Ghana

Malaria Indicator Survey

2019

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Final Report

Ghana Statistical Service
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National Malaria Control Programme
Accra, Ghana

National Public Health and Reference Laboratory
Accra, Ghana

The DHS Program
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TABLES AND FIGURES

FOREWORD

This report presents the findings of the 2019 Ghana Malaria Indicator Survey (GMIS). The 2019 GMIS was the second in the series; the first was conducted in 2016. The 2019 GMIS was a national survey designed to obtain population-based estimates of malaria indicators to complement routine administrative data that are used to inform strategic planning and evaluation of the Ghana Malaria Control Programme.

The survey provides information on malaria prevention, treatment, and prevalence in Ghana. More specifically, the survey collected data on ownership and use of mosquito bed nets, assessed coverage of intermittent preventive treatment to protect pregnant women against malaria, identified practices and specific medications used to treat malaria, measured indicators of malaria knowledge and communication messages, and estimated the prevalence of malaria and anaemia among children age 6-59 months.

The survey was jointly implemented by the Ghana Statistical Service (GSS) and the Ministry of Health/Ghana Health Service, with technical assistance from ICF through The Demographic and Health Surveys (DHS) Program. There were two phases of data collection. The first phase comprised the household listing exercise; each of the 200 selected enumeration areas (clusters) was visited, and information was recorded on structures, the names of heads of households, and the Global Positioning System (GPS) coordinates of clusters. In the second stage, households and eligible women age 15-49 were interviewed, and children age 6-59 months were tested for anaemia and malaria with consent from guardians or parents. Data were collected via computer-assisted personal interviewing (CAPI).

I acknowledge the efforts of the institutions that contributed to the success of this huge undertaking. The close collaboration between the GSS and the National Malaria Control Programme of the Ghana Health Service was critical to the successful completion of the survey. Special thanks go to the staff of these two institutions. I am grateful to ICF through The DHS Program for the technical support provided throughout the various phases of the survey. My profound gratitude also goes to The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM); the United States Agency for International Development (USAID); and the Government of Ghana for providing the required financial support for the survey.

I extend our appreciation to all who participated in this survey: the authors, who are cited in this report; the survey implementation team; the field staff; and other survey personnel. The cooperation of all survey respondents is much appreciated for helping to make the 2019 GMIS a success. This report will be useful for advocacy, evidence-based decision making, and informed service delivery. I encourage users of microdata to conduct further analytical work to deepen our understanding of the topics in the survey.

Prof. Samuel Kobina Annim
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Ghana Statistical Service

ACRONYMS AND ABBREVIATIONS

ACT   artemisinin-based combination therapy
AGAMal   AngloGold Ashanti Malaria Control
AL   artemether-lumefantrine
ANC   antenatal clinic
ASAQ   artesunate-amodiaquine

CAPI   computer-assisted personal interviewing
CSPro   Census and Survey Processing System
CWC   child welfare clinic

DHAP   dihydroartemisinin-piperaquine
DHS   Demographic and Health Survey

EA   enumeration area

FPG   Family Planning Ghana

GDHS   Ghana Demographic and Health Survey
GFATM   Global Fund to Fight AIDs, Tuberculosis and Malaria
GHS   Ghana Health Service
GMIS   Ghana Malaria Indicator Survey
GPS   global positioning system
GSS   Ghana Statistical Service

IFSS   Internet File Streaming System
IPTp-SP   intermittent preventive treatment (of malaria) in pregnancy using sulphadoxine-
             pyrimethamine
IRS   indoor residual spraying
ITN   insecticide-treated net

JHS   junior high school
JSS   junior secondary school

LLIN   long-lasting insecticide-treated net

MIP   malaria in pregnancy
MIS   Malaria Indicator Survey
MVIP   Malaria Vaccine Implementation Programme

NHIS   National Health Insurance Scheme
NMCP   National Malaria Control Programme
NMIMR   Noguchi Memorial Institute for Medical Research
NPHRL   National Public Health and Reference Laboratory

Pf   *Plasmodium falciparum*
PHC   Population and Housing Census
PMI   U.S. President's Malaria Initiative
PPAG   Planned Parenthood Association of Ghana

RDT   rapid diagnostic test

SHS	senior high school
SP	sulphadoxine-pyrimethamine
SSS	senior secondary school
USAID	United States Agency for International Development
VIP	ventilated improved pit
WHO	World Health Organization

READING AND UNDERSTANDING THE 2019 GHANA MALARIA INDICATOR SURVEY (GMIS)

The 2019 Ghana Malaria Indicator Survey (GMIS) report features figures that highlight trends, subnational patterns, and background characteristics. The text has been simplified to highlight key points in bullets and to clearly identify indicator definitions in boxes.

The tables in this report are located at the end of each chapter instead of being imbedded in the chapter text. The report is based on approximately 35 tables of data. 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 GMIS tables.

The following pages provide an introduction to the organisation of GMIS tables, the presentation of background characteristics, and a brief summary of sampling and understanding denominators. In addition, this section provides some exercises for users as they practice their new skills in interpreting GMIS tables.
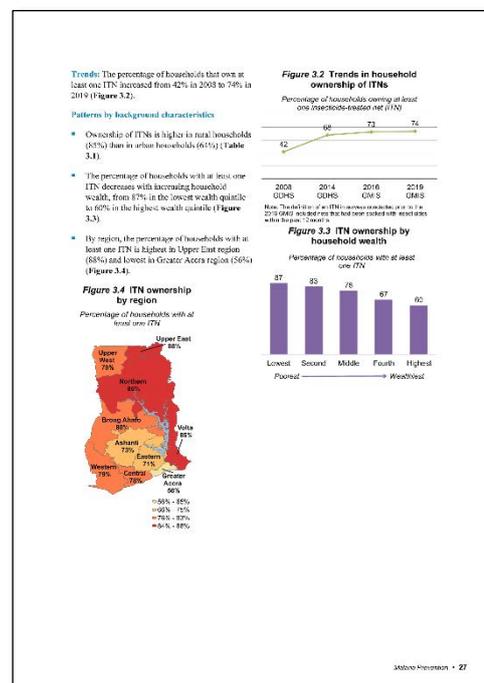
Example 1: Prevalence of Malaria
A Biomarker Measure Taken from All Eligible Respondents

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, Ghana MIS 2019

3 Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	**2** Microscopy positive	Number of children
Age in months				
6-8	8.7	167	6.2	167
9-11	13.7	108	7.8	108
12-17	18.2	286	13.3	286
18-23	21.6	286	13.2	287
24-35	22.8	612	13.9	615
36-47	25.3	576	13.7	578
48-59	29.7	577	19.1	577
Sex				
Male	24.3	1,321	13.9	1,329
Female	21.6	1,292	14.3	1,290
Mother's interview status				
Interviewed	22.3	2,243	13.7	2,250
Not interviewed	26.6	369	16.5	369
Residence				
Urban	9.8	1,057	6.1	1,062
Rural	31.9	1,556	19.6	1,556
Region				
Western	31.2	283	27.0	283
Central	29.9	187	17.6	186
Greater Accra	1.0	304	2.4	307
Volta	33.3	301	20.4	301
Eastern	26.4	267	12.3	270
Ashanti	15.8	413	10.4	413
Brong Ahafo	35.4	228	17.3	230
Northern	18.7	421	13.0	421
Upper East	30.6	124	9.8	124
Upper West	22.6	83	10.5	83
Mother's education[1]				
No education	29.4	511	17.9	510
Primary	26.6	488	16.3	493
Middle/JSS/JHS	20.8	848	12.9	849
Secondary/SSS/SHS or higher	11.2	396	7.0	397
Wealth quintile				
Lowest	35.1	630	22.4	629
Second	33.5	576	18.3	579
Middle	22.1	550	15.0	550
Fourth	10.9	468	6.8	468
Highest	3.2	389	2.1	393
Total **4**	23.0	2,612	14.1	2,619

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RDT = Rapid diagnostic test (SD BIOLINE Malaria Ag P.f)
[1] Excludes children whose mothers were not interviewed

Step 1: Read the title and subtitle—highlighted in orange in the table above. 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 categorised. In this table, the first column of data shows children age 6-59 months who tested positive for malaria according to a rapid diagnostic test or RDT. The second column lists the number of children age 6-59 months who were tested for malaria using RDT in the survey. The third column shows children age 6-59 months who tested positive for malaria according to microscopy, and the last column lists the number of children age 6-59 months who were tested for malaria using microscopy in the survey.

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 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 GMIS report will be divided into these same categories.

Step 4: Look at the row at the bottom of the table highlighted in red. These percentages represent the totals of children age 6-59 months who tested positive for malaria according to the different tests. In this case, 23.0%* of children age 6-59 months tested positive for malaria according to RDT, while 14.1% tested positive for malaria according to microscopy.

Step 5: To find out what percentage of children age 6-59 months in Western region tested positive for malaria according to microscopy, draw two imaginary lines, as shown on the table. This shows that 27.0% of children age 6-59 months in Western region tested positive for malaria according to microscopy.

By looking at patterns by background characteristics, we can see how malaria prevalence varies across Ghana. Resources are often limited; knowing how malaria prevalence varies among different groups can help programme planners and policymakers determine how to most effectively use resources.

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

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

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

Answers:
a) Malaria prevalence is slightly higher among girls age 6-59 months (14.3%) than boys (13.9%).
b) Yes, malaria prevalence generally increases with age, from 6.2% among children age 6-8 months to 19.1% among children age 48-59 months. Malaria prevalence is around 13% among children age 12-47 months.
c) Malaria prevalence ranges from a low of 2.4% in Greater Accra region to a high of 27.0% in Western region.
d) Yes, malaria prevalence decreases as mother's level of education increases, from 17.9% among children whose mothers have no education to 7.0% among children whose mothers have a secondary/SSS/SHS education or higher.
e) Yes, malaria prevalence decreases as wealth increases, from 22.4% among children in the lowest wealth quintile to 2.1% among children in the highest wealth quintile.

Example 2: Use of Mosquito Nets by Pregnant Women
Minimum Number of Cases Required for Reliable Results

Table 3.8 Use of mosquito nets by pregnant women   **1**

Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN), and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Ghana MIS 2019

Background characteristic	**2** Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one ITN[1]	
	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	32.5	31.4	143	44.2	102
Rural	61.0	61.0	202	66.2	186
Region					
Western	(63.9)	(63.9)	33	(71.2)	30
Central	(50.9)	(50.9)	26	(61.1)	21
Greater Accra	(20.8)	(20.8)	43	*	28
Volta	(34.8)	(33.0)	32	*	27
Eastern	(43.7)	(43.7)	46	(56.7)	35
Ashanti	(48.4)	(48.4)	64	(57.1)	54
Brong Ahafo	(61.1)	(57.8)	31	(61.6)	29
Northern	61.4	61.4	45	69.5	40
Upper East	(68.2)	(68.2)	16	(75.9)	15
Upper West	(72.5)	(72.5)	9	(82.1)	8
Education					
No education	63.5	63.5	70	75.2	59
Primary	48.8	48.8	72	55.7	63
Middle/JSS/JHS	50.0	48.8	130	58.5	109
Secondary/SSS/SHS or higher	34.2	34.2	73	44.0	57
Wealth quintile					
Lowest	70.9	70.9	75	78.6	68
Second	68.8	68.8	73	74.2	67
Middle	47.8	47.8	67	(60.3)	53
Fourth	33.8	31.4	65	40.4	50
Highest	18.8	18.8	65	(25.1)	49
Total	49.1	48.7	345	58.4	288

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 2014 GDHS and 2016 GMIS, 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 insecticide-treated net (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: Find the denominators for each indicator in the table. How many pregnant women age 15-49 in all households were interviewed? It's 345. Now look at the second panel. How many pregnant women age 15-49 in households with at least one ITN were interviewed? It's 288. The second panel is a subset of the first panel.

Step 4: Once 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 Upper West region slept under an ITN the night before the survey? 72.5%. This percentage is in parentheses because there

are between 25 and 49 pregnant women (unweighted) in this category. Readers should use this number with caution—it may not be reliable. (For more information on weighted and unweighted numbers, see Example 3.)

- What percentage of pregnant women age 15-49 in households with at least one ITN in Volta region 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 in households with at least one ITN in Volta region were interviewed in the survey. Results for this group are not reported. The subgroup is too small, and therefore the data are not reliable.

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

Example 3: Understanding Sampling Weights in 2019 GMIS Tables

A sample is a group of people who have been selected for a survey. In the GMIS, the sample is designed to represent the national population of women age 15-49. In addition to national data, most countries want to collect and report data on smaller geographical or administrative areas. However, doing so requires a minimum sample size per area. For the 2019 GMIS, the survey sample is representative at the national and regional levels and for urban and rural areas.

To generate statistics that are representative of Ghana as a whole and the 10 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 5,181 women and want to produce results that are representative of Ghana as a whole and its regions (as in Table 2.8). However, the total population of Ghana is not evenly distributed among the regions: some regions, such as Ashanti region, are heavily populated while others, such as Upper East region, are not. Thus, Upper East region must be oversampled.

A sampling statistician determines how many women should be interviewed in each region in order to get reliable statistics. The **blue column (1)** in the table at the right shows the actual number of women interviewed in each region. Within the regions, the number of women interviewed ranges from 416 in Brong Ahafo region to 648 in Ashanti region. The number of interviews is sufficient to get reliable results in each region.

With this distribution of interviews, some regions are overrepresented and some regions are underrepresented. For example, the population in Ashanti region is 18.3% of the population in Ghana, while Upper East region's population contributes only 4.1% of the population in

Table 2.8 Background characteristics of respondents

Percent distribution of women age 15-49 by selected background characteristics, Ghana MIS 2019

| Background characteristic | Women | | |
	Weighted percent	Weighted number	Unweighted number
Region	**3**	**2**	**1**
Western	9.7	501	505
Central	7.1	368	465
Greater Accra	18.1	938	586
Volta	10.8	561	468
Eastern	12.4	642	493
Ashanti	18.3	950	648
Brong Ahafo	7.3	378	416
Northern	9.3	481	581
Upper East	4.1	215	509
Upper West	2.8	146	510
Total	100.0	5,181	5,181

Ghana. But as the blue column shows, the number of women interviewed in Ashanti region accounts for only 12.5% of the total sample of women interviewed (648/5,181) and the number of women interviewed in Upper East region accounts for 9.8% of the total sample of women interviewed (509/5,181). This unweighted distribution of women does not accurately represent the population.

In order to get statistics that are representative of Ghana, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) such that it resembles the true distribution in the country. Women from a small region, like Upper East region, should contribute only a small amount to the national total. Women from a large region, like Ashanti region, 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 5,181 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 Ghana, 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 Upper East region and the proportion of women who live in Ashanti region.

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 GMIS tables, so don't be surprised if these numbers seem low: they may actually represent a larger number of women interviewed.

GHANA

INTRODUCTION AND SURVEY METHODOLOGY **1**
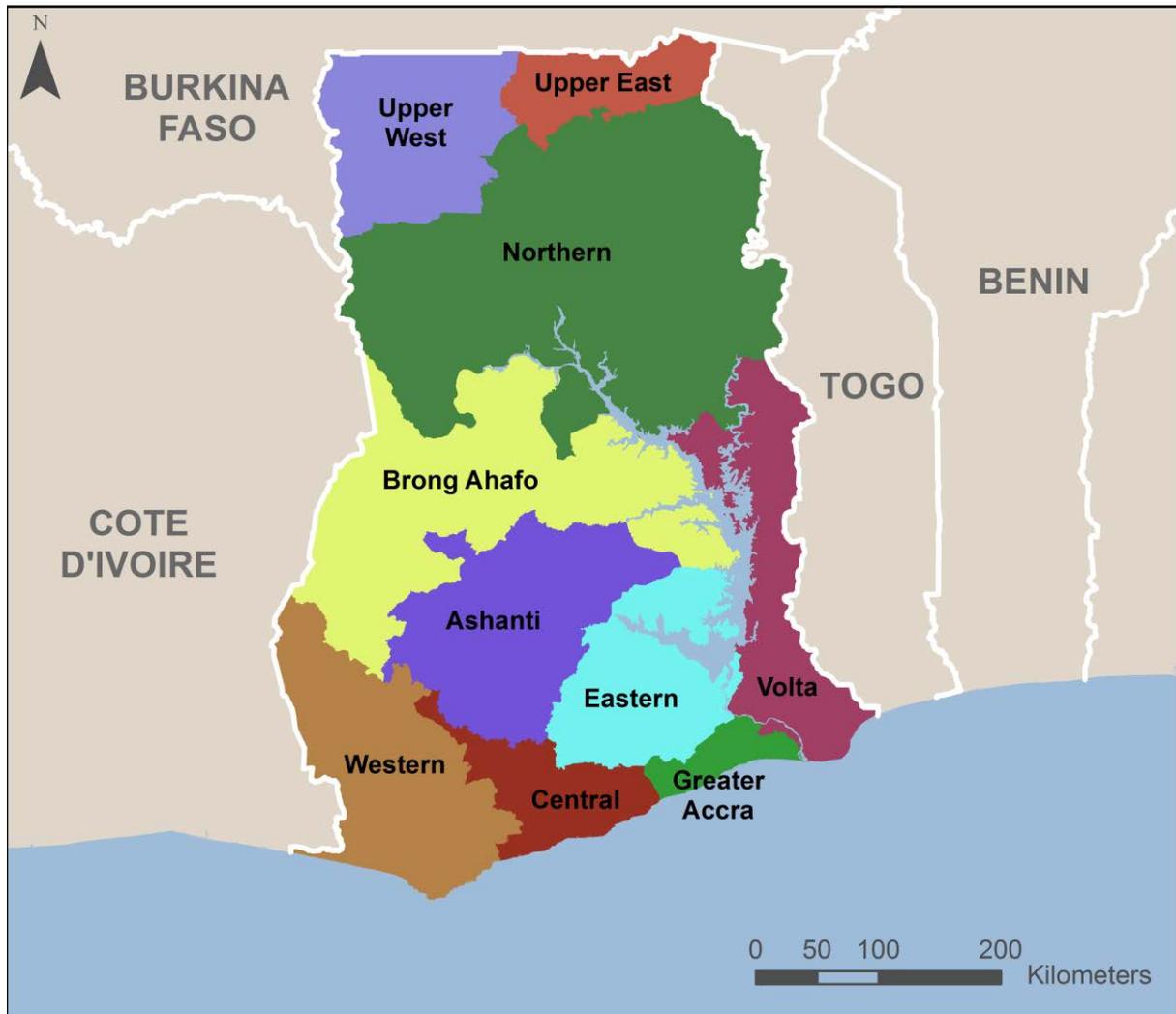
The 2019 Ghana Malaria Indicator Survey (2019 GMIS) was implemented by the Ghana Statistical Service (GSS) in close collaboration with the Ghana National Malaria Control Programme (NMCP) and the National Public Health and Reference Laboratory (NPHRL) of the Ghana Health Service (GHS). Financial support for the survey was provided by the United States Agency for International Development (USAID); The Global Fund to Fight AIDs, Tuberculosis and Malaria (GFATM); and the Government of Ghana. ICF provided technical assistance through The DHS Program, a USAID-funded project that offers support and technical assistance in the implementation of population and health surveys in countries worldwide. The Noguchi Memorial Institute for Medical Research (NMIMR) was responsible for external laboratory quality assurance.

1.1   SURVEY OBJECTIVES

The primary objective of the 2019 GMIS is to provide current estimates of key malaria indicators. Specific objectives were:

- To measure the extent of ownership and use of mosquito bed nets

- To assess coverage of intermittent preventive treatment to protect pregnant women

- To identify practices and specific medications used for treating malaria among children under age 5

- To measure indicators of behaviour change communication messages, knowledge, and practices regarding malaria

- To measure the prevalence of malaria and severe anaemia among children age 6-59 months

The findings from the 2019 GMIS will assist policymakers and programme managers in evaluating and designing programmes and strategies for improving malaria control interventions in Ghana.

1.2   SAMPLE DESIGN

The sample for the 2019 GMIS was designed to provide estimates of key malaria indicators for the country as a whole, for urban and rural areas separately, and for each of the 10 administrative regions (Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East, and Upper West) as defined in the Ghana 2010 Population and Housing Census (PHC).

The sampling frame used for the 2019 GMIS is the frame of the 2010 PHC, conducted in Ghana by GSS. In 2019, Ghana created six new regions, resulting in a total of 16 regions and 260 administrative districts; however, during survey design, the new administrative boundaries were not available. The 2019 GMIS sampling frame is therefore based on the 10 regional boundaries defined according to the 2010 PHC. The frame is a complete list of all census enumeration areas (EAs) created for the PHC. An EA is the smallest geographic area that can be easily canvassed by an enumerator during an enumeration exercise. The sampling frame contains information about EA location, type of residence (urban or rural), the estimated number of residential households, and the estimated population.

The 2019 GMIS sample was stratified and selected from the sampling frame in two stages. Each region was divided into urban and rural areas; this yielded 20 sampling strata. Samples of EAs were selected independently in each stratum in two stages. Implicit stratification with proportional allocation was achieved at each of the lower administrative levels by sorting the sampling frame within each sampling

stratum before sample selection, according to administrative units at different levels, and by using a probability proportional to size selection in the first stage of sampling.

In the first stage, 200 EAs (97 in urban areas and 103 in rural areas) were selected with probability proportional to EA size and with independent selection in each sampling stratum. A household listing operation was conducted from 24 June to 10 August 2019 in all of the selected EAs. The list of households was directly recorded on tablet PCs, using the computer-assisted personal interviewing (CAPI) system, and this list served as a sampling frame for the selection of households in the second stage. Some of the selected EAs were very large. To minimise the task of household listing, each large EA selected for the 2019 GMIS was segmented. Only one segment was selected for the survey with probability proportional to segment size. Household listing was conducted only in the selected segment. Thus, in the 2019 GMIS, a cluster is either an EA or a segment of an EA. As part of the listing, the field teams updated the necessary maps and recorded the geographic coordinates of each cluster. The listing was conducted by 10 teams that included one lister/team leader, one mapper, and a driver.

In the second stage of selection, a fixed number of 30 households was selected from each cluster to make up a total sample size of 6,000 households. Replacement of non-responding households was not allowed. Due to the non-proportional allocation of the sample to the different regions and the possible differences in response rates, sampling weights are required for any analysis that uses the 2019 GMIS data. This ensures the actual representation of the survey results at the national and regional levels. Results shown in this report have been weighted to account for the complex sample design. More information on weight calculation is presented in Appendix A.

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, children age 6-59 months were tested for anaemia and malaria infection.

1.3   QUESTIONNAIRES

Four types of questionnaires were used for the 2019 GMIS: the Household Questionnaire, the Woman's Questionnaire, the Biomarker Questionnaire, and the Fieldworker Questionnaire. The questionnaires were adapted to reflect issues relevant to Ghana. Modifications were determined after a series of meetings with various stakeholders from the NMCP and other government ministries and agencies, nongovernmental organisations, and international partners. The Household and Woman's Questionnaires in English and four local Ghanaian languages (Akan, Dagbani, Ewe, and Ga) were programmed into tablet computers, which enabled the use of computer-assisted personal interviewing for the survey. The Biomarker Questionnaire, also translated into four local languages, was filled out on hard copy and entered into the CAPI system when complete.

The Household Questionnaire was used to list all of the usual members of and visitors to the selected households. Basic information was collected on the characteristics of each person listed in the household, including age, sex, and relationship to the head of the household. The data on age and sex of household members obtained from the questionnaire were used to identify women eligible for individual interviews and children age 6-59 months eligible for anaemia and malaria testing. Additionally, the Household Questionnaire captured information on characteristics of the household's dwelling unit, such as source of water, type of toilet facilities, materials used for the floor, ownership of various durable goods, and ownership and use of mosquito nets.

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

- Background characteristics (age, education, literacy, religion, and ethnicity)
- Reproductive history for the last 5 years
- Preventive malaria treatment during the pregnancy of the most recent live birth

- Prevalence and treatment of fever among children under age 5
- Knowledge about malaria (symptoms, causes, prevention, and types of antimalarial medications)
- Exposure to and source of media messages about malaria in the last 6 months

The Biomarker Questionnaire was used to record the results of the anaemia and malaria testing of children age 6-59 months.

The purpose of the Fieldworker Questionnaire was to collect basic background information on the people who collected data in the field, including the team supervisors, interviewers, and health technicians. This self-administered questionnaire was created to serve as a tool in conducting analyses of data quality. The questionnaire was distributed and collected by the GSS after final selection of fieldworkers and before the fieldworkers entered the field. No personal identifiers were attached to the GMIS fieldworkers' data file.

1.4 ANAEMIA AND MALARIA TESTING

Blood samples for anaemia and malaria testing were collected via finger or heel pricks from children age 6-59 months whose parents or guardians consented to the specified test.

Anaemia testing. A single-use retractable, spring-loaded, sterile lancet was used for the finger or heel prick. A drop of blood from the site was then collected in a microcuvette. Haemoglobin analysis was conducted on site with a battery-operated portable HemoCue 201+ analyser, which produces a result in less than 1 minute. Results of the anaemia test were recorded in the Biomarker Questionnaire and on a brochure left in the household that also contained information on the causes and prevention of anaemia. Parents or guardians of children with a haemoglobin level below 8 g/dl were advised to take the child to a health facility for follow-up care and were given a referral letter with the haemoglobin reading to show to the health worker at the facility.

Malaria testing with a rapid diagnostic test (RDT). Another drop of blood was tested for malaria with the SD BIOLINE Malaria Ag P.f rapid diagnostic test (RDT), which produces a result in 15 minutes. The SD BIOLINE P.f RDT tests for one antigen, histidine-rich protein II (HRP-II), specific to *Plasmodium falciparum* (*Pf*), the major cause of malaria in Ghana. The diagnostic test includes a disposable sample applicator that comes in a standard package. A tiny volume of blood is collected with the applicator and placed in the sample well of the testing device, and then four drops of buffer are added to the appropriate well. As with anaemia testing, malaria RDT results were recorded in the Biomarker Questionnaire and shared with the child's parent or guardian.

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 symptoms of malaria 3 days after the last dose of ACT was taken. In addition, children who tested positive according to the RDT and met one of the following two criteria—a haemoglobin level below 8 g/dl or symptoms indicative of severe malaria—were considered to have severe malaria and were referred to a health facility for immediate treatment. Children who tested positive for uncomplicated malaria were offered a full course of medication according to the standard treatment protocol in Ghana. Age-appropriate doses of ACT were provided along with instructions on how to administer the medicine to the child.

Malaria testing with blood smears. 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 blood sample transmittal form to track blood samples from the field to the National Public Health and Reference Laboratory (NPHRL) in Accra. 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 the NPHRL for logging and microscopic reading.

Upon arrival at the NPHRL, thick blood smears were stained with 3% Giemsa solution and examined under a microscope to determine the presence or absence of *malaria parasites*. All stained slides were read by two independent microscopists who were masked from the RDT results. Slides with discordant results between the first and second readers were re-examined by a third microscopist to determine the final result. The microscopic results were quality checked via internal and external quality control processes. As part of internal quality control, an independent microscopist read 5% of all slides. External quality control was conducted by the Noguchi Memorial Institute for Medical Research (NMIMR), which independently read 10% of the slides. The external quality control testing yielded 95% agreement between the NPHRL and NMIMR results.

1.5 TRAINING OF FIELD STAFF

Fifty-two people (34 women and 18 men) participated in the 3-week main training course on interviewing; the training, which took place at Windy Lodge in Winneba, Central Region, consisted of lectures, demonstrations, and practice interviews. Fourteen health technicians (4 women and 10 men) attended a parallel training course on conducting biomarker tests.

The main training of interviewers was held from 2-21 September 2019 and facilitated by GSS, NMCP, and The DHS Program staff. The training included instruction on interviewing techniques and field procedures, a detailed review of the questionnaire content, instruction on administering the paper and electronic questionnaires, mock interviews between participants in the classroom, and practice interviews with real respondents in areas outside of the survey sample. Training of health technicians on biomarker collection procedures was held from 9-14 September, also at Windy Lodge in Winneba. NPHRL staff facilitated the biomarker training, which included classroom instruction, hands-on demonstrations and practice (with adults in class and with children under age 5 in clinics) focusing on capillary blood collection and anaemia and malaria rapid diagnostic testing, proper techniques for preparing thick blood smears, appropriate procedures for obtaining informed consent, recording biomarker information in the Biomarker Questionnaire, and reporting test results back to respondents with referrals as needed. Health technicians were also trained to identify signs and symptoms of severe malaria and given instruction on how to provide age-appropriate doses of ACT and how to administer the medicine to children.

From 16-18 September, 13 teams composed of supervisors, interviewers, and health technicians practiced data collection in the field in urban and rural communities around Winneba. All participants were taken to a different community each day. At the end of the training, 60 field staff were selected for the fieldwork and six were placed on standby (four interviewers and two health technicians).

1.6 FIELDWORK

Field data collection was conducted during an 8-week period from 25 September to 24 November 2019. Twelve teams were formed, with each including a supervisor, three interviewers, a health technician, and a driver. Each team was allocated specific clusters according to local language competency. The team spent an average of 3 days working in a cluster. Information on selected clusters and sampled households was directly uploaded into supervisors' tablets. When eligible respondents were absent from their homes, two or more call backs were made to offer respondents the opportunity to participate in the survey.

