACT).
- ***Anemia:*** 2% of children age 6–59 months have a hemoglobin level below 8 g/dl.
- ***Malaria:*** 10% of children age 6–59 months tested positive for malaria with microscopy.

This chapter presents data useful for assessing how well fever management strategies are being implemented. Specific topics include care seeking for febrile children, diagnostic testing of children with fever, and therapeutic use of antimalarial drugs. The prevalence of anemia and malaria among children age 6–59 months is also assessed.

4.1 CHILDREN WITH FEVER

Fever is a key symptom of malaria and other acute infections in children and an important entry point into case management for malaria. Malaria fevers require prompt and effective treatment to prevent malaria morbidity and mortality. Thirty-six percent of children under age 5 had a fever in the 2 weeks preceding the survey (**Table 4.1**).

Patterns by background characteristics

- The prevalence of fever among children under age 5 is 39% in rural areas, as compared with 34% in urban areas.
- By region, fever prevalence ranges from 30% in North Central to 46% in South Eastern B.

4.2 Care Seeking for Fever in Children

Care seeking for children under age 5 with a fever

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

One of the targets set forth in the National Malaria Strategic Plan 2021–2025 (Objective 4) is that, by 2025, 90% of caregivers and/or mothers of children under age 5 will be familiar with malaria prevention signs and symptoms and take appropriate actions (NMCP 2020a). The 2022 LMIS results show that advice or treatment was sought for 60% of children with a fever. Twenty-seven percent of children with a recent fever received timely care (advice or treatment was sought the same or next day) following fever onset (**Table 4.1**).

Among children with a recent fever for whom advice or treatment was sought, 29% were taken to a public health sector facility and 24% to a private health sector facility. Less than 1% received care from the nongovernmental organization (NGO) medical sector, and 9% received care from other private sector sources. The most common sources of advice or treatment for children with fever were government clinics (17%), pharmacies (12%), private clinics (9%), black baggers/drug peddlers (5%), and government hospitals (5%) (**Table 4.2.1**).

Trends: The percentage of children with fever for whom advice or treatment was sought increased from 78% in the 2009 LMIS to 81% in the 2019–20 LDHS before dropping to 60% in the 2022 LMIS.

Patterns by background characteristics

- The percentage of children for whom advice or treatment was sought the same or next day decreases with age, from 32% among those under age 12 months to 21% among those age 48–59 months (**Table 4.1**).
- The percentage of children for whom advice or treatment was sought the same or next day ranges from 21% among those from households in the lowest wealth quintile to 31% among those from households in the middle wealth quintile.

4.3 Diagnostic Testing of Children with Fever

Diagnosis of malaria in children under age 5 with a 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 age 5 with a fever in the 2 weeks before the survey

The Liberia Technical Guidelines for Malaria Case Management and Malaria in Pregnancy recommend confirmation of malaria by microscopy or rapid diagnostic testing for all persons with a fever above 37.5°C or a history of fever in the previous 2 days along with one or more malaria signs and symptoms (NMCP 2020b). Adherence to this policy cannot be directly measured through household surveys; however, the 2022 LMIS asked interviewed women with children under age 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 NMCP policy of conducting diagnostic testing for all suspected malaria cases.

In the 2022 LMIS, 45% of children under age 5 with a fever in the 2 weeks before the survey had blood taken from a finger or heel for testing, presumably for malaria testing (**Table 4.1**). Among children with fever for whom blood was taken from a finger or heel for testing, 66% had blood drawn at a public sector facility and 33% at a private medical sector facility (**Table 4.2.2**).

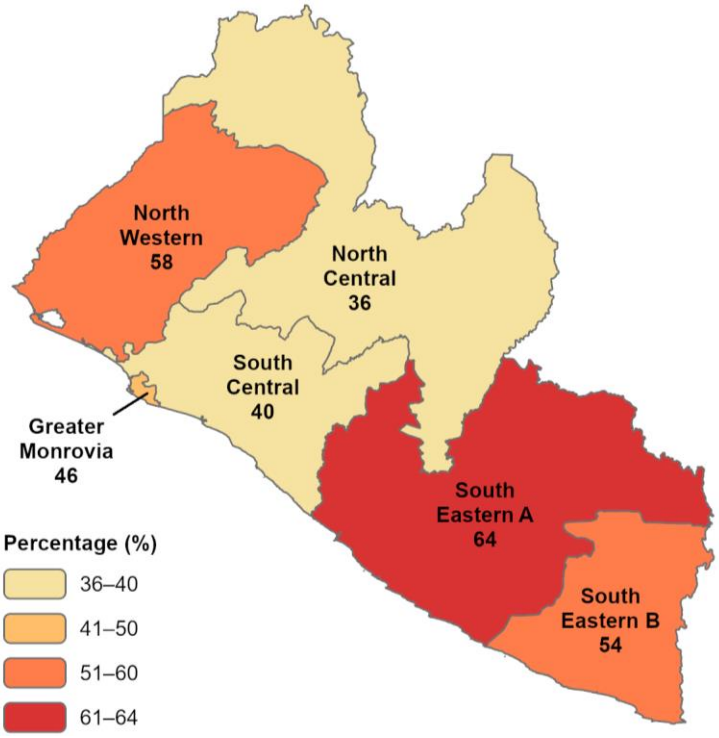
Trends: The percentage of children with fever for whom blood was taken for diagnostic testing increased from 23% in the 2009 LMIS to 50% in the 2016 LMIS before decreasing to 45% in the 2022 LMIS.

Patterns by background characteristics

- The percentage of children who had blood taken from a finger or heel for testing is higher among girls (51%) than boys (40%) (**Table 4.1**).
- By region, the percentage of children who had blood taken for testing ranges from 36% in North Central to 64% in South Eastern A (**Map 4.1**).

Map 4.1 **Diagnostic testing of children with fever by region**

Percentage of children under age 5 with recent fever who had blood taken from a finger or heel for testing



4.4 USE OF RECOMMENDED ANTIMALARIALS

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

Percentage of children under age 5 with a fever in the 2 weeks before the survey who took artemisinin-based combination therapy (ACT).

Sample: Children under age 5 with a fever in the 2 weeks before the survey who took any antimalarial drug

Artemisinin-based combination therapy (ACT) is the recommended first-line antimalarial drug for the treatment of uncomplicated malaria in Liberia. Among children who took any antimalarial, 81% received ACT, 5% received artemether, amodiaquine, and artesunate injection (**Table 4.3**).

Background Information for Interpretation of Trends

WHO recommends artemisinin-based combination therapy for the treatment of uncomplicated malaria caused by the *Plasmodium falciparum* parasite. In sub-Saharan Africa, the two most frequently recommended types of ACT are the drug combinations artesunate/amodiaquine (ASAQ) and artemether/lumefantrine (AL) (WHO 2015b). In 2003, Liberia adopted ASAQ as the first-line treatment of uncomplicated malaria, with AL as the alternative treatment (PMI 2018). The results of the 2017–18 Therapeutic Efficacy Study demonstrated a decline in efficacy of ASAQ treatment, while AL remained highly effective. This led NMCP to replace ASAQ with AL in 2022 as the first-line treatment for uncomplicated malaria (Koko et al. 2022). Because AL was the second-line drug for uncomplicated malaria, there was no formal rollout; however, county health officers were notified of the change.

As part of the 2022 LMIS, women who recently sought care for their child's fever were asked "What drugs did [NAME] take?" The purpose of this question is to assess if the antimalarial treatment received by children under age 5 is in accordance with national malaria treatment policies. However, it is not always possible to accurately distinguish types of antimalarial drugs from respondents' recall during fieldwork. To ensure the highest possible data quality during fieldwork, interviewers were given images of common antimalarial drugs to show to respondents or interviewers asked respondents to see the drug packaging to ensure that the correct drug was documented in the questionnaire.

In Liberia, ASAQ is colloquially referred to as "amodiaquine," while AL is colloquially referred to as "artemether," making it difficult to distinguish use of the single drug and the combination therapies. Interviewers were aware of this distinction and were required to probe when respondents mentioned amodiaquine or artemether. Follow-up questions were also built into the questionnaire to ensure that this probing was carried out by the interviewer.

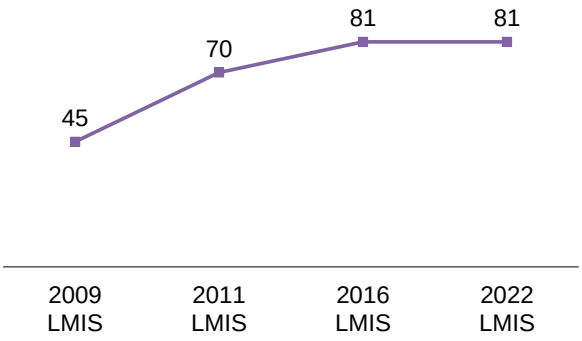
Trends: The percentage of children under age 5 with fever who received ACT increased from 45% in the 2009 LMIS to 70% in the 2011 LMIS and 81% in both the 2016 LMIS and the 2022 LMIS (**Figure 4.1**).

Patterns by background characteristics

- The percentage of children who received ACT is highest in South Eastern A (93%) and lowest in Greater Monrovia (68%) (**Table 4.3**).
- Treatment with ACT is highest among children age 36–47 months (88%).

Figure 4.1 **Trends in ACT use by children under age 5**

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



4.5 PREVALENCE OF LOW HEMOGLOBIN LEVELS IN CHILDREN

Prevalence of low hemoglobin in children

Percentage of children age 6–59 months who had a hemoglobin measurement of less than 8 grams per deciliter (g/dl) of blood. The cutoff of 8 g/dl is often used to classify malaria-related anemia.

Sample: Children age 6–59 months

Anemia, defined as a reduced level of hemoglobin in the blood, decreases the amount of oxygen reaching the tissues and organs of the body and reduces their capacity to function. Anemia is associated with impaired motor and cognitive development in children. The main causes of anemia in children are malaria and inadequate intake of iron, folate, vitamin B12, and other nutrients. Other causes of anemia include intestinal worms, hemoglobinopathy, and sickle cell disease. Although anemia is not specific to malaria, trends in anemia prevalence can reflect malaria morbidity, and they respond to changes in the coverage of malaria interventions (Korenromp et al. 2004). A hemoglobin level below 8.0 g/dl is classified as severe anemia.

During the 2022 LMIS, consent was obtained and testing for anemia was conducted among almost all (99%) eligible children age 6–59 months from the interviewed households (**Table 4.4**). Results detailed in **Table 4.5** show that the overall national percentage of children age 6–59 months classified as having a low hemoglobin level (less than 8.0 g/dl) is 2%.

Trends: The national prevalence of low hemoglobin (less than 8 g/dl) among children age 6–59 months increased from 5% in the 2009 LMIS to 8% in the 2011 LMIS and 2016 LMIS before declining to 2% in the 2022 LMIS (**Figure 4.2**).

Patterns by background characteristics

- By region, low hemoglobin among children ranges from 1% in Greater Monrovia to 3% in South Eastern B (**Table 4.5**).
- The percentage of children with low hemoglobin is highest among those age 9–11 months (6%) (**Table 4.5** and **Figure 4.3**).
- A slightly higher percentage of children in rural areas (3%) than urban areas (2%) have low hemoglobin.

Figure 4.2 **Trends in anemia prevalence among children**

Percentage of children age 6–59 months with hemoglobin lower than 8.0 g/dl

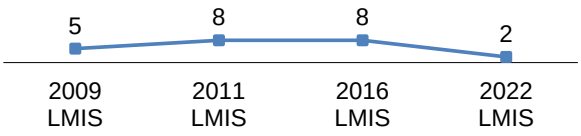
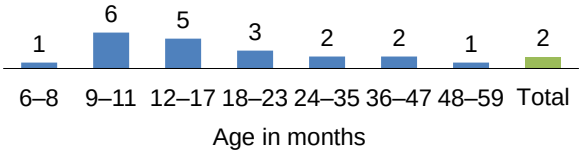


Figure 4.3 **Low hemoglobin in children by age**

Percentage of children age 6–59 months with hemoglobin lower than 8.0 g/dl



4.6 PREVALENCE OF MALARIA IN CHILDREN

Malaria prevalence in children

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

Sample: Children age 6–59 months

Malaria is endemic in Libera. Those living in areas of high malaria transmission acquire partial immunity to the disease over time. However, many people, including children, can have malaria parasites in their blood without showing any signs of infection. Such asymptomatic infections not only contribute to further transmission of malaria but also increase the risk of anemia and other associated morbidity among infected individuals.

The 2022 LMIS was conducted October through December 2022 at the peak of the malaria transmission season. Normally, a spike in malaria cases occurs during these months. Previous surveys that incorporated malaria testing included the 2009 LMIS, 2011 LMIS, and 2016 LMIS.

All children age 6–59 months were eligible for malaria testing. Among eligible children age 6–59 months from interviewed households, 99% were tested for malaria with a rapid diagnostic test (RDT) and 99% were tested by microscopy (**Table 4.4**). (See Chapter 1 for details on malaria testing procedures.)

In the 2022 LMIS, 10% of children age 6–59 months were positive for malaria parasites according to microscopy results. RDTs were performed in conjunction with microscopy to facilitate treatment of infected children during survey fieldwork. Eighteen percent of children age 6–59 months tested positive for malaria antigens using RDTs (**Table 4.6**).

Trends: As measured through microscopy, malaria prevalence among children age 6–59 months dropped from 32% in the 2009 LMIS and 28% in the 2011 LMIS to 10% in the 2022 LMIS (**Figure 4.4**).

Patterns by background characteristics

- Malaria prevalence according to microscopy generally increases with age, ranging from 1% among children age 6–8 months to 16% among those age 48–59 months (**Figure 4.5**).
- By region, the prevalence of malaria according to microscopy is highest in South Eastern B (19%) and lowest in Greater Monrovia (1%) (**Map 4.2**).

Figure 4.4 **Trends in malaria prevalence among children**

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

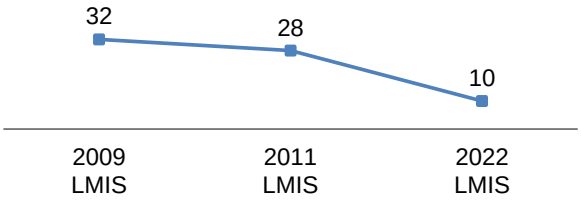
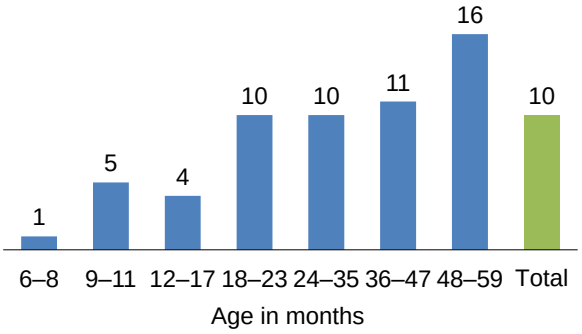


Figure 4.5 **Prevalence of malaria in children by age**

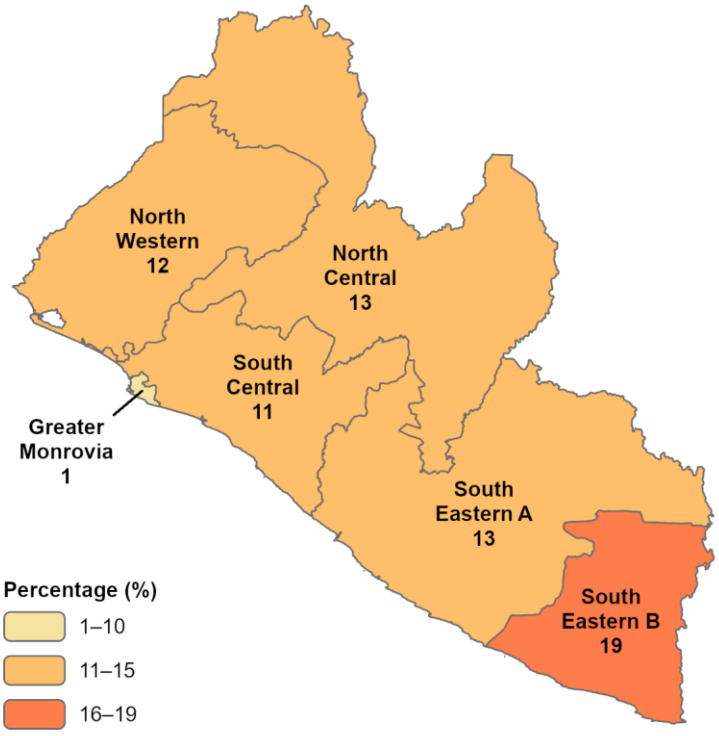
Percentage of children age 6–59 months who tested positive for malaria by microscopy



- The prevalence of malaria according to microscopy decreases with increasing household wealth, from 18% in the lowest wealth quintile to 1% in the highest quintile (**Table 4.6**).
- The prevalence of malaria in children according to microscopy is four times as high in rural areas (16%) as in urban areas (4%).

Map 4.2 Prevalence of malaria in children by region

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



List of Tables

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- **Table 4.2.1 Source of advice or treatment for children with fever**
- **Table 4.2.2 Location of blood testing**
- **Table 4.3 Type of antimalarial drugs used**
- **Table 4.4 Coverage of testing for anemia and malaria in children**
- **Table 4.5 Hemoglobin <8.0 g/dl in children**
- **Table 4.6 Prevalence of malaria in children**

Table 4.1 Children with fever and care seeking, prompt treatment, and diagnosis

Percentage of children under age 5 with a fever in the 2 weeks preceding the survey, and among children under age 5 with fever, percentage for whom advice or treatment was sought, percentage for whom advice or treatment was sought the same or next day following the onset of fever, percentage who had blood taken from a finger or heel for testing, and percentage who were diagnosed with malaria by a health care provider, according to background characteristics, Liberia MIS 2022

	Children under age 5		Children under age 5 with fever				
Background characteristic	Percentage with a fever in the 2 weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought[1]	Percentage for whom advice or treatment was sought the same or next day[1]	Percentage who had blood taken from a finger or heel for testing	Percentage who were diagnosed with malaria by a health care provider	Number of children
Age in months							
<12	36.3	564	60.0	32.0	47.5	43.6	205
12–23	46.6	536	56.4	28.4	46.7	54.9	249
24–35	38.8	462	63.1	25.6	50.7	57.3	179
36–47	33.0	485	61.5	26.4	32.8	44.0	160
48–59	27.2	529	63.2	21.0	43.8	53.9	144
Sex							
Male	39.5	1,306	57.8	27.7	39.9	49.1	516
Female	33.2	1,270	63.5	26.5	50.9	53.1	421
Residence							
Urban	34.3	1,348	59.9	29.3	45.4	51.1	462
Rural	38.7	1,228	60.8	25.0	44.3	50.7	475
Region							
Greater Monrovia	34.9	684	54.4	29.1	45.7	52.9	238
North Western	45.4	195	62.4	20.5	58.0	54.0	88
South Central	40.6	473	59.1	27.4	39.5	52.9	192
South Eastern A	44.2	172	63.1	27.7	63.6	51.0	76
South Eastern B	46.3	160	78.1	36.9	53.6	56.0	74
North Central	30.1	892	60.2	24.7	35.8	45.2	269
Mother's education							
No education	37.2	897	63.3	29.1	38.1	43.9	333
Elementary	32.1	725	58.1	24.5	48.3	52.3	233
Junior high	38.3	478	57.1	29.8	50.2	55.1	183
Senior high	38.4	383	64.7	27.1	43.4	55.5	147
Higher	44.2	94	(48.9)	(14.7)	(60.3)	(63.9)	42
Wealth quintile							
Lowest	37.0	627	57.5	21.1	43.0	46.7	232
Second	34.7	556	66.2	26.2	43.6	50.4	193
Middle	39.4	510	63.9	30.8	38.7	44.2	201
Fourth	35.9	522	57.4	29.6	52.2	56.1	187
Highest	34.5	362	55.5	30.4	48.8	62.4	125
Total	36.4	2,576	60.4	27.2	44.8	50.9	937

Note: Figures in parentheses are based on 25–49 unweighted cases.
[1] Excludes advice or treatment from a traditional practitioner

Table 4.2.1 Source of advice or treatment for children with fever

Percentage of children under age 5 with a 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 a 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, Liberia MIS 2022

	Percentage for whom advice or treatment was sought from each source:	
Source	Among children with fever	Among children with fever for whom advice or treatment was sought
Public sector	29.2	45.8
Government hospital	5.3	8.3
Government health center	2.8	4.4
Government clinic	17.2	27.0
Government health post	0.5	0.7
Mobile clinic	0.2	0.3
Community health assistant	3.5	5.4
Private medical sector (non-NGO)	24.4	38.3
Private hospital/clinic	2.2	3.5
Private clinic	9.2	14.5
Pharmacy	11.8	18.5
Private doctor	0.9	1.4
Mobile clinic	0.5	0.8
Private medical sector (NGO)	0.4	0.6
NGO hospital	0.1	0.2
NGO clinic	0.3	0.5
Other private sector	8.9	14.0
Shop	1.7	2.6
Traditional practitioner	1.5	2.4
Market	0.5	0.8
Black bagger/drug peddler	5.4	8.5
Other	2.4	3.7
Number of children	937	597

Note: Advice or treatment for children with fever may have been sought from more than one source.
NGO = nongovernmental organization

Table 4.2.2 Location of blood testing

Among children under age 5 with a fever in the 2 weeks preceding the survey for whom blood was taken from a finger or heel for testing, percent distribution by location of testing, Liberia MIS 2022

Source	Percentage for whom blood was taken from a finger or heel for testing from each source
Public sector	65.6
Government hospital	13.5
Government health center	9.0
Government clinic	37.5
Government health post	0.2
Mobile clinic	1.0
Community health assistant	4.4
Private medical sector (non-NGO)	33.0
Private hospital/clinic	4.8
Private clinic	22.9
Pharmacy	4.0
Private doctor	0.1
Mobile clinic	1.2
Private medical sector (NGO)	0.8
NGO hospital	0.2
NGO clinic	0.5
Other	0.6
Total	100.0
Number of children	420

NGO = nongovernmental organization

Table 4.3 Type of antimalarial drugs used

Among children under age 5 with a fever in the 2 weeks preceding the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage of children who took:									Number of children with fever who took an anti-malarial drug
	Any ACT	SP/ Fansidar	Chloro-quine	Amodia-quine	Quinine pills	Quinine injection	Artesunate injection	Artemether	Other anti-malarial	
Age in months										
<6	(80.8)	(0.0)	(0.0)	(0.0)	(0.0)	(12.0)	(2.9)	(1.2)	(3.1)	31
6–11	71.5	0.0	0.0	5.6	8.6	3.6	1.8	14.6	2.7	74
12–23	75.4	0.0	2.1	4.5	3.3	0.4	7.6	5.1	2.7	157
24–35	85.7	0.7	2.4	2.4	2.1	0.0	5.9	1.6	0.0	122
36–47	87.5	0.2	0.0	3.8	1.1	0.8	6.6	1.5	0.0	95
48–59	84.2	0.0	0.0	9.2	0.0	0.9	2.4	6.1	0.0	102
Sex										
Male	79.3	0.3	1.9	5.9	1.7	1.2	5.4	4.5	1.9	323
Female	82.8	0.0	0.0	3.1	3.8	1.8	4.9	5.5	0.4	258
Diagnosed with malaria by health care provider										
Yes	80.3	0.2	0.8	3.1	1.9	2.0	7.0	5.4	1.5	422
No	82.2	0.0	1.8	8.9	4.5	0.1	0.3	3.6	0.6	158
Don't know	*	*	*	*	*	*	*	*	*	1
Residence										
Urban	79.2	0.0	0.0	2.9	4.1	2.8	7.4	6.5	0.7	286
Rural	82.5	0.3	2.1	6.4	1.2	0.2	3.0	3.4	1.8	294
Region										
Greater Monrovia	67.6	0.0	0.0	3.3	6.6	4.1	11.4	11.0	1.4	142
North Western	81.6	1.4	0.0	6.6	0.6	0.7	6.0	4.5	0.0	56
South Central	79.2	0.0	2.6	4.1	3.1	1.3	3.8	4.0	4.1	127
South Eastern A	92.7	0.5	0.0	2.4	0.0	1.7	1.3	2.7	0.0	47
South Eastern B	87.0	0.0	0.0	10.8	2.0	0.0	2.2	0.0	0.0	45
North Central	88.3	0.0	1.8	4.7	0.4	0.0	2.4	2.5	0.0	164
Mother's education										
No education	86.6	0.0	1.6	4.1	1.0	0.7	2.8	1.7	2.3	186
Elementary	85.4	0.7	0.0	7.9	3.2	2.1	1.7	1.2	0.6	151
Junior high	77.0	0.0	0.0	0.9	3.7	0.5	12.3	6.9	0.0	119
Senior high	70.6	0.0	3.4	6.8	2.3	1.0	7.6	9.3	2.1	98
Higher	*	*	*	*	*	*	*	*	*	27
Wealth quintile										
Lowest	84.9	0.0	2.1	5.0	1.6	0.1	2.8	2.8	1.4	135
Second	86.8	0.9	0.0	6.9	0.8	0.3	1.6	3.7	0.0	117
Middle	89.5	0.0	2.6	3.4	0.8	0.5	2.4	1.6	0.0	125
Fourth	73.2	0.0	0.0	2.7	0.5	3.9	14.9	5.1	2.7	122
Highest	(63.5)	(0.0)	(0.0)	(6.0)	(12.9)	(3.3)	(3.7)	(15.2)	(2.5)	81
Total	80.8	0.2	1.1	4.7	2.6	1.5	5.2	4.9	1.2	581

Note: At the time of the survey, the types of ACT in use in Liberia were artesunate/amodiaquine (ASAQ) and artemether/lumefantrine (AL). 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.
ACT = artemisinin-based combination therapy

Table 4.4 Coverage of testing for anemia and malaria in children

Percentage of eligible children age 6–59 months who were tested for anemia and for malaria, according to background characteristics (unweighted), Liberia MIS 2022

Background characteristic	Percentage tested for: Anemia	Malaria with RDT	Malaria by microscopy	Number of children
Age in months				
6–8	98.4	98.4	98.4	184
9–11	98.4	98.4	98.4	122
12–17	99.2	99.2	98.9	360
18–23	98.7	98.7	98.4	309
24–35	98.8	98.6	98.8	586
36–47	98.2	98.2	98.2	656
48–59	98.5	98.5	98.5	673
Sex				
Male	98.4	98.3	98.2	1,458
Female	98.8	98.8	98.8	1,432
Mother's interview status				
Interviewed	98.8	98.8	98.8	2,208
Not interviewed[1]	97.8	97.8	97.7	682
Residence				
Urban	97.2	97.1	97.2	1,170
Rural	99.5	99.5	99.4	1,720
Region				
Greater Monrovia	92.8	92.5	92.8	318
North Western	99.3	99.3	99.3	458
South Central	98.4	98.4	98.4	506
South Eastern A	100.0	100.0	99.8	473
South Eastern B	99.0	99.0	98.9	524
North Central	99.7	99.7	99.7	611
Mother's education[2]				
No education	99.4	99.3	99.4	838
Elementary	99.4	99.4	99.3	704
Junior high	97.9	97.9	97.9	341
Senior high	97.4	97.4	97.4	268
Higher	94.7	94.7	94.7	57
Wealth quintile				
Lowest	99.6	99.6	99.4	890
Second	99.4	99.4	99.4	706
Middle	99.4	99.4	99.2	649
Fourth	97.8	97.8	97.8	407
Highest	91.6	91.2	91.6	238
Total	98.6	98.5	98.5	2,890

RDT = rapid diagnostic test (Bioline™ Malaria Ag P.f)
[1] Includes children whose mothers are deceased
[2] Excludes children whose mothers were not interviewed

Table 4.5 Hemoglobin <8.0 g/dl in children

Percentage of children age 6–59 months with hemoglobin lower than 8.0 g/dl, according to background characteristics, Liberia MIS 2022

Background characteristic	Hemoglobin <8.0 g/dl	Number of children
Age in months		
6–8	1.1	176
9–11	6.2	125
12–17	4.7	336
18–23	3.1	299
24–35	1.9	575
36–47	1.6	629
48–59	0.6	664
Sex		
Male	2.8	1,442
Female	1.4	1,362
Mother's interview status		
Interviewed	2.2	2,183
Not interviewed[1]	1.7	621
Residence		
Urban	1.6	1,352
Rural	2.6	1,452
Region		
Greater Monrovia	1.3	632
North Western	2.2	254
South Central	2.5	501
South Eastern A	1.8	209
South Eastern B	2.9	174
North Central	2.4	1,034
Mother's education[2]		
No education	2.2	803
Elementary	3.0	620
Junior high	2.1	393
Senior high	1.4	290
Higher	0.4	77
Wealth quintile		
Lowest	1.9	745
Second	2.3	625
Middle	2.9	577
Fourth	2.5	503
Highest	0.3	354
Total	2.1	2,804

Note: Table is based on children who stayed in the household the night before the interview and who were tested for anemia. Hemoglobin levels are adjusted for altitude using CDC formulas (CDC 1998). Hemoglobin is measured in grams per deciliter (g/dl).
[1] Includes children whose mothers are deceased
[2] Excludes children whose mothers were not interviewed

Table 4.6 Prevalence of malaria in children

Percentage of children age 6–59 months classified in two tests as having malaria, according to background characteristics, Liberia MIS 2022

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
Age in months				
6–8	5.1	176	1.3	176
9–11	5.2	125	4.5	125
12–17	8.8	336	3.5	336
18–23	12.4	299	9.6	298
24–35	18.9	572	10.4	575
36–47	20.9	629	11.3	629
48–59	26.4	664	16.3	664
Sex				
Male	19.2	1,439	10.8	1,441
Female	16.2	1,362	9.6	1,362
Mother's interview status				
Interviewed	17.0	2,180	9.8	2,183
Not interviewed[1]	20.3	621	11.8	620
Residence				
Urban	8.9	1,349	4.3	1,352
Rural	25.9	1,452	15.8	1,451
Region				
Greater Monrovia	4.1	629	0.7	632
North Western	19.5	254	11.5	254
South Central	17.3	501	11.3	501
South Eastern A	23.4	209	13.0	208
South Eastern B	32.8	174	18.5	174
North Central	22.2	1,034	13.3	1,034
Mother's education[2]				
No education	22.2	800	12.6	803
Elementary	22.4	620	13.9	620
Junior high	9.5	393	4.8	393
Senior high	5.9	290	2.4	290
Higher	0.6	77	0.6	77
Wealth quintile				
Lowest	25.7	745	17.9	745
Second	23.9	625	13.4	625
Middle	18.4	577	10.1	577
Fourth	6.9	503	1.6	503
Highest	4.4	351	1.0	354
Total	17.7	2,801	10.2	2,803

RDT = rapid diagnostic test (Bioline™ Malaria Ag P.f)
[1] Includes children whose mothers are deceased
[2] Excludes children whose mothers were not interviewed

MALARIA BELIEFS AND EXPOSURE TO MALARIA MESSAGES

5

Key Findings

- ***Media exposure to malaria messages:*** 50% of women have been exposed to malaria messages in the last 6 months. The most common sources of exposure to malaria messages were health care providers (42%), community health assistants (37%), and radio (35%).
- ***Knowledge of ways to avoid malaria:*** Almost all women have knowledge of ways to avoid getting malaria (94%). Eighty-two percent of women said that sleeping under mosquito nets is a way to avoid malaria.
- ***Acceptability of malaria prevention interventions:*** Almost all women (97%) would allow their child to be vaccinated against malaria.

This chapter assesses the extent to which malaria communication messages reach women age 15–49 and the channels through which women receive such messages. The chapter also presents data on the acceptability of malaria prevention interventions.

5.1 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 last 6 months.

Sample: Women age 15–49

Social behavior change (SBC) is key to the uptake of malaria control interventions. The Ministry of Health and the National Malaria Control Program (NMCP) have outlined SBC approaches that focus on critical areas of malaria prevention and treatment. As part of the National Strategic Plan 2021–2025, the NMCP seeks to engage in advocacy and resource mobilization, promote prevention by strengthening information education campaigns and behavior change communication, establish social media platforms to increase awareness regarding malaria prevention and control, and strengthen and sustain community engagement to promote effective health-seeking behavior among the population (NMCP 2020a).

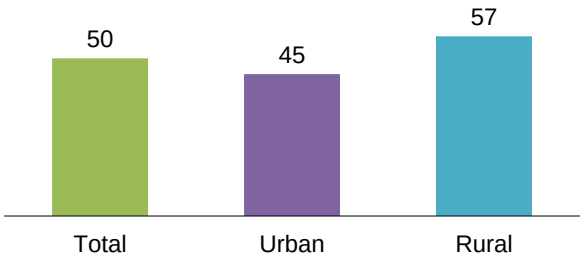
Information exposure plays a critical role in behavioral changes that will help increase malaria prevention knowledge and practices. To assess the coverage of malaria messages, women age 15–49 were asked if they had seen or heard any messages about malaria prevention in the 6 months preceding the survey. Women who had seen or heard messages were further asked about the source of the messages. Fifty percent of women reported seeing or hearing a malaria message in the last 6 months. The most common sources of exposure to malaria messages were health care providers (42%), community health assistants (37%), and radio (35%) (**Table 5.1**).

Patterns by background characteristics

- A higher percentage of women in rural areas than urban areas recalled having seen or heard a malaria message in the last 6 months (57% versus 45%) (**Figure 5.1**).
- Exposure to social and behavior change communication messages varies by region, from 40% in Greater Monrovia to 64% in North Western (**Map 5.1**).
- Radio is the most common source of malaria information among women residing in Greater Monrovia (39%), community health assistants are the most common source among women residing in North Central and South Eastern A (54% each), and health care providers are the most common source among women residing in North Western (53%), South Central (48%), and South Eastern B (67%).

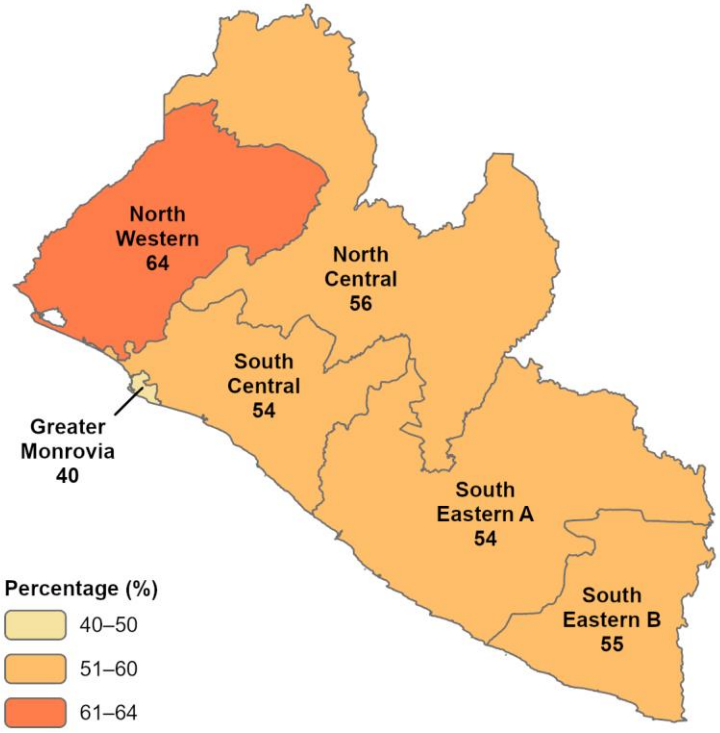
Figure 5.1 **Reach of social and behavior change communication messages by residence**

Percentage of women age 15–49 who saw or heard a message on malaria in the last 6 months



Map 5.1 **Reach of social and behavior change communication messages by region**

Percentage of women age 15–49 who saw or heard a message on malaria in the last 6 months



5.2 KNOWLEDGE OF WAYS TO AVOID MALARIA

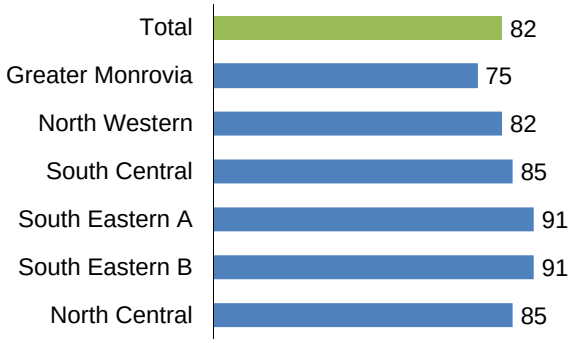
Better knowledge of ways to avoid and prevent malaria, such as increasing the use of insecticide-treated nets (ITNs), is a foundational step toward changing behavior. Women age 15–49 were asked if there are ways to avoid getting malaria. Women who said that there are ways to avoid getting malaria were further asked to report specific ways to avoid malaria. Ninety-four percent of women stated that there are ways to avoid getting malaria. Among those who said there are ways to avoid getting malaria, 82% cited sleeping under a mosquito net or ITN. Other commonly cited measures included keeping surroundings clean (44%), using mosquito coils (30%), cutting the grass (18%), spraying the house with insecticide (17%), and taking preventive medication (14%) (**Table 5.2**).

Patterns by background characteristics

- Nearly identical percentages of women in urban areas and rural areas said that there are ways to avoid getting malaria (95% and 94%, respectively).
- By region, the percentage of women who said that there are ways to avoid getting malaria ranges from 91% in South Eastern B to 97% in South Eastern A (**Figure 5.2**).
- Among women who said there are ways to avoid getting malaria, the percentage who cited sleeping under a mosquito net or ITN as a way to avoid malaria ranges from 75% in Greater Monrovia to 91% in both South Eastern A and South Eastern B.

Figure 5.2 **Knowledge that malaria can be avoided by sleeping under a mosquito net, by region**

Percentage of women age 15–49 who stated that sleeping under mosquito nets or ITNs can protect against malaria



5.3 ACCEPTABILITY OF MALARIA PREVENTION INTERVENTIONS

During the 2022 LMIS, women with children under age 5 were asked questions regarding their knowledge of and opinion about the new malaria vaccine targeting children. Thirty-five percent of women have heard about the malaria vaccine, and 97% stated that they would allow their child to be vaccinated against malaria if the vaccine became available in their area (**Table 5.3**).

Ninety-eight percent of women responded that they would allow their child to be given three doses of sulfadoxine-pyrimethamine (SP)/Fansidar during routine vaccinations to prevent the child from getting malaria.

Patterns by background characteristics

- By region, the percentage of women who have heard about the malaria vaccine is highest in North Western (53%) and lowest in Greater Monrovia (28%).
- The percentage of women who said that they would allow their child to be vaccinated against malaria if the vaccine became available is high across all regions, ranging from 95% in Greater Monrovia to 100% in South Eastern A.
- The percentage of women who would allow their child to be given three doses of SP/Fansidar during routine vaccinations to prevent the child from getting malaria is also high across regions, with a range of 96% in Greater Monrovia and South Central to 100% in South Eastern A.

LIST OF TABLES

For detailed information on malaria beliefs and exposure to malaria messages, see the following tables:

- **Table 5.1 Media exposure to malaria messages**
- **Table 5.2 Knowledge of ways to avoid malaria**
- **Table 5.3 Acceptability of malaria prevention interventions**

Table 5.1 Media exposure to malaria messages

Percentage of women age 15–49 who have seen or heard a malaria message in the last 6 months, and among those who have seen or heard a malaria message in the last 6 months, percentage who cite specific sources for malaria messages, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage who have seen or heard a malaria message in the last 6 months	Number of women	Among women who have seen or heard a malaria message, percentage who cite specific sources of exposure to malaria messages												Number of women
			Radio	Television	Poster/ billboard	Newspaper/ magazine	Leaflet/ brochure	Health care provider	Community health assistant	Social media	Peer educators	Video club	School	Other	
Age															
15–19	46.2	977	25.4	1.0	1.4	0.3	0.5	37.1	31.9	2.4	20.3	0.2	19.0	2.3	451
20–24	46.8	952	30.2	0.1	0.7	1.1	2.7	46.0	33.1	5.0	16.5	0.2	4.5	3.3	445
25–29	49.7	769	36.3	1.1	2.3	0.0	1.6	44.6	33.5	5.6	9.0	0.9	2.1	2.2	382
30–34	52.7	578	37.0	0.0	1.8	0.0	1.7	42.1	36.8	1.4	14.0	0.0	0.7	2.8	305
35–39	48.8	554	38.9	0.6	1.5	1.2	1.8	45.5	45.8	2.7	9.6	0.0	1.2	2.4	270
40–44	58.4	402	44.6	1.3	0.2	0.0	0.4	40.6	46.8	1.9	9.1	0.0	0.0	3.3	235
45–49	56.7	282	49.6	1.9	1.3	0.9	0.9	36.3	40.0	0.9	10.9	0.0	0.0	5.1	160
Residence															
Urban	45.3	2,771	39.4	1.2	1.3	0.9	1.7	40.0	27.1	5.2	18.0	0.2	6.8	3.9	1,256
Rural	56.9	1,742	29.6	0.1	1.5	0.0	1.1	44.8	49.3	0.7	8.1	0.3	3.4	1.6	992
Region															
Greater Monrovia	39.6	1,706	39.1	2.0	1.1	1.2	2.3	35.3	26.2	7.6	23.0	0.0	6.0	4.6	675
North Western	63.5	303	41.4	0.4	3.5	0.2	0.6	52.5	50.9	2.1	9.1	0.6	3.2	0.4	192
South Central	54.4	764	36.4	0.3	0.8	0.1	2.4	47.8	16.4	1.4	19.9	0.0	4.9	3.9	416
South Eastern A	54.2	292	47.5	0.1	2.6	0.1	2.5	47.8	54.2	0.6	3.4	0.0	2.8	2.1	158
South Eastern B	54.7	248	43.9	1.1	6.5	1.3	0.0	66.8	26.6	2.8	4.4	1.1	10.2	0.7	136
North Central	55.8	1,201	23.8	0.0	0.1	0.0	0.3	36.2	54.2	0.9	6.0	0.4	5.0	1.8	670
Education															
No education	48.7	1,290	37.2	0.5	1.3	0.0	0.8	42.0	43.8	0.5	8.8	0.4	0.1	2.1	628
Elementary	50.6	1,165	28.7	1.0	0.8	0.0	1.0	45.8	40.1	0.9	11.1	0.3	4.8	2.8	590
Junior high	49.6	848	28.9	0.7	0.8	0.3	0.8	41.7	36.4	1.3	15.8	0.2	10.4	3.6	420
Senior high	47.9	916	41.9	0.7	1.7	0.9	2.8	37.8	26.6	8.1	19.5	0.0	8.4	3.5	439
Higher	57.8	295	47.8	1.3	3.9	3.4	3.8	42.0	27.5	13.0	19.9	0.0	5.8	2.6	170
Wealth quintile															
Lowest	53.8	794	30.1	0.1	1.1	0.0	0.4	45.3	47.0	0.3	4.3	0.0	2.9	3.1	427
Second	58.1	764	30.2	0.0	1.9	0.0	1.0	42.4	56.8	0.3	5.5	0.6	3.4	0.7	444
Middle	52.1	827	34.9	0.0	1.7	0.3	0.7	48.8	34.6	2.4	12.5	0.6	3.8	1.9	431
Fourth	44.6	1,037	37.5	1.5	1.2	0.3	3.3	37.5	24.2	3.3	24.1	0.0	7.1	3.6	462
Highest	44.3	1,091	41.9	1.9	1.0	1.7	1.6	37.5	23.8	9.1	20.4	0.0	8.9	4.9	484
Total	49.8	4,513	35.1	0.7	1.4	0.5	1.4	42.1	36.9	3.2	13.6	0.2	5.3	2.9	2,248