In addition to the field supervisors, there were national and regional monitors who supervised field activities and ensured the collection and transfer of blood slides to the laboratory. GSS, NMCP, and NPHRL field monitoring staff were responsible for data collection quality control and timely collection and transfer of slides from the field teams to the NPHRL. Periodically during fieldwork, a set of field check tables was run from the computerised data at GSS. Problems that appeared from reviews of these tables were discussed with the appropriate teams (during supervisory visits or briefing sessions), and attempts were made to ensure that they did not persist. In addition, GSS data processing staff provided teams with CAPI-related troubleshooting support during data collection.

1.7 DATA PROCESSING

Data for the 2019 GMIS were collected through questionnaires programmed into the CAPI application. The CAPI application was programmed by The DHS Program and loaded into the computers along with the Household, Biomarker, and Woman's Questionnaires. Using the Internet File Streaming System (IFSS) developed by The DHS Program, the field supervisors transferred data on a daily basis to a central location for data processing in the GSS office located in Accra. To facilitate communication and monitoring, each fieldworker was assigned a unique identification number.

The Census and Survey Processing (CSPro) program was used for data editing, cleaning, weighting, and tabulation. Data received from the field teams' CAPI applications were registered and checked for any inconsistencies and outliers at the GSS Head Office. Data editing and cleaning included an extensive range of structural and internal consistency checks. All anomalies were communicated to field teams, which resolved data discrepancies. The corrected results were maintained in master CSPro data files and then used in producing tables for the final report.

1.8 ETHICAL CONSIDERATIONS

The protocol for the 2019 GMIS was approved by the Ghana Health Service Ethical Review Committee and ICF's Institutional Review Board. The risks and benefits of participation in the survey were explained to respondents. Participation in the survey was voluntary. Informed consent was sought directly from eligible respondents before administration of the Household or Woman's Questionnaire. Before collection of blood samples for malaria and anaemia testing, informed consent was requested from parents or guardians of children. All data and other information collected were confidential. Respondents' names and identification numbers were removed from the final data sets before analyses were conducted. Blood samples were stored with barcode identifiers to protect respondents' identity.

1.9 RESPONSE RATES

Table 1.1 presents the results of the household and individual interviews. A total of 6,002 households were selected for the survey, of which 5,833 were occupied at the time of fieldwork. Among the occupied households, 5,799 were successfully interviewed, yielding a response rate of 99%. In the interviewed households, 5,246 eligible women were identified for individual interviews and 5,181 were successfully interviewed, yielding a response rate of 99%.

Table 1.1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Ghana MIS 2019

| | Residence | | |
Result	Urban	Rural	Total
Household interviews			
Households selected	2,912	3,090	6,002
Households occupied	2,822	3,011	5,833
Households interviewed	2,801	2,998	5,799
Household response rate[1]	99.3	99.6	99.4
Interviews with women age 15-49			
Number of eligible women	2,468	2,778	5,246
Number of eligible women interviewed	2,440	2,741	5,181
Eligible women response rate[2]	98.9	98.7	98.8

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

CHARACTERISTICS OF HOUSEHOLDS AND WOMEN

2

Key Findings

- **Drinking water:** 9 in 10 households (93%) have an improved source of drinking water.

- **Sanitation:** 75% of households use an improved sanitation facility, 11% use an unimproved sanitation facility, and 15% do not use a facility.

- **Electricity:** 84% of households in Ghana have electricity (94% in urban areas and 73% in rural areas).

- **Education:** 17% of women age 15-49 have no education.

- **Literacy:** 6 in 10 women (59%) age 15-49 are literate.

Information on the socioeconomic characteristics of the household population in the 2019 GMIS provides a context to interpret demographic and health indicators and can furnish an approximate indication of the representativeness of the survey. In addition, this information sheds light on the living conditions of the population.

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

2.1   DRINKING WATER SOURCES AND TREATMENT

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 or sachet water.
Sample: Households

Improved sources of water protect against outside contamination so that water is more likely to be safe to drink. **Table 2.1.1** shows that 93% of households use an improved source of drinking water. Bottled/sachet water is the most common source of drinking water among households (39%), followed by tube wells or boreholes (19%) and public taps/standpipes (15%) (**Figure 2.1**). Forty-seven percent of households have water on the premises, and 46% of households take 30 minutes or less (round trip) to obtain drinking water. The percentage of households using improved sources of drinking water is higher in urban areas (99%) than in rural areas (87%).

Urban and rural households rely on different sources of drinking water. About 2 in 10 (19%) urban households have water piped into their dwelling/yard/plot or their neighbour's yard, as compared with 10% of rural households (**Figure 2.1**). Over half (58%) of households in urban areas use bottled/sachet water. In contrast, just 19% of rural households use bottled/sachet water, while one-third (33%) rely on a tube well or borehole and 18% use a public tap/standpipe. Only 2% of urban households have to travel more than 30 minutes to fetch drinking water, compared with 12% of rural households (**Table 2.1.1**).

Figure 2.1 Household drinking water by residence

Percent distribution of households by source of drinking water

Legend:
- Unimproved source
- Other improved source
- Bottled/sachet water
- Tube well or borehole
- Public tap/standpipe
- Piped water into dwelling/yard/plot/ neighbour's yard
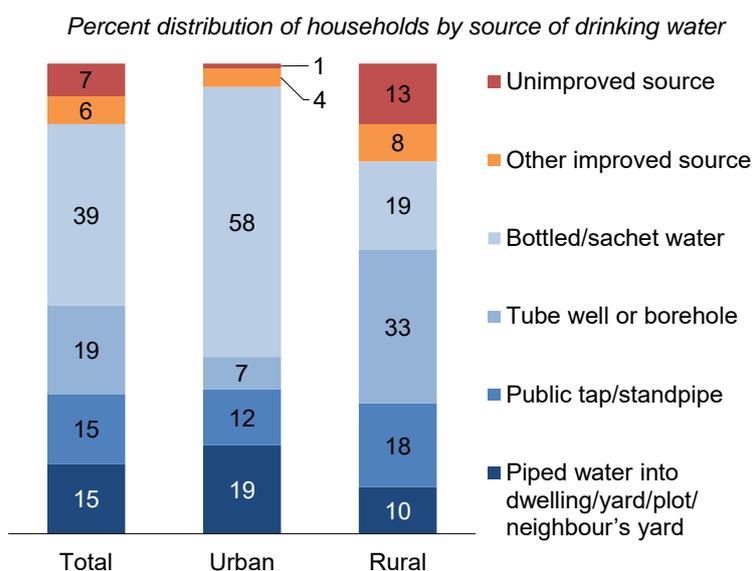
Table 2.1.2 shows access to drinking water among the household population. The percentage of the population with an improved source of drinking water ranges from 78% in Northern region to 98% in Upper West region and 100% in Greater Accra region (**Table 2.1.2**).

2.2 SANITATION

> **Improved sanitation 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

Nationally, 75% of households use improved toilet facilities, 11% use unimproved sanitation facilities, and 15% engage in open defecation (**Table 2.2.1** and **Figure 2.2**). More households in urban than rural areas use improved sanitation (89% versus 60%). The most commonly used improved toilet facilities in urban areas are flush/pour flush to septic tank facilities (39%) and VIP latrines (32%), while in rural areas pit latrines with slabs (26%) and VIP latrines (25%) are primarily used. By region, use of an improved sanitation facility among the household population ranges from 28% in Upper East region to 94% in Greater Accra region. As expected, use of an improved sanitation facility increases with increasing wealth, from 34% in the lowest wealth quintile to 97% in the highest quintile (**Table 2.2.2**).

Figure 2.2 Household toilet facilities by residence

Percent distribution of households by type of toilet facilities

Legend:
- No facility/ bush/field
- Unimproved facility
- Improved facility
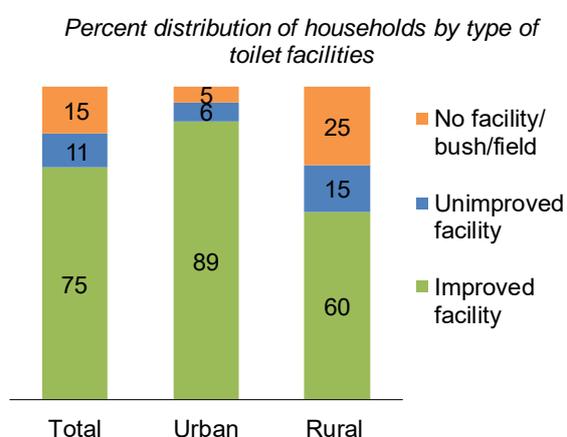
2.3   HOUSING CHARACTERISTICS

The 2019 GMIS collected data on household features such as access to electricity, housing materials, number of sleeping rooms, and types of fuel used for cooking. These data, along with information on ownership of household durable goods as well as water and sanitation, contribute to the creation of the household wealth index and provide information that may be relevant for other health indicators.

Overall, 84% of households in Ghana have access to electricity, including 94% of urban households and 73% of rural households (**Table 2.3**).

Trends: There has been a slight increase in the percentage of households reporting access to electricity, from 79% in 2016 to 84% in 2019.

Cement is the most common flooring material in Ghana, used by 53% of households. A higher percentage of rural households (64%) than urban households (42%) have cement floors. Woollen carpet/synthetic carpet is the second most common flooring material, used by 19% of households (**Table 2.3**). The majority of households in Ghana have zinc/aluminium (89%) roofing (88% of urban households and 91% of rural households). The most common wall material is cement (70%), followed by cement blocks (11%) (**Table 2.3**).

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. Eighteen percent of households use three or more rooms for sleeping, 25% use two rooms, and 57% use only one room. There are slight urban-rural differences in the number of rooms used for sleeping; 62% of urban households use one room for sleeping, as compared with 52% of households in rural areas (**Table 2.3**).

Exposure to cooking smoke, especially to smoke produced from solid fuels, is potentially harmful to health. The percentage of households using clean fuel for cooking is low (27%) relative to the percentage using solid fuels such as charcoal, wood, straw/shrubs/grass, agricultural crops, or animal dung (69%). By far the most common solid fuels used for cooking are wood (35% of households) and charcoal (34% of households). Use of charcoal is more prevalent in households in urban areas (44%) than rural areas (23%), while wood is more commonly used by rural households (60%) than urban households (11%) (**Table 2.3**).

2.4   HOUSEHOLD WEALTH

The survey collected information on ownership of household goods, means of transport, agricultural land, and farm animals. Ninety-two percent of households own a mobile phone. Possession of a mobile phone is more common in urban households (96%) than rural households (89%). Approximately 6 in 10 households own a radio (57%), and about 2 in 3 households (64%) own a television. Thirty-six percent of households own a refrigerator, and 16% own a computer. Twenty-two percent of households own a bicycle, 13% own a motorcycle or scooter, and 9% own a car or truck (**Table 2.4**). Overall, 39% of households own agricultural land and 36% own farm animals. As expected, households in rural areas are more likely than households in urban areas to own agricultural land (58% versus 20%) and farm animals (54% versus 19%).

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 (**Table 2.5**). Thirty-six percent of urban residents are in the highest wealth quintile, while 2% are in the lowest wealth quintile. In contrast, 35% of rural residents are in the lowest wealth quintile and 6% are in the highest quintile (**Figure 2.3**).

Table 2.5 shows that the concentration of wealth differs markedly by region. The percentages of residents in the lowest wealth quintile are highest in the Upper East, Upper West, and Northern regions (75%, 64%, and 60% respectively) and lowest in the Greater Accra region (less than 1%). The Greater Accra region has the highest percentage of residents in the highest wealth quintile (53%).

Figure 2.3 Household wealth by residence

Percent distribution of de jure population by wealth quintiles
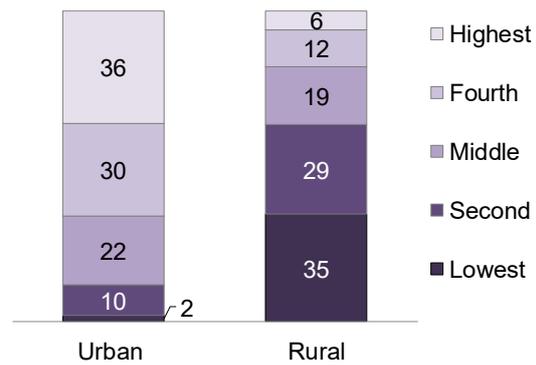
Table 2.5 also presents the Gini coefficient, a measure of the level of concentration of wealth, with 0 representing an exactly equal distribution and 1 representing a totally unequal distribution. The Gini coefficient is higher in rural areas (0.28) than in urban areas (0.14), indicating a somewhat more inequitable distribution of wealth in the rural population than in the urban population. The lowest Gini coefficient is in Greater Accra region (0.16), where over half of the population (53%) is in the highest wealth quintile. The highest Gini coefficient is in Upper East region (0.41), indicating that this region has the most inequitable wealth distribution.

2.5 HOUSEHOLD POPULATION AND COMPOSITION

A total of 21,843 people stayed overnight in the 5,799 interviewed households (**Table 2.6**). The overall sex ratio is 93 males per 100 females, and a majority of the population lives in rural areas (54%).

Age and sex are important demographic variables and are the primary basis of demographic classifications. **Table 2.6** shows the distribution of the de facto household population in the 2019 GMIS by 5-year age groups, according to sex and residence.

The population pyramid in **Figure 2.4** shows the population distribution by sex and by 5-year age groups. The broad base of the pyramid indicates that Ghana's population is young. Forty percent of residents are under age 15, 54% are age 15-64, and only 5% are age 65 or older (**Table 2.6**).

Figure 2.4 Population pyramid

Percent distribution of the household population
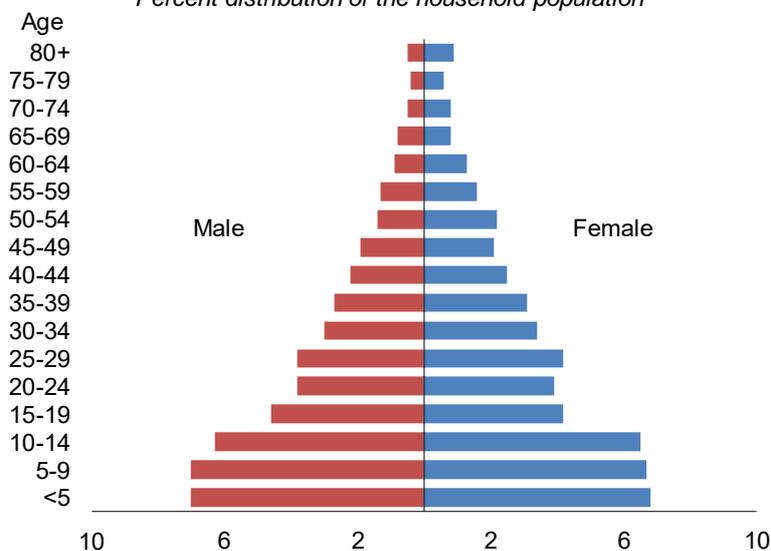
On average, households in Ghana consist of 3.8 persons (**Table 2.7**). Two-thirds of households are headed by men (65%). The proportion of households headed by women is higher in urban areas than in rural areas (37% versus 32%).

2.6   BACKGROUND CHARACTERISTICS OF SURVEY RESPONDENTS

A total of 5,181 women age 15-49 were interviewed with the Woman's Questionnaire (**Table 2.8**). More than half of women interviewed were under age 30 (52%), and one-fifth were age 40-49 (20%). The majority of respondents were Christians: 44% were Pentecostal or Charismatic, and 35% were Catholic, Anglican, Methodist, Presbyterian, or other Christian. Eighteen percent of women were Muslims.

The Akans form the largest ethnic group, with half of respondents (44%) belonging to this group. The Mole-Dagbanis and Ewes account for 18% and 17% of respondents, respectively.

The percentage of respondents living in urban and rural areas is nearly identical (51% and 49%, respectively). Conversely, there are large differences by region: 18% of respondents reside in Greater Accra region and Ashanti region, while 3% of respondents live in Upper West region (3%).

2.7   EDUCATIONAL ATTAINMENT OF WOMEN

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

The current educational system is three-tiered: 6 years of primary education followed by 3 years of junior high school (JHS), formerly called junior secondary school (JSS), and a further 3 years at the senior high school (SHS) level. At the secondary level, the 3-year senior secondary school (SSS) system was changed to the 4-year senior high school system in the 2007/2008 academic year; however, this policy was reversed

in 2009. In this report, women categorised as having "completed primary" include those who have completed sixth grade at the primary level. Women categorised as having "some secondary" education include (1) those who have some middle/JSS/JHS schooling or have completed middle/JSS/JHS and (2) those who have some secondary/SSS/SHS schooling but have not completed secondary/SSS/SHS. Women categorised as having "completed secondary" are those who completed fifth grade or seventh grade at the secondary level (form 5 or upper 6) in the past educational curriculum.

Table 2.9 shows the percent distribution of women age 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics. Sixty-five percent of women have at least some secondary education. Overall, 17% of women have no education. (**Figure 2.5**). Nationally, women have completed a median of 8.0 years of education.

Trends: Educational levels are increasing. The median number of years of schooling among women rose from 7.2 in 2008 to 8.0 in 2019. The proportion of women with more than secondary education has also increased since 2008, from 4% to 8%. The percentage of women with no formal education has decreased from 21% to 17%.

Figure 2.5 Education of survey respondents by residence

Percent distribution of women age 15-49 by highest level of schooling attended or completed
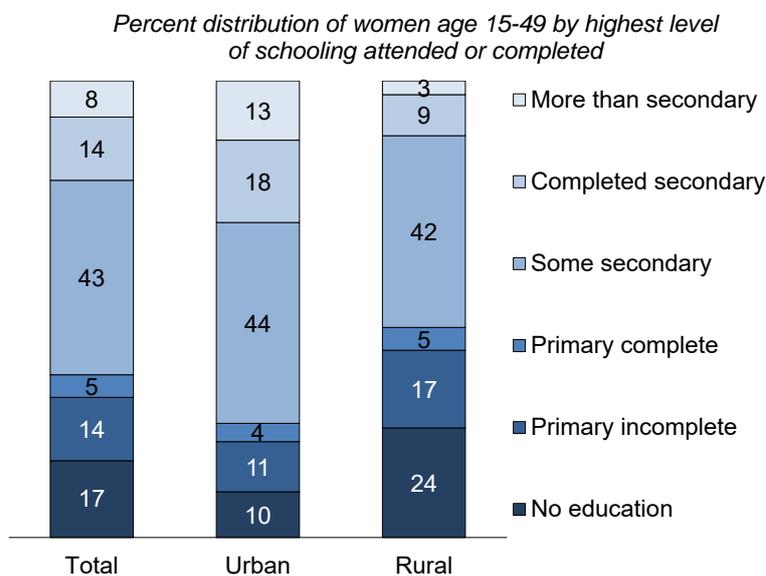
Patterns by background characteristics

- Approximately 1 in 4 women (24%) in rural areas have no education, as compared with 1 in 10 women (10%) in urban areas (**Table 2.9**).

- By region, the percentage of women with no education is highest in Northern region (57%) and lowest in Greater Accra region (5%).

- Greater Accra residents have a clear educational advantage over the rest of the country: 16% of women in Greater Accra region have some education beyond secondary school, compared with 2%-11% of women in other regions.

- Wealth status is positively associated with education; nearly one-quarter of women in the highest wealth quintile (24%) have more than a secondary education, compared with less than 1% of women in the lowest wealth quintile.

2.8   LITERACY OF WOMEN

Literacy

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

Sample: Women age 15-49

Knowing the level and distribution of literacy among the population is an important factor in the design and delivery of health messages and interventions. The results show that, overall, 59% of women age 15-49 in Ghana are literate (**Table 2.10**).

Trends: The percentage of women who are literate increased from 55% in 2016 to 59% in 2019.

Patterns by background characteristics

- The percentage of literate women decreases with increasing age, from 77% among those age 15-24 to 33% among those age 45-49.

- Literacy varies by place of residence; 71% of women in urban areas are literate, as compared with 46% of women in rural areas.

- By region, literacy among women ranges from 26% in Northern region to 81% in Greater Accra region.

- The percentage of literate women increases with increasing wealth, from 27% in the lowest wealth quintile to 87% in the highest wealth quintile.

2.9   HEALTH INSURANCE COVERAGE

The National Health Insurance Scheme (NHIS) is a national health care financing policy introduced to promote universal access to health care in Ghana. In 2003, the scheme was passed into law by Act 650. The Ghana National Health Insurance Authority was established to license, monitor, and regulate the operation of health insurance schemes in the country. In 2012, Act 650 was repealed and replaced with Act 852, which presently governs health insurance practices in Ghana. The purpose of replacing the act was to consolidate schemes as well as to remove bottlenecks, ensure transparency, and govern schemes effectively (NHIS 2020).

Seventy-three percent of women age 15-49 were aware that malaria care is covered under the NHIS; 50% of women are registered and covered by any type of health insurance (**Table 2.11**). Among women registered and covered by health insurance, nearly 100% are covered by the NHIS.

Patterns by background characteristics

- The percentage of women who are aware that malaria care is covered under the NHIS is slightly higher in rural areas (75%) than in urban areas (71%).

- The percentage of women registered and covered by any type of health insurance ranges from 39% in Greater Accra region to 62% in Upper East region.

LIST OF TABLES

For detailed information on characteristics of households and women, see the following tables:

<u>**Table 2.1.1 Household drinking water**</u>

Percent distribution of households and de jure population by source of drinking water and by time to obtain drinking water, percentage of households and de jure population with basic drinking water service, and percentage with limited drinking water service, according to residence, Ghana MIS 2019

	Households			Population		
Characteristic	Urban	Rural	Total	Urban	Rural	Total
Source of drinking water						
Improved source	**98.8**	**87.1**	**93.1**	**98.4**	**85.9**	**91.6**
Piped into dwelling/yard/plot	11.0	4.9	8.0	12.8	5.1	8.6
Piped to neighbour	8.0	5.1	6.6	9.5	5.2	7.2
Public tap/standpipe	11.6	17.8	14.6	12.6	17.2	15.1
Tube well or borehole	6.5	33.1	19.4	8.1	37.9	24.1
Protected dug well	3.1	5.1	4.1	4.1	5.2	4.7
Protected spring	0.0	0.2	0.1	0.0	0.2	0.1
Rainwater	0.7	1.7	1.2	0.6	1.3	1.0
Tanker truck/cart with small tank	0.1	0.6	0.3	0.1	0.6	0.4
Bottled/sachet water	58.0	18.5	38.8	50.8	13.2	30.5
Unimproved source	**1.2**	**12.9**	**6.9**	**1.6**	**14.1**	**8.4**
Unprotected dug well	0.9	2.8	1.8	1.4	3.0	2.3
Unprotected spring	0.0	1.3	0.6	0.1	1.4	0.8
Surface water	0.2	8.8	4.4	0.1	9.7	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Time to obtain drinking water (round trip)						
Water on premises[1]	68.2	23.8	46.6	67.4	21.5	42.7
30 minutes or less	29.9	63.8	46.3	29.9	63.7	48.1
More than 30 minutes	1.8	12.0	6.7	2.5	14.4	8.9
Don't know	0.2	0.5	0.3	0.2	0.4	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Percentage with basic drinking water service[2]	96.9	77.0	87.3	95.8	73.9	84.0
Percentage with limited drinking water service[3]	1.9	10.1	5.9	2.6	12.0	7.7
Number of households/population	2,984	2,815	5,799	10,237	11,958	22,195

[1] Includes water piped to a neighbour and those reporting a round-trip collection time of zero minutes
[2] 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.
[3] Drinking water from an improved source, and round-trip collection time is more than 30 minutes or is unknown

<u>**Table 2.1.2 Drinking water according to region and wealth**</u>

Percent distribution of de jure population by drinking water source, percentage of de jure population with basic drinking water service, and percentage with limited drinking water service, according to region and wealth quintile, Ghana MIS 2019

Background characteristic	Improved source of drinking water[1]	Unimproved source of drinking water[2]	Total	Percentage with basic drinking water service[3]	Percentage with limited drinking water service[4]	Number of persons
Region						
Western	92.9	7.1	100.0	82.4	10.6	2,115
Central	87.9	12.1	100.0	87.3	0.6	1,639
Greater Accra	99.8	0.2	100.0	97.3	2.5	3,501
Volta	89.9	10.1	100.0	80.4	9.4	2,609
Eastern	93.8	6.2	100.0	89.1	4.7	2,452
Ashanti	94.6	5.4	100.0	93.5	1.1	3,855
Brong Ahafo	88.0	12.0	100.0	84.5	3.5	1,830
Northern	77.6	22.4	100.0	66.2	11.4	2,508
Upper East	91.8	8.2	100.0	44.3	47.5	1,016
Upper West	98.4	1.6	100.0	76.9	21.5	669
Wealth quintile						
Lowest	73.8	26.2	100.0	55.0	18.8	4,445
Second	88.8	11.2	100.0	78.3	10.5	4,435
Middle	96.2	3.8	100.0	90.6	5.6	4,437
Fourth	99.5	0.5	100.0	96.8	2.7	4,443
Highest	100.0	0.0	100.0	99.3	0.7	4,434
Total	91.6	8.4	100.0	84.0	7.7	22,195

[1] See Table 2.1.1 for definition of an improved source.
[2] See Table 2.1.1 for definition of an unimproved source.
[3] 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.
[4] Drinking water from an improved source, and round-trip collection time is more than 30 minutes or is unknown

Table 2.2.1 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities, percentage of households and de jure population with basic sanitation services, and percentage with limited sanitation services, according to residence, Ghana MIS 2019

	Households			Population		
Type and location of toilet/latrine facility	Urban	Rural	Total	Urban	Rural	Total
Improved sanitation facility	**88.9**	**59.6**	**74.7**	**87.4**	**55.3**	**70.1**
Flush/pour flush to piped sewer system	2.9	0.7	1.8	2.9	0.4	1.6
Flush/pour flush to septic tank	38.7	6.7	23.2	37.3	5.3	20.1
Flush/pour flush to pit latrine	4.9	1.5	3.2	4.6	1.4	2.9
Flush/pour flush to bio-digester (biofil)	0.3	0.2	0.2	0.2	0.1	0.2
Flush/pour flush, don't know where	0.4	0.0	0.2	0.3	0.0	0.2
Ventilated improved pit (VIP) latrine	31.6	25.0	28.4	31.0	22.0	26.1
Pit latrine with slab	9.7	25.5	17.4	10.7	26.0	18.9
Composting toilet	0.4	0.1	0.2	0.4	0.1	0.3
Unimproved sanitation facility	**6.2**	**15.0**	**10.5**	**7.3**	**14.9**	**11.4**
Flush/pour flush not to sewer/septic tank/pit latrine	0.5	0.1	0.3	0.6	0.1	0.3
Pit latrine without slab/open pit	5.7	13.9	9.6	6.6	13.8	10.5
Bucket	0.0	0.0	0.0	0.0	0.0	0.0
Hanging toilet/hanging latrine	0.0	1.0	0.5	0.0	1.0	0.5
Open defecation (no facility/bush/field)	**4.8**	**25.4**	**14.8**	**5.3**	**29.8**	**18.5**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Percentage with basic sanitation service[1]	20.7	15.1	18.0	23.2	17.2	20.0
Percentage with limited sanitation service[2]	68.3	44.5	56.7	64.3	38.1	50.2
Number of households/population	2,984	2,815	5,799	10,237	11,958	22,195

[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 2 or more households

Table 2.2.2 Sanitation facility type according to region and wealth

Percent distribution of de jure population by type of sanitation, percentage of de jure population with basic sanitation service, and percentage with limited sanitation service, according to region and wealth quintile, Ghana MIS 2019

	Type of sanitation				Percentage with basic sanitation service[3]	Percentage with limited sanitation service[4]	
Background characteristic	Improved sanitation facility[1]	Unimproved sanitation facility[2]	Open defecation	Total			Number of persons
Region							
Western	70.1	17.2	12.6	100.0	12.2	57.9	2,115
Central	66.9	20.0	13.1	100.0	17.2	49.7	1,639
Greater Accra	93.7	3.5	2.8	100.0	25.6	68.1	3,501
Volta	69.7	13.3	17.0	100.0	22.9	46.8	2,609
Eastern	82.5	10.5	7.0	100.0	26.9	55.6	2,452
Ashanti	79.1	12.6	8.3	100.0	23.8	55.2	3,855
Brong Ahafo	73.9	5.4	20.7	100.0	15.6	58.3	1,830
Northern	38.3	13.6	48.1	100.0	13.5	24.9	2,508
Upper East	27.6	2.5	69.9	100.0	9.4	18.2	1,016
Upper West	33.2	22.9	43.9	100.0	15.2	18.0	669
Wealth quintile							
Lowest	33.6	15.2	51.1	100.0	13.0	20.7	4,445
Second	53.9	21.3	24.7	100.0	11.2	42.7	4,435
Middle	78.1	10.0	11.9	100.0	13.1	64.9	4,437
Fourth	88.3	8.2	3.5	100.0	15.9	72.4	4,443
Highest	96.8	2.0	1.2	100.0	46.6	50.2	4,434
Total	70.1	11.4	18.5	100.0	20.0	50.2	22,195