Table 5.2 Knowledge of ways to avoid malaria

Percentage of women age 15–49 who state there are ways to avoid getting malaria, and among women who state there are ways to avoid getting malaria, percentage reporting specific ways to avoid getting malaria, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage who state there are ways to avoid getting malaria	Number of women	Among women who state that there are ways to avoid getting malaria, percentage who report specific ways to avoid getting malaria												Number of women
			Sleep under mosquito net or ITN[1]	Use mosquito repellent	Take preventive medication	Spray house with insecticide	Fill in stagnant water (puddles)	Keep surroundings clean	Put mosquito screen on windows	Use mosquito coils	Keep doors and windows closed	Cut the grass	Take medicine if pregnant	Other	
Age															
15–19	89.9	977	78.7	3.5	16.4	17.5	4.2	39.4	4.8	31.4	7.9	16.2	3.4	3.8	878
20–24	95.7	952	83.7	3.7	14.9	17.3	4.3	42.7	3.9	34.1	7.3	16.2	3.5	3.4	911
25–29	95.8	769	80.8	4.6	15.5	17.6	7.5	50.5	5.3	30.6	9.1	19.0	5.8	4.1	736
30–34	93.5	578	86.0	4.0	14.0	18.4	6.7	44.3	4.2	32.8	9.2	16.8	4.6	4.2	540
35–39	95.5	554	84.2	3.7	12.0	15.2	6.3	44.2	4.9	27.4	6.2	19.3	2.8	3.7	529
40–44	95.1	402	78.7	3.2	9.3	16.2	8.4	47.5	3.8	23.5	9.3	21.0	2.5	5.6	382
45–49	95.7	282	81.3	3.5	13.0	14.4	5.7	46.2	2.5	24.0	4.6	17.2	0.8	5.1	270
Residence															
Urban	94.5	2,771	79.0	4.7	16.3	24.3	5.0	42.0	5.3	37.2	8.5	12.6	4.2	4.4	2,617
Rural	93.5	1,742	86.6	2.4	10.8	5.2	7.2	48.3	2.9	19.3	6.8	25.8	2.8	3.6	1,629
Region															
Greater Monrovia	95.1	1,706	75.4	6.5	21.2	30.1	4.7	43.1	6.8	43.9	10.7	12.3	5.6	4.2	1,622
North Western	93.2	303	82.1	3.0	17.9	6.8	8.0	54.5	2.3	14.0	5.5	24.2	0.2	3.4	282
South Central	94.7	764	85.0	2.9	15.0	14.3	7.2	46.0	2.3	34.2	6.6	10.0	1.9	2.9	723
South Eastern A	97.0	292	91.2	0.5	12.7	10.1	3.3	53.7	3.7	18.7	13.8	29.0	5.4	4.0	283
South Eastern B	91.1	248	91.2	0.1	6.1	7.0	9.2	52.0	1.3	7.3	3.1	25.8	3.7	4.6	226
North Central	92.5	1,201	85.1	2.3	4.5	5.9	6.1	38.8	3.7	19.8	4.7	24.3	2.5	4.6	1,110
Education															
No education	91.6	1,290	82.7	1.9	12.6	7.3	5.8	39.5	3.8	24.0	5.7	18.1	2.5	4.7	1,181
Elementary	91.9	1,165	82.2	2.9	13.7	10.4	6.7	42.7	4.1	23.4	8.4	19.4	3.8	3.9	1,071
Junior high	95.6	848	82.8	4.3	14.6	17.8	4.9	43.4	4.4	36.8	6.5	17.0	3.5	4.5	811
Senior high	97.6	916	80.1	5.1	16.1	29.1	5.1	50.6	4.3	40.0	9.3	15.9	3.7	3.6	894
Higher	98.4	295	80.9	9.4	15.9	41.3	8.1	54.5	8.3	33.8	14.0	16.1	8.2	2.3	290
Wealth quintile															
Lowest	92.6	794	83.1	2.4	9.4	1.5	6.5	44.5	2.8	17.9	7.3	26.8	2.9	5.7	735
Second	94.2	764	88.0	1.8	7.7	4.8	6.3	45.7	3.5	15.8	7.6	24.9	2.8	2.8	720
Middle	90.6	827	86.2	1.5	11.4	9.9	6.7	40.6	2.7	25.3	4.3	14.1	2.0	4.0	749
Fourth	95.5	1,037	80.3	4.2	18.3	25.4	4.9	42.8	3.8	43.1	8.4	12.5	4.1	3.8	990
Highest	96.4	1,091	75.4	7.5	20.2	33.3	5.4	47.8	8.0	40.5	10.5	13.6	5.6	4.0	1,052
Total	94.1	4,513	81.9	3.8	14.2	17.0	5.9	44.4	4.4	30.3	7.9	17.6	3.7	4.1	4,247

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2011 LMIS, 2013 LDHS, and 2016 LMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 5.3 Acceptability of malaria prevention interventions

Among women age 15–49 with a child under age 5, percentage who have heard about the malaria vaccine, percentage who would allow their child to be vaccinated against malaria if the vaccine became available in their area, and percentage who would allow their child to be given three doses of SP/Fansidar during routine vaccinations to prevent the child from getting malaria, according to background characteristics, Liberia MIS 2022

Background characteristic	Percentage who have heard about the malaria vaccine	Percentage who would allow their child to be vaccinated against malaria if the vaccine became available in their area	Percentage who would allow their child to be given three doses of SP/Fansidar during routine vaccinations to prevent the child from getting malaria	Number of women age 15–49 with a child under age 5
Age				
15–19	34.6	97.3	98.8	255
20–24	34.1	97.7	98.1	526
25–29	35.3	97.0	97.8	470
30–34	34.1	95.9	97.4	341
35–39	37.8	96.2	97.2	289
40–44	38.6	99.0	97.9	117
45–49	41.4	95.4	96.3	56
Residence				
Urban	34.5	96.4	97.6	1,107
Rural	36.5	97.6	98.1	946
Region				
Greater Monrovia	27.6	95.0	96.2	585
North Western	53.0	98.2	98.3	148
South Central	40.2	96.6	96.0	386
South Eastern A	43.5	100.0	100.0	138
South Eastern B	22.3	98.5	99.8	133
North Central	36.6	97.7	99.4	663
Education				
No education	34.5	97.3	97.9	683
Elementary	39.7	97.8	98.7	569
Junior high	34.3	96.6	98.7	388
Senior high	35.0	96.3	95.6	329
Higher	21.3	93.2	95.4	84
Wealth quintile				
Lowest	35.0	97.6	98.6	464
Second	40.8	98.1	99.2	427
Middle	35.4	97.7	97.7	402
Fourth	35.1	96.2	98.4	450
Highest	29.3	94.6	94.1	310
Total	35.4	97.0	97.8	2,053

REFERENCES

Centers for Disease Control and Prevention (CDC). 1998. Recommendations to Prevent and Control Iron Deficiency in the United States. *Morbidity and Mortality Weekly Report* 47(RR-3):1–29.

Koko, V. S., M. Warsame, B. Vonhm, M. K. Jeuronlon, D. Menard, L. Ma, F. Taweh, L. Tehmeh, P. Nyansaiye, O. J. Pratt, et al. 2022. Artesunate-Amodiaquine and Artemether-Lumefantrine for the Treatment of Uncomplicated Falciparum Malaria in Liberia: In Vivo Efficacy and Frequency of Molecular Markers. *Malaria Journal* 21(1):134.

Korenromp, E. L., J. Armstrong-Schellenberg, B. Williams, B. Nahlen, and R. W. Snow. 2004. Impact of Malaria Control on Childhood Anemia in Africa—A Quantitative Review. *Tropical Medicine & International Health* 9(10):1050–1065.

Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health and Social Welfare (MoHSW) [Liberia], National AIDS Control Program [Liberia], and Macro International Inc. 2008. *Liberia Demographic and Health Survey 2007*. Monrovia, Liberia: LISGIS and Macro International Inc.

Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health and Social Welfare (MoHSW) [Liberia], National AIDS Control Program [Liberia], and ICF International. 2014. *Liberia Demographic and Health Survey 2013*. Monrovia, Liberia: LISGIS and ICF International.

Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health (MoH) [Liberia], and ICF. 2021. *Liberia Demographic and Health Survey 2019–20*. Monrovia, Liberia, and Rockville, Maryland, USA: LISGIS, MoH, and ICF.

Ministry of Finance and Development Planning (MFDP) [Liberia]. 2018. *Pro Poor Agenda for Prosperity and Development (PAPD) 2018–2023*. Monrovia, Liberia: MFDP.

National Malaria Control Program (NMCP) [Liberia]. 2018. *Liberia Health Facilities Survey*. Monrovia, Liberia: NMCP.

National Malaria Control Program (NMCP) [Liberia]. 2020a. *Malaria National Strategic Plan 2021–2025*. Monrovia, Liberia: NMCP.

National Malaria Control Program (NMCP) [Liberia]. 2020b. *Technical Guidelines for Malaria Case Management and Malaria in Pregnancy*. Monrovia, Liberia: NMCP.

National Malaria Control Program (NMCP) [Liberia], Ministry of Health and Social Welfare (MoHSW) [Liberia], Liberia Institute of Statistics and Geo-Information Services (LISGIS), and ICF Macro. 2009. *Liberia Malaria Indicator Survey 2009*. Monrovia, Liberia: MoHSW, LISGIS, and ICF Macro.

National Malaria Control Program (NMCP) [Liberia], Ministry of Health and Social Welfare (MoHSW) [Liberia], Liberia Institute of Statistics and Geo-Information Services (LISGIS), and ICF International. 2012. *Liberia Malaria Indicator Survey 2011.* Monrovia, Liberia: MoHSW, LISGIS, and ICF International.

National Malaria Control Program (NMCP) [Liberia], Ministry of Health (MoH) [Liberia], Liberia Institute of Statistics and Geo-Information Services (LISGIS), and ICF. 2017. *Liberia Malaria Indicator Survey 2016.* Monrovia, Liberia: MoH, LISGIS, and ICF.

President's Malaria Initiative (PMI), Liberia Malaria Impact Evaluation Group. 2018. *Evaluation of the Impact of Malaria Control Interventions on All-Cause Mortality in Children Under Five Years of Age in Liberia, 2005–2013*. https://www.pmi.gov/docs/default-source/default-document-library/pmi-reports/liberia-malaria-impact-evaluation-group-full-report.pdf?sfvrsn=6.

WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene. 2018. *Core Questions on Drinking Water, Sanitation and Hygiene for Household Surveys: 2018 Update.* New York: United Nations Children's Fund (UNICEF) and World Health Organization (WHO).

World Health Organization (WHO). 2012a. *WHO Evidence Review Group: Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) with Sulfadoxine-Pyrimethamine (SP)*. Report of meeting held at WHO Headquarters, Geneva, July 9–11, 2012. Geneva: WHO. http://www.who.int/malaria/mpac/sep2012/iptp_sp_erg_meeting_report_july2012.pdf.

World Health Organization (WHO). 2012b. *Intermittent Preventive Treatment of Malaria in Pregnancy Using Sulfadoxine-Pyrimethamine (IPTp-SP).* http://who.int/malaria/iptp_sp_updated_policy_recommendation_en_102012.pdf?ua=1.

World Health Organization (WHO). 2014a. *WHO Guidelines for Indoor Air Quality: Household Fuel Combustion*. Geneva: WHO.

World Health Organization (WHO). 2014b. *WHO Policy Brief for the Implementation of Intermittent Preventive Treatment of Malaria in Pregnancy Using Sulfadoxine-Pyrimethamine (IPTp-SP)* (No. WHO/HTM/GMP/2014.4). Geneva: WHO.

World Health Organization (WHO). 2015a. *Global Technical Strategy for Malaria 2021–2025.* Geneva: WHO. https://iris.who.int/bitstream/handle/10665/176712/9789241564991_eng.pdf?sequence=1

World Health Organization (WHO). 2015b. *Guidelines for the Treatment of Malaria*. 3rd ed. Geneva: WHO. https://apps.who.int/iris/bitstream/handle/10665/162441/9789241549127_eng.pdf?sequence=1.

SAMPLE DESIGN

Appendix A

A.1 INTRODUCTION

The 2022 Liberia Malaria Indicator Survey (2022 LMIS) is a follow-up to the 2009, 2011, and 2016 LMIS surveys. The survey, which involved a nationally representative sample of 4,500 households from 150 sample clusters, was designed to provide information on key malaria control indictors such as the proportion of households having at least one bed net and at least one insecticide-treated net (ITN), the proportions of children under age 5 and pregnant women who slept under an ITN the night before the survey, and the proportion of pregnant women who received intermittent preventive treatment (IPT) for malaria during their last pregnancy. Information was also collected on malaria prevalence among children under age 5 based on on-site malaria testing.

The survey was designed to produce representative estimates for the main MIS indictors for the country as a whole, for urban and rural areas separately, for the capital city of Greater Monrovia, and for each of the five geographical regions listed below.

- North Western: Bomi, Grand Cape Mount, and Gbarpolu
- South Central: Grand Bassa, Margibi, and Montserrado (excluding Greater Monrovia)
- South Eastern A: Grand Gedeh, River Cess, and Sinoe
- South Eastern B: Grand Kru, Maryland, and River Gee
- North Central: Bong, Lofa, and Nimba

A.2 SAMPLING FRAME

The sampling frame used for the 2022 LMIS is the 2008 Liberia National Population and Housing Census conducted in Liberia in 2008 (LPHC 2008) which was partially updated in 2019. The sampling frame is a complete list of enumeration areas (EAs) covering the whole country provided by the Liberia Institute of Statistics and Geo-Information Services (LISGIS), the implementing agency for the 2022 LMIS. The census frame had been updated multiple times to reflect urban/rural designations in the country. The census frame has 7,012 EAs. An EA is a natural village or part of a village. Each EA includes identification and administrative information and, as a measure of size, the number of residential households in the EA. Each EA is also classified as urban or rural.

Table A.1 shows the population distribution by county and according to type of residence. In Liberia, 55.4% of the population lives in urban areas, and Greater Monrovia represents 28% of the total population. The smallest county, Grand Kru, represents only 1.7% of the population. **Table A.2** presents the distribution of households. A total of 56.2% of households are in urban areas, with Greater Monrovia representing 30% of the households in Liberia. **Table A.3** presents the distribution of enumeration areas. Among the 7,012 EAs, 3,655 are in urban areas and 3,357 are in rural areas. On average, an EA has 96 households, 103 in urban areas and 88 in rural areas.

Table A.1 Population distribution by county and according to type of residence

		Population distribution			Percentage	
Domain	County	Urban	Rural	Total	Urban	County
Greater Monrovia	Montserrado (urban)	960,636		960,636	100.0	28.0
North Western	Bomi	14,314	68,719	83,033	17.2	2.4
	Gbarpolu	11,950	68,236	80,186	14.9	2.3
	Grand Cape Mount	9,176	116,153	125,329	7.3	3.7
South Central	Grand Bassa	69,711	147,519	217,230	32.1	6.3
	Margibi	102,998	104,148	207,146	49.7	6.0
	Montserrado[1]	82,046	63,284	145,330	56.5	4.2
North Central	Bong	127,572	201,096	328,668	38.8	9.6
	Lofa	98,384	175,606	273,990	35.9	8.0
	Nimba	272,376	182,505	454,881	59.9	13.3
South Eastern A	Grand Gedeh	51,120	71,793	122,913	41.6	3.6
	River Cess	2,212	67,632	69,844	3.2	2.0
	Sinoe	13,229	87,839	101,068	13.1	2.9
South Eastern B	Grand Kru	3,073	54,577	57,650	5.3	1.7
	Maryland	61,323	72,956	134,279	45.7	3.9
	River Gee	19,457	44,873	64,330	30.2	1.9
Liberia		1,899,577	1,526,936	3,426,513	55.4	100.0

Source: 2008 National Population and Housing Census (with partial updates in 2019)
[1] Montserrado excluding Greater Monrovia

Table A.2 Household distribution by county and according to type of residence

		Household distribution			Percentage	
Domain	County	Urban	Rural	Total	Urban	County
Greater Monrovia	Montserrado (urban)	201,251		201,251	100.0	30.0
North Western	Bomi	3,534	16,974	20,508	17.2	3.1
	Gbarpolu	2,250	12,283	14,533	15.5	2.2
	Grand Cape Mount	1,533	22,532	24,065	6.4	3.6
South Central	Grand Bassa	14,810	32,630	47,440	31.2	7.1
	Margibi	20,974	24,121	45,095	46.5	6.7
	Montserrado*[1]	16,638	15,013	31,651	52.6	4.7
North Central	Bong	26,103	43,707	69,810	37.4	10.4
	Lofa	18,033	31,609	49,642	36.3	7.4
	Nimba	47,893	32,841	80,734	59.3	12.0
South Eastern A	Grand Gedeh	8,089	10,054	18,143	44.6	2.7
	River Cess	487	13,494	13,981	3.5	2.1
	Sinoe	2,594	13,235	15,829	16.4	2.4
South Eastern B	Grand Kru	507	8,462	8,969	5.7	1.3
	Maryland	9,381	9,873	19,254	48.7	2.9
	River Gee	2,857	6,965	9,822	29.1	1.5
Liberia		376,934	293,793	670,727	56.2	100.0

Source: 2008 National Population and Housing Census (with partial updates in 2019)
[1] Montserrado excluding Greater Monrovia

Table A.3 Distribution of enumeration areas by county and according to type of residence

Domain	County	EA distribution			Average EA size		
		Urban	Rural	Total	Urban	Rural	Total
Greater Monrovia	Montserrado (urban)	1,967		1,967	102		102
North Western	Bomi	46	227	273	77	75	75
	Gbarpolu	21	127	148	107	97	98
	Grand Cape Mount	17	261	278	90	86	87
South Central	Grand Bassa	152	316	468	97	103	101
	Margibi	168	263	431	125	92	105
	Montserrado[1]	134	149	283	124	101	112
North Central	Bong	326	601	927	80	73	75
	Lofa	170	331	501	106	95	99
	Nimba	434	347	781	110	95	103
South Eastern A	Grand Gedeh	83	93	176	97	108	103
	River Cess	5	147	152	97	92	92
	Sinoe	23	195	218	113	68	73
South Eastern B	Grand Kru	7	123	130	72	69	69
	Maryland	73	98	171	129	101	113
	River Gee	29	79	108	99	88	91
Liberia		3,655	3,357	7,012	103	88	96

Source: 2008 National Population and Housing Census (with partial updates in 2019)
[1] Montserrado excluding Greater Monrovia

A.3 SAMPLING PROCEDURE AND SAMPLE ALLOCATION

The sample for the 2022 LMIS was a stratified sample selected in two stages from the sampling frame. Stratification was achieved by separating each county into urban and rural areas, with Greater Monrovia separated from Montserrado County; in total, 31 sampling strata were created. Samples were selected independently in each sampling stratum through a two-stage selection. In the first stage, 150 clusters were selected with a stratified probability proportional to size sampling procedure according to the sample allocation given in **Table A.4**. Implicit stratification and proportional allocation were achieved at each of the lower administrative unit levels by sorting the sampling frame within the explicit stratum according to administrative units at different levels before sample selection and by using probability proportional to size selection in the first stage of sampling.

After the first-stage selection and before the main survey, a household listing operation was carried out in all of the selected clusters. The household listing operation involved visiting each of the 150 selected clusters to draw a location map and a detailed sketch map and 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 for the selection of households in the second stage. Some of the clusters selected in the household listing operation were large in size. In order to minimize the task of household listing, clusters with more than 300 households were segmented. Only one segment was selected for the survey with probability proportional to segment size. The methodology and the detailed household listing procedure are addressed in the household listing manual.

In the second stage, a fixed number of 30 households were selected from the newly established household listing for each selected cluster. The survey interviewers were asked to interview only the preselected households. In order to prevent bias, no replacements and no changes of the preselected households were allowed in the implementing stages.

Table A.4 shows the sample allocation of clusters and households by county and according to type of residence. The sample allocation featured an equal size allocation at the survey domain level, with 25 clusters

and 750 households in each domain. The domain sample size was then equally allocated to counties, with one county receiving one cluster less or one cluster more because of rounding. Among the 150 clusters, 69 were in urban areas and 81 were in rural areas. Of the total number of 4,500 households selected, 2,070 were in urban areas and 2,430 in rural areas. Urban areas were undersampled because of the undersampling in Greater Monrovia. **Table A.5** presents the expected numbers of women interviewed and children under age 5 covered by the survey by county and according to type of residence. The survey was expected to result in 4,234 interviews of women age 15–49 (2,266 in urban areas and 1,968 in rural areas) and to cover 4,143 children under age 5 (1,763 in urban areas and 2,380 in rural areas). The sample calculations were based on the results of the 2016 LMIS. According to that survey, there were 1.20 women age 15–49 per household in urban areas and 0.85 women age 15–49 per household in rural areas. The response rate was 97% among women in both urban and rural areas, and the household completion rate was 94% in both urban and rural areas. There were 0.85 children under age 5 per household in urban areas and 0.98 per household in rural areas.

Table A.4 Sample allocation of clusters and households by county and according to type of residence

		Allocation of clusters				Allocation of households			
Domain	County	Urban	Rural	County	Domain	Urban	Rural	County	Domain
Greater Monrovia	Montserrado (urban)	25		25	25	750		750	750
North Western	Bomi	2	6	8		60	180	240	
	Gbarpolu	2	6	8		60	180	240	
	Grand Cape Mount	2	7	9	25	60	210	270	750
South Central	Grand Bassa	3	6	9		90	180	270	
	Margibi	3	5	8		90	150	240	
	Montserrado[1]	4	4	8	25	120	120	240	750
North Central	Bong	3	5	8		90	150	240	
	Lofa	3	5	8		90	150	240	
	Nimba	5	4	9	25	150	120	270	750
South Eastern A	Grand Gedeh	4	5	9		120	150	270	
	River Cess	2	6	8		60	180	240	
	Sinoe	2	6	8	25	60	180	240	750
South Eastern B	Grand Kru	2	6	8		60	180	240	
	Maryland	4	5	9		120	150	270	
	River Gee	3	5	8	25	90	150	240	750
Liberia		69	81	150	150	2,070	2,430	4,500	4,500

[1] Montserrado excluding Greater Monrovia

Table A.5 Expected numbers of women age 15–49 interviewed and children under age 5 covered by the survey by county and according to type of residence

		Women age 15–49 interviewed			Children under age 5 covered		
Domain	County	Urban	Rural	Total	Urban	Rural	Total
Greater Monrovia	Montserrado (urban)	821		821	638		638
North Western	Bomi	65	146	211	51	176	227
	Gbarpolu	65	146	211	51	176	227
	Grand Cape Mount	65	170	235	51	206	257
South Central	Grand Bassa	99	146	245	77	176	253
	Margibi	99	121	220	77	147	224
	Montserrado[1]	132	98	230	102	118	220
North Central	Bong	99	121	220	77	147	224
	Lofa	99	121	220	77	147	224
	Nimba	164	98	262	128	118	246
South Eastern A	Grand Gedeh	132	121	253	102	147	249
	River Cess	65	146	211	51	176	227
	Sinoe	65	146	211	51	176	227
South Eastern B	Grand Kru	65	146	211	51	176	227
	Maryland	132	121	253	102	147	249
	River Gee	99	121	220	77	147	224
Liberia		2,266	1,968	4,234	1,763	2,380	4,143

[1] Montserrado excluding Greater Monrovia

A.4 SAMPLING WEIGHTS

Because of the nonproportional allocation of the sample to the different reporting domains and counties, sampling weights will be required for any analysis using 2022 LMIS data to ensure the actual representativeness of the sample. Since the 2022 LMIS sample was a two-stage stratified cluster sample, sampling weights were calculated based on sampling probabilities separately for each sampling stage and for each cluster. The following notations were used:

P_{1hi}: first-stage sampling probability of the i^{th} EA in stratum h from the sampling frame

P_{2hi}: second-stage sampling probability within the i^{th} EA (household selection)

Let n_h be the number of EAs selected in stratum h, M_{hi} the measure of size (number of residential households) according to the sampling frame in the i^{th} EA, and $\sum M_{hi}$ the total measure of size (total number of residential households) in stratum h. The probability of selecting the i^{th} EA in stratum h from the sampling frame is calculated as follows:

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

Let s_{hi} be the proportion of households in the selected segment relative to the total number of households in EA i in stratum h if the EA is segmented; otherwise, $s_{hi} = 1$. Let L_{hi} be the number of households listed in the household listing operation in cluster i in stratum h, and let m_{hi} be the number of households selected in the cluster. The second stage's selection probability for each household in the cluster is calculated as follows:

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

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

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

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

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

A spreadsheet containing all sampling parameters and selection probabilities was constructed to facilitate the calculation of sampling weights. Household sampling weights and women's individual sampling weights were obtained by adjusting the above calculated weights to compensate for household nonresponse and individual nonresponse, respectively. These weights were further normalized so that the total number of unweighted cases was equal to the total number of weighted cases at the national level for both household weights and women's individual weights. The normalized weights are valid for estimation of proportions and means but not valid for estimation of totals.

A.5 SURVEY IMPLEMENTATION

Table A.6 shows detailed results from the household interviews and interviews with women.

Table A.6 Sample implementation

Percent distribution of households and eligible women age 15–49 by results of the household and individual interviews, and household, eligible women, and overall women response rates, according to residence and region (unweighted), Liberia MIS 2022

	Residence		Region						
Result	Urban	Rural	Greater Monrovia	North Western	South Central	South Eastern A	South Eastern B	North Central	Total
Selected households									
Completed (C)	95.3	96.6	92.1	93.3	97.5	95.5	99.3	98.1	96.0
Household present but no competent respondent at home (HP)	0.6	0.0	1.2	0.0	0.4	0.1	0.0	0.1	0.3
Refused (R)	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Dwelling not found (DNF)	0.6	0.2	1.3	0.3	0.3	0.1	0.0	0.1	0.4
Household absent (HA)	1.7	1.6	2.3	4.0	0.9	1.8	0.3	0.5	1.6
Dwelling vacant/address not a dwelling (DV)	1.4	1.4	2.4	2.4	0.7	1.9	0.3	0.9	1.4
Dwelling destroyed (DD)	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1
Other (O)	0.2	0.1	0.3	0.0	0.3	0.4	0.0	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	2,070	2,416	750	750	750	736	750	750	4,486
Household response rate (HRR)[1]	98.6	99.8	97.1	99.7	99.3	99.7	100.0	99.7	99.3
Eligible women									
Completed (EWC)	97.1	99.3	94.2	98.8	98.7	98.8	99.5	99.4	98.2
Not at home (EWNH)	2.2	0.4	4.4	1.2	0.9	0.8	0.1	0.2	1.3
Refused (EWR)	0.2	0.0	0.3	0.0	0.0	0.1	0.0	0.0	0.1
Incapacitated (EWI)	0.3	0.2	0.5	0.0	0.1	0.1	0.2	0.4	0.2
Other (EWO)	0.3	0.0	0.6	0.0	0.3	0.1	0.1	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	2,353	2,245	865	592	795	726	816	804	4,598
Eligible women response rate (EWRR)[2]	97.1	99.3	94.2	98.8	98.7	98.8	99.5	99.4	98.2
Overall women response rate (OWRR)[3]	95.8	99.1	91.4	98.5	98.1	98.5	99.5	99.1	97.4

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

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

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

$$OWRR = HRR * EWRR/100$$

ESTIMATES OF SAMPLING ERRORS

Appendix B

The estimates from a sample survey are affected by two types of errors: nonsampling errors and sampling errors. Nonsampling errors are the results of mistakes made in implementing data collection and in 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 2022 Liberia Malaria Indicator Survey (2022 LMIS) 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 2022 LMIS 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 between 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% 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 2022 LMIS sample was the result of a multistage stratified design, and, consequently, it was necessary to use more complex formulas. The computer software used to calculate sampling errors for the 2022 LMIS is an SAS program. This program uses 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^{th} stratum;
y_{hi} is the sum of the weighted values of variable y in the i^{th} cluster in the h^{th} stratum;
x_{hi} is the sum of the weighted number of cases in the i^{th} cluster in the h^{th} stratum; and
f is the overall sampling fraction, which is so small that it is ignored.

In addition to the standard error, the design effect (DEFT) for each estimate is calculated, which 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 2022 LMIS are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for Liberia as a whole, for urban and rural areas separately, for Greater Monrovia, and for each of the five geographical regions. 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.10** present the value of the statistic (R), its standard error (SE), the number of unweighted (N) and weighted (WN) cases, the design effect (DEFT), the relative standard error (SE/R), and the 95% confidence limits (R±2SE) for each variable. The DEFT is considered undefined when the standard error considering a simple random sample is zero (when the estimate is close to 0 or 1).

The confidence interval, for example as calculated for child has malaria (based on microscopy test), can be interpreted as follows: the overall proportion from the national sample is 0.102, 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, $0.102 \pm 2 \times 0.012$. There is a high probability (95%) that the *true* average proportion of children with malaria according to microscopy is between 0.079 and 0.126.

For the total sample, the value of the DEFT, averaging over all variables, is 1.918. This means that, due to multistage clustering of the sample, the average standard error is increased by a factor of 1.918 over that in an equivalent simple random sample.

Table B.1 List of selected variables for sampling errors, Liberia MIS 2022

Variable	Estimate	Base population
HOUSEHOLDS		
Ownership of at least one mosquito net	Proportion	Households
Average number of mosquito nets per household	Mean	Households
Ownership of at least one ITN	Proportion	Households
Average number of ITNs per household	Mean	Households
Ownership of at least one ITN for every two persons	Proportion	Households (with at least one person who stayed in the household the night before the survey)
WOMEN		
Urban residence	Proportion	Women 15–49
No education	Proportion	All women 15–49
Secondary education or higher	Proportion	All women 15–49
Literacy	Proportion	All women 15–49
4+ ANC visits	Proportion	Last birth of women 15–49 with live births in the last 2 years
8+ ANC visits	Proportion	Last birth of women 15–49 with live births in the last 2 years
Received 1+ doses of SP/Fansidar	Proportion	Last birth of women 15–49 with live births in the last 2 years
Received 2+ doses of SP/Fansidar	Proportion	Last birth of women 15–49 with live births in the last 2 years
Received 3+ doses of SP/Fansidar	Proportion	Last birth of women 15–49 with live births in the last 2 years
CHILDREN		
Slept under any mosquito net last night	Proportion	Children under 5 in households
Slept under an ITN last night	Proportion	Children under 5 in households
Slept under an ITN last night in households with at least one ITN	Proportion	Children under 5 in households with at least one ITN
Had fever in last 2 weeks	Proportion	Child under 5 in women's birth history
Had blood taken from finger/heel	Proportion	Child under 5 in women's birth history who had a fever in the last 2 weeks
Sought care/treatment from a health facility	Proportion	Child under 5 with a fever in the last 2 weeks
Took ACT	Proportion	Child under 5 with a fever in the last 2 weeks who received any antimalarial drugs
Has anemia (hemoglobin <8.0 g/dl)	Proportion	Child 6–59 tested for anemia
Has malaria (based on rapid test)	Proportion	Children 6–59 tested (rapid test) for malaria
Has malaria (based on microscopy test)	Proportion	Children 6–59 tested (microscopy) for malaria
PREGNANT WOMEN		
Slept under any mosquito net last night	Proportion	Pregnant women 15–49 in households
Slept under an ITN last night	Proportion	Pregnant women 15–49 in households
Slept under an ITN last night in households with at least one ITN	Proportion	Pregnant women 15–49 in households with at least one ITN

Table B.2 Sampling errors: Total sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.745	0.015	4,306	4,306	2.227	0.020	0.715	0.774
Average number of mosquito nets per household	1.578	0.054	4,306	4,306	2.497	0.034	1.469	1.687
Ownership of at least one ITN	0.723	0.014	4,306	4,306	2.094	0.020	0.695	0.752
Average number of ITNs per household	1.533	0.053	4,306	4,306	2.421	0.034	1.428	1.639
Ownership of at least one ITN for every two persons	0.328	0.012	4,275	4,276	1.681	0.037	0.304	0.352
WOMEN								
Urban residence	0.614	0.027	4,513	4,513	3.732	0.044	0.560	0.668
No education	0.286	0.017	4,513	4,513	2.499	0.059	0.252	0.319
Secondary education or higher	0.456	0.022	4,513	4,513	3.010	0.049	0.411	0.501
Literacy	0.538	0.019	4,513	4,513	2.499	0.035	0.500	0.575
4+ ANC visits	0.838	0.017	1,171	1,109	1.620	0.021	0.803	0.873
8+ ANC visits	0.207	0.021	1,171	1,109	1.788	0.102	0.165	0.250
Received 1+ doses of SP/Fansidar	0.934	0.010	1,171	1,109	1.429	0.011	0.913	0.955
Received 2+ doses of SP/Fansidar	0.799	0.022	1,171	1,109	1.861	0.027	0.756	0.843
Received 3+ doses of SP/Fansidar	0.626	0.023	1,171	1,109	1.606	0.036	0.581	0.672
CHILDREN								
Slept under any mosquito net last night	0.521	0.018	3,183	3,192	1.679	0.034	0.485	0.557
Slept under an ITN last night	0.503	0.018	3,183	3,192	1.711	0.036	0.467	0.540
Slept under an ITN last night in households with at least one ITN	0.628	0.019	2,589	2,556	1.641	0.030	0.591	0.666
Had fever in last 2 weeks	0.364	0.016	2,722	2,576	1.623	0.043	0.333	0.395
Had blood taken from finger/heel	0.448	0.029	1,026	937	1.707	0.064	0.391	0.506
Sought care/treatment from a health facility	0.604	0.024	1,026	937	1.487	0.041	0.555	0.653
Took ACT	0.808	0.024	624	581	1.448	0.029	0.761	0.856
Has anemia (hemoglobin <8.0 g/dl)	0.021	0.005	2,849	2,804	1.642	0.213	0.012	0.030
Has malaria (based on rapid test)	0.177	0.014	2,848	2,801	1.712	0.078	0.150	0.205
Has malaria (based on microscopy test)	0.102	0.012	2,847	2,803	1.884	0.116	0.079	0.126
PREGNANT WOMEN								
Slept under any mosquito net last night	0.550	0.037	370	428	1.494	0.067	0.477	0.624
Slept under an ITN last night	0.526	0.037	370	428	1.517	0.071	0.451	0.600
Slept under an ITN last night in households with at least one ITN	0.710	0.034	293	317	1.286	0.048	0.643	0.778

Table B.3 Sampling errors: Urban sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.650	0.022	1,972	2,388	2.014	0.033	0.606	0.693
Average number of mosquito nets per household	1.331	0.078	1,972	2,388	2.504	0.059	1.174	1.488
Ownership of at least one ITN	0.616	0.020	1,972	2,388	1.863	0.033	0.575	0.657
Average number of ITNs per household	1.269	0.075	1,972	2,388	2.392	0.059	1.119	1.418
Ownership of at least one ITN for every two persons	0.268	0.016	1,965	2,379	1.587	0.059	0.236	0.300
WOMEN								
Urban residence	1.000	0.000	2,284	2,771	na	0.000	1.000	1.000
No education	0.208	0.023	2,284	2,771	2.727	0.111	0.162	0.255
Secondary education or higher	0.595	0.031	2,284	2,771	3.042	0.053	0.533	0.658
Literacy	0.662	0.025	2,284	2,771	2.555	0.038	0.611	0.712
4+ ANC visits	0.846	0.026	510	603	1.634	0.031	0.794	0.899
8+ ANC visits	0.232	0.036	510	603	1.941	0.157	0.159	0.304
Received 1+ doses of SP/Fansidar	0.934	0.014	510	603	1.245	0.015	0.906	0.961
Received 2+ doses of SP/Fansidar	0.766	0.033	510	603	1.736	0.043	0.701	0.831
Received 3+ doses of SP/Fansidar	0.573	0.033	510	603	1.488	0.057	0.508	0.639
CHILDREN								
Slept under any mosquito net last night	0.485	0.027	1,301	1,601	1.678	0.056	0.430	0.539
Slept under an ITN last night	0.454	0.029	1,301	1,601	1.742	0.063	0.397	0.511
Slept under an ITN last night in households with at least one ITN	0.628	0.033	963	1,157	1.767	0.052	0.562	0.694
Had fever in last 2 weeks	0.343	0.024	1,146	1,348	1.665	0.070	0.295	0.391
Had blood taken from finger/heel	0.454	0.047	404	462	1.834	0.104	0.360	0.548
Sought care/treatment from a health facility	0.599	0.040	404	462	1.576	0.067	0.519	0.679
Took ACT	0.792	0.039	249	286	1.465	0.049	0.714	0.870
Has anemia (hemoglobin <8.0 g/dl)	0.016	0.005	1,137	1,352	1.270	0.298	0.006	0.025
Has malaria (based on rapid test)	0.089	0.015	1,136	1,349	1.514	0.163	0.060	0.118
Has malaria (based on microscopy test)	0.043	0.012	1,137	1,352	1.652	0.274	0.019	0.067
PREGNANT WOMEN								
Slept under any mosquito net last night	0.434	0.054	172	233	1.460	0.123	0.327	0.541
Slept under an ITN last night	0.388	0.055	172	233	1.516	0.142	0.278	0.498
Slept under an ITN last night in households with at least one ITN	0.647	0.061	117	139	1.396	0.094	0.526	0.768

Table B.4 Sampling errors: Rural sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.863	0.017	2,334	1,918	2.313	0.019	0.830	0.896
Average number of mosquito nets per household	1.885	0.071	2,334	1,918	2.413	0.038	1.744	2.027
Ownership of at least one ITN	0.857	0.016	2,334	1,918	2.257	0.019	0.824	0.890
Average number of ITNs per household	1.863	0.070	2,334	1,918	2.402	0.038	1.722	2.004
Ownership of at least one ITN for every two persons	0.403	0.019	2,310	1,897	1.819	0.046	0.366	0.440
WOMEN								
Urban residence	0.000	0.000	2,229	1,742	na	na	0.000	0.000
No education	0.409	0.026	2,229	1,742	2.510	0.064	0.357	0.462
Secondary education or higher	0.235	0.028	2,229	1,742	3.073	0.118	0.180	0.290
Literacy	0.340	0.023	2,229	1,742	2.320	0.069	0.294	0.387
4+ ANC visits	0.827	0.022	661	506	1.513	0.027	0.783	0.872
8+ ANC visits	0.178	0.018	661	506	1.228	0.103	0.142	0.215
Received 1+ doses of SP/Fansidar	0.934	0.016	661	506	1.634	0.017	0.903	0.966
Received 2+ doses of SP/Fansidar	0.839	0.026	661	506	1.845	0.031	0.786	0.892
Received 3+ doses of SP/Fansidar	0.690	0.030	661	506	1.663	0.043	0.630	0.750
CHILDREN								
Slept under any mosquito net last night	0.558	0.022	1,882	1,591	1.597	0.039	0.514	0.602
Slept under an ITN last night	0.552	0.022	1,882	1,591	1.566	0.039	0.509	0.596
Slept under an ITN last night in households with at least one ITN	0.628	0.021	1,626	1,399	1.440	0.033	0.586	0.670
Had fever in last 2 weeks	0.387	0.019	1,576	1,228	1.527	0.049	0.349	0.425
Had blood taken from finger/heel	0.443	0.033	622	475	1.563	0.076	0.376	0.510
Sought care/treatment from a health facility	0.608	0.028	622	475	1.359	0.046	0.551	0.664
Took ACT	0.825	0.026	375	294	1.339	0.032	0.772	0.877
Has anemia (hemoglobin <8.0 g/dl)	0.026	0.007	1,712	1,452	1.904	0.282	0.011	0.041
Has malaria (based on rapid test)	0.259	0.022	1,712	1,452	1.952	0.086	0.215	0.304
Has malaria (based on microscopy test)	0.158	0.019	1,710	1,451	2.088	0.122	0.119	0.196
PREGNANT WOMEN								
Slept under any mosquito net last night	0.689	0.040	198	196	1.302	0.057	0.610	0.768
Slept under an ITN last night	0.689	0.040	198	196	1.302	0.057	0.610	0.768
Slept under an ITN last night in households with at least one ITN	0.760	0.036	176	177	1.097	0.047	0.689	0.831

Table B.5 Sampling errors: Greater Monrovia sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.561	0.032	691	1,434	1.676	0.056	0.498	0.625
Average number of mosquito nets per household	1.021	0.091	691	1,434	2.020	0.089	0.839	1.203
Ownership of at least one ITN	0.514	0.030	691	1,434	1.552	0.057	0.455	0.573
Average number of ITNs per household	0.932	0.079	691	1,434	1.798	0.085	0.774	1.090
Ownership of at least one ITN for every two persons	0.221	0.020	689	1,430	1.286	0.092	0.180	0.262
WOMEN								
Urban residence	1.000	0.000	815	1,706	na	0.000	1.000	1.000
No education	0.150	0.020	815	1,706	1.587	0.133	0.110	0.190
Secondary education or higher	0.699	0.027	815	1,706	1.671	0.039	0.645	0.752
Literacy	0.741	0.019	815	1,706	1.254	0.026	0.702	0.779
4+ ANC visits	0.841	0.045	143	307	1.446	0.053	0.752	0.930
8+ ANC visits	0.324	0.067	143	307	1.684	0.205	0.191	0.457
Received 1+ doses of SP/Fansidar	0.945	0.019	143	307	1.002	0.020	0.906	0.983
Received 2+ doses of SP/Fansidar	0.747	0.057	143	307	1.548	0.076	0.634	0.861
Received 3+ doses of SP/Fansidar	0.552	0.045	143	307	1.081	0.082	0.461	0.642
CHILDREN								
Slept under any mosquito net last night	0.468	0.043	367	788	1.469	0.093	0.381	0.555
Slept under an ITN last night	0.417	0.046	367	788	1.536	0.111	0.324	0.509
Slept under an ITN last night in households with at least one ITN	0.659	0.052	220	499	1.344	0.079	0.555	0.762
Had fever in last 2 weeks	0.349	0.033	324	684	1.276	0.096	0.282	0.415
Had blood taken from finger/heel	0.457	0.072	111	238	1.555	0.158	0.313	0.602
Sought care/treatment from a health facility	0.544	0.063	111	238	1.335	0.115	0.419	0.669
Took ACT	0.676	0.056	63	142	0.989	0.083	0.564	0.789
Has anemia (hemoglobin <8.0 g/dl)	0.013	0.008	295	632	1.323	0.659	0.000	0.030
Has malaria (based on rapid test)	0.041	0.015	294	629	1.239	0.373	0.011	0.072
Has malaria (based on microscopy test)	0.007	0.007	295	632	1.451	0.992	0.000	0.021
PREGNANT WOMEN								
Slept under any mosquito net last night	0.317	0.073	51	123	1.231	0.229	0.172	0.462
Slept under an ITN last night	0.237	0.072	51	123	1.337	0.303	0.093	0.380
Slept under an ITN last night in households with at least one ITN	0.597	0.142	19	49	1.350	0.238	0.313	0.881