[1] See Table 2.2.1 for definition of an improved facility.
[2] See Table 2.2.1 for definition of an unimproved facility.
[3] Defined as use of improved facilities that are not shared with other households. Includes safely managed sanitation service, which is not shown separately.
[4] Defined as use of improved facilities shared by 2 or more households

Table 2.3 Household characteristics

Percent distribution of households and de jure population by housing characteristics and percentage using solid fuel and clean fuel for cooking, according to residence, Ghana MIS 2019

Housing characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Electricity						
Yes	93.8	72.5	83.5	93.7	70.8	81.3
No	6.2	27.5	16.5	6.3	29.2	18.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Flooring material						
Earth/sand	2.1	11.6	6.7	2.6	11.9	7.6
Dung	0.0	0.1	0.0	0.0	0.2	0.1
Wood/planks	0.3	0.0	0.1	0.3	0.0	0.1
Palm/bamboo	0.0	0.0	0.0	0.0	0.0	0.0
Parquet or polished wood	0.1	0.2	0.1	0.1	0.1	0.1
Vinyl or asphalt strips	1.3	0.6	1.0	1.2	0.6	0.9
Ceramic/marble/porcelain/tiles/terrazzo	15.4	5.0	10.4	15.5	4.2	9.4
Cement	42.1	63.7	52.6	46.5	68.3	58.3
Woollen carpet/synthetic carpet	25.8	11.8	19.0	21.9	9.0	14.9
Linoleum/rubber carpet	12.9	7.0	10.0	11.9	5.6	8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Roof material						
No roof	0.0	0.2	0.1	0.0	0.3	0.1
Thatch/palm leaf	0.4	4.5	2.4	0.6	5.3	3.1
Sod	0.0	0.0	0.0	0.0	0.1	0.0
Rustic mat	0.0	0.2	0.1	0.0	0.3	0.1
Palm/bamboo	0.1	0.3	0.2	0.1	0.2	0.1
Wood planks	0.1	0.0	0.1	0.1	0.0	0.1
Cardboard	0.0	0.1	0.0	0.0	0.1	0.1
Zinc/aluminium	88.0	90.5	89.2	88.4	89.5	88.9
Wood	0.0	0.0	0.0	0.0	0.0	0.0
Ceramic/brick tiles	0.2	0.0	0.1	0.2	0.0	0.1
Cement	1.9	0.7	1.3	2.0	0.7	1.3
Roofing shingles	0.9	0.1	0.5	0.8	0.0	0.4
Asbestos/slate roofing sheets	8.3	3.3	5.9	7.7	3.4	5.4
Other	0.0	0.1	0.1	0.1	0.2	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Wall material						
No walls	0.9	1.5	1.2	0.9	1.2	1.1
Cane/palm/trunks	0.7	0.6	0.7	0.9	0.6	0.7
Mud/landcrete	2.2	17.0	9.4	3.3	20.9	12.8
Bamboo with mud	0.1	2.2	1.1	0.1	1.9	1.1
Stone with mud	0.3	3.7	2.0	0.5	3.9	2.3
Plywood	2.5	0.2	1.4	2.2	0.1	1.1
Cardboard	0.0	0.0	0.0	0.0	0.0	0.0
Reused wood	1.1	0.2	0.6	0.8	0.2	0.5
Cement	76.9	61.9	69.6	75.7	59.5	67.0
Stone with lime/cement	0.3	0.8	0.5	0.3	0.6	0.4
Bricks	0.5	1.4	0.9	0.6	1.5	1.1
Cement blocks	11.2	10.4	10.8	11.6	9.3	10.4
Covered adobe	0.0	0.1	0.0	0.0	0.1	0.0
Wood planks/shingles	3.0	0.0	1.5	2.7	0.0	1.3
Other	0.2	0.1	0.2	0.3	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Rooms used for sleeping						
One	62.1	51.8	57.1	46.1	32.9	39.0
Two	24.1	24.9	24.5	30.5	29.2	29.8
Three or more	13.8	23.3	18.4	23.4	38.0	31.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Cooking fuel						
Electricity	0.5	0.3	0.4	0.3	0.2	0.3
LPG/natural gas/biogas	39.5	13.2	26.7	34.8	9.0	20.9
Kerosene	0.0	0.0	0.0	0.0	0.0	0.0
Cooking gel	0.1	0.1	0.1	0.1	0.0	0.0
Charcoal	44.3	22.8	33.9	47.8	19.2	32.4
Wood	10.7	59.9	34.6	15.1	69.4	44.3
Straw/shrubs/grass	0.0	0.9	0.5	0.0	1.3	0.7
Other fuel	0.1	0.0	0.0	0.1	0.0	0.1
No food cooked in household	4.8	2.8	3.8	1.9	0.7	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Percentage using solid fuel for cooking[1]	55.1	83.6	68.9	63.0	90.0	77.5
Percentage using clean fuel for cooking[2]	40.1	13.5	27.2	35.1	9.3	21.2
Total	95.1	97.2	96.1	98.1	99.3	98.7
Number of households/population	2,984	2,815	5,799	10,237	11,958	22,195

LPG = Liquefied petroleum gas
[1] Includes charcoal, wood, straw/shrubs/grass, agricultural crops, and animal dung
[2] Includes electricity, LPG/natural gas/biogas, and cooking gel

Table 2.4 Household possessions

Percentage of households possessing various household effects, means of transportation, agricultural land, and livestock/farm animals, according to residence, Ghana MIS 2019

	Residence		
Possession	Urban	Rural	Total
Household effects			
Radio	61.2	51.5	56.5
Television	78.5	48.1	63.7
Computer/tablet computer	23.2	8.0	15.8
Mobile telephone	95.8	88.5	92.3
Non-mobile telephone	1.2	0.4	0.8
Refrigerator	49.5	21.1	35.7
Freezer	14.1	5.4	9.9
Generator	2.8	1.4	2.1
Washing machine	3.4	0.8	2.1
Camera	3.2	0.9	2.1
Video/DVD/VCD	22.6	15.9	19.4
Sewing machine	17.3	12.2	14.8
Bed	80.7	68.8	74.9
Table	88.3	83.8	86.1
Chair	92.6	87.9	90.3
Cabinet	38.8	19.3	29.3
Means of transport			
Bicycle	16.6	27.1	21.7
Animal-drawn cart	0.2	1.6	0.9
Motorcycle/scooter	10.1	17.0	13.4
Car/truck	13.1	4.4	8.9
Boat with a motor	0.6	1.5	1.0
Boat without a motor	0.4	0.9	0.7
Ownership of agricultural land	20.4	57.9	38.6
Ownership of farm animals[1]	18.9	53.5	35.7
Number of households	2,984	2,815	5,799

[1] Cows, bulls, other cattle, horses, donkeys, mules, goats, sheep, chickens, other poultry, pigs, rabbits, and grasscutters

Table 2.5 Wealth quintiles

Percent distribution of the de jure population by wealth quintiles, and the Gini coefficient, according to residence and region, Ghana MIS 2019

Residence/ region	Wealth quintile					Total	Number of persons	Gini coefficient
	Lowest	Second	Middle	Fourth	Highest			
Residence								
Urban	2.4	10.0	21.5	29.8	36.4	100.0	10,237	0.14
Rural	35.1	28.5	18.7	11.6	6.0	100.0	11,958	0.28
Region								
Western	9.1	26.6	26.8	21.9	15.7	100.0	2,115	0.17
Central	9.0	24.4	34.3	21.0	11.3	100.0	1,639	0.23
Greater Accra	0.1	3.3	9.3	34.7	52.6	100.0	3,501	0.16
Volta	20.6	29.2	24.6	17.7	7.9	100.0	2,609	0.32
Eastern	7.0	16.8	24.6	28.2	23.4	100.0	2,452	0.25
Ashanti	6.8	21.1	22.2	21.6	28.3	100.0	3,855	0.26
Brong Ahafo	23.4	31.7	26.6	11.7	6.5	100.0	1,830	0.25
Northern	60.2	22.9	10.0	5.7	1.1	100.0	2,508	0.31
Upper East	74.8	9.4	8.3	3.7	3.7	100.0	1,016	0.41
Upper West	64.2	17.9	9.2	6.1	2.6	100.0	669	0.32
Total	20.0	20.0	20.0	20.0	20.0	100.0	22,195	0.25

Table 2.6 Household population by age, sex, and residence

Percent distributions 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, Ghana MIS 2019

Characteristic	Urban			Rural			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age									
<5	13.0	11.8	12.4	15.8	14.2	14.9	14.5	13.0	13.7
5-9	12.4	11.6	12.0	16.4	14.1	15.2	14.6	12.9	13.7
10-14	11.3	11.3	11.3	14.4	13.8	14.1	13.0	12.6	12.8
15-19	9.1	8.4	8.7	10.0	7.8	8.9	9.5	8.1	8.8
20-24	9.4	9.1	9.2	6.6	6.2	6.4	7.9	7.5	7.7
25-29	9.7	9.1	9.3	6.5	7.3	6.9	7.9	8.1	8.0
30-34	7.6	7.7	7.7	4.9	5.7	5.3	6.2	6.6	6.4
35-39	6.7	6.3	6.5	4.7	5.9	5.3	5.6	6.0	5.8
40-44	5.0	5.1	5.1	4.0	4.6	4.3	4.5	4.8	4.6
45-49	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
50-54	2.9	4.5	3.8	3.0	4.0	3.5	2.9	4.2	3.6
55-59	3.0	3.1	3.0	2.6	3.3	2.9	2.8	3.2	3.0
60-64	2.0	2.8	2.4	1.9	2.3	2.1	2.0	2.6	2.3
65-69	1.5	1.4	1.5	1.8	1.8	1.8	1.7	1.6	1.6
70-74	1.0	1.6	1.3	1.2	1.6	1.4	1.1	1.6	1.4
75-79	0.8	0.9	0.8	1.0	1.3	1.1	0.9	1.1	1.0
80+	0.5	1.4	1.0	1.4	2.1	1.8	1.0	1.8	1.4
Don't know	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dependency age groups									
0-14	36.7	34.6	35.6	46.6	42.1	44.3	42.1	38.6	40.3
15-64	59.4	60.0	59.7	48.0	51.0	49.6	53.2	55.2	54.2
65+	3.9	5.2	4.6	5.4	6.9	6.1	4.7	6.1	5.4
Don't know	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1
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	42.0	39.8	40.8	52.9	46.9	49.8	48.0	43.6	45.7
18+	57.9	60.1	59.1	47.0	53.1	50.1	52.0	56.4	54.3
Don't know	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adolescents 10-19	20.4	19.7	20.0	24.4	21.6	23.0	22.6	20.7	21.6
Number of persons	4,785	5,300	10,085	5,736	6,022	11,758	10,521	11,322	21,843

Table 2.7 Household composition

Percent distribution of households by sex of head of household and by household size, and mean size of households, according to residence, Ghana MIS 2019

Characteristic	Residence		
	Urban	Rural	Total
Household headship			
Male	62.6	68.0	65.2
Female	37.4	32.0	34.8
Total	100.0	100.0	100.0
Number of usual members			
0	0.1	0.0	0.0
1	24.0	18.8	21.5
2	16.2	11.8	14.1
3	16.9	13.9	15.4
4	15.3	14.8	15.0
5	11.6	12.5	12.1
6	7.7	8.8	8.2
7	3.7	8.1	5.8
8	2.2	4.8	3.4
9+	2.4	6.5	4.4
Total	100.0	100.0	100.0
Mean size of households	3.4	4.2	3.8
Number of households	2,984	2,815	5,799

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

Table 2.8 Background characteristics of respondents

Percent distribution of women age 15-49 by selected background characteristics, Ghana MIS 2019

Background characteristic	Women		
	Weighted percent	Weighted number	Unweighted number
Age			
15-19	17.7	918	943
20-24	16.7	865	870
25-29	17.9	927	900
30-34	14.6	756	744
35-39	13.6	702	681
40-44	10.7	554	561
45-49	8.9	459	482
Religion			
Catholic	8.0	412	599
Anglican/Methodist/Presbyterian	12.5	646	613
Pentecostal/Charismatic	44.2	2,289	1,981
Other Christian	14.1	730	692
Islam	18.2	944	1,095
Traditional/spiritualist	1.1	55	76
No religion	2.0	101	122
Other	0.1	4	3
Ethnic group			
Akan	44.0	2,282	1,958
Ga/Dangme	7.3	377	275
Ewe	17.0	878	744
Guan	2.1	111	119
Mole-Dagbani	17.7	918	1,460
Grusi	3.1	162	217
Gurma	5.3	273	223
Mande	0.9	47	49
Other	2.6	133	136
Residence			
Urban	51.3	2,657	2,440
Rural	48.7	2,524	2,741
Region			
Western	9.7	501	505
Central	7.1	368	465
Greater Accra	18.1	938	586
Volta	10.8	561	468
Eastern	12.4	642	493
Ashanti	18.3	950	648
Brong Ahafo	7.3	378	416
Northern	9.3	481	581
Upper East	4.1	215	509
Upper West	2.8	146	510
Education			
No education	16.7	865	1,133
Primary	18.6	963	960
Middle/JSS/JHS	36.6	1,898	1,811
Secondary/SSS/SHS or higher	28.1	1,456	1,277
Wealth quintile			
Lowest	16.2	839	1,326
Second	18.1	940	950
Middle	20.6	1,069	1,035
Fourth	21.0	1,087	909
Highest	24.1	1,247	961
Total	100.0	5,181	5,181

Note: Education categories refer to the highest level of education attended, whether or not that level was completed.
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 2.9 Educational attainment of women

Percent distribution of women age 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, Ghana MIS 2019

| Background characteristic | Highest level of schooling | | | | | | Total | Median years completed | Number of women |
	No education	Some primary	Completed primary[1]	Some secondary[2]	Completed secondary[3]	More than secondary			
Age									
15-24	5.8	12.1	3.4	54.9	18.8	5.0	100.0	8.2	1,783
15-19	3.5	13.6	3.5	69.2	9.6	0.5	100.0	7.7	918
20-24	8.2	10.5	3.2	39.7	28.6	9.8	100.0	8.7	865
25-29	14.2	11.1	4.9	38.5	16.5	14.7	100.0	8.3	927
30-34	18.7	15.9	4.5	34.1	13.8	13.0	100.0	8.1	756
35-39	24.6	15.2	6.6	39.1	8.1	6.4	100.0	6.8	702
40-44	32.4	16.7	3.7	35.5	7.4	4.3	100.0	5.2	554
45-49	29.4	20.2	5.6	35.0	4.1	5.7	100.0	5.1	459
Residence									
Urban	9.6	11.1	4.4	44.0	18.2	12.7	100.0	8.6	2,657
Rural	24.2	17.2	4.6	41.9	9.0	3.2	100.0	6.3	2,524
Region									
Western	13.1	7.8	7.4	49.6	15.8	6.2	100.0	8.2	501
Central	9.8	17.5	3.6	56.0	9.4	3.7	100.0	7.6	368
Greater Accra	5.0	11.8	5.3	39.7	22.0	16.3	100.0	8.9	938
Volta	16.2	22.6	3.1	41.8	12.1	4.2	100.0	6.6	561
Eastern	9.3	11.4	3.9	51.7	15.4	8.3	100.0	8.3	642
Ashanti	10.4	13.0	5.8	46.7	13.4	10.7	100.0	8.3	950
Brong Ahafo	12.2	18.6	3.5	52.9	8.1	4.7	100.0	7.4	378
Northern	57.0	13.2	2.2	17.8	8.0	1.8	100.0	0.0	481
Upper East	37.4	17.3	3.4	29.2	8.3	4.2	100.0	3.9	215
Upper West	45.5	14.7	2.2	27.0	6.3	4.3	100.0	2.7	146
Wealth quintile									
Lowest	46.8	20.3	4.4	24.6	3.6	0.3	100.0	1.3	839
Second	23.4	18.3	4.3	46.5	6.2	1.3	100.0	6.2	940
Middle	13.5	15.3	5.4	51.6	11.9	2.2	100.0	7.6	1,069
Fourth	6.6	14.2	6.2	47.4	18.6	7.0	100.0	8.4	1,087
Highest	2.9	5.6	2.5	41.3	23.5	24.3	100.0	10.9	1,247
Total	16.7	14.1	4.5	42.9	13.7	8.1	100.0	8.0	5,181

JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] Completed 6th grade at the primary level
[2] Includes some middle/JSS/JHS and completed middle/JSS/JHS and some secondary/SSS/SHS but have not completed secondary/SSS/SHS
[3] Completed 6th grade at the secondary level

Table 2.10 Women's literacy

Percent distribution of women age 15-49 by level of schooling attended and level of literacy, and percentage literate, according to background characteristics, Ghana MIS 2019

Background characteristic	Higher than secondary schooling	No schooling, primary or secondary school					Total	Percentage literate[1]	Number of women
		Can read a whole sentence	Can read part of a sentence	Cannot read at all	No card with required language	Blind/visually impaired			
Age									
15-24	5.0	62.2	9.5	22.9	0.4	0.0	100.0	76.7	1,783
15-19	0.5	70.7	10.0	18.0	0.8	0.0	100.0	81.2	918
20-24	9.8	53.1	8.9	28.1	0.0	0.0	100.0	71.9	865
25-29	14.7	39.7	8.7	36.8	0.0	0.1	100.0	63.1	927
30-34	13.0	33.7	8.6	44.2	0.5	0.0	100.0	55.3	756
35-39	6.4	30.3	8.5	54.7	0.1	0.0	100.0	45.1	702
40-44	4.3	23.7	6.8	65.2	0.0	0.0	100.0	34.8	554
45-49	5.7	18.6	9.0	66.8	0.0	0.0	100.0	33.2	459
Residence									
Urban	12.7	48.7	9.2	29.2	0.2	0.0	100.0	70.6	2,657
Rural	3.2	34.3	8.3	53.9	0.3	0.0	100.0	45.8	2,524
Region									
Western	6.2	45.8	9.7	38.1	0.1	0.0	100.0	61.7	501
Central	3.7	42.5	8.7	45.1	0.0	0.0	100.0	54.9	368
Greater Accra	16.3	52.8	11.7	19.2	0.0	0.0	100.0	80.8	938
Volta	4.2	41.2	8.2	44.4	1.8	0.2	100.0	53.6	561
Eastern	8.3	49.9	7.9	34.0	0.0	0.0	100.0	66.0	642
Ashanti	10.7	42.9	6.4	40.0	0.0	0.0	100.0	60.0	950
Brong Ahafo	4.7	35.5	11.8	48.0	0.0	0.0	100.0	52.0	378
Northern	1.8	18.1	6.5	73.6	0.0	0.0	100.0	26.4	481
Upper East	4.2	28.7	9.0	57.5	0.6	0.0	100.0	41.9	215
Upper West	4.3	25.3	7.0	63.4	0.0	0.0	100.0	36.6	146
Wealth quintile									
Lowest	0.3	18.5	7.6	73.5	0.1	0.0	100.0	26.5	839
Second	1.3	33.8	7.4	57.4	0.1	0.0	100.0	42.5	940
Middle	2.2	42.3	9.8	44.9	0.7	0.1	100.0	54.3	1,069
Fourth	7.0	51.5	10.3	31.0	0.2	0.0	100.0	68.8	1,087
Highest	24.3	54.2	8.3	13.1	0.0	0.0	100.0	86.8	1,247
Total	8.1	41.7	8.7	41.2	0.2	0.0	100.0	58.5	5,181

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

Table 2.11 Women's health insurance coverage

Percentage of women age 15-49 who are aware that malaria care is covered by the National Health Insurance Scheme (NHIS), percentage of women registered and covered by any health insurance, and among women registered and covered by any health insurance, percentage with specific types of health insurance coverage, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of women who are aware that malaria care is covered under the NHIS	Percentage of women registered and covered by any health insurance	Number of women	Percentage registered and covered by type of health insurance				Number of women registered and covered by any health insurance
				NHIS[1]	Employer-based health insurance	Mutual health organisation/ community-based insurance	Other privately purchased commercial insurance	
Age								
15-19	68.4	49.0	918	99.2	0.8	0.1	0.2	450
20-24	71.6	47.9	865	99.8	0.4	0.2	0.0	414
25-29	69.1	51.9	927	99.5	0.7	0.0	0.0	481
30-34	74.5	53.3	756	99.6	1.2	0.0	0.3	403
35-39	75.6	49.3	702	99.5	0.5	0.0	1.4	346
40-44	78.8	47.7	554	99.6	0.4	0.1	1.3	264
45-49	75.0	46.5	459	100.0	0.5	0.0	1.3	214
Residence								
Urban	70.7	49.0	2,657	99.6	0.4	0.0	0.7	1,301
Rural	74.6	50.3	2,524	99.5	1.0	0.1	0.4	1,270
Region								
Western	67.7	49.6	501	98.6	1.8	0.0	0.0	248
Central	75.7	39.9	368	99.0	0.6	1.0	0.0	147
Greater Accra	63.7	39.0	938	99.6	0.8	0.0	1.2	366
Volta	67.8	52.5	561	99.7	0.3	0.0	0.3	295
Eastern	70.4	50.0	642	100.0	1.2	0.0	0.0	321
Ashanti	81.7	53.2	950	99.3	0.4	0.0	1.6	506
Brong Ahafo	83.6	54.1	378	100.0	0.5	0.0	0.0	204
Northern	70.7	57.4	481	100.0	0.4	0.0	0.0	276
Upper East	74.9	62.3	215	100.0	0.0	0.3	0.0	134
Upper West	82.2	49.8	146	99.5	0.5	0.0	0.0	73
Education								
No education	71.2	47.7	865	99.4	0.6	0.0	0.0	413
Primary	71.0	44.9	963	99.6	0.4	0.0	0.2	432
Middle/JSS/JHS	74.5	49.8	1,898	99.7	0.4	0.2	0.1	946
Secondary/SSS/SHS or higher	72.1	53.6	1,456	99.4	1.2	0.0	1.5	780
Wealth quintile								
Lowest	72.2	46.5	839	99.5	0.3	0.2	0.0	390
Second	73.5	48.3	940	99.6	0.9	0.0	0.2	454
Middle	75.7	50.9	1,069	99.9	0.2	0.1	0.0	544
Fourth	72.0	48.7	1,087	99.8	0.8	0.0	0.0	529
Highest	70.1	52.4	1,247	99.1	1.1	0.1	1.9	653
Total	72.6	49.6	5,181	99.6	0.7	0.1	0.5	2,570

JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

MALARIA PREVENTION

3

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Key Findings

- **Ownership of insecticide-treated nets (ITNs):** 74% of households in Ghana own at least one ITN, and 52% of households have at least one ITN for every two people.

- **Sources of ITNs:** 67% of ITNs owned by households were obtained from the latest mass distribution campaign in 2018.

- **Access to an ITN:** Nearly 7 in 10 people (67%) have access to an ITN. This means that 67% of the country's population could sleep under an ITN if every ITN in a household were used by two people.

- **Use of ITNs:** 43% of the household population, 54% of children under age 5, and 49% of pregnant women slept under an ITN the night before the survey.

- **Intermittent preventive treatment (IPTp-SP):** 80% of pregnant women received at least two doses of IPTp-SP for prevention of malaria in pregnancy, and 61% received at least three doses.

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This chapter describes population coverage rates of some key malaria control interventions in Ghana, including ownership and use of mosquito nets, indoor residual spraying (IRS), and intermittent preventive treatment during pregnancy (IPTp) using sulfadoxine and pyrimethamine (IPTp-SP). The 2014-2020 Ghana Strategic Plan for Malaria Control focuses on scaling up these preventive interventions to reduce the malaria morbidity and mortality burden by 75% by 2020 (NMCP 2014).

3.1 OWNERSHIP OF INSECTICIDE-TREATED NETS

Ownership of insecticide-treated nets
Households that have at least one insecticide-treated net (ITN). An ITN is defined as a factory-treated net that does not require any further treatment. This is also called a long-lasting insecticidal net or LLIN.
Sample: Households

Full household ITN coverage
Percentage of households with at least one ITN for every two people.
Sample: Households

ITNs provide protection against mosquito bites and thus reduce the transmission of malaria parasites. Additionally, ITNs repel and kill mosquitoes. By reducing the vector population, ITNs help to decrease malaria risk at the individual level as well as the community level when high coverage is achieved. The distribution and use of ITNs is one of the core interventions for preventing malaria infection in Ghana. In surveys conducted prior to 2016, the definition of an ITN included nets that had been soaked or retreated with insecticides within the past 12 months. In the 2016 GMIS and the 2019 GMIS, questions on

retreatment of nets were eliminated, since nets that require annual retreatment and the products used in this process are no longer distributed. As a result, the distinction between ITNs and long-lasting insecticide-treated nets (LLIN) is no longer meaningful.

The 2014-2020 Ghana Strategic Plan aims to sustain universal coverage by distributing a sufficient number of ITNs to cover all household members. This indicator is operationalised as one ITN for every two household members. ITNs in Ghana are distributed through mass distribution campaigns, during visits to antenatal care (ANC) clinics and child welfare clinics (CWCs), and at primary schools (NMCP 2019).

3.1.1 Mass Distribution Campaigns

The most recent ITN mass distribution campaign took place in 2018. The goal of that campaign was to distribute ITNs (one ITN per two persons) to 90% of the registered population. The 2018 campaign took place from 13 February to 21 December and reached 194 districts in nine of the country's 10 regions (USAID 2020). All 11 districts in Upper West region, one district in Ashanti region, three districts in Upper East region, and seven districts in Northern region were excluded from the campaign due to implementation of IRS. The percentage of allocated nets distributed as part of the campaign ranged from 70% in Greater Accra region to 95% in Upper East region; the national average was 89% (NMCP 2019).

3.1.2 Continuous Distribution

As part of continuous distribution, ITNs are routinely distributed at antenatal care clinics, child welfare clinics, and primary schools. Health facility-based distribution targets pregnant women during their first ANC visit. As part of child welfare visits, ITNs are distributed free to children age 18 months or older during their second dose of measles-rubella vaccine (NMCP 2020). In years in which a mass distribution campaign does not occur, children in primary 2 and primary 6 from public and private schools across the country are given free nets as part of school-based distributions (NMCP 2020).

The 2019 GMIS results show that 74% of households in Ghana own at least one ITN (**Table 3.1**). Fifty-two percent of households have at least one ITN for every two people who stayed in the household the night before the survey, while 22% own at least one ITN but have an insufficient supply for the number of household members and 26% do not own any ITNs (**Figure 3.1**).

Figure 3.1 **Household coverage of ITNs**

Percent distribution of households

No ITN 26%

At least 1 ITN, but not enough for all HH members 22%

At least 1 ITN for every 2 people in the HH 52%
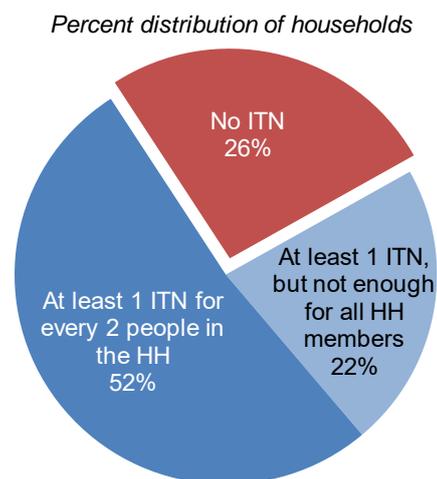
Trends: The percentage of households that own at least one ITN increased from 42% in 2008 to 74% in 2019 (**Figure 3.2**).

Patterns by background characteristics

- Ownership of ITNs is higher in rural households (85%) than in urban households (64%) (**Table 3.1**).

- The percentage of households with at least one ITN decreases with increasing household wealth, from 87% in the lowest wealth quintile to 60% in the highest wealth quintile (**Figure 3.3**).

- By region, the percentage of households with at least one ITN is highest in Upper East region (88%) and lowest in Greater Accra region (56%) (**Figure 3.4**).

Figure 3.2 **Trends in household ownership of ITNs**

Percentage of households owning at least one insecticide-treated net (ITN)
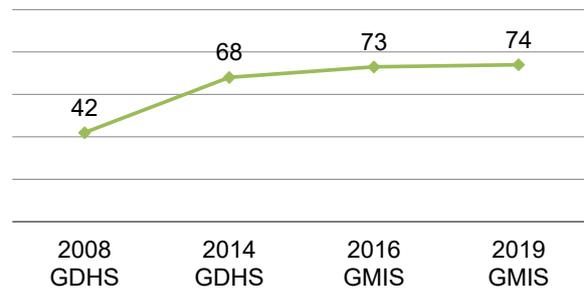
2008 GDHS	2014 GDHS	2016 GMIS	2019 GMIS
42	68	73	74

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

Figure 3.3 **ITN ownership by household wealth**

Percentage of households with at least one ITN

Lowest	Second	Middle	Fourth	Highest
87	83	78	67	60

Poorest ——————————→ Wealthiest

Figure 3.4 **ITN ownership by region**

Percentage of households with at least one ITN

Upper East 88%
Upper West 78%
Northern 85%
Brong Ahafo 80%
Volta 85%
Ashanti 73%
Eastern 71%
Western 79%
Central 78%
Greater Accra 56%

☐ 56% - 65%
☐ 66% - 75%
☐ 76% - 83%
■ 84% - 88%
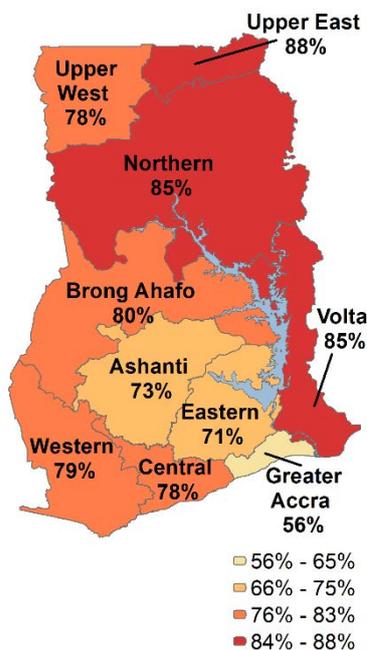
3.1.3 Source of Nets

There are several ways to obtain a mosquito net in Ghana. Mosquito nets can be obtained during mass distribution campaigns, during ANC visits by pregnant women, at schools, and during visits to child welfare clinics. Nets can also be purchased directly at various sales points. **Figure 3.5** shows the percentage distribution of ITNs in interviewed households.

The main source of ITNs in Ghana was the 2018 mass national distribution campaign, which accounted for 67% of household nets (**Table 3.2**). Eleven percent of ITNs were obtained in prior mass distribution campaigns. Six percent of households obtained their ITNs through ANC visits, 5% via school distribution, and 3% from immunisation visits.

Figure 3.5 **Source of ITNs**

Percent distribution of ITNs in interviewed households
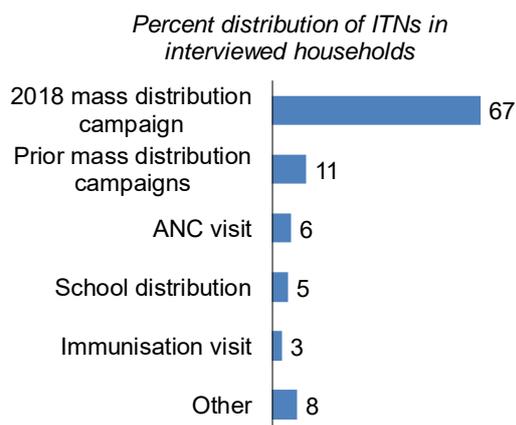
3.2 HOUSEHOLD ACCESS TO AND USE OF ITNS

Access to an ITN

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

Use of ITNs

Percentage of the population that slept under an ITN the night before the survey.
Sample: De facto household population

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

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

Figure 3.6 shows that although 67% of household residents in Ghana have access to an ITN, only 43% slept under an ITN the night before the survey (**Table 3.3** and **Table 3.5**). The gap between access to and use of ITNs is larger in urban (59% versus 28%) than rural (74% versus 57%) households (**Table 3.4** and **Table 3.5**).

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

Percentage of the household population with access to an ITN and the percentage who slept under an ITN the night before the survey
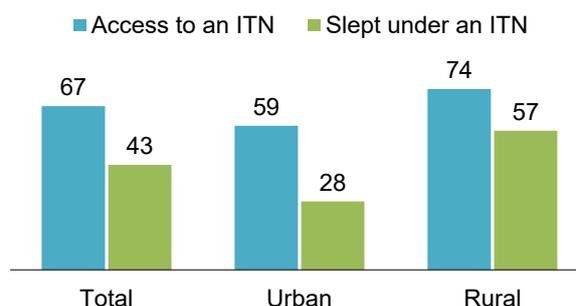
In households with at least one ITN, 54% of the population slept under an ITN the previous night (**Table 3.5**). Overall, 50% of all existing ITNs were used the night before the survey (**Table 3.6**).

Trends: The percentage of the household population with access to an ITN has increased by 37 percentage points since 2008, from 30% to 67%. There has been a smaller increase in the use of ITNs; 21% of the household population slept under an ITN the night before the survey in 2008, as compared with 43% in 2019. This difference is reflected in the gap between ITN access and ITN use over the same period: the gap increased sharply from 9 percentage points in 2008 to 23 percentage points in 2014 and has since remained almost unchanged (24 percentage points in both 2016 and 2019) (**Figure 3.7**).

Patterns by background characteristics

- The percentage of the population with access to an ITN generally decreases with increasing household wealth, from 71% in the lowest wealth quintile to 58% in the highest wealth quintile (**Table 3.4**).

- ITN access ranges from 51% in Greater Accra region to 76% in Volta region (**Figure 3.8**).

- ITN use by the household population ranges from 19% in Greater Accra region to 66% in Upper East region (**Figure 3.9**).

- The difference between ITN access and ITN use is largest in Greater Accra region and Eastern region (32 percentage points each) and smallest in Upper West region (6 percentage points).

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

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

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

Figure 3.8 ITN access by region

Percent of the household population that could sleep under an ITN if each ITN in the household were used by up to 2 people
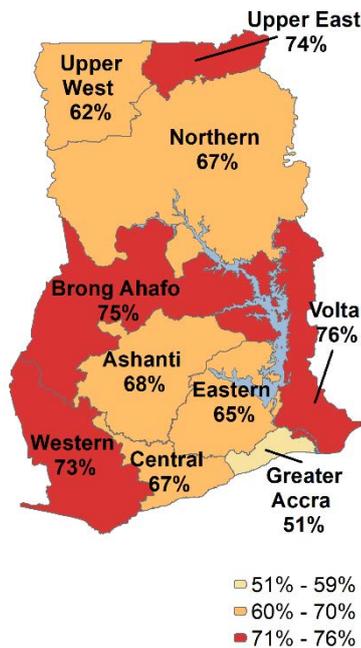
Figure 3.9 ITN use in the household population by region

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

Upper East 74%
Upper West 62%
Northern 67%
Brong Ahafo 75%
Volta 76%
Ashanti 68%
Eastern 65%
Western 73%
Central 67%
Greater Accra 51%

☐ 51% - 59%
☐ 60% - 70%
■ 71% - 76%

Upper East 66%
Upper West 55%
Northern 52%
Brong Ahafo 60%
Volta 54%
Ashanti 40%
Eastern 34%
Western 47%
Central 44%
Greater Accra 19%

☐ 19% - 32%
☐ 33% - 42%
■ 43% - 51%
■ 52% - 66%
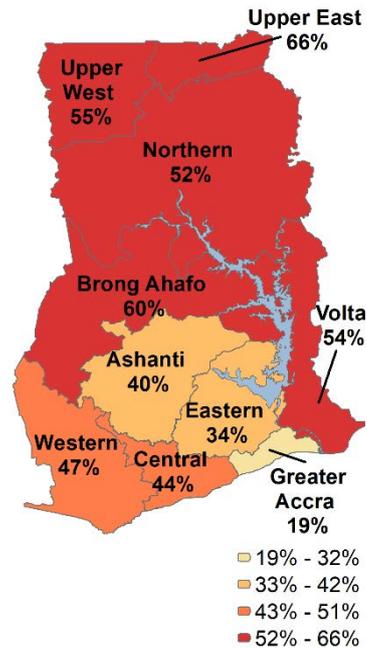
3.3 USE OF ITNs BY CHILDREN AND PREGNANT WOMEN

Malaria is endemic in Ghana, with transmission occurring year-round with seasonal variations. Partial immunity to the disease is acquired over time among those living in high malaria transmission areas (Doolan et al. 2009). Children under age 5 are prone to severe malaria infection because they lack acquired immunity. For about 6 months after birth, antibodies acquired from the mother during pregnancy protect the child, although this maternal immunity is gradually lost when the child begins to develop his/her own immunity to malaria. Age is an important factor in determining levels of acquired immunity to malaria because acquired immunity does not prevent infection but protects against severe disease and death. The pace at which immunity develops depends upon the level of exposure to malarial infection. In high malaria-endemic areas, children are thought to attain a high level of immunity by their fifth birthday. These children may experience episodes of malaria illness but usually do not suffer from severe, life-threatening conditions (Shulman and Dorman 2003).

Adults usually acquire some degree of immunity. However, since pregnancy suppresses immunity, women in their first pregnancies are at increased risk for severe malaria. Malaria in pregnancy is frequently associated with the development of anaemia, which interferes with the maternal-foetus exchange and may lead to low birth weight infants, placental parasitaemia, foetal death, abortion, stillbirth, and prematurity (Shulman and Dorman 2003).

As stated in the 2014-2020 Strategic Plan for Malaria Control in Ghana, children under age 5 and pregnant women should sleep under an ITN every night to prevent malaria complications (NMCP 2014).

Fifty-four percent of children under age 5 slept under an ITN the night before the survey, and 63% of children in households with at least one ITN slept under an ITN the night before the survey (**Table 3.7**). Overall, 49% of pregnant women age 15-49 slept under an ITN the night before the survey, and 58% of pregnant women living in households with at least one ITN slept under an ITN the night before the survey (**Table 3.8**).

Trends: ITN use among children under age 5 has increased markedly since 2008, from 39% to 54%. Similarly, the percentage of pregnant women who slept under an ITN the night before the survey has nearly doubled, from 27% to 49% (**Figure 3.10**).

Patterns by background characteristics

- ITN use by children under age 5 ranges from 25% in Greater Accra region to 69% in Brong Ahafo and Upper West regions.

- The percentage of children under age 5 who slept under an ITN the previous night decreases as household wealth increases, from 69% in the lowest and second wealth quintiles to 30% in the highest quintile.

- ITN use by pregnant women is twice as high in rural areas (61%) as in urban areas (31%).

Figure 3.10 **Trends in ITN use by children and pregnant women**

Percentage of children and pregnant women using an ITN the night before the survey
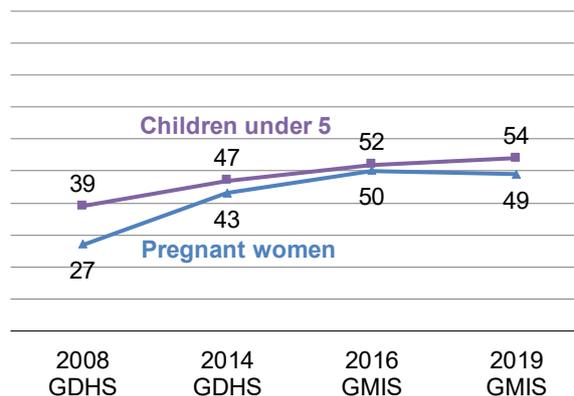
Note: The definition of an ITN in surveys conducted prior to the 2016 GMIS included nets that had been soaked with insecticides within the past 12 months.

3.4 REASONS MOSQUITO NETS WERE NOT USED

Table 3.9 presents reasons why mosquito nets were not used the night before the survey. This information is important to the NMCP for identifying barriers to net usage. Overall, 50% of mosquito nets in households were not used the night before the survey. Thirty-nine percent of respondents reported that the net was an extra net or that they were saving it for later, 25% said that it was too hot, and 13% stated that they preferred other mosquito control methods (coils, spray, or fans).

Patterns by background characteristics

- By region, the proportion of nets that were not used ranged from 16% in Upper West region to 72% in Greater Accra region.

- The percentage of households not using a net the night before the survey was higher in urban areas than in rural areas (63% versus 41%).

- Rural households were more likely than urban households to report not using a mosquito net because it was an extra net or they were saving the net for later (51% versus 28%).

3.5 INDOOR RESIDUAL SPRAYING

In Ghana, indoor residual spraying (IRS) is implemented in targeted geographical areas by the PMI VectorLink Project, funded by USAID and the President's Malaria Initiative (PMI), and AngloGold Ashanti Malaria Control limited (AGAMal), funded by The Global Fund. The PMI VectorLink Project operates in seven districts (Bunkpurugu Yunyoo, East Mamprusi, Gushegu, Karaga, Kumbungu, Mamprugu Moaduri, and West Mamprusi) in the Northern region. AGAMal operates in 16 districts: all districts in the Upper West region, three districts (Builsa North, Builsa South, and Kassena Nankana West) in the Upper East region, and one district (Obuasi Municipal) in the Ashanti region (NMCP 2020). It is important to note that because IRS spraying is not conducted across all of Ghana, results by region better represent coverage of IRS in Ghana.

Table 3.10 shows that 6% of all households received IRS in the past 12 months. Seventy-five percent of households had at least one ITN and/or IRS in the preceding 12 months. The majority of households with

IRS in the past 12 months were sprayed by a government worker/program (62%) or a nongovernmental organisation (NGO) (27%).

Patterns by background characteristics

- The percentage of households receiving IRS is higher in rural areas (9%) than in urban areas (4%).

- By region, households in Upper West region (90%), Northern region (30%), and Upper East region (15%) are most likely to have received IRS in the past 12 months.

- Urban households (26%) were more likely than rural households (less than 1%) to have been sprayed by a private company.

3.6 MALARIA IN PREGNANCY

Intermittent preventive treatment (IPTp) during pregnancy (IPTp-SP 2+)
Percentage of women who took at least two doses of 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 (IPTp) during pregnancy (IPTp-SP 3+)
Percentage of women who took at least three doses of SP/Fansidar during their last pregnancy.
Sample: Women age 15-49 with a live birth in the 2 years before the survey

Malaria infection during pregnancy is a major public health problem in Ghana, with substantial risks for the mother, her foetus, and the neonate. The World Health Organization (WHO) recommends a package of interventions for reducing the negative health effects associated with malaria in pregnancy (MIP): prompt diagnosis and treatment of confirmed infections, use of ITNs, and IPTp-SP (WHO 2017).

IPTp-SP is a full therapeutic course of antimalarial medicine given to pregnant women at routine antenatal care visits to prevent malaria. IPTp-SP helps prevent maternal malaria episodes, maternal and foetal anaemia, placental parasitaemia, low birth weight, and neonatal mortality (WHO 2019).

3.6.1 Antenatal Care (ANC)

The 2019 GMIS assessed the use of antenatal care services for the last birth in the 5 years preceding the survey and IPTp-SP usage during the pregnancy for the last birth in the 2 years preceding the survey among women age 15-49.

Overall, 97% of women received antenatal care from a skilled provider for their last birth in the past 5 years (**Table 3.11**). Seventy-two percent received care from a nurse or midwife, and 25% received care from a doctor. Two percent of women received no antenatal care. Forty-three percent of women had eight or more ANC visits, with the majority attending their first visit during the first trimester of pregnancy (67%). Among those who received ANC, the median number of months pregnant at the first visit was 3.5 (**Table 3.12**).

3.6.2 IPTp-SP

Malaria during pregnancy is a priority area in the control of malaria. Ghana has deployed several strategies to address the problem of malaria in pregnancy. In 2003, Ghana adopted the intermittent preventive treatment during pregnancy (IPTp) strategy using sulfadoxine and pyrimethamine (IPTp-SP), together with the use of insecticide-treated nets, for the prevention of malaria in pregnancy. These preventive interventions were integrated into ANC visits, with IPTp-SP being given to women from the 16th week of

pregnancy, at monthly intervals, as directly observed therapy (NMCP 2019). In 2013 and 2017, the National Malaria Control Programme revised the policy based on WHO recommendations from up to three doses of IPTp-SP to three or more doses of IPTp-SP until delivery (WHO 2012a; WHO 2012b; WHO 2017).

The 2019 GMIS measured coverage of this intervention among women age 15-49 with a live birth in the 2 years before the survey. Ninety-one percent of women with a live birth in the 2 years before the survey reported receiving one or more doses of IPTp-SP during the pregnancy of their most recent live birth, while 80% received two or more doses. Sixty-one percent of women received three or more doses of IPTp-SP as recommended by the National Malaria Control Strategy (**Table 3.13**).

Among women with a live birth in the 2 years preceding the survey who took IPTp-SP only one or two times during pregnancy, the most commonly cited reasons for not taking IPTp-SP more than one or two times were that they were not aware they had to take more (42%) and it was not given (35%) (**Table 3.14**).

Trends: The percentage of women receiving one or more doses of IPTp-SP increased from 58% in 2008 to 91% in 2019, while the percentage receiving two or more doses increased from 46% to 80%. Over the same period, the percentage of women receiving three or more doses of IPTp-SP increased from 28% to 61% (**Figure 3.11**).

Patterns by background characteristics

- Differences by residence are small; 62% of pregnant women from rural areas received at least three doses of IPTp-SP, as compared with 60% of women from urban areas (**Table 3.13**).

Figure 3.11 **Trends in IPTp-SP 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 IPTp-SP

- By region, the percentage of women receiving three or more doses of IPTp-SP ranges from 42% in Eastern region to 78% in Upper West region.

- Urban women were more likely than rural women to say that they did not take IPTp-SP more than one or two times because they were not given the medicine (40% versus 31%) (**Table 3.14**).
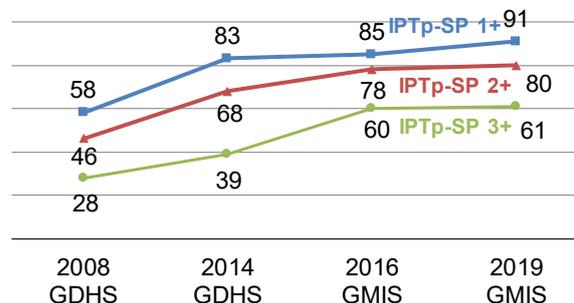
LIST OF TABLES

For detailed information on malaria, 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, Ghana MIS 2019

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 mosquito net for every two persons who stayed in the household last night		Number of households with at least one person who stayed in the household last night
	Any mosquito net	Insecticide-treated mosquito net (ITN)[1]	Any mosquito net	Insecticide-treated mosquito net (ITN)[1]		Any mosquito net	Insecticide-treated mosquito net (ITN)[1]	
Residence								
Urban	63.9	63.5	1.4	1.4	2,984	44.6	44.3	2,970
Rural	84.6	84.5	2.2	2.2	2,815	59.9	59.7	2,786
Region								
Western	78.8	78.8	2.0	2.0	573	59.0	59.0	567
Central	77.7	77.7	1.7	1.7	463	54.6	54.6	456
Greater Accra	56.2	56.1	1.2	1.2	1,103	39.7	39.4	1,102
Volta	84.9	84.5	2.1	2.1	644	61.3	61.1	640
Eastern	71.9	71.3	1.6	1.5	739	48.8	48.3	728
Ashanti	72.8	72.5	1.8	1.8	1,057	54.1	54.0	1,053
Brong Ahafo	80.0	79.6	2.0	1.9	499	61.8	60.9	495
Northern	85.4	85.4	2.5	2.5	405	47.7	47.7	402
Upper East	87.8	87.8	2.4	2.4	193	55.5	55.5	191
Upper West	77.9	77.9	1.9	1.9	123	42.6	42.6	123
Wealth quintile								
Lowest	87.0	87.0	2.3	2.3	861	56.1	56.0	856
Second	83.4	83.4	2.1	2.1	1,046	56.1	55.8	1,040
Middle	78.2	78.1	1.8	1.8	1,231	57.9	57.8	1,222
Fourth	67.6	67.2	1.5	1.5	1,334	48.4	48.0	1,318
Highest	60.6	60.1	1.4	1.4	1,326	44.4	44.0	1,320
Total	74.0	73.7	1.8	1.8	5,799	52.0	51.8	5,756

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.2 Source of mosquito nets

Percent distribution of mosquito nets by source of net, according to background characteristics, Ghana MIS 2019

Background characteristic	2018 mass distribution campaign	ANC visit	Immuni- sation visit	School distribution	Private health facility	NGO	Pharmacy/ chemist/ drug store	Shop/ market	Religious institution	Community- based agents	Petrol station/ mobile mart	Prior mass distribution campaign	Other	Don't know	Total	Number of mosquito nets
Type of net																
ITN[1]	67.2	5.5	2.7	5.0	0.8	0.7	0.6	1.1	0.1	1.7	0.0	10.9	3.3	0.4	100.0	10,308
Other[2]	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(4.4)	(5.9)	(31.5)	(0.0)	(15.8)	(0.0)	(20.5)	(16.8)	(5.2)	(100.0)	52
Residence																
Urban	60.7	6.0	1.8	5.6	1.6	0.8	1.0	1.5	0.1	1.7	0.0	14.7	4.2	0.5	100.0	4,240
Rural	71.1	5.0	3.4	4.6	0.3	0.7	0.3	1.0	0.2	1.8	0.0	8.4	2.8	0.4	100.0	6,120
Region																
Western	71.7	4.3	1.8	6.0	0.0	0.3	0.1	0.3	0.0	2.4	0.0	5.8	7.1	0.2	100.0	1,138
Central	63.9	5.1	2.8	5.0	1.9	5.9	0.4	1.7	0.2	0.9	0.0	10.9	1.3	0.0	100.0	777
Greater Accra	57.2	6.8	2.7	3.6	3.5	0.0	2.1	1.4	0.4	0.6	0.0	18.1	2.7	0.9	100.0	1,316
Volta	70.6	4.3	4.3	5.1	0.0	0.1	0.3	0.6	0.1	0.0	0.0	9.8	4.4	0.3	100.0	1,384
Eastern	53.2	10.0	2.4	9.6	0.0	0.1	0.4	1.3	0.0	1.2	0.0	13.7	6.6	1.5	100.0	1,153
Ashanti	74.1	3.8	1.7	4.6	0.9	0.3	0.8	2.2	0.0	0.1	0.0	10.1	1.4	0.2	100.0	1,916
Brong Ahafo	81.0	2.5	0.9	4.9	0.7	0.8	0.2	0.6	0.4	0.6	0.0	5.7	1.7	0.1	100.0	978
Northern	67.7	4.5	1.8	2.0	0.0	0.4	0.3	0.8	0.0	9.9	0.0	10.4	2.2	0.1	100.0	1,000
Upper East	64.4	6.3	2.7	5.0	0.0	0.3	0.2	2.0	0.5	4.3	0.0	11.7	2.6	0.1	100.0	467
Upper West	35.3	15.5	20.4	1.8	0.2	0.8	0.0	1.5	0.2	0.2	0.0	20.3	3.3	0.5	100.0	231
Wealth quintile																
Lowest	69.5	5.2	3.8	2.8	0.1	0.5	0.1	0.9	0.2	4.3	0.0	10.3	2.1	0.2	100.0	1,996
Second	72.4	3.8	2.0	5.4	0.3	0.7	0.2	0.6	0.2	1.7	0.0	8.8	3.4	0.4	100.0	2,235
Middle	70.1	5.6	3.2	5.0	0.7	1.2	0.2	0.8	0.1	0.7	0.0	8.0	3.8	0.5	100.0	2,248
Fourth	63.3	6.9	1.6	6.2	1.5	0.6	0.6	2.3	0.1	1.0	0.0	11.6	3.7	0.5	100.0	1,969
Highest	57.4	5.9	3.1	5.5	1.6	0.4	2.0	1.5	0.1	1.2	0.0	17.1	3.7	0.4	100.0	1,912
Total	66.8	5.4	2.7	5.0	0.8	0.7	0.6	1.2	0.1	1.8	0.0	11.0	3.4	0.4	100.0	10,360

Note: Figures in parentheses are based on 25–49 unweighted cases.
ANC = Antenatal care
NGO = Nongovernmental organisation
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).
[2] Any net that is not an ITN

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

Percent distribution of the de facto household population by number of ITNs the household owns, and percentage with access to an ITN, according to number of persons who stayed in the household the night before the survey, Ghana MIS 2019

Number of ITNs[1]	Number of persons who stayed in the household the night before the survey								Total
	1	2	3	4	5	6	7	8+	
0	42.6	35.2	23.5	21.2	19.2	14.9	11.2	12.8	19.9
1	37.7	30.1	28.2	18.7	14.2	11.3	7.3	7.5	16.8
2	14.9	23.4	27.6	28.5	26.0	25.0	19.3	11.0	22.0
3	4.2	7.8	13.3	18.3	21.4	19.9	21.9	19.0	17.3
4	0.5	2.6	4.6	8.4	10.9	16.6	19.3	19.7	11.8
5	0.1	0.6	2.5	2.6	5.2	6.7	8.3	9.7	5.2
6	0.0	0.1	0.1	1.6	2.5	3.1	5.2	6.5	2.9
7	0.1	0.3	0.3	0.6	0.8	2.4	7.5	13.8	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	1,232	1,706	2,743	3,344	3,459	2,702	2,404	4,254	21,843
Percentage with access to an ITN[1,2]	57.4	64.8	67.1	69.4	67.1	69.2	72.2	62.9	66.7

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).
[2] Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.4 Access to an ITN by background characteristics

Percentage of the de facto population with access to an ITN in the household, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage with access to an ITN[1,2]
Residence	
Urban	58.5
Rural	73.8
Region	
Western	72.5
Central	67.2
Greater Accra	51.4
Volta	75.5
Eastern	65.0
Ashanti	67.7
Brong Ahafo	75.1
Northern	66.7
Upper East	74.0
Upper West	61.5
Wealth quintile	
Lowest	70.8
Second	73.2
Middle	70.0
Fourth	61.2
Highest	58.4
Total	66.7

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).
[2] Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.5 Use of mosquito nets by persons in the household

Percentage of the de facto household population who slept the night before the survey under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN), and among the de facto household population in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Ghana MIS 2019

Background characteristic	Household population			Household population in households with at least one ITN[1]	
	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	54.2	54.1	3,011	63.3	2,575
5-14	44.4	44.1	5,793	52.5	4,862
15-34	36.6	36.5	6,741	48.4	5,083
35-49	42.8	42.7	3,180	54.1	2,506
50+	46.3	46.1	3,118	58.5	2,461
Sex					
Male	41.1	40.9	10,521	51.9	8,303
Female	45.5	45.3	11,322	55.9	9,185
Residence					
Urban	27.8	27.6	10,085	38.8	7,172
Rural	56.7	56.6	11,758	64.5	10,315
Region					
Western	47.0	47.0	2,076	56.6	1,725
Central	43.6	43.6	1,590	53.3	1,300
Greater Accra	19.0	19.0	3,470	30.5	2,163
Volta	54.6	54.3	2,576	61.8	2,266
Eastern	34.0	33.5	2,405	42.5	1,898
Ashanti	40.5	40.3	3,836	51.4	3,009
Brong Ahafo	60.9	60.3	1,769	69.7	1,530
Northern	51.6	51.6	2,476	58.2	2,193
Upper East	65.8	65.8	996	73.6	890
Upper West	55.3	55.3	650	70.1	513
Wealth quintile					
Lowest	62.6	62.5	4,408	71.2	3,870
Second	59.3	59.1	4,361	67.0	3,843
Middle	45.1	44.9	4,352	54.8	3,566
Fourth	28.8	28.5	4,339	38.4	3,221
Highest	21.0	20.8	4,383	30.5	2,987
Total	43.4	43.2	21,843	54.0	17,488

Note: Total includes 12 people for whom information on age is missing.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.6 Use of existing ITNs

Percentage of insecticide-treated nets (ITNs) that were used by anyone the night before the survey, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of existing ITNs[1] used last night	Number of ITNs[1]
Residence		
Urban	37.5	4,205
Rural	58.7	6,103
Region		
Western	47.3	1,138
Central	45.9	777
Greater Accra	28.5	1,310
Volta	58.7	1,376
Eastern	40.0	1,135
Ashanti	44.1	1,907
Brong Ahafo	58.3	969
Northern	67.0	999
Upper East	77.4	466
Upper West	84.0	231
Wealth quintile		
Lowest	74.6	1,995
Second	61.0	2,226
Middle	47.4	2,243
Fourth	36.2	1,958
Highest	28.7	1,887
Total	50.1	10,308

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.7 Use of mosquito nets by children

Percentage of children under age 5 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN), and among children under age 5 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Ghana MIS 2019

Background characteristic	Children under age 5 in all households			Children under age 5 in households with at least one ITN[1]	
	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	57.8	57.6	591	66.8	509
12-23	58.9	58.7	584	66.6	515
24-35	52.9	52.7	636	61.9	542
36-47	50.7	50.7	602	61.3	498
48-59	51.0	51.0	595	59.7	509
Sex					
Male	52.9	52.9	1,530	61.1	1,323
Female	55.6	55.4	1,478	65.5	1,249
Residence					
Urban	37.9	37.8	1,246	48.4	972
Rural	65.7	65.7	1,762	72.3	1,600
Region					
Western	58.5	58.5	310	67.9	267
Central	56.4	56.4	223	65.2	193
Greater Accra	24.7	24.7	376	34.9	266
Volta	67.6	67.6	340	72.4	317
Eastern	43.5	43.5	315	50.4	272
Ashanti	52.5	52.3	472	62.4	395
Brong Ahafo	70.2	69.3	259	76.4	235
Northern	57.5	57.5	473	64.7	421
Upper East	67.2	67.2	144	74.9	129
Upper West	69.3	69.3	95	85.5	77
Wealth quintile					
Lowest	68.6	68.6	693	77.3	615
Second	68.7	68.5	672	73.6	625
Middle	52.3	52.3	619	60.9	531
Fourth	41.3	41.1	548	51.1	441
Highest	30.3	30.1	476	39.8	360
Total	54.2	54.1	3,008	63.3	2,572