Table B.6 Sampling errors: North Western sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval R-2SE	Confidence interval R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.740	0.033	700	383	2.005	0.045	0.673	0.807
Average number of mosquito nets per household	1.600	0.169	700	383	2.900	0.105	1.263	1.937
Ownership of at least one ITN	0.728	0.032	700	383	1.877	0.043	0.664	0.791
Average number of ITNs per household	1.537	0.161	700	383	2.844	0.105	1.214	1.860
Ownership of at least one ITN for every two persons	0.394	0.039	690	378	2.113	0.100	0.315	0.473
WOMEN								
Urban residence	0.123	0.039	585	303	2.862	0.319	0.044	0.201
No education	0.401	0.048	585	303	2.378	0.121	0.304	0.497
Secondary education or higher	0.257	0.030	585	303	1.633	0.115	0.198	0.317
Literacy	0.409	0.049	585	303	2.394	0.120	0.311	0.507
4+ ANC visits	0.818	0.040	171	89	1.340	0.049	0.739	0.898
8+ ANC visits	0.290	0.055	171	89	1.560	0.188	0.181	0.400
Received 1+ doses of SP/Fansidar	0.936	0.018	171	89	0.969	0.019	0.900	0.972
Received 2+ doses of SP/Fansidar	0.857	0.018	171	89	0.690	0.022	0.820	0.894
Received 3+ doses of SP/Fansidar	0.737	0.047	171	89	1.385	0.064	0.643	0.831
CHILDREN								
Slept under any mosquito net last night	0.490	0.038	495	274	1.356	0.078	0.414	0.567
Slept under an ITN last night	0.472	0.041	495	274	1.454	0.086	0.391	0.553
Slept under an ITN last night in households with at least one ITN	0.591	0.043	400	219	1.384	0.072	0.506	0.676
Had fever in last 2 weeks	0.454	0.049	384	195	1.809	0.107	0.356	0.551
Had blood taken from finger/heel	0.580	0.080	156	88	1.908	0.139	0.419	0.741
Sought care/treatment from a health facility	0.624	0.053	156	88	1.281	0.085	0.518	0.730
Took ACT	0.816	0.052	91	56	1.384	0.064	0.712	0.921
Has anemia (hemoglobin <8.0 g/dl)	0.022	0.010	455	254	1.255	0.460	0.002	0.042
Has malaria (based on rapid test)	0.195	0.022	455	254	1.158	0.112	0.151	0.238
Has malaria (based on microscopy test)	0.115	0.017	455	254	1.156	0.150	0.081	0.150
PREGNANT WOMEN								
Slept under any mosquito net last night	0.344	0.084	44	23	1.123	0.244	0.176	0.511
Slept under an ITN last night	0.344	0.084	44	23	1.123	0.244	0.176	0.511
Slept under an ITN last night in households with at least one ITN	0.476	0.075	35	16	0.862	0.158	0.326	0.627

Table B.7 Sampling errors: South Central sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval R-2SE	Confidence interval R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.786	0.038	731	741	2.500	0.048	0.710	0.862
Average number of mosquito nets per household	1.451	0.110	731	741	2.317	0.076	1.231	1.672
Ownership of at least one ITN	0.777	0.038	731	741	2.479	0.049	0.700	0.854
Average number of ITNs per household	1.437	0.109	731	741	2.294	0.076	1.218	1.655
Ownership of at least one ITN for every two persons	0.286	0.025	728	738	1.508	0.088	0.236	0.337
WOMEN								
Urban residence	0.420	0.071	785	764	3.998	0.169	0.278	0.562
No education	0.349	0.027	785	764	1.571	0.077	0.295	0.402
Secondary education or higher	0.355	0.052	785	764	3.005	0.145	0.252	0.459
Literacy	0.448	0.038	785	764	2.156	0.086	0.371	0.525
4+ ANC visits	0.768	0.043	229	220	1.550	0.057	0.681	0.855
8+ ANC visits	0.211	0.037	229	220	1.362	0.175	0.137	0.284
Received 1+ doses of SP/Fansidar	0.937	0.014	229	220	0.878	0.015	0.909	0.965
Received 2+ doses of SP/Fansidar	0.797	0.032	229	220	1.192	0.040	0.733	0.860
Received 3+ doses of SP/Fansidar	0.619	0.056	229	220	1.727	0.090	0.507	0.730
CHILDREN								
Slept under any mosquito net last night	0.475	0.034	563	566	1.384	0.072	0.407	0.543
Slept under an ITN last night	0.471	0.035	563	566	1.416	0.073	0.402	0.541
Slept under an ITN last night in households with at least one ITN	0.602	0.033	427	443	1.190	0.054	0.537	0.668
Had fever in last 2 weeks	0.406	0.028	505	473	1.273	0.068	0.351	0.461
Had blood taken from finger/heel	0.395	0.043	206	192	1.198	0.110	0.308	0.481
Sought care/treatment from a health facility	0.591	0.046	206	192	1.280	0.078	0.499	0.684
Took ACT	0.792	0.044	131	127	1.234	0.056	0.704	0.880
Has anemia (hemoglobin <8.0 g/dl)	0.025	0.010	498	501	1.479	0.413	0.004	0.045
Has malaria (based on rapid test)	0.173	0.037	498	501	1.970	0.215	0.098	0.247
Has malaria (based on microscopy test)	0.113	0.025	498	501	1.689	0.225	0.062	0.163
PREGNANT WOMEN								
Slept under any mosquito net last night	0.656	0.079	62	72	1.378	0.120	0.499	0.814
Slept under an ITN last night	0.656	0.079	62	72	1.378	0.120	0.499	0.814
Slept under an ITN last night in households with at least one ITN	0.760	0.069	49	62	1.113	0.091	0.621	0.898

Table B.8 Sampling errors: North Central sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.898	0.019	736	1,206	1.683	0.021	0.860	0.935
Average number of mosquito nets per household	2.200	0.116	736	1,206	2.145	0.053	1.968	2.432
Ownership of at least one ITN	0.892	0.019	736	1,206	1.615	0.021	0.855	0.929
Average number of ITNs per household	2.184	0.118	736	1,206	2.159	0.054	1.949	2.419
Ownership of at least one ITN for every two persons	0.428	0.031	728	1,190	1.661	0.071	0.367	0.489
WOMEN								
Urban residence	0.413	0.045	799	1,201	2.563	0.109	0.323	0.503
No education	0.408	0.043	799	1,201	2.492	0.107	0.321	0.495
Secondary education or higher	0.262	0.044	799	1,201	2.831	0.169	0.173	0.351
Literacy	0.361	0.038	799	1,201	2.217	0.105	0.285	0.437
4+ ANC visits	0.887	0.021	229	352	1.013	0.024	0.845	0.930
8+ ANC visits	0.095	0.018	229	352	0.904	0.184	0.060	0.130
Received 1+ doses of SP/Fansidar	0.911	0.025	229	352	1.340	0.028	0.861	0.962
Received 2+ doses of SP/Fansidar	0.792	0.040	229	352	1.483	0.050	0.712	0.872
Received 3+ doses of SP/Fansidar	0.612	0.043	229	352	1.319	0.070	0.527	0.698
CHILDREN								
Slept under any mosquito net last night	0.595	0.036	667	1,141	1.542	0.061	0.522	0.667
Slept under an ITN last night	0.587	0.035	667	1,141	1.505	0.060	0.516	0.658
Slept under an ITN last night in households with at least one ITN	0.649	0.035	599	1,033	1.431	0.054	0.579	0.719
Had fever in last 2 weeks	0.301	0.025	566	892	1.297	0.084	0.251	0.351
Had blood taken from finger/heel	0.358	0.060	170	269	1.564	0.167	0.239	0.478
Sought care/treatment from a health facility	0.602	0.040	170	269	1.066	0.066	0.522	0.682
Took ACT	0.883	0.030	103	164	0.990	0.034	0.823	0.944
Has anemia (hemoglobin <8.0 g/dl)	0.024	0.009	609	1,034	1.555	0.395	0.005	0.042
Has malaria (based on rapid test)	0.222	0.027	609	1,034	1.451	0.123	0.167	0.276
Has malaria (based on microscopy test)	0.133	0.026	609	1,034	1.700	0.194	0.081	0.184
PREGNANT WOMEN								
Slept under any mosquito net last night	0.710	0.038	94	160	0.812	0.054	0.634	0.786
Slept under an ITN last night	0.710	0.038	94	160	0.812	0.054	0.634	0.786
Slept under an ITN last night in households with at least one ITN	0.778	0.039	84	146	0.843	0.050	0.700	0.856

Table B.9 Sampling errors: South Eastern A sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.811	0.022	703	301	1.505	0.027	0.766	0.855
Average number of mosquito nets per household	1.894	0.107	703	301	1.819	0.056	1.680	2.108
Ownership of at least one ITN	0.801	0.024	703	301	1.557	0.029	0.754	0.848
Average number of ITNs per household	1.874	0.111	703	301	1.881	0.059	1.651	2.096
Ownership of at least one ITN for every two persons	0.420	0.027	699	300	1.438	0.064	0.367	0.474
WOMEN								
Urban residence	0.413	0.069	717	292	3.741	0.168	0.274	0.552
No education	0.250	0.031	717	292	1.940	0.126	0.188	0.313
Secondary education or higher	0.402	0.045	717	292	2.435	0.111	0.313	0.492
Literacy	0.524	0.047	717	292	2.492	0.089	0.431	0.618
4+ ANC visits	0.776	0.046	193	76	1.513	0.059	0.684	0.867
8+ ANC visits	0.133	0.038	193	76	1.540	0.285	0.057	0.208
Received 1+ doses of SP/Fansidar	0.951	0.023	193	76	1.458	0.024	0.905	0.996
Received 2+ doses of SP/Fansidar	0.879	0.041	193	76	1.750	0.047	0.797	0.962
Received 3+ doses of SP/Fansidar	0.717	0.044	193	76	1.351	0.061	0.629	0.805
CHILDREN								
Slept under any mosquito net last night	0.472	0.030	521	230	1.185	0.063	0.412	0.532
Slept under an ITN last night	0.471	0.030	521	230	1.185	0.064	0.411	0.531
Slept under an ITN last night in households with at least one ITN	0.571	0.033	431	190	1.210	0.058	0.504	0.637
Had fever in last 2 weeks	0.442	0.034	440	172	1.354	0.077	0.374	0.510
Had blood taken from finger/heel	0.636	0.039	182	76	1.076	0.061	0.558	0.714
Sought care/treatment from a health facility	0.631	0.042	182	76	1.105	0.066	0.548	0.714
Took ACT	0.927	0.032	109	47	1.316	0.034	0.863	0.990
Has anemia (hemoglobin <8.0 g/dl)	0.018	0.007	473	209	1.252	0.420	0.003	0.033
Has malaria (based on rapid test)	0.234	0.056	473	209	2.515	0.237	0.123	0.345
Has malaria (based on microscopy test)	0.130	0.053	472	208	3.040	0.409	0.024	0.237
PREGNANT WOMEN								
Slept under any mosquito net last night	0.600	0.057	66	29	0.967	0.096	0.485	0.714
Slept under an ITN last night	0.574	0.060	66	29	1.008	0.105	0.453	0.695
Slept under an ITN last night in households with at least one ITN	0.695	0.054	56	24	0.880	0.078	0.586	0.804

Table B.10 Sampling errors: South Eastern B sample, Liberia MIS 2022

Variable	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence interval: R-2SE	Confidence interval: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net	0.866	0.023	745	241	1.873	0.027	0.819	0.912
Average number of mosquito nets per household	1.740	0.104	745	241	2.236	0.060	1.532	1.949
Ownership of at least one ITN	0.855	0.028	745	241	2.126	0.032	0.800	0.910
Average number of ITNs per household	1.724	0.106	745	241	2.264	0.062	1.511	1.937
Ownership of at least one ITN for every two persons	0.379	0.033	741	240	1.867	0.088	0.313	0.446
WOMEN								
Urban residence	0.367	0.115	812	248	6.604	0.313	0.138	0.597
No education	0.336	0.037	812	248	2.223	0.110	0.262	0.410
Secondary education or higher	0.344	0.068	812	248	4.036	0.198	0.208	0.480
Literacy	0.441	0.054	812	248	3.064	0.122	0.334	0.549
4+ ANC visits	0.889	0.017	206	65	0.776	0.019	0.855	0.923
8+ ANC visits	0.225	0.039	206	65	1.332	0.173	0.147	0.303
Received 1+ doses of SP/Fansidar	0.974	0.011	206	65	1.012	0.012	0.951	0.996
Received 2+ doses of SP/Fansidar	0.918	0.022	206	65	1.174	0.024	0.874	0.963
Received 3+ doses of SP/Fansidar	0.826	0.045	206	65	1.696	0.055	0.736	0.916
CHILDREN								
Slept under any mosquito net last night	0.538	0.033	570	193	1.401	0.062	0.472	0.604
Slept under an ITN last night	0.532	0.035	570	193	1.470	0.065	0.463	0.601
Slept under an ITN last night in households with at least one ITN	0.591	0.044	512	174	1.728	0.074	0.504	0.679
Had fever in last 2 weeks	0.463	0.043	503	160	2.015	0.093	0.376	0.549
Had blood taken from finger/heel	0.536	0.063	201	74	1.959	0.118	0.409	0.662
Sought care/treatment from a health facility	0.781	0.037	201	74	1.388	0.047	0.707	0.855
Took ACT	0.870	0.041	127	45	1.462	0.047	0.789	0.952
Has anemia (hemoglobin <8.0 g/dl)	0.029	0.011	519	174	1.520	0.379	0.007	0.051
Has malaria (based on rapid test)	0.328	0.019	519	174	0.897	0.057	0.290	0.365
Has malaria (based on microscopy test)	0.185	0.021	518	174	1.252	0.115	0.142	0.228
PREGNANT WOMEN								
Slept under any mosquito net last night	0.495	0.053	53	22	0.874	0.108	0.388	0.602
Slept under an ITN last night	0.495	0.053	53	22	0.874	0.108	0.388	0.602
Slept under an ITN last night in households with at least one ITN	0.546	0.042	50	20	0.601	0.078	0.462	0.631

DATA QUALITY TABLES

Appendix C

Table C.1 Household age distribution

Single-year age distribution of the de facto household population by sex (weighted), Liberia MIS 2022

	Female		Male			Female		Male	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
0	306	2.8	328	3.2	41	69	0.6	60	0.6
1	308	2.9	312	3.1	42	101	0.9	150	1.5
2	293	2.7	306	3.0	43	73	0.7	110	1.1
3	305	2.8	324	3.2	44	50	0.5	42	0.4
4	347	3.2	356	3.5	45	87	0.8	120	1.2
5	217	2.0	244	2.4	46	67	0.6	43	0.4
6	299	2.8	336	3.3	47	54	0.5	46	0.5
7	319	3.0	316	3.1	48	59	0.5	76	0.7
8	299	2.8	328	3.2	49	37	0.3	57	0.6
9	276	2.6	235	2.3	50	162	1.5	114	1.1
10	297	2.8	330	3.2	51	109	1.0	45	0.4
11	239	2.2	229	2.2	52	111	1.0	80	0.8
12	301	2.8	282	2.8	53	102	0.9	43	0.4
13	301	2.8	241	2.4	54	55	0.5	65	0.6
14	327	3.0	242	2.4	55	68	0.6	64	0.6
15	195	1.8	258	2.5	56	58	0.5	49	0.5
16	241	2.2	248	2.4	57	34	0.3	36	0.4
17	201	1.9	217	2.1	58	50	0.5	28	0.3
18	261	2.4	236	2.3	59	33	0.3	26	0.3
19	199	1.8	227	2.2	60	98	0.9	75	0.7
20	227	2.1	185	1.8	61	12	0.1	16	0.2
21	178	1.7	147	1.4	62	37	0.3	29	0.3
22	239	2.2	208	2.0	63	35	0.3	23	0.2
23	221	2.1	124	1.2	64	24	0.2	35	0.3
24	191	1.8	134	1.3	65	71	0.7	60	0.6
25	192	1.8	219	2.1	66	16	0.1	14	0.1
26	199	1.9	149	1.5	67	19	0.2	15	0.1
27	122	1.1	119	1.2	68	27	0.3	18	0.2
28	162	1.5	128	1.2	69	14	0.1	16	0.2
29	156	1.4	137	1.3	70	52	0.5	28	0.3
30	173	1.6	183	1.8	71	6	0.1	9	0.1
31	88	0.8	50	0.5	72	8	0.1	21	0.2
32	168	1.6	179	1.8	73	3	0.0	5	0.1
33	95	0.9	95	0.9	74	7	0.1	6	0.1
34	102	0.9	107	1.0	75	44	0.4	25	0.2
35	171	1.6	151	1.5	76	7	0.1	4	0.0
36	113	1.0	145	1.4	77	6	0.1	4	0.0
37	105	1.0	95	0.9	78	15	0.1	8	0.1
38	124	1.2	103	1.0	79	6	0.1	4	0.0
39	96	0.9	83	0.8	80+	80	0.7	31	0.3
40	135	1.3	189	1.8	Don't know	2	0.0	7	0.1
					Total	10,755	100.0	10,226	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, Liberia MIS 2022

Age group	Household population of women age 10–54	Interviewed women age 15–49		Percentage of eligible women interviewed
		Number	Percentage	
10–14	1,464	na	na	na
15–19	1,096	1,070	22.3	97.7
20–24	1,056	1,028	21.4	97.3
25–29	831	801	16.7	96.3
30–34	626	606	12.6	96.8
35–39	609	594	12.4	97.5
40–44	428	411	8.6	96.1
45–49	305	299	6.2	98.0
50–54	538	na	na	na
15–49	4,952	4,810	100.0	97.1
Ratios				
10–14 to 15–19	134	na	na	na
50–54 to 45–49	176	na	na	na

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

Table C.3 Age displacement at ages 14/15

Number of women age 12–18 listed in the household schedule by single-year age and age ratio 15/14, according to region (weighted), Liberia MIS 2022

Region	Age							Total age 12–18	Age ratio (age 15/ age 14)
	12	13	14	15	16	17	18		
Greater Monrovia	164	161	219	142	195	162	160	1,203	64.9
North Western	47	42	28	40	29	31	40	257	144.1
South Central	109	88	104	77	77	66	107	629	73.5
South Eastern A	48	44	33	48	38	28	33	272	143.5
South Eastern B	39	31	30	30	28	20	36	213	97.9
North Central	201	185	175	130	130	125	141	1,086	74.1
Total	608	552	589	465	498	433	517	3,661	79.0

Table C.4 Age displacement at ages 49/50

Number of women age 47–53 listed in the household schedule by single-year age and age ratio 50/49, according to region (weighted), Liberia MIS 2022

Region	Age							Total age 47–53	Age ratio (age 50/ age 49)
	47	48	49	50	51	52	53		
Greater Monrovia	19	34	32	82	35	72	37	312	254.6
North Western	8	14	16	18	17	20	12	106	115.7
South Central	30	29	11	38	27	41	42	218	361.1
South Eastern A	10	11	12	25	14	19	9	101	214.3
South Eastern B	9	9	11	13	8	10	8	67	118.8
North Central	38	46	19	119	62	54	48	386	624.7
Total	114	144	100	294	163	218	157	1,190	294.8

Table C.5 Live births by years preceding the survey

Number of live births, percentage with year and month of birth given, sex ratio at birth, and ratio by years preceding the survey, according to living, dead, and total children (weighted), Liberia MIS 2022

Years preceding survey	Number of live births			Percentage with year and month of birth given			Sex ratio at birth[1]			Ratio of years preceding survey[2]		
	Living children	Dead children	Total	Living children	Dead children	Total	Living children	Dead children	Total	Living children	Dead children	Total
0	564	20	584	99.4	93.6	99.2	104.2	89.0	103.6	na	na	na
1	536	23	559	100.0	100.0	100.0	102.6	299.8	106.9	104.3	106.8	104.4
2	462	24	486	100.0	97.7	99.9	99.6	242.9	103.7	90.7	81.6	90.2
3	485	34	519	99.3	94.3	99.0	106.0	152.1	108.5	97.7	149.4	100.0
4	529	23	552	99.4	100.0	99.5	101.5	60.1	99.4	134.8	81.1	131.3
5	301	21	322	100.0	100.0	100.0	97.7	216.7	102.7	113.6	187.1	116.6
All	2,877	145	3,022	99.7	97.4	99.6	102.3	151.2	104.2	na	na	na

na = not applicable
[1] $(B_m/B_f)x100$, where B_m and B_f are the numbers of male and female births, respectively
[2] $[2P_x/(P_{x-1}+P_{x+1})] \times 100$, where P_x is the number of pregnancy outcomes in year x preceding the survey

Table C.6 Completeness of reporting

Percentage of observations missing information for selected demographic and health questions (weighted), Liberia MIS 2022

Subject	Percentage with information missing	Number of cases
Date of live birth		
Missing day only	0.15	2,700
Missing month but year reported	0.50	-
Date of birth of women		
Missing month but year reported	1.39	4,513
Missing year	0.08	-
Anemia		
Children	2.73	2,882
Malaria		
Children	2.14	2,882

Table C.7 Observation of mosquito nets

Percentage of all mosquito nets observed by the interviewers, according to background characteristics (weighted), Liberia MIS 2022

Background characteristic	Percentage of mosquito nets observed by interviewers	Number of mosquito nets
Residence		
Urban	93.0	3,179
Rural	97.5	3,616
Region		
Greater Monrovia	87.1	1,464
North Western	94.6	613
South Central	97.7	1,075
South Eastern A	96.0	571
South Eastern B	97.3	420
North Central	98.8	2,653
Wealth quintile		
Lowest	98.6	1,621
Second	97.7	1,711
Middle	96.8	1,475
Fourth	89.4	1,119
Highest	90.3	869
Total	95.4	6,795

Table C.8 Number of enumeration areas completed by month and region

During the period of fieldwork, number of enumeration areas (EAs) completed by month, according to region, and percent distribution of EAs completed by month, Liberia MIS 2022

	Month of fieldwork			
Region	October	November	December	Number of EAs
Greater Monrovia	25	0	0	25
North Western	4	13	8	25
South Central	11	9	5	25
South Eastern A	5	16	4	25
South Eastern B	2	19	4	25
North Central	7	17	1	25
Total number of EAs	54	74	22	150
Percent distribution	36.0	49.3	14.7	100.0

Note: EAs are classified by month according to the date by which the last Biomarker Questionnaire in the EA was completed.