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 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.8 Use of mosquito nets by pregnant women

Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN), and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Ghana MIS 2019

Background characteristic	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one ITN[1]	
	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	32.5	31.4	143	44.2	102
Rural	61.0	61.0	202	66.2	186
Region					
Western	(63.9)	(63.9)	33	(71.2)	30
Central	(50.9)	(50.9)	26	(61.1)	21
Greater Accra	(20.8)	(20.8)	43	*	28
Volta	(34.8)	(33.0)	32	*	27
Eastern	(43.7)	(43.7)	46	(56.7)	35
Ashanti	(48.4)	(48.4)	64	(57.1)	54
Brong Ahafo	(61.1)	(57.8)	31	(61.6)	29
Northern	61.4	61.4	45	69.5	40
Upper East	(68.2)	(68.2)	16	(75.9)	15
Upper West	(72.5)	(72.5)	9	(82.1)	8
Education					
No education	63.5	63.5	70	75.2	59
Primary	48.8	48.8	72	55.7	63
Middle/JSS/JHS	50.0	48.8	130	58.5	109
Secondary/SSS/SHS or higher	34.2	34.2	73	44.0	57
Wealth quintile					
Lowest	70.9	70.9	75	78.6	68
Second	68.8	68.8	73	74.2	67
Middle	47.8	47.8	67	(60.3)	53
Fourth	33.8	31.4	65	40.4	50
Highest	18.8	18.8	65	(25.1)	49
Total	49.1	48.7	345	58.4	288

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.
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.9 Reasons mosquito nets were not used the night before the survey

Among ITNs, other ITNs, and all mosquito nets, the percentage of nets not used by anyone the night before the survey, percentage that were not used by anyone the night before the survey, percentage not used for specific reasons, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of nets not used the night before the survey	Total number of mosquito nets	Reason for not using the net last night															Number of mosquito nets not used the night before the survey
			Too hot	No mosquitoes	No malaria	Prefer other method (coils, spray, fans)	Net too old/ torn	Chemicals in net are unsafe	Don't like smell	Net too short/small	Usual user did not sleep here	Extra net/ saving for later	Net was being washed/ dried/aired	Slept outside	Net brought bugs	Don't like shape	Other	
Residence																		
Urban	62.6	4,240	33.1	9.5	0.6	15.8	3.6	3.9	1.4	0.4	2.7	27.7	3.8	0.6	0.0	1.2	10.0	2,653
Rural	41.3	6,120	16.3	6.2	0.1	10.4	2.9	3.1	0.9	0.4	3.3	50.5	4.7	0.9	0.0	0.8	7.6	2,525
Net textile type																		
Polyethylene[1]	54.4	1,539	23.2	7.0	0.0	14.4	1.8	4.0	1.2	0.2	2.4	40.4	2.9	0.7	0.1	2.0	10.3	838
Polyester[2]	49.0	8,585	25.0	8.2	0.4	12.8	3.5	3.4	1.2	0.4	3.1	39.1	4.4	0.8	0.0	0.8	8.5	4,208
Other textile type[3]	56.7	153	29.7	3.5	0.0	16.1	6.2	3.4	0.0	1.6	8.3	23.3	11.2	0.0	0.0	0.0	8.8	87
Other net[4]	55.6	83	(36.6)	(12.6)	(0.0)	(26.1)	(2.8)	(2.8)	(0.0)	(0.0)	(3.1)	(19.6)	(0.0)	(0.7)	(0.0)	(0.0)	(8.2)	46
Region																		
Western	52.7	1,138	24.9	13.0	0.7	20.2	1.8	2.9	1.7	0.0	4.6	41.9	3.9	0.9	0.0	0.1	9.6	599
Central	54.1	777	27.8	7.8	0.5	14.0	3.4	7.9	1.8	1.2	2.0	36.4	5.3	0.7	0.0	0.7	5.6	420
Greater Accra	71.6	1,316	33.1	12.1	0.2	11.2	3.9	4.5	1.9	0.2	1.9	28.5	2.3	0.4	0.0	2.8	11.1	943
Volta	41.4	1,384	14.2	6.3	0.1	12.7	3.2	0.9	2.1	0.1	2.7	39.3	8.3	0.8	0.0	3.1	11.3	573
Eastern	60.1	1,153	22.6	9.3	1.1	7.1	4.2	5.6	0.7	0.6	3.7	36.3	6.4	0.3	0.1	0.0	12.2	693
Ashanti	56.0	1,916	31.2	3.5	0.1	18.1	2.5	1.6	0.1	0.4	3.1	39.1	3.3	0.0	0.0	0.2	5.6	1,072
Brong Ahafo	41.5	978	20.9	3.7	0.0	6.8	1.1	1.6	0.8	0.8	2.3	51.4	2.4	3.8	0.0	0.2	10.2	406
Northern	33.0	1,000	9.0	8.8	0.0	12.8	4.7	4.2	0.2	0.3	1.3	55.1	3.9	1.0	0.0	0.0	2.8	330
Upper East	22.6	467	14.6	0.7	0.0	10.5	11.3	6.2	2.4	0.7	9.9	39.1	0.6	2.4	0.0	1.2	7.6	106
Upper West	16.0	231	27.3	7.4	2.8	7.1	3.8	4.2	0.0	1.5	15.0	29.5	0.7	0.0	0.0	0.0	5.7	37
Wealth quintile																		
Lowest	25.4	1,996	8.2	4.1	0.2	4.9	6.0	2.5	0.4	0.6	4.9	59.5	2.7	2.1	0.0	0.1	6.1	507
Second	38.9	2,235	14.1	3.6	0.1	6.8	4.2	2.4	0.4	0.3	2.6	57.8	3.4	1.1	0.1	0.0	7.3	869
Middle	52.5	2,248	27.1	5.7	0.2	10.7	4.1	4.0	1.0	0.1	3.3	39.8	3.9	0.7	0.0	0.2	9.9	1,181
Fourth	63.8	1,969	31.2	8.3	0.2	17.4	2.0	2.7	1.9	0.5	3.4	31.5	6.7	0.6	0.0	0.8	9.4	1,256
Highest	71.4	1,912	30.4	13.7	0.9	18.8	2.1	5.0	1.4	0.6	2.0	25.0	3.3	0.3	0.0	2.8	9.3	1,365
Total	50.0	10,360	24.9	7.9	0.4	13.2	3.3	3.5	1.2	0.4	3.0	38.8	4.2	0.8	0.0	1.0	8.8	5,179

Note: Figures in parentheses are based on 25-49 unweighted cases.
[1] Includes ITN brand names Olyset, Royal Sentry, Duranet, and Magnet
[2] Includes ITN brand names Permanet, Interceptor, Dawa Plus, and Yorkool
[3] Includes Life Net and other ITN brand names
[4] Any net that is not an ITN

Table 3.10 Indoor residual spraying against mosquitoes

Percentage of households in which someone has come into the dwelling to spray the interior walls against mosquitoes (IRS) in the past 12 months, percentage of households with at least one ITN and/or IRS in the past 12 months, and among households with IRS in the past 12 months, percentage sprayed by a government program, private company, or nongovernmental organisation (NGO), according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of households with IRS in the past 12 months	Percentage of households with at least one ITN[1] and/or IRS in the past 12 months	Number of households	Among households with IRS in the past 12 months				Number of households with IRS in the past 12 months
				Percentage sprayed by a government worker/program	Percentage sprayed by a private company	Percentage sprayed by an NGO	Other/ don't know	
Residence								
Urban	3.6	64.9	2,984	51.0	25.9	22.1	2.2	108
Rural	8.5	85.8	2,815	67.5	0.4	28.8	3.3	240
Region								
Western	0.9	79.0	573	*	*	*	*	5
Central	2.4	77.9	463	*	*	*	*	11
Greater Accra	0.7	56.3	1,103	*	*	*	*	7
Volta	0.0	84.5	644	*	*	*	*	0
Eastern	0.4	71.3	739	*	*	*	*	3
Ashanti	5.8	74.8	1,057	(43.8)	(35.0)	(23.3)	(0.0)	61
Brong Ahafo	0.0	79.6	499	*	*	*	*	0
Northern	30.0	90.3	405	71.8	0.4	23.1	4.7	121
Upper East	14.7	90.0	193	65.0	0.0	35.0	0.0	28
Upper West	89.8	95.6	123	63.8	0.3	34.0	1.9	110
Wealth quintile								
Lowest	21.0	90.6	861	71.3	0.0	25.1	3.6	181
Second	5.7	84.4	1,046	60.4	0.6	34.8	4.3	59
Middle	3.5	78.6	1,231	50.1	6.0	42.2	1.7	43
Fourth	2.6	68.6	1,334	60.7	27.0	11.1	1.2	35
Highest	2.3	60.6	1,326	(32.4)	(55.0)	(16.9)	(0.0)	30
Total	6.0	75.0	5,799	62.4	8.3	26.7	2.9	348

Note: Figures in parentheses are based on 25-49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In the 2014 GDHS and 2016 GMIS, this was known as a long-lasting insecticidal net (LLIN).

Table 3.11 Antenatal care

Percent distribution of women age 15-49 who had a live birth in the 5 years preceding the survey by antenatal care (ANC) provider during the pregnancy for the most recent birth and percentage receiving antenatal care from a skilled provider for the most recent birth, according to background characteristics, Ghana MIS 2019

Background characteristic	Antenatal care provider							Percentage receiving antenatal care from a skilled provider[1]	Number of women
	Doctor	Nurse/ midwife	Community health officer/ nurse	Community/ village health worker	Traditional health practitioner	No ANC	Total		
Age at birth									
<20	16.5	78.4	2.3	0.8	0.0	2.0	100.0	97.2	237
20-34	24.2	72.1	0.9	0.4	0.0	2.3	100.0	97.3	1,559
35-49	31.7	65.4	1.1	0.4	0.2	1.2	100.0	98.2	420
Birth order									
1	26.1	72.0	0.6	0.2	0.0	1.0	100.0	98.7	1,395
2-3	22.7	70.6	2.0	0.8	0.1	3.8	100.0	95.3	816
4-5	*	*	*	*	*	*	*	*	4
Residence									
Urban	30.6	68.0	0.1	0.0	0.1	1.1	100.0	98.8	973
Rural	20.2	74.2	1.9	0.8	0.0	2.9	100.0	96.3	1,242
Region									
Western	35.9	61.8	0.0	0.0	0.4	2.0	100.0	97.7	231
Central	32.4	65.5	0.0	0.0	0.0	2.1	100.0	97.9	164
Greater Accra	37.6	61.8	0.0	0.0	0.0	0.6	100.0	99.4	325
Volta	28.2	67.1	0.0	0.0	0.0	4.7	100.0	95.3	230
Eastern	22.4	76.0	0.5	0.0	0.0	1.1	100.0	98.9	236
Ashanti	24.4	74.9	0.0	0.0	0.0	0.7	100.0	99.3	378
Brong Ahafo	17.0	81.1	0.0	0.0	0.0	1.9	100.0	98.1	188
Northern	9.4	74.5	7.9	3.4	0.0	4.8	100.0	91.8	295
Upper East	13.5	86.2	0.0	0.0	0.0	0.3	100.0	99.7	98
Upper West	12.3	84.5	0.0	0.0	0.0	3.2	100.0	96.8	71
Education									
No education	19.3	72.0	3.8	1.6	0.0	3.3	100.0	95.1	465
Primary	21.5	73.2	1.1	0.4	0.0	3.8	100.0	95.8	468
Middle/JSS/JHS	25.0	74.0	0.2	0.1	0.1	0.7	100.0	99.1	845
Secondary/SSS/ SHS or higher	33.9	64.3	0.1	0.0	0.0	1.6	100.0	98.4	438
Wealth quintile									
Lowest	12.0	77.0	4.4	2.1	0.0	4.5	100.0	93.4	469
Second	17.8	78.1	0.5	0.0	0.2	3.4	100.0	96.4	464
Middle	26.3	72.5	0.4	0.0	0.0	0.8	100.0	99.2	484
Fourth	33.8	65.0	0.0	0.0	0.0	1.2	100.0	98.8	421
Highest	37.4	62.6	0.0	0.0	0.0	0.0	100.0	100.0	377
Total	24.8	71.5	1.1	0.4	0.0	2.1	100.0	97.4	2,216

Note: If more than one source of ANC was mentioned, only the provider with the highest qualifications is considered in this tabulation. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] Skilled provider includes doctor, nurse, midwife, and community health officer/nurse.

Table 3.12 Number of antenatal care visits and timing of first visit

Percent distribution of women age 15-49 who had a live birth in the 5 years preceding the survey by number of antenatal care (ANC) visits 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 residence, Ghana MIS 2019

Number of ANC visits and timing of first visit	Residence		Total
	Urban	Rural	
Number of ANC visits			
None	1.1	2.9	2.1
1	0.6	1.9	1.4
2	1.1	2.9	2.1
3	2.6	4.8	3.8
4	6.2	7.5	6.9
5	10.8	12.6	11.8
6	15.1	15.3	15.2
7	15.3	13.0	14.0
8+	47.1	39.0	42.6
Don't know/missing	0.1	0.1	0.1
Total	100.0	100.0	100.0
Number of months pregnant at time of first ANC visit			
No antenatal care	1.1	2.9	2.1
<4	67.1	66.0	66.5
4-5	24.6	24.5	24.6
6-7	6.3	5.9	6.1
8+	0.5	0.6	0.5
Don't know/missing	0.4	0.1	0.2
Total	100.0	100.0	100.0
Number of women	973	1,242	2,216
Median months pregnant at first visit (for those with ANC)	3.4	3.5	3.5
Number of women with ANC	962	1,207	2,169

Table 3.13 Use of intermittent preventive treatment (IPTp-SP) 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 IPTp-SP, received two or more doses of IPTp-SP, and received three or more doses of IPTp-SP, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage who received one or more doses of IPTp-SP	Percentage who received two or more doses of IPTp-SP	Percentage who received three or more doses of IPTp-SP	Number of women with a live birth in the 2 years preceding the survey
Residence				
Urban	91.0	78.9	59.5	500
Rural	91.6	81.2	62.2	651
Region				
Western	90.2	84.4	67.5	114
Central	91.6	77.6	62.4	98
Greater Accra	91.8	75.1	57.0	174
Volta	94.6	81.8	53.2	121
Eastern	82.2	68.4	42.2	111
Ashanti	93.9	84.8	64.2	184
Brong Ahafo	93.8	87.3	63.2	95
Northern	88.4	77.0	64.5	161
Upper East	96.8	89.4	77.4	55
Upper West	94.9	87.7	77.8	37
Education				
No education	88.3	76.1	64.3	224
Primary	90.7	77.2	52.0	248
Middle/JSS/JHS	94.4	84.6	61.4	435
Secondary/SSS/SHS or higher	89.4	79.2	66.5	243
Wealth quintile				
Lowest	88.7	76.3	59.6	242
Second	91.9	81.9	61.5	265
Middle	92.5	81.6	61.0	232
Fourth	93.5	81.8	63.3	222
Highest	90.1	79.3	59.5	189
Total	91.4	80.2	61.0	1,151

JSS = junior secondary school
JHS = junior high school
SSS = senior secondary school
SHS = senior high school

Table 3.14 Reasons for taking IPTp-SP only one or two times

Among women with a live birth in the 2 years preceding the survey who took IPTp-SP only one or two times during the pregnancy for their most recent live birth, percentage by reported reason for not taking IPTp-SP more than twice, according to residence, Ghana MIS 2019

Reported reason[1]	Residence		
	Urban	Rural	Total
Facility too far	1.2	0.0	0.6
Had no money	1.9	1.9	1.9
Side effects	15.1	7.2	10.8
Not aware had to take more	42.6	41.5	42.0
Did not want to take	5.0	9.7	7.6
Not given	39.9	30.8	34.9
Not available	0.5	1.9	1.3
Other	2.3	5.1	3.9
Don't know/missing	1.3	10.0	6.1
Number of women who took IPTp-SP less than 2 times	155	190	344

[1] Respondents may have mentioned more than one reason.

MALARIA IN CHILDREN

<div style="text-align:right">**4**</div>

Key Findings

- *Fever prevalence:* 30% of children under age 5 had a fever in the 2 weeks before the survey.

- *Care seeking for fever:* Advice or treatment was sought for 69% of children with a fever in the 2 weeks before the survey.

- *Testing:* One in three children (34%) 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 received an antimalarial, 85% received artemisinin-based combination therapy.

- *Low haemoglobin:* 4% of children age 6-59 months had a haemoglobin level below 8.0 g/dl.

- *Malaria:* One out of seven children (14%) age 6-59 months tested positive for malaria via 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 malaria and low blood haemoglobin among children age 6-59 months is also discussed.

4.1 CARE SEEKING FOR FEVER IN CHILDREN

Care seeking for children under age 5 with 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 key case management objectives of the National Malaria Control Programme (NMCP) is to ensure that all patients with suspected malaria cases have access to confirmatory diagnosis and receive effective treatment.

Fever is a key symptom of malaria and other acute infections in children. Malaria fevers require prompt and effective treatment to prevent malaria morbidity and mortality. Thirty percent of children under age 5 had a fever in the 2 weeks preceding the survey. Advice or treatment was sought for 69% of these children, and 41% received timely care (the same or next day following fever onset) (**Table 4.1**).

Among children with recent fever, 34% each received advice or treatment from the public health sector and the private health sector. Only 2% received advice from "other" private sector sources. Among children receiving care from public health facilities, the most common sources were government health centres (14%), government hospitals (12%), and government health posts (8%) (**Table 4.2**).

Trends: The percentage of children with recent fever receiving advice or treatment increased from 68% in 2008 to 77% in 2014 before decreasing to 72% in 2016 and 69% in 2019.

Patterns by background characteristics

- By region, the percentage of children under age 5 with recent fever ranges from 19% in Greater Accra region to 40% in Western region (**Table 4.1**).

- The percentage of children with recent fever generally decreases with increasing household wealth, from 35% in the lowest wealth quintile to 23% in the highest wealth quintile.

- Advice or treatment for children with recent fever was sought more often in urban areas than in rural areas (74% versus 65%).

4.2 DIAGNOSTIC TESTING OF CHILDREN WITH FEVER

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

The National Malaria Control Programme policy recommends prompt parasitological confirmation by microscopy or, alternatively, rapid diagnostic tests (RDTs) for all patients with suspected malaria before treatment is started (MOH 2020b). Adherence to this policy cannot be directly measured through household surveys; however, the 2019 GMIS 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 2019 GMIS, 34% of children with a fever in the 2 weeks before the survey had blood taken from a finger or heel, presumably for malaria testing (**Table 4.1**).

Trends: The percentage of children with a fever in the 2 weeks preceding the survey who had blood taken from a finger or heel for testing decreased from 34% in 2014 to 30% in 2016 before increasing to 34% in 2019. Although modest, the positive trend from 2016 to 2019 shows improved adherence to the NMCP policy of testing before treatment.

Patterns by background characteristics

- The percentage of children under age 5 with recent fever who had blood taken from a finger or heel for testing ranges from 21% in Greater Accra region to 71% in Upper East region (**Figure 4.1**).

- The percentage of children with recent fever who had blood taken from a finger or heel for testing peaks at 43% among those age 12-23 months, declines to 26% among those age 36-47 months, and then rises to 32% among those age 48-59 months (**Table 4.1**).

Figure 4.1 Diagnostic testing of children with fever by region

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

Region	Value
Western	45
Central	24
Greater Accra	(21)
Volta	40
Eastern	25
Ashanti	25
Brong Ahafo	40
Northern	33
Upper East	71
Upper West	47
Total	34
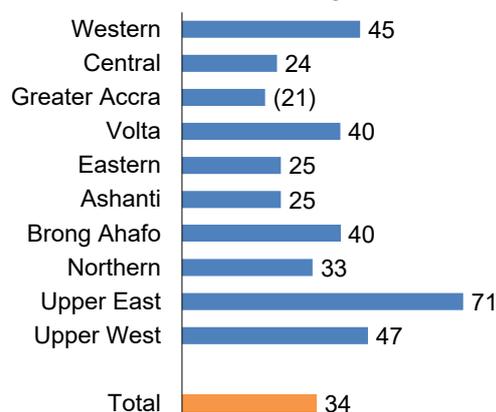
Note: Figures in parentheses are based on 25-49 unweighted cases.

4.3 USE OF RECOMMENDED ANTIMALARIALS

Artemisinin-based combination therapy for children under age 5 with fever

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

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

Ghana adopted artemisinin-based combination therapy (ACT), specifically artesunate-amodiaquine (ASAQ), as the first-line treatment for malaria in 2004 (MOH 2020a). The policy was revised in 2014 to allow artemether-lumefantrine (AL) and dihydroartemisinin-piperaquine (DHAP), each a type of ACT, to be alternative first-line treatment for patients unable to tolerate ASAQ (MOH 2020a). Based on the comparable efficacies of the three ACTs and the benefit of multiple first line therapy in delaying the emergence and spread of drug resistance, Ghana is adopting a multiple first line approach in the treatment of uncomplicated malaria. ASAQ and AL are first line ACTs with DHAP designated as the second line ACT for the treatment of uncomplicated malaria (MOH 2020a). The 2019 GMIS results showed that 46% of children under age 5 with recent fever took an antimalarial drug (**Table 4.1**). Most children with recent fever who took an antimalarial received ACT (85%) (**Table 4.3**). Thirteen percent received amodiaquine, 4% were given an artesunate injection/IV, and 4% received chloroquine.

Figure 4.2 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

2008 GDHS	2014 GDHS	2016 GMIS	2019 GMIS
48	78	59	85

Trends: Among children under age 5 with recent fever who took an antimalarial, the percentage who received ACT increased from 48% in 2008 to 85% in 2019 (**Figure 4.2**).
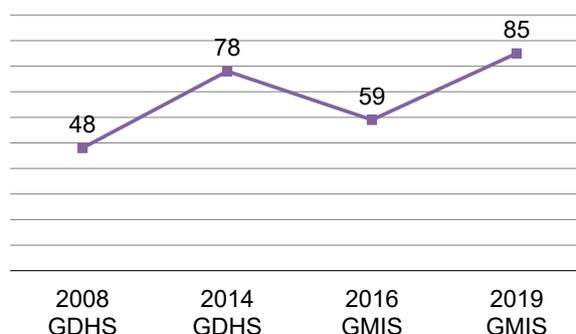
4.4   PREVALENCE OF LOW HAEMOGLOBIN IN CHILDREN

> **Prevalence of low haemoglobin in children**
>
> Percentage of children age 6-59 months who had a haemoglobin measurement of less than 8 grams per decilitre (g/dl) of blood. The cutoff of 8 g/dl is often used to classify malaria-related anaemia.
>
> *Sample:* Children age 6-59 months

Anaemia, defined as a reduced level of haemoglobin in the blood, decreases the amount of oxygen reaching the tissues and organs of the body and reduces their capacity to function. Anaemia is associated with impaired motor and cognitive development in children. The main causes of anaemia in children are malaria and inadequate intake of iron, folate, vitamin B12, and other nutrients. Other causes of anaemia include intestinal worms, haemoglobinopathy, and sickle cell disease. Although anaemia is not specific to malaria, trends in anaemia prevalence can reflect malaria morbidity, and they respond to changes in the coverage of malaria interventions (Korenromp et al. 2004). Malaria interventions have been associated with a 60% reduction in the risk of anaemia using a cutoff of 8.0 g/dl (Roll Back Malaria Partnership 2003).

During the 2019 GIMS, consent was obtained and testing for anaemia was conducted among almost all (98%) eligible children age 6-59 months from the interviewed households (**Table 4.4**). **Table 4.5** shows the percentage of children age 6-59 months classified as having low haemoglobin levels (less than 8.0 g/dl). Overall, 4% of children have low haemoglobin levels.

Trends: The percentage of children age 6-59 months with low haemoglobin levels has decreased steadily over time, from 19% in 2008 to 4% in 2019.

Patterns by background characteristics

- By region, the prevalence of low haemoglobin levels in children age 6-59 months ranges from less than 1% in Greater Accra region to 10% in Northern region (**Figure 4.3**).

Figure 4.3 Prevalence of low haemoglobin in children by region

Percentage of children age 6-59 months with haemoglobin <8.0 g/dl

Upper East 2%
Upper West 4%
Northern 10%
Brong Ahafo 2%
Volta 3%
Ashanti 3%
Eastern 2%
Western 3%
Central 6%
Greater Accra < 1%

- 0% - 3%
- 4% - 7%
- 8% - 10%
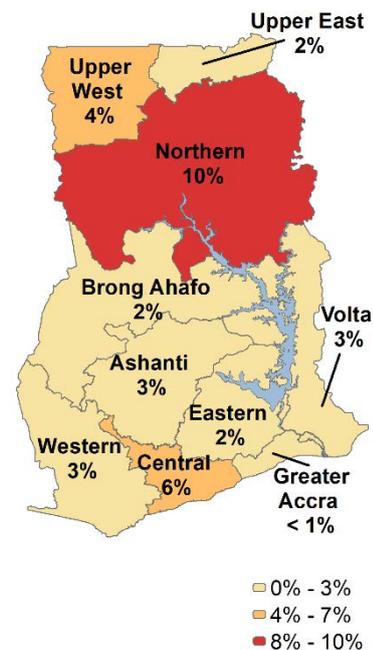
- The prevalence of low haemoglobin levels among children is higher in rural than urban areas (5% and 2%, respectively).

- The percentage of children with low haemoglobin levels decreases with increasing household wealth, from 7% in the lowest wealth quintile to less than 1% in the highest quintile (**Figure 4.4**).

Figure 4.4 Low haemoglobin in children by household wealth

Percentage of children age 6-59 months with haemoglobin lower than 8.0 g/dl

7	5	3	1	<1
Lowest	Second	Middle	Fourth	Highest

Poorest ———————————→ *Wealthiest*
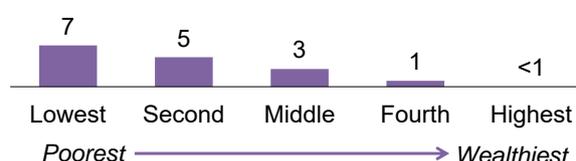
4.5 PREVALENCE OF MALARIA IN CHILDREN

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 all regions of Ghana. Those living in areas of high malaria transmission acquire partial immunity to the disease over time (Doolan et al. 2009). However, many people, including children, may 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 anaemia and other associated morbidity among the infected individuals.

In the 2019 GMIS, all children age 6-59 months from the interviewed households were eligible for malaria testing. Testing with malaria rapid diagnostic tests (RDTs) was successfully carried out among 97% of eligible children, and 98% were tested for malaria by microscopy (**Table 4.4**).

Fourteen percent of children age 6-59 months tested positive for malaria parasites according to microscopy results (**Table 4.6**). Rapid diagnostic tests were done in conjunction with microscopy to facilitate treatment of infected children during the survey fieldwork. Results from these RDTs are also presented in **Table 4.6** for reference. Twenty-three percent of children tested positive for malaria antigens according to RDT results.

The 2019 GMIS was conducted between September and November 2019 at the peak of malaria season. Normally, a spike in malaria cases occurs during these months. Previous surveys that incorporated malaria testing included the 2014 GDHS and the 2016 GMIS. Both of these surveys were conducted during a similar period when malaria transmission was at its peak. The 2014 GDHS was conducted between September and December 2014, and the 2016 GMIS was conducted from October through December 2016.

Trends: The percentage of children under age 5 testing positive for malaria according to microscopy has decreased consistently over time, from 27% in 2014 to 21% in 2016 and 14% in 2019 (**Figure 4.5**).

Figure 4.5 Trends in malaria prevalence among children

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

2014 GDHS	2016 GMIS	2019 GMIS
27	21	14
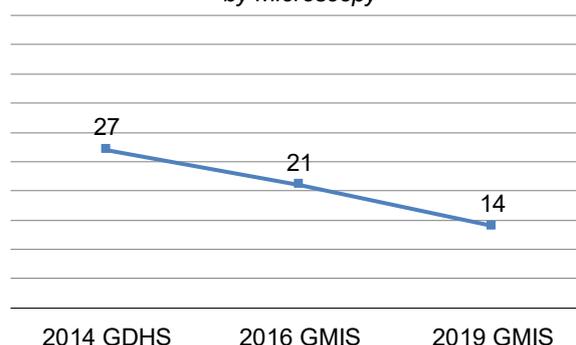
Patterns by background characteristics

- Malaria prevalence according to microscopy among children age 6-59 months generally increases with increasing age, from 6% among children age 6-8 months to 19% among those age 48-59 months (**Figure 4.6**).

- The percentage of children with malaria according to microscopy is over three times as high in rural areas (20%) as in urban areas (6%).

- Malaria prevalence according to microscopy decreases with increasing wealth, from 22% in the lowest wealth quintile to 2% in the highest quintile (**Figure 4.7**).

- By region, the percentage of children with malaria according to microscopy is highest in Western region (27%) and Volta region (20%) and lowest in Greater Accra region (2%) (**Figure 4.8**).

Figure 4.8 **Prevalence of malaria in children by region**

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

Upper East 10%
Upper West 11%
Northern 13%
Brong Ahafo 17%
Volta 20%
Ashanti 10%
Eastern 12%
Western 27%
Central 18%
Greater Accra 2%

- 2% - 8%
- 9% - 15%
- 16% - 21%
- 22% - 27%

Figure 4.6 **Prevalence of malaria in children by age**

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

Age in months	Percentage
6-8	6
9-11	8
12-17	13
18-23	13
24-35	14
36-47	14
48-59	19
Total	14
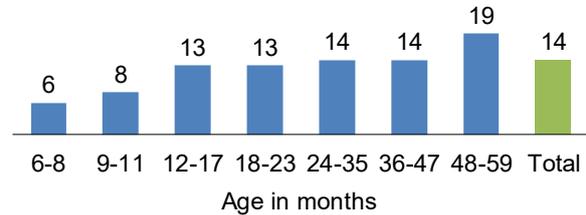
Figure 4.7 **Prevalence of malaria in children by household wealth**

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

	Percentage
Lowest	22
Second	18
Middle	15
Fourth	7
Highest	2

Poorest ⟶ *Wealthiest*

LIST OF TABLES

For detailed information on malaria, see the following tables:

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

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 took any antimalarial medication, according to background characteristics, Ghana MIS 2019

Background characteristic	Children under age 5		Children under age 5 with fever				
	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 took an antimalarial drug	Number of children
Age in months							
<12	23.8	587	65.6	33.9	28.2	30.7	140
12-23	33.3	571	75.0	43.7	43.1	45.3	190
24-35	34.7	594	70.4	42.3	38.3	52.6	206
36-47	31.1	550	66.1	45.0	25.9	52.6	171
48-59	24.7	507	65.5	35.6	31.5	43.5	125
Sex							
Male	28.5	1,441	67.8	43.7	34.1	45.6	411
Female	30.8	1,368	70.2	37.8	34.2	46.1	421
Residence							
Urban	29.6	1,194	74.3	46.4	34.0	43.6	354
Rural	29.6	1,615	65.1	36.5	34.2	47.5	479
Region							
Western	40.4	289	64.1	44.7	44.6	64.6	117
Central	36.3	206	61.2	32.1	24.0	39.6	75
Greater Accra	19.3	379	(79.8)	(56.9)	(20.6)	(40.5)	73
Volta	24.7	309	80.4	34.3	39.5	41.7	76
Eastern	28.3	297	60.3	32.6	24.9	43.7	84
Ashanti	32.1	465	66.1	40.6	25.2	30.2	149
Brong Ahafo	33.7	246	64.4	42.6	40.1	39.6	83
Northern	26.3	409	72.5	38.2	32.8	62.5	107
Upper East	35.1	122	78.7	51.1	70.5	53.7	43
Upper West	29.2	88	79.2	36.3	47.1	43.1	26
Mother's education							
No education	30.1	627	72.2	45.3	39.3	54.3	189
Primary	34.2	600	72.7	39.6	30.6	47.8	205
Middle/JSS/JHS	30.4	1,066	65.7	38.8	31.4	43.0	324
Secondary/SSS/SHS or higher	22.2	516	66.7	40.9	40.0	36.7	114
Wealth quintile							
Lowest	35.0	628	68.5	36.2	36.1	49.7	220
Second	29.9	620	68.9	41.6	31.5	49.0	185
Middle	32.3	584	67.0	39.2	37.7	46.1	189
Fourth	25.6	525	65.2	40.7	28.7	41.7	134
Highest	23.1	452	78.7	51.7	35.4	37.0	104
Total	29.6	2,809	69.0	40.7	34.1	45.9	832

Note: Figures in parentheses are based on 25-49 unweighted cases.
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] Excludes advice or treatment from a traditional practitioner

Table 4.2 Source of advice or treatment for children with fever

Percentage of children under age 5 with 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, Ghana MIS 2019

| | 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	**34.1**	**49.0**
Government hospital	11.7	16.9
Government health centre	14.0	20.1
Government health post/CHPS	8.1	11.6
Mobile clinic	1.0	1.4
Fieldworker/CHW	0.3	0.4
Private sector	**33.6**	**48.3**
Private hospital/clinic	6.8	9.8
Pharmacy	13.6	19.6
Chemist/drug store	13.0	18.7
Private doctor	0.1	0.1
Other private medical sector[1]	0.2	0.3
Other private sector	**2.1**	**3.0**
Shop	0.1	0.1
Traditional practitioner	0.5	0.7
Market	0.3	0.5
Itinerant drug seller	1.2	1.8
Other	0.6	0.9
Number of children	832	579

[1] Includes Family Planning Ghana (FPG) and the Planned Parenthood Association of Ghana (PPAG)
CHPS = Community-based health planning and services
CHW = Community health worker

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, Ghana MIS 2019

Background characteristic	Percentage of children who took:									Number of children with fever who took anti-malarial drug
	Any ACT	SP/ Fansidar	Chloroquine	Amodia-quine	Quinine pills	Quinine injection/IV	Artesunate rectal	Artesunate injection/IV	Other anti-malarial	
Age in months										
<6	*	*	*	*	*	*	*	*	*	4
6-11	(79.4)	(0.0)	(1.1)	(19.8)	(0.0)	(0.0)	(0.0)	(13.5)	(0.0)	39
12-23	79.8	0.0	11.7	11.9	6.6	0.0	2.1	0.5	0.0	86
24-35	85.0	0.0	0.3	14.1	1.7	1.0	0.0	3.0	0.0	108
36-47	89.7	1.7	2.9	11.1	0.0	0.0	2.0	4.6	0.0	90
48-59	86.4	0.0	1.4	10.4	1.3	0.0	0.0	4.1	1.6	54
Sex										
Male	83.2	0.0	1.8	15.0	0.5	0.0	1.0	5.1	0.0	188
Female	85.9	0.8	6.0	10.7	3.7	0.6	0.9	3.0	0.5	194
Residence										
Urban	83.2	0.5	5.1	12.7	0.7	0.3	0.3	3.5	0.6	154
Rural	85.5	0.3	3.1	12.9	3.2	0.3	1.4	4.4	0.0	228
Region										
Western	64.2	0.0	15.7	46.0	0.0	0.0	2.4	5.8	1.2	75
Central	(87.7)	(0.0)	(1.5)	(7.4)	(3.4)	(0.0)	(0.0)	(0.0)	(0.0)	30
Greater Accra	*	*	*	*	*	*	*	*	*	30
Volta	(92.2)	(0.0)	(0.0)	(6.5)	(0.0)	(1.2)	(0.0)	(0.0)	(0.0)	32
Eastern	(79.5)	(0.0)	(0.0)	(10.3)	(8.0)	(0.0)	(2.3)	(0.0)	(0.0)	37
Ashanti	(89.9)	(0.0)	(3.7)	(0.0)	(6.4)	(0.0)	(0.0)	(6.7)	(0.0)	45
Brong Ahafo	(76.3)	(2.2)	(0.0)	(17.1)	(4.5)	(0.0)	(0.0)	(0.0)	(0.0)	33
Northern	95.9	0.0	1.0	0.0	0.0	1.0	0.0	6.7	0.0	67
Upper East	91.0	0.0	0.0	0.0	0.0	0.0	3.4	11.0	0.0	23
Upper West	(88.2)	(7.5)	(2.5)	(5.2)	(0.0)	(0.0)	(2.0)	(9.3)	(0.0)	11
Mother's education										
No education	91.6	1.5	3.2	4.7	0.9	0.0	0.5	5.4	0.0	103
Primary	83.5	0.0	2.5	17.0	3.6	0.7	0.0	1.9	0.9	98
Middle/JSS/JHS	78.4	0.0	6.0	16.3	2.8	0.3	2.2	1.3	0.0	139
Secondary/SSS/SHS or higher	(89.8)	(0.0)	(2.0)	(11.2)	(0.0)	(0.0)	(0.0)	(14.6)	(0.0)	42
Wealth quintile										
Lowest	90.9	0.7	1.8	3.3	2.1	0.6	0.5	4.0	0.0	109
Second	84.4	0.0	1.6	16.1	1.1	0.0	0.0	2.6	1.0	91
Middle	80.8	1.0	4.2	20.6	2.4	0.5	3.0	6.9	0.0	87
Fourth	76.4	0.0	6.7	16.9	5.1	0.0	0.8	2.6	0.0	56
Highest	(87.0)	(0.0)	(10.6)	(8.4)	(0.0)	(0.0)	(0.0)	(3.2)	(0.0)	39
Total	84.5	0.4	3.9	12.8	2.2	0.3	1.0	4.0	0.2	382

Note: Figures in parentheses are based on 25-49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.
ACT = Artemisinin-based combination therapy
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 4.4 Coverage of testing for anaemia and malaria in children

Percentage of eligible children age 6-59 months who were tested for anaemia and for malaria, according to background characteristics (unweighted), Ghana MIS 2019

Background characteristic	Percentage tested for:			Number of children
	Anaemia	Malaria with RDT	Malaria by microscopy	
Age in months				
6-8	97.9	97.9	97.9	188
9-11	98.5	98.5	98.5	131
12-17	97.7	97.7	97.7	308
18-23	98.7	98.4	98.7	314
24-35	97.5	97.2	97.2	671
36-47	96.8	96.4	96.8	647
48-59	97.6	97.4	97.4	661
Sex				
Male	97.4	97.1	97.4	1,496
Female	97.8	97.7	97.5	1,424
Mother's interview status				
Interviewed	97.7	97.5	97.7	2,485
Not interviewed	96.6	96.3	96.3	435
Residence				
Urban	95.5	95.1	95.3	1,103
Rural	98.8	98.7	98.8	1,817
Region				
Western	100.0	100.0	100.0	286
Central	95.8	95.8	95.4	262
Greater Accra	92.1	91.6	92.1	203
Volta	98.8	98.4	98.0	254
Eastern	95.7	94.9	95.7	234
Ashanti	94.3	94.3	94.3	297
Brong Ahafo	100.0	99.2	100.0	263
Northern	98.3	98.3	98.3	518
Upper East	98.3	98.3	98.3	302
Upper West	100.0	100.0	100.0	301
Mother's education[1]				
No education	98.9	98.9	98.7	705
Primary	98.3	97.8	98.3	538
Middle/JSS/JHS	98.2	98.1	98.1	835
Secondary/SSS/SHS or higher	94.1	93.9	94.1	407
Wealth quintile				
Lowest	99.1	99.1	99.0	964
Second	98.4	98.1	98.4	628
Middle	98.2	98.0	98.0	564
Fourth	97.6	97.6	97.6	415
Highest	90.8	90.0	90.5	349
Total	97.6	97.4	97.5	2,920

RDT = Rapid diagnostic test (SD BIOLINE Malaria Ag P.f)
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] Excludes children whose mothers were not interviewed

Table 4.5 Haemoglobin <8.0 g/dl in children

Percentage of children age 6-59 months with haemoglobin lower than 8.0 g/dl, according to background characteristics, Ghana MIS 2019

Background characteristic	Haemoglobin <8.0 g/dl	Number of children
Age in months		
6-8	2.0	167
9-11	4.4	108
12-17	5.7	286
18-23	5.0	287
24-35	4.5	616
36-47	3.6	578
48-59	1.4	579
Sex		
Male	3.8	1,329
Female	3.5	1,293
Mother's interview status		
Interviewed	3.6	2,251
Not interviewed	3.8	370
Residence		
Urban	2.3	1,064
Rural	4.5	1,557
Region		
Western	3.3	283
Central	5.7	187
Greater Accra	0.0	307
Volta	2.8	302
Eastern	1.6	270
Ashanti	2.8	413
Brong Ahafo	2.3	230
Northern	9.6	421
Upper East	1.9	124
Upper West	3.6	83
Mother's education[1]		
No education	6.4	511
Primary	3.2	493
Middle/JSS/JHS	3.5	849
Secondary/SSS/SHS or higher	0.8	397
Wealth quintile		
Lowest	7.1	630
Second	5.0	579
Middle	3.1	551
Fourth	0.9	468
Highest	0.2	394
Total	3.6	2,621

Note: Table is based on children who stayed in the household the night before the interview. Haemoglobin levels are adjusted for altitude using CDC formulas (CDC 1998). Haemoglobin is measured in grams per decilitre (g/dl).
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] 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, Ghana MIS 2019

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	8.7	167	6.2	167
9-11	13.7	108	7.8	108
12-17	18.2	286	13.3	286
18-23	21.6	286	13.2	287
24-35	22.8	612	13.9	615
36-47	25.3	576	13.7	578
48-59	29.7	577	19.1	577
Sex				
Male	24.3	1,321	13.9	1,329
Female	21.6	1,292	14.3	1,290
Mother's interview status				
Interviewed	22.3	2,243	13.7	2,250
Not interviewed	26.6	369	16.5	369
Residence				
Urban	9.8	1,057	6.1	1,062
Rural	31.9	1,556	19.6	1,556
Region				
Western	31.2	283	27.0	283
Central	29.9	187	17.6	186
Greater Accra	1.0	304	2.4	307
Volta	33.3	301	20.4	301
Eastern	26.4	267	12.3	270
Ashanti	15.8	413	10.4	413
Brong Ahafo	35.4	228	17.3	230
Northern	18.7	421	13.0	421
Upper East	30.6	124	9.8	124
Upper West	22.6	83	10.5	83
Mother's education[1]				
No education	29.4	511	17.9	510
Primary	26.6	488	16.3	493
Middle/JSS/JHS	20.8	848	12.9	849
Secondary/SSS/SHS or higher	11.2	396	7.0	397
Wealth quintile				
Lowest	35.1	630	22.4	629
Second	33.5	576	18.3	579
Middle	22.1	550	15.0	550
Fourth	10.9	468	6.8	468
Highest	3.2	389	2.1	393
Total	23.0	2,612	14.1	2,619

RDT = Rapid diagnostic test (SD BIOLINE Malaria Ag P.f)
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school
[1] Excludes children whose mothers were not interviewed

MALARIA KNOWLEDGE, EXPOSURE TO MESSAGES, AND BELIEFS

5

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Key Findings

Exposure to malaria messages:

- 59% of women reported having seen or heard a malaria message in the past 6 months.

- Among women who have seen or heard a malaria message, television (77%), radio (56%), and a health worker (40%) are the most common sources of information.

- 82% of women who have been exposed to malaria messages on television or radio reported seeing or hearing the Goodlife campaign recommending sleeping under treated bed nets every night.

- 59% of women had seen or heard an advertisement on the use of artemisinin-based combination therapy (ACT) or malaria medicines in the past 6 months.

Knowledge of ways to avoid malaria:

- 79% of women reported sleeping under a mosquito net or an insecticide-treated net (ITN) as a way to avoid getting malaria.

Malaria prevention:

- 90% of women stated that they would allow their child to be vaccinated against malaria.

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T his 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 provides data on women's basic knowledge about causes, symptoms, treatment, and prevention of malaria.

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 past 6 months.
> ***Sample:*** Women age 15-49

A crucial element in the fight to eliminate malaria is the ability to inform and educate people on the causes and ways to avoid getting it. Exposure to information is the critical first step in increasing knowledge of practices and services that may influence an individual to adopt or change a behaviour. The target population's ability to recall messages about malaria is an indicator of the success of communication activities.

To assess the coverage of malaria communication programmes, women were asked if they had seen or heard any messages about malaria prevention in the 6 months preceding the survey. Women who had heard or seen messages were further asked about the source of the messages.

Regardless of the source, 59% of women had heard or seen a malaria message in the 6 months preceding the survey. Among those who had seen or heard a malaria message, television was the most commonly cited source of information, with over three quarters of women (77%) reporting that they had seen or heard a malaria message on television. Other commonly cited sources for malaria messages were the radio (56%) and a health worker (40%) (**Table 5.1**).

Women who had seen or heard a malaria message in the past 6 months were asked whether they had seen or heard seven specific messages. The results showed that nearly all women (93%) had been exposed to at least one of the seven messages. The most common malaria messages cited by respondents were "Sleep under an insecticide-treated mosquito net" (72%), "Always test before treating malaria" (25%), and "Malaria kills" (22%) (**Table 5.2**).

Additionally, women were asked if they had seen or heard four specific malaria messages on television or radio in the past 6 months. The vast majority of women (91%) reported that they had seen or heard at least one of the messages. The most common messages/information cited by respondents were Goodlife campaign recommending sleeping under treated bed nets every night (82%), Goodlife campaign recommending that pregnant women sleep under treated bed nets (76%), and the advertisement where people were asked to test first before treating (76%) (**Table 5.2**).

Fifty-nine percent of women had seen or heard an advertisement on the use of artemisinin-based combination therapy (ACT) or malaria medicines through various media sources in the past 6 months (**Table 5.3**). Among these women, 80% had seen or heard an advertisement on television and 23% had heard an advertisement on the radio (**Table 5.3**).

Trends: The percentage of women who have seen or heard a malaria message in the past 6 months increased from 46% in 2016 to 59% in 2019.

Patterns by background characteristics

- Sixty-five percent of women in urban areas have been exposed to malaria messages from any source, as compared with 52% of women in rural areas (**Figure 5.1**).

Figure 5.1 **Women who have seen or heard a malaria message by residence**

Percentage of women age 15-49 who saw or heard a message on malaria in the past 6 months
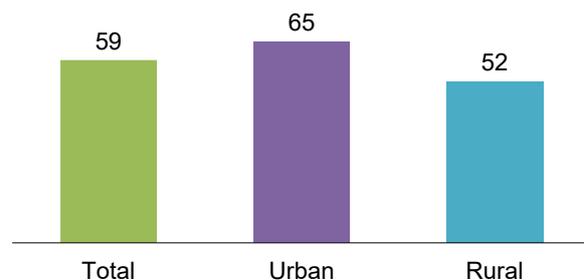
- The percentage of women who have seen or heard a malaria message in the past 6 months ranges from 45% in Upper West region to 71% in Greater Accra region (**Figure 5.2**).

- Among women who have seen or heard a malaria message in the past 6 months, 31% of those in urban areas and 16% of those in rural areas have heard the message "Always test before treating malaria" (**Table 5.2**).

- The percentage of women who have seen or heard an advertisement on the use of ACT/malaria medicines in the past 6 months increases with increasing education, from 52% among those with no education to 68% among those with a secondary or higher education.
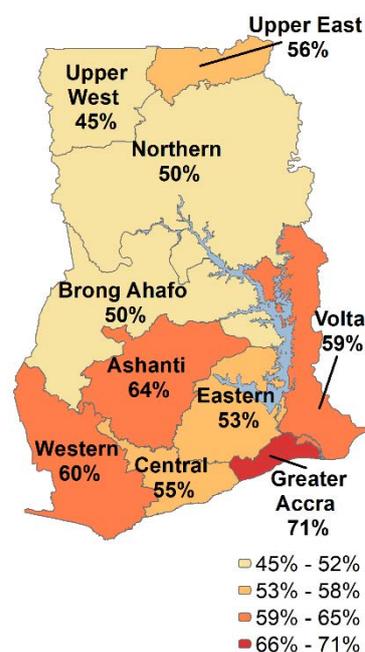
5.2 KNOWLEDGE OF WAYS TO AVOID MALARIA

Better knowledge of ways to avoid and prevent malaria, such as increasing use of insecticide-treated nets (ITNs), is a foundational step toward changing behaviour. Women age 15-49 were asked to cite things people can do to prevent themselves from getting malaria. Seventy-nine percent of women reported sleeping under a mosquito net or ITN as a way to avoid getting malaria, 54% mentioned keeping surroundings clean, 24% cited filling in stagnant waters (24%), and 20% mentioned spraying the house with insecticide (**Table 5.4**).

5.3 PERCEIVED SUSCEPTIBILITY, SEVERITY, AND MALARIA PREVENTION

The world's first malaria vaccine, RTS,S/AS01 (RTS,S), has been shown to provide partial protection against malaria in young children (PATH 2020). On 1 May 2019 the Ministry of Health/Ghana Health Service, with support from the World Health Organization (WHO) and PATH, introduced the RTS,S malaria vaccine into the routine immunisation schedule through the phased Malaria Vaccine Implementation Programme (MVIP). The vaccine has been successfully introduced sub-nationally into the routine schedule in three of the country's regions: Brong Ahafo, Central, and Volta. In addition, post-marketing surveillance is being conducted in the Upper East region (PATH 2020).

During the 2019 GMIS, a series of statements were read to respondent to capture their perceptions of malaria susceptibility and the severity of the consequences of malaria. Seventy-three percent of women agreed with the statement that when a child has a fever they almost always worry it might be malaria, and 40% disagreed with the statement that they do not worry about malaria because it can be easily treated (**Table 5.5**). Additionally, women were asked if they had heard about the malaria vaccine and if they would allow their child to be vaccinated against malaria. Thirty-six percent of respondents stated that they had heard about the malaria vaccine, and 90% reported that they would allow their child to be vaccinated against malaria (**Table 5.5**).

***Figure 5.2* Women who have seen or heard a malaria message by region**

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

- Upper East 56%
- Upper West 45%
- Northern 50%
- Brong Ahafo 50%
- Volta 59%
- Ashanti 64%
- Eastern 53%
- Western 60%
- Central 55%
- Greater Accra 71%

- 45% - 52%
- 53% - 58%
- 59% - 65%
- 66% - 71%

LIST OF TABLES

For detailed information on malaria, see the following tables:

Table 5.1 Media exposure to malaria messages

Percentage of women age 15-49 who have seen or heard a malaria message in the past 6 months, and among those who have seen or heard a malaria message in the past 6 months, percentages who cite specific sources for malaria messages, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage who have seen or heard a malaria message in the past 6 months	Number of women	Source of exposure to malaria messages in the past 6 months											Number of women
			Radio	Television	Poster/ billboard	Newspaper/ magazine	Leaflet/ brochure	Health worker	Community health worker (CHW)	Community volunteer/ CBA	Word of mouth	Community event/ durbar meeting	Other	
Age														
15-19	49.9	918	46.6	77.6	19.5	5.9	5.7	29.5	9.3	2.0	40.9	3.2	4.6	458
20-24	59.8	865	48.3	78.8	17.9	5.7	3.2	39.4	16.8	3.2	37.2	4.4	2.9	517
25-29	63.7	927	51.4	80.7	23.5	6.0	5.6	46.5	19.9	5.4	38.5	5.7	1.1	590
30-34	59.4	756	58.8	80.4	20.5	3.7	6.6	41.2	17.3	5.6	40.6	5.8	1.5	449
35-39	65.5	702	63.5	75.5	16.8	1.9	4.2	38.3	12.2	2.2	29.9	5.1	1.4	460
40-44	56.3	554	63.7	71.4	20.5	4.8	4.1	40.4	19.3	4.2	41.5	10.4	2.4	312
45-49	58.4	459	67.0	64.1	13.3	1.5	2.4	39.7	16.2	3.9	35.9	5.4	2.0	268
Residence														
Urban	65.3	2,657	54.0	88.1	21.2	5.2	5.2	32.0	10.9	2.7	32.3	4.8	1.6	1,734
Rural	52.3	2,524	57.9	61.7	16.8	3.5	4.1	49.4	22.4	5.2	44.9	6.4	3.0	1,320
Region														
Western	59.7	501	52.5	85.9	20.0	4.0	4.8	53.5	16.7	2.4	62.8	6.9	3.2	299
Central	54.5	368	73.0	80.7	27.3	4.0	8.5	50.3	30.4	7.8	42.4	8.8	2.8	201
Greater Accra	70.7	938	47.4	93.4	12.5	2.6	2.3	11.2	3.2	0.3	12.0	3.4	0.9	663
Volta	58.8	561	61.4	62.7	20.4	5.8	7.1	63.0	23.8	3.3	42.2	7.5	7.2	330
Eastern	53.2	642	60.9	86.3	48.8	13.1	10.7	45.4	15.9	1.8	39.9	8.4	2.2	342
Ashanti	63.7	950	49.5	82.7	18.3	4.5	4.4	35.9	10.6	3.8	38.1	5.0	0.0	605
Brong Ahafo	50.4	378	47.9	58.5	13.3	1.9	2.2	40.5	15.3	4.6	19.7	3.4	0.8	190
Northern	49.5	481	72.6	58.4	7.9	1.5	3.0	49.6	23.9	13.0	74.3	5.2	0.9	238
Upper East	56.1	215	60.1	28.3	1.1	0.0	0.0	54.2	41.3	8.2	28.4	2.5	8.8	120
Upper West	44.9	146	54.8	25.9	2.5	0.0	0.0	48.5	28.7	2.4	69.4	1.9	1.9	65
Education														
No education	46.0	865	58.4	50.4	8.6	0.3	1.4	47.4	22.1	8.9	49.9	6.5	1.5	398
Primary	54.2	963	52.9	68.3	10.7	1.5	3.3	41.9	16.0	2.6	34.1	4.9	1.6	522
Middle/JSS/JHS	57.0	1,898	58.0	78.0	18.4	2.7	4.3	39.2	16.3	3.3	36.6	4.8	1.6	1,082
Secondary/SSS/SHS or higher	72.3	1,456	53.7	89.4	28.6	9.3	7.1	35.7	12.9	3.0	36.0	6.1	3.4	1,053
Wealth quintile														
Lowest	43.5	839	63.7	31.5	5.0	0.2	0.6	51.4	28.3	7.2	47.6	5.0	3.4	365
Second	47.6	940	57.5	54.7	14.4	2.8	3.2	49.3	25.9	5.5	45.4	8.2	2.2	448
Middle	57.7	1,069	53.8	78.5	19.4	3.7	7.1	49.5	20.1	4.3	45.0	6.0	2.0	617
Fourth	65.7	1,087	58.1	90.1	22.0	5.6	5.6	33.0	10.5	2.5	31.3	4.6	2.0	714
Highest	73.1	1,247	51.0	93.7	25.2	6.6	4.8	28.4	7.2	2.3	30.1	4.7	2.1	912
Total	59.0	5,181	55.7	76.7	19.3	4.4	4.7	39.5	15.8	3.8	37.7	5.5	2.2	3,054

CBA = Community-based agent
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 5.2 Exposure to specific messages and information on malaria

Among women age 15-49 who have seen or heard a specific malaria message in the past 6 months, percentage who heard or saw specific messages or information on malaria and percentage who heard or saw specific malaria messages on television or radio, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of women who, in the past 6 months, heard or saw:								Percentage of women who, in the past 6 months, heard or saw on television or radio:					Number of women who have seen or heard a malaria message in the past 6 months
	If you have a fever, go to a health facility	Sleep under an insecticide-treated mosquito net	Pregnant women should take drugs to prevent malaria	SP protects pregnant women and unborn babies from getting malaria	Always test before treating malaria	Treat malaria with ACT	Malaria kills	Percentage of women who saw or heard any of the 7 specific messages or information on malaria in the past 6 months	Goodlife campaign recommending that pregnant women sleep under treated bed nets	Goodlife campaign recommending sleeping under treated bed nets every night all through the night	"My net my life" advertisement addressing the availability of different types of treated bed net on sale at designated points	Advertisement where people were asked to test first before treating	Percentage of women who, in the past 6 months, saw or heard any of the 4 specific messages or information on TV or radio	
Age														
15-19	11.6	72.8	3.7	1.2	23.6	6.5	19.6	93.4	65.4	75.4	48.0	73.2	87.7	458
20-24	19.4	73.5	7.2	3.3	31.2	7.3	20.0	95.9	74.6	82.7	48.6	74.8	91.4	517
25-29	16.8	72.0	7.1	2.3	28.8	8.1	22.6	93.6	75.0	81.8	49.5	78.1	90.7	590
30-34	13.7	75.0	5.3	4.0	26.3	6.3	23.0	93.4	84.0	84.1	50.9	82.7	92.7	449
35-39	13.9	74.2	8.5	3.3	18.1	6.1	20.7	92.0	82.4	84.9	52.4	73.5	93.3	460
40-44	12.6	68.7	8.6	2.3	20.9	3.8	22.1	90.3	79.3	82.4	45.1	75.6	90.7	312
45-49	20.7	67.4	1.9	2.1	19.4	8.1	25.6	93.9	72.0	79.9	44.1	70.2	86.2	268
Residence														
Urban	15.9	70.8	4.7	2.0	31.4	8.4	19.4	92.9	80.6	87.7	53.0	84.1	95.6	1,734
Rural	15.0	74.5	8.3	3.6	16.1	4.5	24.7	94.0	70.3	73.9	43.4	64.9	84.1	1,320
Region														
Western	29.1	85.0	9.0	4.5	30.7	9.6	33.3	98.9	69.3	86.4	55.0	78.1	91.7	299
Central	16.3	64.7	3.2	2.2	19.8	9.2	28.2	92.5	80.3	81.9	35.4	75.6	92.8	201
Greater Accra	17.5	61.4	3.2	0.0	30.2	11.2	17.5	92.1	85.0	90.4	50.0	86.3	97.3	663
Volta	5.3	68.1	1.7	1.9	9.1	2.3	29.9	88.8	75.6	72.8	44.2	66.6	84.7	330
Eastern	6.9	58.9	2.7	1.6	19.0	3.6	16.4	84.2	76.7	83.3	37.3	78.9	94.1	342
Ashanti	5.1	89.7	13.0	1.7	36.1	5.9	15.4	98.3	72.0	81.2	60.2	77.4	92.6	605
Brong Ahafo	18.0	78.7	8.7	6.6	14.8	4.7	20.2	96.8	68.7	71.8	50.5	60.2	81.7	190
Northern	41.8	76.9	8.5	11.1	26.3	4.9	25.2	96.1	78.0	78.9	54.8	71.6	84.1	238
Upper East	22.9	58.1	3.7	2.8	12.6	3.6	27.3	91.5	68.0	68.6	29.4	62.5	77.1	120
Upper West	6.7	73.2	2.4	0.2	9.9	4.7	15.9	93.8	71.7	75.8	37.8	61.0	81.2	65
Education														
No education	23.7	70.4	7.0	6.9	13.7	3.9	21.3	89.7	68.2	72.3	40.6	62.7	80.4	398
Primary	12.1	70.2	4.0	2.2	14.9	6.3	18.7	88.9	71.1	75.7	41.1	68.5	85.0	522
Middle/JSS/JHS	14.1	72.7	6.7	1.7	21.0	4.5	23.1	93.8	75.8	83.0	51.4	75.8	92.2	1,082
Secondary/SSS/SHS or higher	15.4	73.9	6.6	2.4	37.9	10.3	21.9	96.6	81.9	86.8	53.2	84.4	95.7	1,053
Wealth quintile														
Lowest	21.3	71.2	4.9	3.8	10.6	2.6	22.3	93.3	61.2	60.4	27.6	52.3	69.5	365
Second	16.6	74.3	7.3	3.9	17.9	3.9	23.7	94.1	65.1	69.8	40.1	64.0	82.2	448
Middle	13.5	72.8	9.5	3.6	19.6	4.0	26.8	92.2	73.7	79.5	51.6	72.3	91.1	617
Fourth	13.1	74.3	5.7	1.7	30.0	8.6	19.7	93.2	82.4	91.0	50.4	83.8	96.9	714
Highest	15.9	70.2	4.5	1.8	33.4	10.1	18.6	94.0	84.2	90.3	58.5	87.2	98.0	912
Total	15.5	72.4	6.2	2.7	24.8	6.7	21.7	93.4	76.1	81.7	48.8	75.8	90.7	3,054