Table C.9 Positive rapid diagnostic test (RDT) results by month and region

Among children age 6–59 months tested for malaria by RDT, percentage who tested positive by month of fieldwork, according to region, Liberia MIS 2022

	Percentage of children classified as having malaria by month of fieldwork			Total	Number of
Region	October	November	December	percentage	children
Greater Monrovia	4.1	*	*	4.1	629
North Western	15.5	20.5	18.4	19.5	254
South Central	19.1	19.7	10.0	17.3	501
South Eastern A	14.5	21.3	48.5	23.4	209
South Eastern B	36.0	33.2	29.7	32.8	174
North Central	24.0	21.5	*	22.2	1,034
Total	12.7	22.1	19.5	17.7	2,801

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

Table C.10 Concordance and discordance between rapid diagnostic test (RDT) and microscopy results

Among children age 6–59 months tested for malaria, percent distribution of results according to concordance and discordance between RDT and microscopy test results, Liberia MIS 2022

	Concordance		Discordance				
	RDT+/ microscopy+	RDT−/ microscopy−	RDT+/ microscopy−	RDT−/ microscopy+	Other[1]	Total percentage	Number of children
Total	9.5	81.3	8.1	0.7	0.3	100.0	2,800

[1] Includes children for whom microscopy results could not be determined because of slide loss, slide breakage, or smear quality

Table C.11 Concordance and discordance between national and external quality control laboratories

Among microscope slides of thick films examined by both the national laboratory and the external quality control (EQC) laboratory, percent distribution of concordant and discordant results, Liberia MIS 2022

	National lab and EQC lab results are:				
	Concordant	Discordant	Other[1]	Total percentage	Number of microscope slides
Total	97.5	1.8	0.7	100.0	285

[1] Includes films where the EQC laboratory could not determine a result because of slide loss, slide breakage, or film quality

PERSONS INVOLVED IN THE 2022 LIBERIA MALARIA INDICATOR SURVEY

Appendix D

Project Manager

D. Levi Hinneh

Assistant Project Manager

Joseph O. Aladae

Coordinators

Asatu M. Dono
Dennis Saylay
Dikena G. Jackson
Agnes S. Janafo
Beatrice B. Wilson
T. Wynstine Williams
Hawa Gboyah
Tabadeh P. Collins
Tisha T. Tumbey
Stryker Dweh
Sarah P. Guwaye
Emmanuel T. S. Dahn
Prince A. Gonqueh
Joshua Weah
Stephen S. Seah
James S. Momo Jr.

Data Editors

Lent B. Jones
Precious T. Bollie
Peva Gbagornah

Field Teams (Interviewers and Supervisors)

Team 1
Alice Tracy-Kallon
Laurene Kollie
Sando K. D. Momolu

Team 2
Mydea Woods
Alfred Cheeks
Jangar Kesselly

Team 3
Mildred T. Grear
R. Barkue Sayee
Mona Peters

Team 4
Sieh R. Guwaye
Steven Goe
Ruth M. Nehwon

Team 5
Zinnah Musu Kamara
Eric Chea
Nannoh T. Seekey

Team 6
Stephen Freeman
Manneh S. Fouday
Rita Nimely

Team 7
Victor N. Nyan
Cherish T. Davis
Mazoe Flomo

Team 8
Martenneh Dorley
Alice Peters
Zephyrinus N. Wiefue

Team 9
Sanford Thomas
Augusta S. Nugba
Yodiody Z. Teeba

Team 10
Lucia Yenee
Bee Binda
Prince Quaye

Team 11
S. Biko Smith
William O. Massaquoi
Christina Washington

Team 12
Rozzeta S. Boakai
Christam Kafi
Bindu Massaquoi

Field Monitors

Hon. Norwu Howard
Dr. Francis N. Kateh
Dr. Gbobee Logan
Mr. Varfee Tulay
Mr. Stanford Wesseh
Mrs. Paulina Doe Hilton
Mr. Jefferson Cooper

Biomarker Technicians

Akanuyeah A. Nyomo
Josephine Williams
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Ibrahim K. Traore
Joshua Gocoe
Debbie T. Queweah
Bill Mulbah
Edrache Tarley
Arena Glay
Kwanty Wooe
Emmanuel Smith
Anna Dunbar
Pierre Joe
Bill Bosleah
Gabriel Goncakpor
Sylvester T. Mulbah
Moses G. Dowee
Sam G. Clark
Patrick T. Gibson
Elijah Benson
Alvin Sinatue
Lovina Goagee
Amos Wilma
Emmanuel Sumo

Team Logisticians

Clarance Kalay
Issac N. Jaye
Stanley T. Vah
Samuel Zueah Larkey
Rosetta D. Williams
Danna K. Paye
Hawah J. Guwah
Gabrielyn N. Juwle
William A. Totimeh
Lemeul Z. Banwon
Jerry J. Tiah-Tiah
Massa T. D. Warner

Stainers

Hawa Saywon
Edward Lasannah
David P. Sayweah
John F. Tokpah
Abraham Singbe
Benjamin S. Quellie
John Targblor
Joseph S. F. Foryoh
Emmanuel Wiefue
Nyumah Samuel Kundu
James K. Jallah
Roland T. Gobeh
Sampson Massah
Chester Peter
Pauline Slobor
Nelson Karpo
Moses Yewolo
Adonie Kokol
Marshall Quoi
Robert Geakeh
Moses Toe
Nyah W. Lougan
Rochester T. Gaye
Ishmael D. Brown

Microscopists

Harley K. Seward
Ruth I. Daniels-Ketuojo
Arthur N. Brown
Alfred B. Rogers (Sr.)
Andrew T. Samorlu
Ezekiel Kanue Fardolo
Manfred Yarkpawolo
Pandora C. Johnson
Danny J. T. Smallwood
Jonathan Stubblefield

Technical Committee

C. Sanford Wesseh
Moses Jeuronlon
Jessica Healey
D. Levi Hinneh
Jessica Kafuko
Mamadou Diallo
Miatta Sonkarlay Joe-Joe
Uwem Inyang
Ashley Melpass
Christie Hershey
Francis Katteh
Norwu Howard
Varfee Tulay
Odell W. Kumeh
Paulina Doe Hilton
Momolu Massaquoi
Joseph Alade
Francis Wreh
Lawrance George
Aretha Dunbar
Thomas Davis
Wade-Mai Harmon-Gray
Ayesha Gam-Woto
Sis. Barbara Brilliant
Natasha Lavin
Jacqueline Papo
Jethro Zawolo
Ibrahim Kamara
Ibrahima Barbar

ICF

Sara Scates
Hanna Useem
Chinyere Okoro
Felix Adeoye
Joanna Lowell
Cameron Taylor
Livia Montana
Gloria Twesigye
Peter Redvers-Lee
Chris Gramer
Natalie Shattuck
Joan Wardell
Greg Edmondson
Ruilin Ren
Justin Fisher
Ivan Gonzalez
Janet Nunez
Ronnette Nolasco
David Kioko
Han Raggers
Peter Aka
Michael Amakye
Emily Eckert
Brad Janocha
Ben Mayala
Rose Donohue
Samir Hamedi
Kerry MacQuarrie
Tom Pullum
Victoria Owusu Ansah
Olsen Hanner

QUESTIONNAIRES

Appendix **E**

FORMATTING DATE: 25 Aug 2022
ENGLISH LANGUAGE: 25 Aug 2022

2022 LIBERIA MALARIA INDICATOR SURVEY
HOUSEHOLD QUESTIONNAIRE

NATIONAL MALARIA CONTROL PROGRAM

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER . . . . . [ ][ ][ ][ ]

HOUSEHOLD NUMBER . . . . . [ ][ ][ ][ ]

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY [ ][ ] MONTH [ ][ ] YEAR [ ][ ][ ][ ]
INTERVIEWER'S NAME				INT. NO. [ ][ ][ ][ ]
RESULT*				RESULT* [ ]
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS [ ]
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 [ ][ ]

TOTAL ELIGIBLE WOMEN [ ][ ]

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE [ ][ ]

LANGUAGE OF QUESTIONNAIRE** [0][1] LANGUAGE OF INTERVIEW** [ ][ ] NATIVE LANGUAGE OF RESPONDENT** [ ][ ] TRANSLATOR USED (YES = 1, NO = 2) [ ]

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH

TEAM	TEAM SUPERVISOR	
NUMBER [ ][ ]	NAME _____	NUMBER [ ][ ][ ][ ]

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INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with the Ministry of Health. We are conducting a survey about malaria all over Liberia. 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 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.

GIVE FACT SHEET WITH CONTACT INFORMATION

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 . . . . . ☐☐ MINUTES . . . . . ☐☐

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBILITY	
1	2	3	4	5	6	7	8	9
	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 ASKING QUESTIONS 2-7 FOR EACH PERSON ASK QUESTIONS 7A-7C TO BE SURE THAT THE LISTING IS COMPLETE.	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'.	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-5
01			M F 1 2	Y N 1 2	Y N 1 2	IN YEARS	01	01
02			1 2	1 2	1 2		02	02
03			1 2	1 2	1 2		03	03
04			1 2	1 2	1 2		04	04
05			1 2	1 2	1 2		05	05
06			1 2	1 2	1 2		06	06
07			1 2	1 2	1 2		07	07
08			1 2	1 2	1 2		08	08
09			1 2	1 2	1 2		09	09
10			1 2	1 2	1 2		10	10

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

7A) 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
7B) 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
7C) 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

01 = HEAD
02 = WIFE OR HUSBAND OR SPOUSE
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
12 = CO-WIFE
98 = DON'T KNOW

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	What is the main source of drinking water for members of your household?	**PIPED WATER** PIPED INTO DWELLING . . . . . 11 PIPED TO YARD/PLOT . . . . . 12 PIPED TO NEIGHBOR . . . . . 13 PUBLIC TAP/STANDPIPE . . . . . 14 HAND PUMP/TUBE WELL OR BOREHOLE . . 21 **DUG WELL** PROTECTED WELL . . . . . 31 UNPROTECTED WELL . . . . . 32 **WATER FROM SPRING** PROTECTED SPRING . . . . . 41 UNPROTECTED SPRING . . . . . 42 RAINWATER . . . . . 51 TANKER TRUCK . . . . . 61 CART WITH SMALL TANK . . . . . 71 SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/ IRRIGATION CHANNEL) . . . . . 81 BOTTLED WATER . . . . . 91 MINERAL WATER IN SACHET . . . . . 92 OTHER _____ 96 (SPECIFY)	→ 105 → 103 → 103
102	What is the main source of water used by your household for other purposes such as cleaning, cooking, and handwashing?	**PIPED WATER** PIPED INTO DWELLING . . . . . 11 PIPED TO YARD/PLOT . . . . . 12 PIPED TO NEIGHBOR . . . . . 13 PUBLIC TAP/STANDPIPE . . . . . 14 HAND PUMP/TUBE WELL OR BOREHOLE . . 21 **DUG WELL** PROTECTED WELL . . . . . 31 UNPROTECTED WELL . . . . . 32 **WATER FROM SPRING** PROTECTED SPRING . . . . . 41 UNPROTECTED SPRING . . . . . 42 RAINWATER . . . . . 51 TANKER TRUCK . . . . . 61 CART WITH SMALL TANK . . . . . 71 SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/ IRRIGATION CHANNEL) . . . . . 81 OTHER _____ 96 (SPECIFY)	→ 105
103	Where is that water source located?	IN OWN DWELLING . . . . . 1 IN OWN YARD/PLOT . . . . . 2 ELSEWHERE 3	→ 105
104	How long does it take to go there, get water, and come back?	MINUTES . . . . . ☐☐☐ DON'T KNOW 998	

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.	**FLUSH OR POUR FLUSH TOILET** 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 **PIT LATRINE** 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)	→ 109
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 ..... 0 [ ] 10 OR MORE HOUSEHOLDS ..... 95 DON'T KNOW 98	
108	Where is this toilet facility located?	IN OWN DWELLING ..... 1 IN OWN YARD/PLOT ..... 2 ELSEWHERE 3	
109	In your household, what type of cookstove is mainly used for cooking?	ELECTRIC STOVE ..... 01 SOLAR COOKER ..... 02 LIQUIFIED PETROLEUM GAS (LPG)/ COOKING GAS STOVE ..... 03 PIPED NATURAL GAS STOVE ..... 04 BIOGAS STOVE ..... 05 LIQUID FUEL STOVE ..... 06 MANUFACTURED SOLID FUEL STOVE .... 07 TRADITIONAL SOLID FUEL STOVE ..... 08 THREE STONE STOVE/OPEN FIRE ..... 09 NO FOOD COOKED IN HOUSEHOLD ..... 95 OTHER _____ 96 (SPECIFY)	→ 111 → 111
110	What type of fuel or energy source is used in this cookstove?	ALCOHOL/ETHANOL ..... 01 GASOLINE/DIESEL ..... 02 KEROSENE/PARAFFIN ..... 03 FIRE COAL/CHARCOAL ..... 04 WOOD ..... 05 STRAW/SHRUBS/GRASS ..... 06 AGRICULTURAL CROP ..... 07 ANIMAL DUNG/WASTE ..... 08 PROCESSED BIOMASS (PELLETS) OR WOODCHIPS ..... 09 GARBAGE/PLASTIC ..... 10 SAWDUST ..... 11 GAS CYLINDER/COOKING GAS ..... 12 OTHER _____ 96 (SPECIFY)	

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	How many rooms in this household are used for sleeping?	ROOMS	
112	Does this household own any livestock, herds, other farm animals, or poultry like chicken, ducks, or guinea fowl?	YES . . . . . 1 NO 2	→ 114
113	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) Milk cows or bulls?	a) COWS/BULLS	
	b) Pigs?	b) PIGS	
	c) Goats?	c) GOATS	
	d) Sheep?	d) SHEEP	
	e) Chickens, ducks, or guinea fowl?	e) CHICKENS/POULTRY	
	f) Guinea Pigs?	f) GUINEA PIG	
	g) Rabbits?	e) RABBITS	
114	Does any member of this household own any agricultural land?	YES . . . . . 1 NO 2	→ 116
115	How many acres of agricultural land do members of this household own? IF 95 OR MORE, CIRCLE '950'.	ACRES . . . . 95 OR MORE ACRES . . . . . 950 DON'T KNOW 998	

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
116	Does your household have:	YES NO	
	a) Electricity that is connected?	a) ELECTRICITY 1 2	
	b) A generator?	b) GENERATOR 1 2	
	c) A radio?	c) RADIO 1 2	
	d) A housephone or landline?	d) NON-MOBILE TELEPHONE 1 2	
	e) An icebox?	e) ICE BOX (REFRIGERATOR) 1 2	
	f) A table?	f) TABLE 1 2	
	g) Chairs?	g) CHAIRS 1 2	
	h) A cupboard?	h) CUPBOARD 1 2	
	i) A mattress (not made of straw or grass)?	i) MATTRESS 1 2	
	j) A sewing machine?	j) SEWING MACHINE 1 2	
	k) A television?	k) TELEVISION 1 2	
	l) A computer?	l) COMPUTER 1 2	
	m) A bench or stool?	m) BENCH OR STOOL 1 2	
117	Does any member of this household own:	YES NO	
	a) A watch?	a) WATCH 1 2	
	b) A mobile phone?	b) MOBILE PHONE 1 2	
	c) A bicycle?	c) BICYCLE 1 2	
	d) A motorcycle or motor scooter?	d) MOTORCYCLE/SCOOTER . . 1 2	
	e) A wheelbarrow?	e) WHEELBARROW 1 2	
	f) A car or truck?	f) CAR/TRUCK 1 2	
	g) A boat or canoe?	g) BOAT OR CANOE 1 2	
	h) A tricycle or kehkeh?	h) TRICYCLE OR KEHKEH 1 2	
118	Does any member of this household have an account in a bank or other financial institution?	YES . . . . . 1 NO 2	
119	Does any member of this household use a mobile phone to make financial transactions such as sending or receiving money, paying bills, purchasing goods or services, or receiving wages? This is also referred to as mobile money.	YES . . . . . 1 NO 2	
120	Does your household have any mosquito nets?	YES . . . . . 1 NO 2	→ 132
121	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS . . . . . ☐	

MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD. OBSERVE AND ANSWER THE QUESTIONS FOR EACH NET, ONE BY ONE.		
122	ASSIGN EACH NET A SEQUENTIAL NUMBER AND RECORD THE NUMBER HERE.	NET NUMBER	
123	WAS THIS NET OBSERVED?	OBSERVED . . . . . 1 NOT OBSERVED 2	
124	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	
125	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.	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** INTERCEPTOR G2 . . . . . 11 PERMANET . . . . . 12 DURANET . . . . . 13 OLYSET . . . . . 14 BASF NET . . . . . 15 OTHER/DON'T KNOW BRAND (LLIN) . . . . . 16 OTHER TYPE (NOT LLIN) . . . . . 96 DON'T KNOW TYPE 98	
126	Did you get the net through the 2021 mass distribution campaign, during an antenatal care visit, during a delivery in a health facility, or through a school distribution program?	YES, 2021 MASS DISTRIBUTION CAMPAIGN . . . . . 1 YES, ANC . . . . . 2 YES, HEALTH FACILITY DELIVERY . . . . . 3 YES, SCHOOL DISTRIBUTION 4 NO 5	→ 128
127	Where did you get the net?	GOVERNMENT HEALTH FACILITY . . . . . 01 PRIVATE HEALTH FACILITY . . . . . 02 PHARMACY . . . . . 03 SHOP/MARKET . . . . . 04 RELIGIOUS INSTITUTION . . . . . 05 STREET CORNER . . . . . 06 NEIGHBOR/FRIEND/RELATIVE . . . . . 07 OTHER MASS DISTRIBUTION CAMPAIGN 08 OTHER . . . . . 96 DON'T KNOW 98	

MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
128	Did anyone sleep under this mosquito net last night?	YES . . . . . 1 NO . . . . . 2 NOT SURE 8	→ 130 → 131
129	Who slept under this mosquito net last night? RECORD THE PERSON'S NAME AND LINE NUMBER FROM HOUSEHOLD SCHEDULE.	NAME _____ LINE NUMBER . . . . . ☐☐ NAME _____ LINE NUMBER . . . . . ☐☐ NAME _____ LINE NUMBER . . . . . ☐☐ NAME _____ LINE NUMBER . . . . . ☐☐	→ 131
130	What was the main reason this net was not used last night?	TOO HOT . . . . . 01 DON'T LIKE NET SHAPE/COLOR/SIZE/TEXTURE 02 DON'T LIKE SMELL . . . . . 03 UNABLE TO HANG NET . . . . . 04 SLEPT OUTDOORS . . . . . 05 USUAL USER DIDN'T SLEEP HERE LAST NIGHT . . . . . 06 NO MOSQUITOES/NO MALARIA . . . . . 07 EXTRA NET/SAVING FOR LATER . . . . . 08 NOT HUNG UP/STORED AWAY . . . . . 09 DIFFICULT TO BREATHE . . . . . 10 NOT IN GOOD CONDITION/TORN . . . . . 11 ITCHING/SKIN IRRITATION . . . . . 12 OTHER _____ 96 (SPECIFY)	
131	GO BACK TO 122 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 132.		

ADDITIONAL HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
132	OBSERVE MAIN MATERIAL OF THE FLOOR OF THE DWELLING. RECORD OBSERVATION.	**NATURAL FLOOR** EARTH/SAND/MUD . . . . . 11 DUNG . . . . . 12 **RUDIMENTARY FLOOR** WOOD PLANKS . . . . . 21 **FINISHED FLOOR** PARQUET OR POLISHED WOOD . . . . . 31 FLOOR MAT, LINOLEUM, VINYL . . . . . 32 CERAMIC TILES/TERRAZO . . . . . 33 CONCRETE/CEMENT . . . . . 34 CARPET . . . . . 35 OTHER _____ 96 (SPECIFY)	
133	OBSERVE MAIN MATERIAL OF THE ROOF OF THE DWELLING. RECORD OBSERVATION.	**NATURAL ROOFING** NO ROOF . . . . . 11 THATCH/PALM LEAF . . . . . 12 SOD 13 **RUDIMENTARY ROOFING** RUSTIC MAT . . . . . 21 PALM/BAMBOO . . . . . 22 WOOD PLANKS . . . . . 23 CARDBOARD 24 TARPAULIN, PLASTIC . . . . . 25 **FINISHED ROOFING** ZINC/METAL/ALUMINUM . . . . . 31 WOOD . . . . . 32 CALAMINE/CEMENT FIBER 33 CERAMIC TILES . . . . . 34 CONCRETE/CEMENT . . . . . 35 ASBESTOS SHEETS/ ROOFING SHINGLES 36 DECRA ZINC . . . . . 37 OTHER _____ 96 (SPECIFY)	
134	OBSERVE MAIN MATERIAL OF THE EXTERIOR WALLS OF THE DWELLING. RECORD OBSERVATION.	**NATURAL WALLS** NO WALLS . . . . . 11 CANE/PALM/TRUNKS . . . . . 12 DIRT . . . . . 13 STRAW/THATCH MATS . . . . . 14 **RUDIMENTARY WALLS** MUD AND STICKS . . . . . 21 STONE WITH MUD . . . . . 22 UNCOVERED ADOBE . . . . . 23 PLYWOOD . . . . . 24 CARDBOARD/PLASTIC . . . . . 25 REUSED WOOD . . . . . 26 **FINISHED WALLS** CEMENT . . . . . 31 STONE WITH LIME/CEMENT . . . . . 32 BRICKS . . . . . 33 CEMENT BLOCKS . . . . . 34 COVERED ADOBE . . . . . 35 WOOD PLANKS/SHINGLES . . . . . 36 ZINC/METAL . . . . . 37 OTHER _____ 96 (SPECIFY)	
135	RECORD THE TIME.	HOURS . . . . . ☐☐ MINUTES . . . . . ☐☐	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

FORMATTING DATE: 25 Aug 2022
ENGLISH LANGUAGE: 25 Aug 2022

2022 LIBERIA MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

NATIONAL MALARIA CONTROL PROGRAM

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER . . . . . | | | | |

HOUSEHOLD NUMBER . . . . . | | | | |

NAME AND LINE NUMBER OF WOMAN _____ | | |

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY | | MONTH | | YEAR | | | |
INTERVIEWER'S NAME	_____	_____	_____	INT. NO. | | | |
RESULT*	_____	_____	_____	RESULT* |
NEXT VISIT: DATE	_____	_____		
TIME	_____	_____		TOTAL NUMBER OF VISITS |

*RESULT CODES: 1 COMPLETED; 2 NOT AT HOME; 3 POSTPONED; 4 REFUSED; 5 PARTLY COMPLETED; 6 INCAPACITATED; 7 OTHER _____ (SPECIFY)

LANGUAGE OF QUESTIONNAIRE** **0 1** | LANGUAGE OF INTERVIEW** | | | NATIVE LANGUAGE OF RESPONDENT** | | | TRANSLATOR USED (YES = 1, NO = 2) |

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH

TEAM	TEAM SUPERVISOR	
NUMBER	NAME _____ NUMBER	
| |	| | | |	

INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with Ministry of Health. We are conducting a survey about malaria all over Liberia. 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 _____

RESPONDENT AGREES TO BE INTERVIEWED . . 1 ↓

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

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	
102	In what month and year were you born?	MONTH . . . . . [ ][ ] DON'T KNOW MONTH . . . . . 98 YEAR . . . . . [ ][ ][ ][ ] 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 . . . . . [ ][ ]	
104	Have you ever attended school?	YES . . . . . 1 NO 2	
105	What is the highest level of school you attended: elementary, junior high, senior high, or higher?	ELEMENTARY (1-6) . . . . . 1 JUNIOR HIGH (7-9) . . . . . 2 SENIOR HIGH (10-12) . . . . . 3 HIGHER 4	
106	What is the highest [GRADE/YEAR] you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE . . . . . [ ][ ]	→ 107
107	CHECK 105: ELEMENTARY OR JUNIOR HIGH OR SENIOR HIGH ☐ ↓ HIGHER ☐		→ 110
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	CHECK 108: CODE '2', '3' OR '4' CIRCLED ↓ CODE '1' OR '5' CIRCLED → 111		
110	Do you read a newspaper or magazine at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . 1 LESS THAN ONCE A WEEK . . . 2 NOT AT ALL . . . 3	
111	Do you listen to the radio at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . 1 LESS THAN ONCE A WEEK . . . 2 NOT AT ALL . . . 3	
112	Do you watch television at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK . . . 1 LESS THAN ONCE A WEEK . . . 2 NOT AT ALL . . . 3	
113	Do you own a cell phone?	YES . . . 1 NO . . . 2	→ 115
114	Is your mobile phone a smart phone? PROBE: Does your phone have internet or any apps?	YES . . . 1 NO . . . 2	
115	Have you ever used the Internet from any location on any device?	YES . . . 1 NO . . . 2	→ 118
116	In the last 12 months, have you used the Internet? IF NECESSARY, PROBE FOR USE FROM ANY LOCATION, WITH ANY DEVICE.	YES . . . 1 NO . . . 2	→ 118
117	During the last one month, how often did you use the Internet: almost every day, at least once a week, less than once a week, or not at all?	ALMOST EVERY DAY . . . 1 AT LEAST ONCE A WEEK . . . 2 LESS THAN ONCE A WEEK . . . 3 NOT AT ALL . . . 4	
118	What is your religion?	CHRISTIAN . . . 01 MUSLIM . . . 02 TRADITIONAL RELIGION . . . 03 NO RELIGION . . . 04 OTHER _____ 96 (SPECIFY)	
119	What dialect do you speak or understand well? IF RESPONDENT CAN SPEAK SEVERAL DIALECTS, ASK WHICH ONE SHE SPEAKS MOST, OR WHICH IS HER FIRST LANGUAGE, OR MOTHER TONGUE	BASSA . . . 01 GBANDI . . . 02 BELLE . . . 03 DEY . . . 04 GIO . . . 05 GOLA . . . 06 GREBO . . . 07 KISSI . . . 08 KPELLE . . . 09 KRAHN . . . 10 KRU . . . 11 LORMA . . . 12 MANDINGO . . . 13 MANO . . . 14 MENDE . . . 15 SAPO . . . 16 VAI . . . 17 NONE / ONLY ENGLISH . . . 18 OTHER _____ 96 (SPECIFY)	

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 (belly born)?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth (belly born) 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 . . . . . [ ][ ] b) DAUGHTERS AT HOME . . . . . [ ][ ]	
204	Do you have any sons or daughters to whom you have given birth (belly born) 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 . . . . . [ ][ ] b) DAUGHTERS ELSEWHERE . . . . . [ ][ ]	
206	Have you ever given birth to a boy or girl who was belly 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 . . . . . [ ][ ] b) GIRLS DEAD . . . . . [ ][ ]	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL LIVE BIRTHS . . . . . [ ][ ]	
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL _____ births (belly born) during your life. Is that correct? YES NO PROBE AND CORRECT 201-208 AS NECESSARY.		
210	CHECK 208: ONE OR MORE BIRTHS NO BIRTHS		→ 224
211	Now I'd like to ask you about your more recent births (belly born). How many births have you had in 2017-2022? RECORD NUMBER OF LIVE BIRTHS IN 2017-2022.	TOTAL IN 2017-2022 . . . . . [ ][ ] NONE 00	→ 224

SECTION 2. REPRODUCTION

212 Now I would like to record the names of all your births in 2017-2022, whether still alive or not, starting with the most recent one you had.

RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2017-2022. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. IF THERE ARE MORE THAN 3 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE.

213	214	215	216	217	218	219 IF ALIVE:	220 IF ALIVE:	221 IF ALIVE:
What name was given to your (most recent baby/ baby born before (PREVIOUS BABY NAME))? RECORD NAME. BIRTH HISTORY NUMBER.	Is (NAME) a boy or a girl?	Was (NAME) a single birth, a twin, or a triplet? IF MULTIPLE PREG-NANCY: COPY VALUE FOR 215 IN NEXT ROW(S).	On what day, month, and year was (NAME) born?	FOR ROW 01, ASK: Have you had any live births since the birth of (NAME OF MOST RECENT BIRTH), including any children who died after birth? AFTER ROW 01: IF 215=1 OR THIS IS THE LAST BIRTH OF A MULTIPLE PREGNANCY, ASK: Were there any other live births between (NAME) and (NAME OF FOLLOWING BIRTH), including any children who died after birth? IF 215 > 1 AND THIS IS NOT THE LAST BIRTH OF THE PREGNANCY, SKIP TO 213 IN NEXT ROW.	Is (NAME) still alive?	How old was (NAME) at (his/her) last birthday? RECORD AGE IN COMP-LETED YEARS.	Is (NAME) living with you?	RECORD HOUSEHOLD LINE NUMBER OF CHILD. RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD.
01	BOY 1 GIRL 2	SING 1 TWINS 2 TRIP 3 NO. OF OUT-COME	DAY MONTH YEAR	YES . . . . . 1 (ADD BIRTH) NO . . . . . 2 (GO TO 213 IN NEXT ROW)	YES 1 NO 2 (NEXT BIRTH)	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER
02	BOY 1 GIRL 2	SING 1 TWINS 2 TRIP 3 NO. OF OUT-COME	DAY MONTH YEAR	YES . . . . . 1 (ADD BIRTH) NO . . . . . 2 (GO TO 213 IN NEXT ROW)	YES 1 NO 2 (NEXT BIRTH)	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER
03	BOY 1 GIRL 2	SING 1 TWINS 2 TRIP 3 NO. OF OUT-COME	DAY MONTH YEAR	YES . . . . . 1 (ADD BIRTH) NO . . . . . 2 (GO TO 213 IN NEXT ROW)	YES 1 NO 2 (NEXT BIRTH)	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER

217A	Did you have any other live births before the birth of (NAME) and during or after January 2017?	YES . . . . . 1 → ADD TO TABLE NO 2	

217B READ THE LIST OF LIVE BIRTHS IN ORDER TO THE RESPONDENT, STARTING FROM THE MOST RECENT BIRTH, AND ASK IF THEY ARE ALL THAT SHE HAS HAD IN OR SINCE JANUARY 2017, AND IF THEY ARE LISTED IN ORDER.

DOES THE RESPONDENT AGREE?
IF NOT, PROBE FOR THE CORRECT INFORMATION AND REVISE THE PREGNANCY HISTORY ACCORDINGLY.
IF YES, PROCEED TO 218 ROW 1.

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
223	COMPARE 211 WITH NUMBER OF BIRTHS IN BIRTH HISTORY NUMBERS ARE THE SAME ☐ ↓ NUMBERS ARE DIFFERENT ☐ → (PROBE AND RECONCILE)		
224	Are you pregnant now?	YES . . . . . 1 NO . . . . . 2 UNSURE 8	→ 301
225	How many weeks or months pregnant are you? RECORD NUMBER OF COMPLETED WEEKS OR MONTHS.	WEEKS . . . . . 1 ☐☐ MONTHS . . . . . 2 ☐☐	

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	CHECK 216 AND 219 ONE OR MORE BIRTHS 0-35 MONTHS BEFORE THE SURVEY ↓	NO BIRTHS 0-35 MONTHS BEFORE THE SURVEY →	401
302	RECORD THE NAME OF THE MOST RECENT BIRTH FROM 213, LINE 01:	MOST RECENT BIRTH NAME _____	
303	Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. While you were pregnant with (NAME), did you see anyone for antenatal care for this pregnancy or visit the big belly clinic?	YES . . . . . 1 NO 2	→ 304
303A	What was the main reason why you did not see anyone for antenatal care (or go to big belly clinic)?	FACILITY TOO FAR . . . . . 01 HAD NO MONEY . . . . . 02 HAD NO TIME . . . . . 03 OVERCROWDING AT CLINIC/LONG QUEUES . . . . . 04 NOT AWARE HAD TO ATTEND . . . . . 05 DID NOT WANT TO ATTEND . . . . . 06 PREFER TRADITIONAL CARE . . . . . 07 COVID RESTRICTIONS . . . . . 08 COVID CONCERNS . . . . . 09 OTHER _____ 10 (SPECIFY)	→ 308
304	Whom did you see? Anyone else? PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.	**HEALTH PERSONNEL** DOCTOR . . . . . A NURSE/MIDWIFE/MIDMAN . . . . . B PHYSICIAN ASSISTANT . . . . . C **OTHER PERSON** TRADITIONAL BIRTH ATTENDANT (TBA) . . . . . D TRAINED TRADITIONAL MIDWIFE (TTM) . . . . . E OTHER _____ X (SPECIFY)	
305	Where did you receive antenatal (big belly) care for this pregnancy? Anywhere else? PROBE TO IDENTIFY THE TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC, PRIVATE, OR NGO SECTOR, RECORD 'X' AND WRITE THE NAME OF THE PLACE(S).	**HOME** HER HOME . . . . . A OTHER HOME . . . . . B **PUBLIC SECTOR** GOVERNMENT HOSPITAL . . . . . C GOVERNMENT HEALTH CENTER . . . . D GOVERNMENT CLINIC E OTHER PUBLIC SECTOR _____ F (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL . . . . . G PRIVATE CLINIC . . . . . H OTHER PRIVATE MEDICAL SECTOR _____ I (SPECIFY) **NGO MEDICAL SECTOR** NGO HOSPITAL . . . . . J NGO CLINIC . . . . . K OTHER NGO MEDICAL SECTOR _____ L (SPECIFY) OTHER _____ X (SPECIFY)	

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	NAME OF CHILD _____	BIRTH HISTORY NUMBER	
306	How many weeks or months pregnant were you when you first received antenatal care (or went to the big belly clinic) for this pregnancy?	WEEKS ..... 1 MONTHS ..... 2 DON'T KNOW 998	
307	How many times did you receive antenatal care (or go to the big belly clinic) during this pregnancy?	NUMBER OF TIMES ..... DON'T KNOW 98	
308	During this pregnancy, did you take SP/Fansidar to keep you from getting malaria? PROBE: SP/FANSIDAR USUSALLY CONSISTS OF TAKING 3 BIG WHITE TABLETS AT THE HEALTH FACILITY	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 401
309	How many times did you take SP/Fansidar during this pregnancy?	TIMES	
309A	CHECK 309: TOOK SP ONLY 1 OR 2 TIMES DURING THIS PREGNANCY	CODE '01' OR '02' TIMES ENTERED ☐ OTHER ☐	→ 310
309B	The government recommends that a woman take SP/ Fansidar three times or more during pregnancy. Why did you take SP/Fansidar only one or two times during this pregnancy? RECORD ALL MENTIONED	FACILITY TOO FAR ..... A HAD NO MONEY ..... B SIDE EFFECTS ..... C NOT AWARE HAD TO TAKE MORE ..... D DID NOT WANT TO TAKE ..... E NOT GIVEN ..... F NOT AVAILABLE ..... G COVID CONCERNS ..... H COVID RESTRICTIONS ..... I OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	
310	Did you get the SP/Fansidar during any antenatal care visit, during another visit to a health facility or from another source? IF MORE THAN ONE SOURCE, RECORD THE HIGHEST SOURCE ON THE LIST.	ANTENATAL VISIT ..... 1 ANOTHER FACILITY VISIT ..... 2 OTHER SOURCE 6	

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
401	CHECK 216, 217, AND 219 IN THE BIRTH HISTORY: ANY SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY? ONE OR MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ NO SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ → 501		
402	Now I would like to ask some questions about the health of your children born in the last 5 years. (We will talk about each separately, starting with the youngest.)		
403	RECORD THE NAME AND BIRTH HISTORY NUMBER FROM 213 OF THE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY, STARTING WITH THE LAST ONE. NAME OF CHILD _____ BIRTH HISTORY NUMBER . . . . . ☐☐		
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 415AA
405	At any time during (NAME)'s fever, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 406
405A	Where did (NAME) go to have blood taken from their finger or heel for testing?	**PUBLIC SECTOR** GOVERNMENT HOSPITAL . . . . . 11 GOVERNMENT HEALTH CENTER . . . . . 12 GOVERNMENT CLINIC . . . . . 13 GOVERNMENT HEALTH POST . . . . . 14 MOBILE CLINIC . . . . . 15 COMMUNITY HEALTH ASSISTANT (CHA) . . . . . 16 OTHER PUBLIC SECTOR SECTOR _____ 17 (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL . . . . . 21 PRIVATE CLINIC . . . . . 22 PHARMACY . . . . . 23 PRIVATE DOCTOR . . . . . 24 MOBILE CLINIC . . . . . 25 OTHER PRIVATE MEDICAL SECTOR _____ 26 (SPECIFY) **NGO MEDICAL SECTOR** NGO HOSPITAL . . . . . 31 NGO CLINIC . . . . . 32 OTHER NGO MEDICAL SECTOR _____ 36 (SPECIFY) OTHER _____ 96 (SPECIFY)	
406	Were you told by a healthcare provider that (NAME) had malaria?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
407	Did you seek advice or treatment for the fever from any source?	YES . . . . . 1 NO 2	→ 412

SECTION 4. FEVER IN CHILDREN

NO.	NAME OF CHILD _____	BIRTH HISTORY NUMBER	

408	Where did you seek advice or treatment? Anywhere else? PROBE TO IDENTIFY THE TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC, PRIVATE, OR NGO SECTOR, RECORD 'X' AND WRITE THE NAME OF THE PLACE(S).	**PUBLIC SECTOR** GOVERNMENT HOSPITAL ..... A GOVERNMENT HEALTH CENTER ..... B GOVERNMENT CLINIC C GOVERNMENT HEALTH POST ..... D MOBILE CLINIC ..... E COMMUNITY HEALTH ASSISTANT (CHA) ..... F OTHER PUBLIC SECTOR SECTOR _____ G (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL ..... H PRIVATE CLINIC ..... I PHARMACY ..... J PRIVATE DOCTOR ..... K MOBILE CLINIC ..... OTHER PRIVATE MEDICAL L SECTOR _____ M (SPECIFY) **NGO MEDICAL SECTOR** NGO HOSPITAL ..... N NGO CLINIC ..... O OTHER NGO MEDICAL SECTOR _____ P (SPECIFY) **OTHER SOURCE** SHOP ..... Q TRADITIONAL PRACTITIONER ..... R MARKET ..... S BLACK BAGGER/ DRUG PEDDLER .... T OTHER _____ X (SPECIFY)	

SECTION 4. FEVER IN CHILDREN

NO.	NAME OF CHILD _____ BIRTH HISTORY NUMBER	
409	CHECK 408: TWO OR MORE CODES CIRCLED ☐ ↓ ; ONLY ONE CODE CIRCLED ☐ → 411	
410	Where did you first seek advice or treatment? USE LETTER CODE FROM 408.	FIRST PLACE . . . . . ☐
411	How many days after the fever began did you first seek advice or treatment for (NAME)? IF THE SAME DAY RECORD '00'.	DAYS . . . . . ☐☐
412	At any time during the fever, did (NAME) take any medicine for the fever?	YES . . . . . 1 NO . . . . . 2 → 415A DON'T KNOW 8
413	What medicine did (NAME) take? Any other medicine? RECORD ALL MENTIONED. SHOW RESPONDENT PICTURES OF COMMON MEDICINES IN THE DISPLAY BOOK **PROBE**: IF AMODIAQUINE OR ARTEMETHER IS NAMED CLARIFY TO VERIFY IF IT IS ACT IF MEDICINE NOT KNOWN, ASK TO SEE THE PACKAGE OR PRESCRIPTION.	**ANTIMALARIAL MEDICINE** ARTEMISININ COMBINATION THERAPY (ACT) / AS-AQ/ AL . . . . . A SP/FANSIDAR . . . . . B CHLOROQUINE . . . . . C AMODIAQUINE . . . . . D ARTEMETHER . . . . . E QUININE PILLS/ SYRUP . . . . . F INJECTION/IV . . . . . G ARTESUNATE INJECTION/IV . . . . . H OTHER ANTIMALARIAL _____ (SPECIFY) I **ANTIBIOTIC MEDICINE** AMOXICILLIN . . . . . J COTRIMOXAZOLE . . . . . K OTHER PILL/SYRUP . . . . . L OTHER INJECTION/IV . . . . . M **OTHER MEDICINE** ASPIRIN . . . . . N PARACETAMOL/PANADOL/ ACETAMINOPHEN . . . . . O IBUPROFEN . . . . . P OTHER _____ (SPECIFY) X DON'T KNOW . . . . . Z
413A	CHECK 413: AMODIAQUINE ('D') GIVEN CODE 'D' CIRCLED ☐ ↓ ; CODE 'D' NOT CIRCLED ☐ → 413C	
413B	Was the amodiaquine (NAME) took, given as part of an Artemisinin Combination Therapy, also called an ACT or the new malaria medicine, or was the amodiaquine given by itself? SHOW RESPONDENT PICTURES OF COMMON MEDICINES IN THE DISPLAY BOOK	ARTEMISININ COMBINATION THERAPY . . . . 1 → 415 AMODIAQUINE ALONE . . . . . 2 DON'T KNOW 8