ACT = Artemisinin-based combination therapy
SP = Sulfadoxine/pyrimethamine
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 5.3 Exposure to messages on malaria treatment by media source

Among women age 15-49 who have seen or heard a malaria message in the past 6 months, percentage who heard or saw an advertisement on the use of ACT or malaria medicines and percentage who heard or saw an advertisement on the use of ACT/malaria medicines by media source, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of women who, in the past 6 months, have seen or heard an advertisement on the use of ACT/malaria medicines	Number of women who have seen or heard a malaria message in the past 6 months	Percentage of women who heard or saw an advertisement on the use of ACT/malaria medicines in the past 6 months, by media source						Number of women who, in the past 6 months, have seen or heard an advertisement on the use of ACT/malaria medicines
			Television	Radio	Newspaper/ magazine	Poster/leaflet	Billboard	Other	
Age									
15-19	51.3	458	85.9	12.8	0.3	2.4	1.3	5.2	235
20-24	54.1	517	86.2	17.7	0.0	1.2	0.5	7.7	280
25-29	64.8	590	80.5	18.4	0.3	1.6	0.5	11.2	382
30-34	63.6	449	83.3	20.0	0.0	1.7	0.3	8.8	286
35-39	55.4	460	76.1	31.2	0.0	0.4	0.6	13.0	255
40-44	60.5	312	71.2	36.6	0.0	0.2	0.0	10.8	189
45-49	60.2	268	65.7	35.9	0.0	0.0	0.0	11.8	162
Residence									
Urban	64.1	1,734	90.6	18.3	0.2	1.4	0.6	3.4	1,111
Rural	51.2	1,320	61.6	31.0	0.0	0.8	0.3	20.2	677
Region									
Western	52.0	299	91.6	18.0	0.0	0.0	0.8	4.6	155
Central	45.7	201	71.4	34.4	0.0	0.9	0.0	16.7	92
Greater Accra	63.2	663	93.6	16.5	0.2	2.6	1.2	0.4	419
Volta	62.7	330	44.6	11.5	0.0	0.6	0.0	46.7	207
Eastern	63.9	342	91.3	12.1	0.5	0.2	0.0	1.7	218
Ashanti	62.2	605	87.7	23.9	0.0	2.0	0.0	1.3	377
Brong Ahafo	33.3	190	75.0	13.3	0.0	0.6	0.0	19.1	63
Northern	69.6	238	72.5	56.3	0.0	0.0	1.1	7.8	166
Upper East	49.3	120	35.4	42.0	0.0	0.0	0.0	28.4	59
Upper West	47.4	65	39.9	56.9	0.0	0.5	0.5	11.1	31
Education									
No education	52.3	398	55.5	45.2	0.0	0.4	0.4	20.4	208
Primary	52.5	522	66.7	22.8	0.0	0.0	0.0	19.7	274
Middle/JSS/JHS	54.9	1,082	80.2	24.3	0.0	0.4	0.2	8.1	594
Secondary/SSS/SH S or higher	67.6	1,053	91.1	15.8	0.3	2.6	0.9	4.2	712
Wealth quintile									
Lowest	47.6	365	33.3	50.3	0.0	0.0	0.5	28.8	173
Second	49.2	448	58.6	33.2	0.4	0.4	0.6	20.7	220
Middle	54.7	617	77.1	22.9	0.0	0.6	0.0	12.3	337
Fourth	58.1	714	92.8	22.5	0.3	0.3	0.2	2.0	415
Highest	70.4	912	92.1	12.9	0.0	2.7	0.8	4.6	642
Total	58.5	3,054	79.6	23.1	0.1	1.2	0.5	9.8	1,788

ACT = Artemisinin-based combination therapy
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 5.4 Knowledge of things to do to prevent malaria

Percentage of women age 15-49 who state specific things people can do to prevent themselves from getting malaria, according to background characteristics, Ghana MIS 2019

Background characteristic	Sleep under mosquito net or ITN	Use mosquito repellent	Take preventive medication	Spray house with insecticide	Fill in stagnant water (puddles)	Keep surround-ings clean	Put mosquito screen on windows	Other	Number of women
Age									
15-19	76.2	11.1	3.4	18.5	26.1	57.3	0.6	2.3	918
20-24	79.2	13.1	4.1	21.9	24.1	52.8	0.1	4.9	865
25-29	82.5	14.5	4.3	21.7	24.2	50.5	0.9	6.0	927
30-34	81.8	14.9	2.6	21.5	25.4	50.6	0.8	4.2	756
35-39	78.9	10.3	3.6	17.7	23.3	58.5	0.8	5.3	702
40-44	76.0	10.9	4.6	14.9	21.5	50.1	0.8	9.5	554
45-49	72.7	9.9	3.0	17.3	23.1	55.6	1.1	5.2	459
Residence									
Urban	77.4	13.8	3.4	25.2	26.7	60.3	0.8	4.5	2,657
Rural	80.1	10.8	3.9	13.4	21.5	46.5	0.6	5.8	2,524
Region									
Western	77.6	14.7	6.9	29.1	35.1	65.6	0.7	5.1	501
Central	74.2	7.7	3.3	11.6	25.2	62.7	0.9	2.8	368
Greater Accra	74.4	15.6	2.9	24.7	25.3	59.0	0.6	4.4	938
Volta	77.2	11.3	5.8	15.4	17.9	39.2	0.4	6.9	561
Eastern	75.0	10.4	2.2	23.2	16.3	44.4	1.1	14.3	642
Ashanti	84.3	8.9	3.5	24.1	31.2	64.4	0.4	1.6	950
Brong Ahafo	79.5	11.5	2.5	9.9	31.9	56.4	0.8	1.6	378
Northern	85.8	21.5	3.0	11.7	11.5	34.2	1.5	2.8	481
Upper East	86.0	11.8	5.1	10.0	24.7	52.2	0.3	9.0	215
Upper West	70.6	2.8	0.6	6.5	10.3	38.8	0.0	1.6	146
Education									
No education	78.9	12.7	3.8	9.6	11.0	36.0	0.4	4.2	865
Primary	75.0	9.6	3.4	15.2	16.5	44.5	0.5	5.4	963
Middle/JSS/JHS	78.0	11.5	3.1	17.8	23.7	56.1	0.6	6.1	1,898
Secondary/SSS/SHS or higher	81.8	15.2	4.4	30.4	37.6	66.9	1.2	4.1	1,456
Wealth quintile									
Lowest	80.2	10.6	3.3	6.9	14.2	35.6	0.3	4.4	839
Second	80.1	10.4	3.3	12.1	17.8	47.7	0.2	5.0	940
Middle	79.2	11.3	4.1	19.0	23.4	54.3	1.3	4.6	1,069
Fourth	77.5	13.9	3.8	24.2	25.0	59.7	0.4	5.7	1,087
Highest	77.2	14.6	3.8	29.9	35.6	64.3	1.1	5.5	1,247
Total	78.7	12.4	3.7	19.5	24.2	53.6	0.7	5.1	5,181

Note: Percentages may add to more than 100% since multiple responses were allowed.
ITN = Insecticide-treated net
JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

Table 5.5 Perceived susceptibility, severity, and malaria prevention

Percentage of women age 15-49 who express specific perceptions about malaria, percentage who have heard about the malaria vaccine, and percentage who would allow their child to be vaccinated against malaria, according to background characteristics, Ghana MIS 2019

Background characteristic	Percentage of women who agree that when a child has a fever, they almost always worry it might be malaria	Percentage of women who disagree that they don't worry about malaria because it can be easily treated	Percentage of women who have heard about the malaria vaccine	Percentage of women who would allow their child to be vaccinated against malaria	Number of women
Age					
15-19	68.2	36.1	21.5	84.2	918
20-24	67.2	41.1	34.7	89.7	865
25-29	73.8	41.7	38.6	92.0	927
30-34	71.5	39.7	40.9	90.9	756
35-39	75.4	42.5	40.1	94.1	702
40-44	81.0	37.9	39.5	91.6	554
45-49	79.4	41.7	39.0	91.7	459
Residence					
Urban	67.4	39.0	33.2	88.9	2,657
Rural	78.6	41.1	38.1	91.7	2,524
Region					
Western	72.8	50.8	29.7	89.4	501
Central	74.5	26.3	40.3	92.0	368
Greater Accra	58.1	45.0	27.6	82.9	938
Volta	75.0	33.2	37.8	85.0	561
Eastern	75.0	28.1	35.0	89.7	642
Ashanti	76.0	48.1	34.6	95.8	950
Brong Ahafo	85.2	37.1	41.7	96.6	378
Northern	81.8	29.7	45.2	94.4	481
Upper East	63.2	61.5	43.3	91.8	215
Upper West	78.6	41.4	37.5	90.9	146
Education					
No education	76.3	39.9	39.0	91.3	865
Primary	74.7	40.8	35.1	91.9	963
Middle/JSS/JHS	76.5	38.8	31.8	90.5	1,898
Secondary/SSS/SHS or higher	64.7	41.1	38.8	88.3	1,456
Wealth quintile					
Lowest	77.0	41.0	37.7	92.8	839
Second	79.4	35.7	39.0	91.5	940
Middle	77.1	38.9	34.7	91.1	1,069
Fourth	70.9	42.5	31.7	89.7	1,087
Highest	63.1	41.4	35.8	87.4	1,247
Total	72.8	40.0	35.6	90.3	5,181

JSS = Junior secondary school
JHS = Junior high school
SSS = Senior secondary school
SHS = Senior high school

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SAMPLE DESIGN

Appendix **A**

A.1 INTRODUCTION

T he 2019 Ghana Malaria Indicator Survey (2019 GMIS) is the second MIS conducted in Ghana, after the 2016 GMIS. In 2008 and 2014, Ghana implemented DHS surveys that also collected data on the primary household-level malaria indicators. The 2019 GMIS used a nationally representative sample of 200 clusters and about 6,000 selected households. The survey was designed to provide information on key malaria control indicators such as the proportion of households with at least one mosquito bed net and at least one insecticide-treated net (ITN), the proportion of children under age 5 who slept under a net the previous night and the proportion who slept under an ITN, the proportion of pregnant women who slept under a bed net the previous night and the proportion who received intermittent preventive treatment (IPT) for malaria during their most recent pregnancy in the last 2 years, and the prevalence of anaemia and malaria parasitemia among children under age 5.

The survey was designed to produce reliable estimates for key indicators at the national level as well as for urban and rural areas and each of the country's 10 administrative regions: Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East, and Upper West.

A.2 SAMPLE FRAME

In 2019 Ghana created six new regions, resulting in a total of 16 regions and 260 administrative districts; however, during survey design, the new administrative boundaries were not available. The sampling frame used for the 2019 GMIS is the frame of the Population and Housing Census (PHC) conducted in Ghana in 2010, provided by the Ghana Statistical Service (GSS). The sampling frame contains information about the location of enumeration areas (EAs), type of residence (urban or rural), the estimated number of residential households, and the estimated population. A sketch map that delineates the EA geographic boundaries is available for each EA. As part of the 2010 PHC, Ghana was administratively divided into 10 geographical regions. Each region was further sub-divided into districts; in total, there were 216 districts in Ghana at the time of the 2010 census.

Table A.1 provides the population distribution in the sampling frame by region and type of residence. The size of the regions as a percentage of the total population varies greatly, from 2.8% (Upper West) to 19.4% (Ashanti). The urbanisation of the regions also varies greatly, from the predominantly urban Greater Accra region (90.5%) to the Upper West region, where only 16.3% of residents live in urban areas. Overall, 50.9% of the population in Ghana lives in urban areas.

Table A.1 Population

Distribution of the residential population in the sampling frame, percentage that each region contributes to the total population, and percentage of each region that is urban, Ghana MIS 2019

Region	Residential population			Percentage of total population	Percent urban
	Urban	Rural	Total		
Western	1,007,969	1,368,052	2,376,021	9.6	42.4
Central	1,037,878	1,163,985	2,201,863	8.9	47.1
Greater Accra	3,630,955	379,099	4,010,054	16.3	90.5
Volta	713,735	1,404,517	2,118,252	8.6	33.7
Eastern	1,143,918	1,489,236	2,633,154	10.7	43.4
Ashanti	2,897,290	1,883,090	4,780,380	19.4	60.6
Brong Ahafo	1,028,473	1,282,510	2,310,983	9.4	44.5
Northern	750,712	1,728,749	2,479,461	10.1	30.3
Upper East	219,646	826,899	1,046,545	4.2	21.0
Upper West	114,653	587,457	702,110	2.8	16.3
Ghana	12,545,229	12,113,594	24,658,823	100.0	50.9

Source: The 2010 Ghana Population and Housing Census sampling frame provided by the Ghana Statistical Service (GSS).

Table A.2 presents the household distribution in the sampling frame by region and type of residence. The household distribution is slightly different from the population distribution because the average urban household size is smaller than the average rural household size. In Ghana, 55.8% of households are in urban areas.

Table A.2 Households

Distribution of residential households in the sampling frame, percentage that each region contributes to the total number of households, and percentage of each region that is urban, Ghana MIS 2019

	Number of residential households in frame			Percentage of total households	Percent urban
Region	Urban	Rural	Total		
Western	248,919	304,715	553,634	10.1	45.0
Central	255,365	271,398	526,763	9.6	48.5
Greater Accra	950,336	86,034	1,036,370	19.0	91.7
Volta	178,814	316,786	495,600	9.1	36.1
Eastern	293,547	338,498	632,045	11.6	46.4
Ashanti	715,462	410,743	1,126,205	20.6	63.5
Brong Ahafo	236,283	254,232	490,515	9.0	48.2
Northern	106,071	212,048	318,119	5.8	33.3
Upper East	41,941	135,688	177,629	3.2	23.6
Upper West	22,628	87,546	110,174	2.0	20.5
Ghana	3,049,366	2,417,688	5,467,054	100.0	55.8

Source: The 2010 Ghana Population and Housing Census sampling frame provided by the Ghana Statistical Service (GSS).

Table A.3 provides the distribution of EAs and their average size in number of households by region and type of residence. There are a total of 37,675 EAs, with 16,503 in urban areas and 21,172 in rural areas. The average EA size is 145 households. Urban EAs (average of 185 households) are larger than rural EAs (average of 114 households). The average size of EAs makes them convenient as a first-stage survey cluster with a sample take of 30 households per cluster at the second stage of sampling.

Table A.3 Enumeration areas

Distribution of the enumeration areas in the sampling frame and average number of residential households per enumeration area, by region and residence, Ghana MIS 2019

	Number of enumeration areas in frame			Average number of residential households in enumeration area		
Region	Urban	Rural	Total	Urban	Rural	Total
Western	1,239	2,300	3,539	201	132	156
Central	1,350	1,885	3,235	189	144	163
Greater Accra	4,724	699	5,423	201	123	191
Volta	964	2,646	3,610	185	120	137
Eastern	1,708	2,705	4,413	172	125	143
Ashanti	3,618	3,442	7,060	198	119	160
Brong Ahafo	1,425	2,246	3,671	166	113	134
Northern	998	2,873	3,871	106	74	82
Upper East	324	1,403	1,727	129	97	103
Upper West	153	973	1,126	148	90	98
Ghana	16,503	21,172	37,675	185	114	145

Source: The 2010 Ghana Population and Housing Census sampling frame provided by the Ghana Statistical Service (GSS).

A.3   SAMPLE DESIGN AND IMPLEMENTATION

The sample for the 2019 GMIS was a stratified sample selected in two stages from the sampling frame. Stratification was achieved by separating each region into urban and rural areas. In total, 20 sampling strata were created. Samples were selected independently in each sampling stratum through a two-stage selection. In the first stage, 200 EAs were selected with a probability proportional to size selection procedure according to the sample allocation given in **Table A.4**. The EA size is the number of residential households in the EA according to the 2010 PHC. Implicit stratification with proportional allocation was achieved at each of the lower administrative unit levels by sorting the EA frame before the sample

selection according to the units (within each explicit stratum) and by using a probability proportional to size selection procedure. The sample allocation in **Table A.4** features a power allocation with a small adjustment because a proportional allocation would have resulted in a very small sample size for the small regions such as Upper East and Upper West.

After the selection of EAs and before the main survey, a household listing operation was conducted in all of the selected EAs. The listing operation consisted of visiting each of the 200 selected EAs, drawing a location map and a detailed sketch map, and recording on the household listing forms all occupied residential households found in the EA 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 selected EAs were large. To reduce the workload during the household listing operation, large EAs were segmented by the listing team in the field before the household listing. Only one segment was selected for the survey with probability proportional to segment size. Household listing was conducted only in the selected segment. Thus, a 2019 GMIS cluster is either an EA or a segment of an EA.

Table A.4 Sample allocation of clusters and households

Number of clusters and households allocated by region, according to type of residence, Ghana MIS 2019

Region	Number of clusters allocated			Number of households allocated		
	Urban	Rural	Total	Urban	Rural	Total
Western	9	11	20	270	330	600
Central	10	11	21	300	330	630
Greater Accra	22	2	24	660	60	720
Volta	7	13	20	210	390	600
Eastern	10	11	21	300	330	630
Ashanti	16	9	25	480	270	750
Brong Ahafo	10	10	20	300	300	600
Northern	6	12	18	180	360	540
Upper East	4	12	16	120	360	480
Upper West	3	12	15	90	360	450
Ghana	97	103	200	2,910	3,090	6,000

In the second stage of selection, a fixed number of 30 households were selected in each cluster with equal probability systematic sampling based on the newly updated household listing. The survey interviewers interviewed only the pre-selected households. No replacements and no changes of the pre-selected households were allowed in the implementing stages in order to prevent bias. **Table A.5** shows the expected number of women with completed interviews and the expected number of children under age 5.

Table A.5 Sample allocation of expected number of women age 15-49 and expected number of children under age 5

Sample allocation of the number of women age 15-49 expected to complete interviews and the expected number of children under age 5 by region, according to type of residence, Ghana MIS 2019

Region	Number of women expected to complete interviews			Expected number of children under age 5		
	Urban	Rural	Total	Urban	Rural	Total
Western	220	297	517	118	223	341
Central	244	297	541	131	223	354
Greater Accra	537	54	591	289	41	330
Volta	171	351	522	92	263	355
Eastern	244	297	541	131	223	354
Ashanti	391	242	633	210	182	392
Brong Ahafo	244	270	514	131	203	334
Northern	146	324	470	79	243	322
Upper East	98	324	422	52	243	295
Upper West	73	324	397	39	243	282
Ghana	2,368	2,780	5,148	1,272	2,087	3,359

The parameters used in the sample calculation came from the 2016 GMIS; in that survey, the average number of women age 15-49 per household was 0.89, and the response rate among women was 99%. The household completion rate was 97%. On average, there were 0.57 children under age 5 per household.

A.4 SAMPLE PROBABILITIES AND SAMPLING WEIGHTS

Due to the non-proportional allocation of the sample to different divisions and their urban and rural areas and the possible differences in response rates, sampling weights will be required for any analysis using the 2019 GMIS data to ensure the actual representativeness of the survey results at the national level as well as the domain level. Since the 2019 GMIS 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 ith cluster in stratum h

P_{2hi}:   second-stage sampling probability within the ith cluster (households)

P_{hi}:   overall sampling probability for any households within the ith cluster of stratum h

Let a_h be the number of EAs selected in stratum h, M_{hi} the number of households according to the sampling frame in the ith EA, and $\sum M_{hi}$ the total number of households in the stratum. The probability of selecting the ith EA in the 2019 GMIS sample is calculated as follows:

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

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

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

Let L_{hi} be the number of households listed in the household listing operation in cluster i in stratum h, and let g_{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:

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

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

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

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

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

The design weights were adjusted for household non-response and individual non-response to obtain the sampling weights for households and for women, respectively. Non-response was adjusted at the sampling stratum level. For the household sampling weight, the household design weight was multiplied by the inverse of the household response rate by stratum. For women's individual sampling weight, the household

sampling weight was multiplied by the inverse of women's individual response rate by stratum. After adjusting for non-response, the sampling weights were normalised to obtain the final standard weights that appear in the data files. The normalisation process was done to obtain a total number of unweighted cases equal to the total number of weighted cases at the national level for the total number of households and women. Normalisation was done by multiplying the sampling weight by the estimated sampling fraction obtained from the survey for the household weight and the individual women's weights. The normalised weights are relative weights that are valid for estimating means, proportions, ratios, and rates but are not valid for estimating population totals or for pooled data.

A.5 SURVEY IMPLEMENTATION

An examination of response rates for the 2019 GMIS indicates that the survey was successfully implemented. **Table A.6** presents interview completion rates for households and individual women in the 2019 GMIS by residence and region.

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), Ghana MIS 2019

	Residence		Region										Total
Result	Urban	Rural	Western	Central	Greater Accra	Volta	Eastern	Ashanti	Brong Ahafo	Northern	Upper East	Upper West	Total
Selected households													
Completed (C)	96.2	97.0	98.2	96.8	96.8	93.5	97.0	97.2	94.8	96.3	98.3	97.6	96.6
Household present but no competent respondent at home (HP)	0.5	0.4	0.0	0.3	0.8	0.7	1.1	0.5	0.0	0.2	0.0	0.4	0.4
Postponed (P)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refused (R)	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.2	0.0	0.2	0.1
Dwelling not found (DNF)	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Household absent (HA)	2.6	1.8	1.8	2.7	1.5	4.0	1.3	1.5	5.0	2.2	0.8	1.1	2.2
Dwelling vacant/ address not a dwelling (DV)	0.4	0.7	0.0	0.2	0.6	1.7	0.6	0.5	0.0	0.9	0.8	0.2	0.5
Dwelling destroyed (DD)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0
Other (O)	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	2,912	3,090	600	630	720	602	630	750	600	540	480	450	6,002
Household response rate (HRR)[1]	99.3	99.6	100.0	99.7	98.9	99.3	98.9	99.2	100.0	99.6	100.0	98.9	99.4
Eligible women													
Completed (EWC)	98.9	98.7	99.2	98.5	99.7	99.6	98.2	98.5	98.8	97.5	99.2	98.6	98.8
Not at home (EWNH)	0.9	0.7	0.4	0.6	0.2	0.2	1.4	1.1	1.0	2.0	0.4	0.4	0.8
Postponed (EWP)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refused (EWR)	0.0	0.1	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1
Incapacitated (EWI)	0.2	0.5	0.2	0.4	0.0	0.2	0.4	0.5	0.2	0.3	0.4	1.0	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	2,468	2,778	509	472	588	470	502	658	421	596	513	517	5,246
Eligible women response rate (EWRR)[2]	98.9	98.7	99.2	98.5	99.7	99.6	98.2	98.5	98.8	97.5	99.2	98.6	98.8
Overall women response rate (OWRR)[3]	98.1	98.2	99.2	98.2	98.5	98.9	97.1	97.7	98.8	97.1	99.2	97.5	98.2

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

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

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

$$OWRR = HRR * EWRR/100$$

ESTIMATES OF SAMPLING ERRORS

Appendix **B**

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

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in the 2019 GMIS 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.

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 2019 GMIS sample is the result of a multi-stage stratified design, and, consequently, it was necessary to use more complex formulas. Sampling errors are computed in SAS, using programs developed by ICF. These programs use 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 hth stratum;
          y_{hi} is the sum of the weighted values of variable y in the ith cluster in the hth stratum;
          x_{hi} is the sum of the weighted number of cases in the ith cluster in the hth 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. The design effect is defined as the ratio between the standard error using the given sample design and the standard error that would result if a simple random sample had been used. A DEFT value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design. Relative standard errors and confidence limits for the estimates are also calculated.

Sampling errors for the 2019 GMIS are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for the country as a whole, for urban and rural areas, and for each of the country's 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** through **B.14** 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 selected 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 (e.g., as calculated for *had fever in last 2 weeks*) can be interpreted as follows: the overall average from the national sample is 0.296, and its standard error is 0.015. Therefore, to obtain the 95% confidence limits, one adds and subtracts twice the standard error to the sample estimate, that is, $0.296 \pm 2 \times 0.015$. There is a high probability (95%) that the true proportion of children who had a fever in the last 2 weeks is between 0.267 and 0.326.

For the total sample, the value of the DEFT, averaged over all variables, is 1.65. This means that, due to multi-stage clustering of the sample, the average standard error is increased by a factor of 1.65 over that in an equivalent simple random sample.