SECTION 4. FEVER IN CHILDREN

NO.	NAME OF CHILD _____ BIRTH HISTORY NUMBER	
413C	CHECK 413: ARTEMETHER ('E') GIVEN CODE 'E' CIRCLED ☐ ↓ CODE 'E' NOT CIRCLED ☐ → 414	
413D	Was the artemether (NAME) took, given as part of an Artemisinin Combination Therapy, also called an ACT or the new malaria medicine, or was the artemether given by itself? SHOW RESPONDENT PICTURES OF COMMON MEDICINES IN THE DISPLAY BOOK	ARTEMISININ COMBINATION THERAPY . . . . 1 ARTEMETHER ALONE . . . . . 2 DON'T KNOW . . . . . 8 → 415

SECTION 4. FEVER IN CHILDREN

NO.	NAME OF CHILD _____ BIRTH HISTORY NUMBER	
414	CHECK 413: ARTEMISININ COMBINATION THERAPY ('A') GIVEN CODE 'A' CIRCLED ↓ CODE 'A' NOT CIRCLED → 415A	
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
415AA	CHECK 216, 217, AND 219 IN THE BIRTH HISTORY: IS THIS THE **YOUNGEST**, SURVIVING CHILD, BORN 0-59 MONTHS BEFORE THE SURVEY? YES ↓ NO → 416	
415A	The Liberian government is thinking about introducing additional programs to protect children from malaria. Have you heard about the new malaria vaccine?	YES ..... 1 NO ..... 2 DON'T KNOW 8
415B	Would you allow your child to be vaccinated against malaria if the vaccine became available in your area?	YES ..... 1 NO ..... 2 DON'T KNOW 8
415C	SP/Fansidar is a medication (three white tablets) given to women during pregnancy (big belly) to protect them from malaria. This medicine can also be given to children to prevent malaria. Would you allow your child to be given three doses of SP/Fansidar (three white tablets) during routine vaccinations to prevent the child from getting malaria?	YES ..... 1 NO ..... 2 DON'T KNOW 8
416	CHECK 216 AND 217 IN BIRTH HISTORY: ANY MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY? NO MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ↓ (GO TO 501) MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY → 403	

SECTION 5. MALARIA KNOWLEDGE AND MESSAGING

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	In the last six months, have you seen or heard any messages about malaria?	YES . . . . . 1 NO . . . . . 2 → 503	
502	Where did you see or hear these messages? PROBE: Anywhere else? RECORD ALL MENTIONED.	RADIO . . . . . A TELEVISION . . . . . B POSTER/BILLBOARD . . . . . C NEWSPAPER/MAGAZINE . . . . . D LEAFLET/BROCHURE . . . . . E HEALTHCARE PROVIDER . . . . . F COMMUNITY HEALTH ASSISTANT . . . . . G SOCIAL MEDIA . . . . . H PEER EDUCATORS . . . . . I VIDEO CLUB . . . . . J SCHOOL . . . . . K OTHER _____ X (SPECIFY) DON'T REMEMBER . . . . . Z	
503	Are there things you can do to protect yourself or others from getting malaria?	YES . . . . . 1 NO . . . . . 2 → 505	
504	What are the things that people can do to protect themselves from getting malaria? RECORD ALL MENTIONED.	SLEEP UNDER A MOSQUITO NET OR AN INSECTICIDE TREATED NET . . . . A USE MOSQUITO REPELLENT . . . . . B TAKE PREVENTATIVE MEDICATIONS . . . . C SPRAY HOUSE WITH INSECTICIDE . . . . . D FILL IN STAGNANT WATERS (PUDDLES) . . E KEEP SURROUNDINGS CLEAN . . . . . F PUT MOSQUITO SCREEN ON WINDOWS . . G USE MOSQUITO COILS . . . . . H KEEP DOORS AND WINDOWS CLOSED . . I CUT THE GRASS . . . . . J PREGNANT WOMEN TAKE MEDICINE . . . . K OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
505	RECORD THE TIME.	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

FORMATTING DATE: 25 Aug 2022
ENGLISH LANGUAGE: 20 Jul 2022

2022 LIBERIA MALARIA INDICATOR SURVEY
BIOMARKER QUESTIONNAIRE

NATIONAL MALARIA CONTROL PROGRAM

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER . . . . . [ ][ ][ ][ ]

HOUSEHOLD NUMBER . . . . . [ ][ ][ ][ ]

BIOMARKER TECHNICIAN VISITS

	1	2	3	FINAL VISIT
DATE	_____	_____	_____	DAY [ ][ ]
BIOMARKER TECH NAME	_____	_____	_____	MONTH [ ][ ] YEAR [ ][ ][ ][ ]
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS [ ]
TIME	_____	_____		
NOTES: _____ _____ _____ _____ _____				TOTAL ELIGIBLE CHILDREN [ ][ ]

LANGUAGE OF QUESTIONNAIRE** [0][1] LANGUAGE OF INTERVIEW** [ ][ ] NATIVE LANGUAGE OF RESPONDENT** [ ][ ] TRANSLATOR (YES = 1, NO = 2) [ ]

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH

TEAM	TEAM SUPERVISOR	
[ ][ ] NUMBER	_____ NAME [ ][ ][ ][ ] NUMBER	

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS". RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN AGE 0-5 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 1		SKIP
102	CHECK CAPI OUTPUT AND RECORD NAME AND LINE NUMBER OF CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
105	CHECK 104: CHILD AGE 0-4 YEARS? YES ☐ NO ☐ → 129		
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐ AGE 0-5 MONTHS ☐ → 129		
107	RECORD NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
108	ASK CONSENT FOR MALARIA AND ANEMIA TESTS FROM PARENT/RESPONSIBLE ADULT: As part of this survey, we are asking children all over the country to take a test to see if they have malaria and a test to see if they have anemia. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. Anemia is a serious health problem that usually results from poor nutrition, malaria and other infections, or chronic disease. This survey will assist the government to develop programs to prevent and treat malaria and anemia. We ask that all children age 6 months through 4 years take part in malaria and anemia testing. The tests require a few drops of blood from a finger or heel. 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 and anemia immediately, and the results 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. 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 and anemia tests?		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER 3	
110	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 1		SKIP
111	IF CONSENT GRANTED, PREPARE EQUIPMENT AND SUPPLIES FOR THE TESTS AND PROCEED WITH THE		
112	PLACE 1ST BAR CODE LABEL FOR MALARIA LAB TEST IN SPACE TO THE RIGHT. PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT . . . . . 99994 REFUSED . . . . . 99995 OTHER 99996	
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	G/DL . . . . . ☐☐.☐ NOT PRESENT . . . . . 994 REFUSED . . . . . 995 OTHER 996	
114	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	POSITIVE . . . . . 1 NEGATIVE . . . . . 2 NOT PRESENT . . . . . 4 REFUSED . . . . . 5 OTHER 6	→ 126 → 128 → 126
115	Does (NAME) suffer from any of the following illnesses or symptoms: a) Extreme weakness? b) Heart problems? c) Loss of consciousness? d) Rapid or difficult breathing? e) Seizures? f) Abnormal bleeding? g) Jaundice or yellow skin? h) Dark urine?	YES NO a) EXTREME WEAKNES 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	
116	CHECK 115: ANY 'YES' CIRCLED? NO ☐ YES ☐		→ 118
117	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 119
118	**SEVERE MALARIA REFERRAL** The malaria test shows that (NAME OF CHILD) has malaria. Your child also has symptoms of severe malaria. 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. RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.		→ 126
119	In the past 2 weeks has (NAME) taken or is (NAME) taking ACT given by a doctor or health center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT.	YES . . . . . 1 NO 2	→ 121
120	**ALREADY TAKING ACT REFERRAL STATEMENT** You have told me that (NAME OF CHILD) had already received ACT for malaria. Therefore, I cannot give you additional ACT. However, the test shows that he/she has malaria. If your child has a fever for 2 days after the last dose of ACT, you should take the child to the nearest health facility for further examination.		→ 128

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 1		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called Artemether-Lumefantrine (AL) Fixed Dose Combination. AL 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	**TREATMENT FIRST LINE ACT: ARTEMETHER-LUMEFANTRINE Fixed Dose Combination** **Weight*** / **Age** / **Artemether- Lumefantrine (AL) Dosage Information** 5-14 KG / 6 months - < 3 years / 1 tablet twice a day for 3 days 15-25 KG / 3-7 years / 2 tablets twice a day for 3 days TELL THE PARENT/RESPONSIBLE 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 2 days, you should take him/her to a health professional for treatment right away.		→ 128
126	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANEMIA REFERRAL** The anemia test shows that (NAME OF CHILD) has severe anemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 102 ON THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.		

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS". RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN AGE 0-5 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 2		SKIP
102	CHECK CAPI OUTPUT AND RECORD NAME AND LINE NUMBER OF CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
105	CHECK 104: CHILD AGE 0-4 YEARS? YES ☐ NO ☐ → 129		
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐ AGE 0-5 MONTHS ☐ → 129		
107	RECORD NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
108	ASK CONSENT FOR MALARIA AND ANEMIA TESTS FROM PARENT/RESPONSIBLE ADULT: As part of this survey, we are asking children all over the country to take a test to see if they have malaria and a test to see if they have anemia. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. Anemia is a serious health problem that usually results from poor nutrition, malaria and other infections, or chronic disease. This survey will assist the government to develop programs to prevent and treat malaria and anemia. We ask that all children age 6 months through 4 years take part in malaria and anemia testing. The tests require a few drops of blood from a finger or heel. 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 and anemia immediately, and the results 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. 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 and anemia tests?		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER 3	
110	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 2		SKIP
111	IF CONSENT GRANTED, PREPARE EQUIPMENT AND SUPPLIES FOR THE TESTS AND PROCEED WITH THE		
112	PLACE 1ST BAR CODE LABEL FOR MALARIA LAB TEST IN SPACE TO THE RIGHT. PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT . . . . . 99994 REFUSED . . . . . 99995 OTHER 99996	
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE [ANEMIA AND MALARIA PAMPHLET].	G/DL . . . . . ☐☐.☐ NOT PRESENT . . . . . 994 REFUSED . . . . . 995 OTHER 996	
114	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	POSITIVE . . . . . 1 NEGATIVE . . . . . 2 → 126 NOT PRESENT . . . . . 4 → 128 REFUSED . . . . . 5 OTHER . . . . . 6 → 126	
115	Does (NAME) suffer from any of the following illnesses or symptoms: a) Extreme weakness? b) Heart problems? c) Loss of consciousness? d) Rapid or difficult breathing? e) Seizures? f) Abnormal bleeding? g) Jaundice or yellow skin? h) Dark urine?	YES NO a) EXTREME WEAKNES 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	
116	CHECK 115: ANY 'YES' CIRCLED? NO ☐ ↓ YES ☐		→ 118
117	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 → 119 OTHER 6	
118	**SEVERE MALARIA REFERRAL** The malaria test shows that (NAME OF CHILD) has malaria. Your child also has symptoms of severe malaria. 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. RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.		→ 126
119	In the past 2 weeks has (NAME) taken or is (NAME) taking ACT given by a doctor or health center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT.	YES . . . . . 1 NO . . . . . 2 → 121	
120	**ALREADY TAKING ACT REFERRAL STATEMENT** You have told me that (NAME OF CHILD) had already received ACT for malaria. Therefore, I cannot give you additional ACT. However, the test shows that he/she has malaria. If your child has a fever for 2 days after the last dose of ACT, you should take the child to the nearest health facility for further examination.		→ 128

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 2		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called Artemether-Lumefantrine (AL) Fixed Dose Combination. AL 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	**TREATMENT FIRST LINE ACT: ARTEMETHER-LUMEFANTRINE Fixed Dose Combination** **Weight*** / **Age** / **Artemether- Lumefantrine (AL) Dosage Information** 5-14 KG / 6 months - < 3 years / 1 tablet twice a day for 3 days 15-25 KG / 3-7 years / 2 tablets twice a day for 3 days TELL THE PARENT/RESPONSIBLE 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 2 days, you should take him/her to a health professional for treatment right away.		→ 128
126	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANEMIA REFERRAL** The anemia test shows that (NAME OF CHILD) has severe anemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 102 ON THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.		

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS". RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN AGE 0-5 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 3		SKIP
102	CHECK CAPI OUTPUT AND RECORD NAME AND LINE NUMBER OF CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐	
105	CHECK 104: CHILD AGE 0-4 YEARS? YES ☐ NO ☐ → 129		
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐ AGE 0-5 MONTHS ☐ → 129		
107	RECORD NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____ LINE NUMBER . . . . . ☐☐	
108	ASK CONSENT FOR MALARIA AND ANEMIA TESTS FROM PARENT/RESPONSIBLE ADULT: As part of this survey, we are asking children all over the country to take a test to see if they have malaria and a test to see if they have anemia. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. Anemia is a serious health problem that usually results from poor nutrition, malaria and other infections, or chronic disease. This survey will assist the government to develop programs to prevent and treat malaria and anemia. We ask that all children age 6 months through 4 years take part in malaria and anemia testing. The tests require a few drops of blood from a finger or heel. 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 and anemia immediately, and the results 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. 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 and anemia tests?		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER 3	
110	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 3	SKIP
111	IF CONSENT GRANTED, PREPARE EQUIPMENT AND SUPPLIES FOR THE TESTS AND PROCEED WITH THE	
112	PLACE 1ST BAR CODE LABEL FOR MALARIA LAB TEST IN SPACE TO THE RIGHT. PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM. PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT . . . . . 99994 REFUSED . . . . . 99995 OTHER 99996	
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE [ANEMIA AND MALARIA PAMPHLET]. G/DL . . . . . ☐☐.☐ NOT PRESENT . . . . . 994 REFUSED . . . . . 995 OTHER 996	
114	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE ANEMIA AND MALARIA PAMPHLET. POSITIVE . . . . . 1 NEGATIVE . . . . . 2 NOT PRESENT . . . . . 4 REFUSED . . . . . 5 OTHER 6	→ 126 → 128 → 126
115	Does (NAME) suffer from any of the following illnesses or symptoms: a) Extreme weakness? b) Heart problems? c) Loss of consciousness? d) Rapid or difficult breathing? e) Seizures? f) Abnormal bleeding? g) Jaundice or yellow skin? h) Dark urine?	YES NO a) EXTREME WEAKNES 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
116	CHECK 115: ANY 'YES' CIRCLED? NO ☐ YES ☐	→ 118
117	CHECK 113: HEMOGLOBIN RESULT BELOW 8.0 G/DL, SEVERE ANEMIA . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 119
118	**SEVERE MALARIA REFERRAL** The malaria test shows that (NAME OF CHILD) has malaria. Your child also has symptoms of severe malaria. 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. RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	→ 126
119	In the past 2 weeks has (NAME) taken or is (NAME) taking ACT given by a doctor or health center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT. YES . . . . . 1 NO 2	→ 121
120	**ALREADY TAKING [FIRST LINE MEDICATION] REFERRAL STATEMENT** You have told me that (NAME OF CHILD) had already received ACT for malaria. Therefore, I cannot give you additional ACT. However, the test shows that he/she has malaria. If your child has a fever for 2 days after the last dose of ACT, you should take the child to the nearest health facility for further examination.	→ 128

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 6 MONTHS TO 4 YEARS

	CHILD 3		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called Artemether-Lumefantrine (AL) Fixed Dose Combination. AL 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER FIELDWORKER NUMBER.	_____ (SIGN) ☐☐☐☐ FIELDWORKER NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	**TREATMENT FIRST LINE ACT: ARTEMETHER-LUMEFANTRINE Fixed Dose Combination** **Weight* / Age / Artemether- Lumefantrine (AL) Dosage Information** 5-14 KG / 6 months - < 3 years / 1 tablet twice a day for 3 days 15-25 KG / 3-7 years / 2 tablets twice a day for 3 days TELL THE PARENT/RESPONSIBLE 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 2 days, you should take him/her to a health professional for treatment right away.		→ 128
126	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANEMIA REFERRAL** The anemia test shows that (NAME OF CHILD) has severe anemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 102 IN ADDITIONAL QUESTIONNAIRE; IF NO MORE CHILDREN, END INTERVIEW.		

BIOMARKER TECH'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING BIOMARKERS

SUPERVISOR'S OBSERVATIONS

2022 LIBERIA MALARIA INDICATOR SURVEY
FIELDWORKER QUESTIONNAIRE

LIBERIA
NATIONAL MALARIA CONTROL PROGRAM

LANGUAGE OF QUESTIONNAIRE ENGLISH

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
100	What is your name?	NAME _____	
101	RECORD FIELDWORKER NUMBER	NUMBER . . . . . [ ][ ][ ][ ]	

INSTRUCTIONS

Information on all Liberia MIS field workers is collected as part of the LMIS survey. Please fill out the questions below. The information you provide will be part of the survey data file; however, your name will be removed and will not be part of the data file. Thank you for providing the information needed.

102	In what county do you live?	BOMI . . . . . 01 BONG . . . . . 02 GBARPOLU . . . . . 03 GRAND BASSA . . . . . 04 GRAND CAPE MOUNT . . . . . 05 GRAND GEDEH . . . . . 06 GRAND KRU . . . . . 07 LOFA . . . . . 08 MARGIBI . . . . . 09 MARYLAND . . . . . 10 MONTSERRADO . . . . . 11 NIMBA . . . . . 12 RIVER CESS . . . . . 13 RIVER GEE . . . . . 14 SINOE 15	
103	Do you live in a city, town, or rural area?	CITY . . . . . 1 TOWN . . . . . 2 RURAL 3	
104	How old are you? RECORD AGE IN COMPLETED YEARS.	AGE . . . . . [ ][ ]	
105	Are you male or female?	MALE . . . . . 1 FEMALE 2	
106	What is your current marital status?	CURRENTLY MARRIED . . . . . 1 LIVING WITH A MAN/WOMAN . . . . . 2 WIDOWED . . . . . 3 DIVORCED . . . . . 4 SEPARATED . . . . . 5 NEVER MARRIED OR LIVED WITH A MAN/WOMAN 6	
107	How many living children do you have? INCLUDE ONLY CHILDREN WHO ARE YOUR BIOLOGICAL CHILDREN.	LIVING CHILDREN . . . . . [ ][ ]	
108	Have you ever had a child who died?	YES . . . . . 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
109	What is the highest level of school you attended: elementary, junior high, senior high, or higher?	ELEMENTARY (1-6) . . . . . 1 JUNIOR HIGH (7-9) . . . . . 2 SENIOR HIGH (10-12) . . . . . 3 HIGHER 4	
110	What is the highest [GRADE/YEAR] you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	[GRADE/YEAR] . . . . . ☐☐	
110A	Have you ever received clinical, medical, or laboratory training or worked in healthcare?	YES . . . . . 1 NO 2	→ 111
110B	What is your current occupational category or qualification? For example, are you a registered nurse, doctor, or laboratory technician?	MEDICAL DOCTOR . . . . . 01 PHYSICIAN ASSISTANT . . . . . 02 REGISTERED NURSE . . . . . 03 REGISTERED MIDWIFE/MIDMAN . . . . . 04 CERTIFIED MIDWIFE . . . . . 05 NURSE AIDE . . . . . 06 LABORATORY TECHNOLOGIST . . . . . 07 LABORATORY TECHNICIAN . . . . . 08 LABORATORY ASSISTANT . . . . . 09 LABORATORY AIDE . . . . . 10 NO TECHNICAL QUALIFICATION . . . . . 95 OTHER _____ 96 (SPECIFY)	
111	What is your religion?	CHRISTIAN . . . . . 01 MUSLIM . . . . . 02 TRADITIONAL RELIGION . . . . . 03 NO RELIGION . . . . . 95 OTHER _____ 96 (SPECIFY)	
113	What dialect do you speak well? RECORD ALL LANGUAGES YOU CAN SPEAK.	BASSA . . . . . A GBANDI . . . . . B BELLE . . . . . C DEY . . . . . D GIO . . . . . E GOLA . . . . . F GREBO . . . . . G KISSI . . . . . H KPELLE . . . . . I KRAHN . . . . . J KRU . . . . . K LORMA . . . . . L MANDINGO . . . . . M MANO . . . . . N MENDE . . . . . O SAPO . . . . . P VAI . . . . . Q NONE / ONLY ENGLISH . . . . . R OTHER _____ X (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
114	What is your mother tongue/native language (language spoken at home growing up)?	BASSA . . . . . 01 GBANDI . . . . . 02 BELLE . . . . . 03 DEY . . . . . 04 GIO . . . . . 05 GOLA . . . . . 06 GREBO . . . . . 07 KISSI . . . . . 08 KPELLE . . . . . 09 KRAHN . . . . . 10 KRU . . . . . 11 LORMA . . . . . 12 MANDINGO . . . . . 13 MANO . . . . . 14 MENDE . . . . . 15 SAPO . . . . . 16 VAI . . . . . 17 ENGLISH . . . . . 18 OTHER _____ 96 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
115	Have you ever worked on: a) an LDHS prior to this survey? b) an LMIS prior to this survey? c) any other survey prior to this survey?	YES NO a) LDHS . . . . . 1 2 b) LMIS . . . . . 1 2 c) OTHER SURVEY 1 2	
116	Were you already working for NMCP, MOH, or LISGIS at the time you were employed to work on the 2022 LMIS?	YES, NMCP . . . . . 1 YES, MOH . . . . . 2 YES, LISGIS . . . . . 3 NO 4	→ 118
117	Are you a permanent or temporary employee of NMCP or LISGIS?	PERMANENT . . . . . 1 TEMPORARY 2	
118	If you have comments, please write them here.		

ADDITIONAL DHS PROGRAM RESOURCES

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