Table B.1 List of selected variables for sampling errors, Ghana MIS 2019

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 two persons	Proportion	Households
WOMEN		
No education	Proportion	All women 15-49
Secondary education or higher	Proportion	All women 15-49
Literacy	Proportion	All women 15-49
CHILDREN		
Slept under any mosquito net last night	Proportion	Children under 5
Slept under an ITN last night	Proportion	Children under 5
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
Sought care/treatment from a health facility	Proportion	Child under 5 with fever in last 2 weeks
Took ACT	Proportion	Child under 5 with fever in last 2 weeks who received any antimalarial drugs
Has anaemia (haemoglobin <8.0 g/dl)	Proportion	Child 6-59 tested for anaemia
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 (on microscopy) for malaria
PREGNANT WOMEN		
Slept under any mosquito net last night	Proportion	All pregnant women 15-49
Slept under an ITN last night	Proportion	All pregnant women 15-49
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
Received 1+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years
Received 2+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years
Received 3+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years

Table B.2 Sampling errors: Total sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.740	0.009	5,799	5,799	1.535	0.012	0.722	0.757
Average number of mosquito nets per household	1.787	0.038	5,799	5,799	1.756	0.021	1.711	1.862
Ownership of at least one ITN	0.737	0.009	5,799	5,799	1.515	0.012	0.720	0.755
Average number of ITNs per household	1.778	0.037	5,799	5,799	1.743	0.021	1.703	1.852
Ownership of at least one ITN for two persons	0.518	0.012	5,749	5,756	1.772	0.023	0.494	0.541
WOMEN								
No education	0.167	0.011	5,181	5,181	2.075	0.064	0.145	0.188
Secondary education or higher	0.647	0.015	5,181	5,181	2.199	0.023	0.618	0.677
Literacy	0.585	0.015	5,181	5,181	2.192	0.026	0.555	0.615
CHILDREN								
Slept under any mosquito net last night	0.542	0.016	3,252	3,008	1.495	0.030	0.510	0.574
Slept under an ITN last night	0.541	0.016	3,252	3,008	1.495	0.030	0.509	0.573
Slept under an ITN last night in households with at least one ITN	0.633	0.017	2,805	2,572	1.544	0.027	0.599	0.666
Had fever in last 2 weeks	0.296	0.015	2,928	2,809	1.619	0.050	0.267	0.326
Sought care/treatment from a health facility	0.690	0.023	929	832	1.344	0.033	0.645	0.735
Took ACT	0.845	0.022	435	382	1.127	0.026	0.801	0.890
Has anaemia (haemoglobin <8.0 g/dl)	0.036	0.005	2,849	2,621	1.365	0.144	0.026	0.047
Has malaria (based on rapid test)	0.230	0.017	2,843	2,612	1.857	0.073	0.196	0.263
Has malaria (based on microscopy test)	0.141	0.012	2,846	2,619	1.599	0.085	0.117	0.165
PREGNANT WOMEN								
Slept under any mosquito net last night	0.491	0.031	364	345	1.147	0.063	0.429	0.553
Slept under an ITN last night	0.487	0.031	364	345	1.147	0.064	0.425	0.549
Slept under an ITN last night in households with at least one ITN	0.584	0.035	310	288	1.223	0.061	0.513	0.655
Received 1+ doses of SP/Fansidar	0.914	0.013	1,215	1,151	1.521	0.014	0.888	0.939
Received 2+ doses of SP/Fansidar	0.802	0.016	1,215	1,151	1.393	0.020	0.769	0.835
Received 3+ doses of SP/Fansidar	0.610	0.019	1,215	1,151	1.354	0.032	0.571	0.649

Table B.3 Sampling errors: Urban sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.639	0.012	2,801	2,984	1.290	0.018	0.616	0.663
Average number of mosquito nets per household	1.421	0.049	2,801	2,984	1.697	0.035	1.322	1.520
Ownership of at least one ITN	0.635	0.011	2,801	2,984	1.261	0.018	0.613	0.658
Average number of ITNs per household	1.409	0.049	2,801	2,984	1.671	0.034	1.312	1.506
Ownership of at least one ITN for two persons	0.443	0.014	2,781	2,970	1.484	0.032	0.415	0.471
WOMEN								
No education	0.096	0.011	2,440	2,657	1.815	0.113	0.074	0.117
Secondary education or higher	0.749	0.017	2,440	2,657	1.915	0.022	0.716	0.783
Literacy	0.706	0.019	2,440	2,657	2.019	0.026	0.669	0.744
CHILDREN								
Slept under any mosquito net last night	0.379	0.025	1,232	1,246	1.454	0.065	0.330	0.429
Slept under an ITN last night	0.378	0.025	1,232	1,246	1.452	0.065	0.329	0.427
Slept under an ITN last night in households with at least one ITN	0.484	0.030	978	972	1.567	0.062	0.424	0.544
Had fever in last 2 weeks	0.296	0.016	1,140	1,194	1.088	0.053	0.265	0.328
Sought care/treatment from a health facility	0.743	0.030	352	354	1.248	0.041	0.683	0.803
Took ACT	0.832	0.035	159	154	1.030	0.042	0.762	0.901
Has anaemia (haemoglobin <8.0 g/dl)	0.023	0.006	1,053	1,064	1.095	0.251	0.012	0.035
Has malaria (based on rapid test)	0.098	0.013	1,049	1,057	1.224	0.129	0.073	0.123
Has malaria (based on microscopy test)	0.061	0.012	1,051	1,062	1.428	0.190	0.038	0.084
PREGNANT WOMEN								
Slept under any mosquito net last night	0.325	0.042	136	143	1.019	0.129	0.241	0.409
Slept under an ITN last night	0.314	0.042	136	143	1.021	0.132	0.231	0.397
Slept under an ITN last night in households with at least one ITN	0.442	0.056	102	102	1.098	0.128	0.329	0.555
Received 1+ doses of SP/Fansidar	0.910	0.020	478	500	1.491	0.022	0.870	0.950
Received 2+ doses of SP/Fansidar	0.789	0.022	478	500	1.163	0.028	0.745	0.833
Received 3+ doses of SP/Fansidar	0.595	0.026	478	500	1.143	0.044	0.543	0.647

Table B.4 Sampling errors: Rural sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.846	0.011	2,998	2,815	1.684	0.013	0.824	0.868
Average number of mosquito nets per household	2.174	0.046	2,998	2,815	1.539	0.021	2.082	2.267
Ownership of at least one ITN	0.845	0.011	2,998	2,815	1.670	0.013	0.823	0.867
Average number of ITNs per household	2.168	0.046	2,998	2,815	1.537	0.021	2.076	2.261
Ownership of at least one ITN for two persons	0.597	0.016	2,968	2,786	1.762	0.027	0.565	0.629
WOMEN								
No education	0.242	0.018	2,741	2,524	2.202	0.075	0.206	0.278
Secondary education or higher	0.540	0.022	2,741	2,524	2.360	0.042	0.495	0.585
Literacy	0.458	0.020	2,741	2,524	2.151	0.045	0.417	0.499
CHILDREN								
Slept under any mosquito net last night	0.657	0.020	2,020	1,762	1.527	0.031	0.617	0.698
Slept under an ITN last night	0.657	0.020	2,020	1,762	1.531	0.031	0.616	0.697
Slept under an ITN last night in households with at least one ITN	0.723	0.018	1,827	1,600	1.475	0.025	0.686	0.760
Had fever in last 2 weeks	0.296	0.023	1,788	1,615	1.974	0.077	0.251	0.342
Sought care/treatment from a health facility	0.651	0.032	577	479	1.413	0.049	0.588	0.714
Took ACT	0.855	0.029	276	228	1.213	0.034	0.796	0.913
Has anaemia (haemoglobin <8.0 g/dl)	0.045	0.008	1,796	1,557	1.478	0.169	0.030	0.061
Has malaria (based on rapid test)	0.319	0.026	1,794	1,556	2.090	0.081	0.267	0.371
Has malaria (based on microscopy test)	0.196	0.018	1,795	1,556	1.652	0.090	0.161	0.231
PREGNANT WOMEN								
Slept under any mosquito net last night	0.610	0.042	228	202	1.267	0.069	0.525	0.694
Slept under an ITN last night	0.610	0.042	228	202	1.267	0.069	0.525	0.694
Slept under an ITN last night in households with at least one ITN	0.662	0.045	208	186	1.356	0.068	0.572	0.752
Received 1+ doses of SP/Fansidar	0.916	0.016	737	651	1.550	0.018	0.884	0.949
Received 2+ doses of SP/Fansidar	0.812	0.023	737	651	1.574	0.029	0.766	0.858
Received 3+ doses of SP/Fansidar	0.622	0.028	737	651	1.517	0.044	0.567	0.678

Table B.5 Sampling errors: Western region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.788	0.028	589	573	1.689	0.036	0.731	0.845
Average number of mosquito nets per household	1.984	0.121	589	573	1.773	0.061	1.743	2.225
Ownership of at least one ITN	0.788	0.028	589	573	1.689	0.036	0.731	0.845
Average number of ITNs per household	1.984	0.121	589	573	1.773	0.061	1.743	2.225
Ownership of at least one ITN for two persons	0.590	0.026	581	567	1.286	0.045	0.537	0.642
WOMEN								
No education	0.131	0.019	505	501	1.234	0.141	0.094	0.168
Secondary education or higher	0.717	0.030	505	501	1.493	0.042	0.657	0.777
Literacy	0.617	0.039	505	501	1.784	0.063	0.540	0.695
CHILDREN								
Slept under any mosquito net last night	0.585	0.060	314	310	1.726	0.103	0.464	0.705
Slept under an ITN last night	0.585	0.060	314	310	1.726	0.103	0.464	0.705
Slept under an ITN last night in households with at least one ITN	0.679	0.046	271	267	1.339	0.067	0.587	0.770
Had fever in last 2 weeks	0.404	0.031	288	289	0.992	0.076	0.343	0.465
Sought care/treatment from a health facility	0.641	0.043	115	117	0.927	0.067	0.556	0.726
Took ACT	0.642	0.062	73	75	1.014	0.096	0.518	0.765
Has anaemia (haemoglobin <8.0 g/dl)	0.033	0.017	286	283	1.634	0.509	0.000	0.066
Has malaria (based on rapid test)	0.312	0.042	286	283	1.379	0.134	0.228	0.396
Has malaria (based on microscopy test)	0.270	0.039	286	283	1.364	0.143	0.193	0.348
PREGNANT WOMEN								
Slept under any mosquito net last night	0.639	0.083	36	33	1.052	0.129	0.474	0.805
Slept under an ITN last night	0.639	0.083	36	33	1.052	0.129	0.474	0.805
Slept under an ITN last night in households with at least one ITN	0.712	0.086	32	30	1.110	0.121	0.540	0.885
Received 1+ doses of SP/Fansidar	0.902	0.024	115	114	0.874	0.027	0.853	0.950
Received 2+ doses of SP/Fansidar	0.844	0.029	115	114	0.849	0.034	0.786	0.901
Received 3+ doses of SP/Fansidar	0.675	0.038	115	114	0.876	0.057	0.599	0.752

Table B.6 Sampling errors: Central region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.777	0.026	610	463	1.534	0.033	0.725	0.829
Average number of mosquito nets per household	1.680	0.094	610	463	1.587	0.056	1.491	1.868
Ownership of at least one ITN	0.777	0.026	610	463	1.534	0.033	0.725	0.829
Average number of ITNs per household	1.680	0.094	610	463	1.587	0.056	1.491	1.868
Ownership of at least one ITN for two persons	0.546	0.030	602	456	1.473	0.055	0.486	0.606
WOMEN								
No education	0.098	0.016	465	368	1.192	0.168	0.065	0.130
Secondary education or higher	0.691	0.030	465	368	1.417	0.044	0.630	0.751
Literacy	0.549	0.027	465	368	1.161	0.049	0.495	0.602
CHILDREN								
Slept under any mosquito net last night	0.564	0.043	295	223	1.249	0.076	0.478	0.649
Slept under an ITN last night	0.564	0.043	295	223	1.249	0.076	0.478	0.649
Slept under an ITN last night in households with at least one ITN	0.652	0.037	258	193	1.051	0.057	0.578	0.726
Had fever in last 2 weeks	0.363	0.043	266	206	1.379	0.118	0.278	0.448
Sought care/treatment from a health facility	0.612	0.060	101	75	1.122	0.098	0.492	0.732
Took ACT	0.877	0.053	41	30	1.022	0.061	0.770	0.984
Has anaemia (haemoglobin <8.0 g/dl)	0.057	0.015	251	187	0.978	0.268	0.027	0.088
Has malaria (based on rapid test)	0.299	0.035	251	187	1.087	0.118	0.229	0.370
Has malaria (based on microscopy test)	0.176	0.029	250	186	1.038	0.162	0.119	0.234
PREGNANT WOMEN								
Slept under any mosquito net last night	0.509	0.065	35	26	0.749	0.127	0.380	0.638
Slept under an ITN last night	0.509	0.065	35	26	0.749	0.127	0.380	0.638
Slept under an ITN last night in households with at least one ITN	0.611	0.076	29	21	0.829	0.125	0.458	0.764
Received 1+ doses of SP/Fansidar	0.916	0.028	125	98	1.138	0.031	0.860	0.973
Received 2+ doses of SP/Fansidar	0.776	0.035	125	98	0.945	0.046	0.705	0.847
Received 3+ doses of SP/Fansidar	0.624	0.043	125	98	0.985	0.069	0.539	0.710

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
			HOUSEHOLDS					
Ownership of at least one mosquito net	0.562	0.017	697	1,103	0.910	0.030	0.528	0.596
Average number of mosquito nets per household	1.194	0.067	697	1,103	1.189	0.056	1.060	1.327
Ownership of at least one ITN	0.561	0.017	697	1,103	0.899	0.030	0.527	0.595
Average number of ITNs per household	1.188	0.067	697	1,103	1.192	0.056	1.054	1.322
Ownership of at least one ITN for two persons	0.394	0.022	696	1,102	1.183	0.056	0.350	0.438
			WOMEN					
No education	0.050	0.015	586	938	1.663	0.301	0.020	0.080
Secondary education or higher	0.780	0.023	586	938	1.348	0.030	0.734	0.826
Literacy	0.808	0.029	586	938	1.777	0.036	0.750	0.866
			CHILDREN					
Slept under any mosquito net last night	0.247	0.033	234	376	1.045	0.134	0.181	0.313
Slept under an ITN last night	0.247	0.033	234	376	1.045	0.134	0.181	0.313
Slept under an ITN last night in households with at least one ITN	0.349	0.045	164	266	1.094	0.128	0.260	0.438
Had fever in last 2 weeks	0.193	0.020	231	379	0.766	0.101	0.154	0.232
Sought care/treatment from a health facility	0.798	0.081	44	73	1.387	0.102	0.635	0.960
Took ACT	1.000	0.000	18	30	na	0.000	1.000	1.000
Has anaemia (haemoglobin <8.0 g/dl)	0.000	0.000	187	307	na	na	0.000	0.000
Has malaria (based on rapid test)	0.010	0.008	186	304	1.052	0.765	0.000	0.025
Has malaria (based on microscopy test)	0.024	0.013	187	307	1.155	0.537	0.000	0.049
			PREGNANT WOMEN					
Slept under any mosquito net last night	0.208	0.079	29	43	1.012	0.379	0.050	0.366
Slept under an ITN last night	0.208	0.079	29	43	1.012	0.379	0.050	0.366
Slept under an ITN last night in households with at least one ITN	0.317	0.108	21	28	0.978	0.340	0.101	0.533
Received 1+ doses of SP/Fansidar	0.918	0.026	103	174	0.987	0.028	0.867	0.970
Received 2+ doses of SP/Fansidar	0.751	0.043	103	174	1.032	0.057	0.666	0.837
Received 3+ doses of SP/Fansidar	0.570	0.045	103	174	0.940	0.078	0.481	0.659

na = Not applicable

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
			HOUSEHOLDS					
Ownership of at least one mosquito net	0.849	0.017	563	644	1.119	0.020	0.815	0.883
Average number of mosquito nets per household	2.148	0.103	563	644	1.482	0.048	1.942	2.354
Ownership of at least one ITN	0.845	0.016	563	644	1.018	0.018	0.814	0.876
Average number of ITNs per household	2.135	0.101	563	644	1.458	0.047	1.932	2.337
Ownership of at least one ITN for two persons	0.611	0.039	559	640	1.892	0.064	0.532	0.689
			WOMEN					
No education	0.162	0.043	468	561	2.535	0.268	0.075	0.249
Secondary education or higher	0.581	0.061	468	561	2.650	0.105	0.459	0.702
Literacy	0.536	0.058	468	561	2.495	0.108	0.420	0.652
			CHILDREN					
Slept under any mosquito net last night	0.676	0.028	280	340	0.889	0.042	0.619	0.732
Slept under an ITN last night	0.676	0.028	280	340	0.889	0.042	0.619	0.732
Slept under an ITN last night in households with at least one ITN	0.724	0.036	259	317	1.219	0.050	0.652	0.797
Had fever in last 2 weeks	0.247	0.084	245	309	3.015	0.339	0.079	0.414
Sought care/treatment from a health facility	0.804	0.046	73	76	0.905	0.057	0.713	0.895
Took ACT	0.922	0.042	32	32	0.807	0.046	0.838	1.007
Has anaemia (haemoglobin <8.0 g/dl)	0.028	0.015	251	302	1.329	0.530	0.000	0.058
Has malaria (based on rapid test)	0.333	0.082	250	301	2.499	0.246	0.169	0.496
Has malaria (based on microscopy test)	0.204	0.038	249	301	1.398	0.187	0.128	0.281
			PREGNANT WOMEN					
Slept under any mosquito net last night	0.348	0.091	27	32	1.012	0.261	0.166	0.530
Slept under an ITN last night	0.330	0.089	27	32	0.998	0.268	0.153	0.508
Slept under an ITN last night in households with at least one ITN	0.389	0.110	22	27	1.102	0.283	0.169	0.610
Received 1+ doses of SP/Fansidar	0.946	0.021	104	121	0.943	0.022	0.903	0.988
Received 2+ doses of SP/Fansidar	0.818	0.063	104	121	1.644	0.078	0.691	0.944
Received 3+ doses of SP/Fansidar	0.532	0.096	104	121	1.919	0.180	0.340	0.723

Table B.9 Sampling errors: Eastern region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
			HOUSEHOLDS					
Ownership of at least one mosquito net	0.719	0.027	611	739	1.479	0.038	0.665	0.773
Average number of mosquito nets per household	1.559	0.069	611	739	1.099	0.044	1.420	1.697
Ownership of at least one ITN	0.713	0.026	611	739	1.426	0.037	0.660	0.765
Average number of ITNs per household	1.535	0.061	611	739	0.975	0.040	1.413	1.657
Ownership of at least one ITN for two persons	0.483	0.035	600	728	1.689	0.072	0.414	0.552
			WOMEN					
No education	0.093	0.021	493	642	1.568	0.222	0.051	0.134
Secondary education or higher	0.754	0.028	493	642	1.423	0.037	0.699	0.809
Literacy	0.660	0.037	493	642	1.715	0.056	0.587	0.734
			CHILDREN					
Slept under any mosquito net last night	0.435	0.070	263	315	1.930	0.161	0.295	0.575
Slept under an ITN last night	0.435	0.070	263	315	1.930	0.161	0.295	0.575
Slept under an ITN last night in households with at least one ITN	0.504	0.083	228	272	2.146	0.166	0.337	0.671
Had fever in last 2 weeks	0.283	0.029	246	297	0.913	0.102	0.225	0.341
Sought care/treatment from a health facility	0.603	0.077	76	84	1.166	0.128	0.448	0.758
Took ACT	0.795	0.102	29	37	1.336	0.128	0.591	0.998
Has anaemia (haemoglobin <8.0 g/dl)	0.016	0.008	224	270	0.916	0.489	0.000	0.031
Has malaria (based on rapid test)	0.264	0.051	222	267	1.604	0.193	0.162	0.366
Has malaria (based on microscopy test)	0.123	0.041	224	270	1.707	0.335	0.041	0.206
			PREGNANT WOMEN					
Slept under any mosquito net last night	0.437	0.058	34	46	0.745	0.134	0.320	0.553
Slept under an ITN last night	0.437	0.058	34	46	0.745	0.134	0.320	0.553
Slept under an ITN last night in households with at least one ITN	0.567	0.089	28	35	1.001	0.156	0.390	0.745
Received 1+ doses of SP/Fansidar	0.822	0.063	91	111	1.527	0.077	0.695	0.948
Received 2+ doses of SP/Fansidar	0.684	0.053	91	111	1.055	0.078	0.578	0.790
Received 3+ doses of SP/Fansidar	0.422	0.054	91	111	1.009	0.128	0.314	0.530

Table B.10 Sampling errors: Ashanti region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
			HOUSEHOLDS					
Ownership of at least one mosquito net	0.728	0.024	729	1,057	1.453	0.033	0.680	0.776
Average number of mosquito nets per household	1.813	0.094	729	1,057	1.534	0.052	1.626	2.001
Ownership of at least one ITN	0.725	0.024	729	1,057	1.449	0.033	0.677	0.773
Average number of ITNs per household	1.805	0.094	729	1,057	1.541	0.052	1.616	1.993
Ownership of at least one ITN for two persons	0.540	0.029	727	1,053	1.573	0.054	0.482	0.598
			WOMEN					
No education	0.104	0.019	648	950	1.563	0.181	0.066	0.141
Secondary education or higher	0.708	0.037	648	950	2.088	0.053	0.634	0.783
Literacy	0.600	0.035	648	950	1.801	0.058	0.531	0.670
			CHILDREN					
Slept under any mosquito net last night	0.525	0.041	318	472	1.281	0.079	0.442	0.607
Slept under an ITN last night	0.523	0.041	318	472	1.274	0.079	0.440	0.605
Slept under an ITN last night in households with at least one ITN	0.624	0.045	260	395	1.362	0.073	0.534	0.715
Had fever in last 2 weeks	0.321	0.029	303	465	1.088	0.092	0.262	0.379
Sought care/treatment from a health facility	0.661	0.066	99	149	1.384	0.100	0.529	0.793
Took ACT	0.899	0.074	31	45	1.356	0.083	0.750	1.047
Has anaemia (haemoglobin <8.0 g/dl)	0.028	0.012	280	413	1.105	0.418	0.005	0.052
Has malaria (based on rapid test)	0.158	0.042	280	413	1.766	0.265	0.074	0.241
Has malaria (based on microscopy test)	0.104	0.029	280	413	1.572	0.279	0.046	0.162
			PREGNANT WOMEN					
Slept under any mosquito net last night	0.484	0.092	40	64	1.222	0.190	0.300	0.668
Slept under an ITN last night	0.484	0.092	40	64	1.222	0.190	0.300	0.668
Slept under an ITN last night in households with at least one ITN	0.571	0.109	32	54	1.349	0.191	0.353	0.790
Received 1+ doses of SP/Fansidar	0.939	0.025	117	184	1.190	0.027	0.888	0.990
Received 2+ doses of SP/Fansidar	0.848	0.033	117	184	1.023	0.039	0.782	0.914
Received 3+ doses of SP/Fansidar	0.642	0.036	117	184	0.846	0.056	0.570	0.715

Table B.11 Sampling errors: Brong Ahafo region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.800	0.018	569	499	1.050	0.022	0.765	0.835
Average number of mosquito nets per household	1.958	0.090	569	499	1.324	0.046	1.779	2.138
Ownership of at least one ITN	0.796	0.017	569	499	1.025	0.022	0.762	0.831
Average number of ITNs per household	1.940	0.089	569	499	1.317	0.046	1.762	2.119
Ownership of at least one ITN for two persons	0.609	0.019	563	495	0.924	0.031	0.571	0.647
WOMEN								
No education	0.122	0.025	416	378	1.578	0.208	0.071	0.173
Secondary education or higher	0.656	0.044	416	378	1.884	0.067	0.568	0.744
Literacy	0.520	0.040	416	378	1.628	0.077	0.440	0.600
CHILDREN								
Slept under any mosquito net last night	0.702	0.036	298	259	1.255	0.051	0.630	0.774
Slept under an ITN last night	0.693	0.038	298	259	1.321	0.055	0.617	0.769
Slept under an ITN last night in households with at least one ITN	0.764	0.041	271	235	1.511	0.053	0.682	0.845
Had fever in last 2 weeks	0.337	0.042	278	246	1.366	0.124	0.254	0.420
Sought care/treatment from a health facility	0.644	0.066	98	83	1.221	0.103	0.512	0.777
Took ACT	0.763	0.084	38	33	1.088	0.109	0.596	0.930
Has anaemia (haemoglobin <8.0 g/dl)	0.023	0.009	263	230	0.982	0.394	0.005	0.041
Has malaria (based on rapid test)	0.354	0.053	261	228	1.726	0.149	0.248	0.460
Has malaria (based on microscopy test)	0.173	0.032	263	230	1.342	0.183	0.109	0.236
PREGNANT WOMEN								
Slept under any mosquito net last night	0.611	0.102	34	31	1.166	0.166	0.408	0.815
Slept under an ITN last night	0.578	0.105	34	31	1.180	0.181	0.369	0.788
Slept under an ITN last night in households with at least one ITN	0.616	0.103	32	29	1.145	0.167	0.410	0.822
Received 1+ doses of SP/Fansidar	0.938	0.027	110	95	1.152	0.029	0.883	0.992
Received 2+ doses of SP/Fansidar	0.873	0.041	110	95	1.261	0.047	0.790	0.955
Received 3+ doses of SP/Fansidar	0.632	0.058	110	95	1.234	0.092	0.515	0.749

Table B.12 Sampling errors: Northern region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.854	0.016	520	405	1.032	0.019	0.822	0.886
Average number of mosquito nets per household	2.470	0.103	520	405	1.309	0.042	2.265	2.676
Ownership of at least one ITN	0.854	0.016	520	405	1.032	0.019	0.822	0.886
Average number of ITNs per household	2.468	0.104	520	405	1.322	0.042	2.261	2.676
Ownership of at least one ITN for two persons	0.477	0.037	517	402	1.700	0.079	0.402	0.552
WOMEN								
No education	0.570	0.031	581	481	1.511	0.055	0.508	0.632
Secondary education or higher	0.276	0.037	581	481	1.996	0.134	0.202	0.351
Literacy	0.264	0.038	581	481	2.052	0.143	0.189	0.340
CHILDREN								
Slept under any mosquito net last night	0.575	0.025	565	473	1.029	0.044	0.524	0.625
Slept under an ITN last night	0.575	0.025	565	473	1.029	0.044	0.524	0.625
Slept under an ITN last night in households with at least one ITN	0.647	0.025	505	421	1.024	0.038	0.597	0.696
Had fever in last 2 weeks	0.263	0.039	472	409	1.748	0.150	0.184	0.341
Sought care/treatment from a health facility	0.725	0.070	132	107	1.662	0.096	0.586	0.865
Took ACT	0.959	0.020	83	67	0.931	0.021	0.919	1.000
Has anaemia (haemoglobin <8.0 g/dl)	0.096	0.020	509	421	1.595	0.211	0.055	0.136
Has malaria (based on rapid test)	0.187	0.033	509	421	1.840	0.177	0.121	0.253
Has malaria (based on microscopy test)	0.130	0.038	509	421	2.180	0.289	0.055	0.206
PREGNANT WOMEN								
Slept under any mosquito net last night	0.614	0.079	60	45	1.223	0.128	0.457	0.771
Slept under an ITN last night	0.614	0.079	60	45	1.223	0.128	0.457	0.771
Slept under an ITN last night in households with at least one ITN	0.695	0.062	53	40	0.986	0.089	0.572	0.819
Received 1+ doses of SP/Fansidar	0.884	0.050	186	161	2.182	0.057	0.784	0.985
Received 2+ doses of SP/Fansidar	0.770	0.061	186	161	2.006	0.079	0.648	0.891
Received 3+ doses of SP/Fansidar	0.645	0.061	186	161	1.781	0.095	0.522	0.767

Table B.13 Sampling errors: Upper East region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.878	0.027	472	193	1.768	0.030	0.824	0.931
Average number of mosquito nets per household	2.423	0.142	472	193	2.055	0.059	2.138	2.708
Ownership of at least one ITN	0.878	0.027	472	193	1.768	0.030	0.824	0.931
Average number of ITNs per household	2.421	0.142	472	193	2.054	0.059	2.137	2.706
Ownership of at least one ITN for two persons	0.555	0.046	466	191	1.984	0.083	0.463	0.647
WOMEN								
No education	0.374	0.036	509	215	1.670	0.096	0.303	0.446
Secondary education or higher	0.418	0.042	509	215	1.908	0.100	0.334	0.502
Literacy	0.419	0.035	509	215	1.616	0.085	0.348	0.490
CHILDREN								
Slept under any mosquito net last night	0.672	0.061	342	144	1.990	0.090	0.551	0.793
Slept under an ITN last night	0.672	0.061	342	144	1.990	0.090	0.551	0.793
Slept under an ITN last night in households with at least one ITN	0.749	0.045	308	129	1.559	0.060	0.659	0.839
Had fever in last 2 weeks	0.351	0.035	285	122	1.202	0.100	0.281	0.421
Sought care/treatment from a health facility	0.787	0.053	99	43	1.263	0.067	0.681	0.893
Took ACT	0.910	0.028	50	23	0.710	0.030	0.855	0.966
Has anaemia (haemoglobin <8.0 g/dl)	0.019	0.009	297	124	1.054	0.487	0.000	0.037
Has malaria (based on rapid test)	0.306	0.041	297	124	1.438	0.134	0.224	0.388
Has malaria (based on microscopy test)	0.098	0.018	297	124	1.027	0.187	0.061	0.135
PREGNANT WOMEN								
Slept under any mosquito net last night	0.682	0.112	36	16	1.377	0.164	0.458	0.906
Slept under an ITN last night	0.682	0.112	36	16	1.377	0.164	0.458	0.906
Slept under an ITN last night in households with at least one ITN	0.759	0.097	32	15	1.244	0.128	0.565	0.953
Received 1+ doses of SP/Fansidar	0.968	0.014	131	55	0.939	0.015	0.939	0.997
Received 2+ doses of SP/Fansidar	0.894	0.031	131	55	1.154	0.035	0.832	0.956
Received 3+ doses of SP/Fansidar	0.774	0.050	131	55	1.350	0.064	0.675	0.873

Table B.14 Sampling errors: Upper West region sample, Ghana MIS 2019

Variable	Value (R)	Standard error (SE)	Number of cases Unweighted (N)	Number of cases Weighted (WN)	Design effect (DEFT)	Relative error (SE/R)	Confidence limits Lower (R-2SE)	Confidence limits Upper (R+2SE)
HOUSEHOLDS								
Ownership of at least one mosquito net	0.779	0.038	439	123	1.908	0.049	0.703	0.855
Average number of mosquito nets per household	1.882	0.133	439	123	1.854	0.071	1.616	2.149
Ownership of at least one ITN	0.779	0.038	439	123	1.908	0.049	0.703	0.855
Average number of ITNs per household	1.882	0.133	439	123	1.854	0.071	1.616	2.149
Ownership of at least one ITN for two persons	0.426	0.035	438	123	1.492	0.083	0.355	0.496
WOMEN								
No education	0.455	0.037	510	146	1.669	0.081	0.382	0.529
Secondary education or higher	0.376	0.040	510	146	1.866	0.107	0.296	0.456
Literacy	0.366	0.037	510	146	1.738	0.102	0.291	0.440
CHILDREN								
Slept under any mosquito net last night	0.693	0.038	343	95	1.216	0.055	0.617	0.770
Slept under an ITN last night	0.693	0.038	343	95	1.216	0.055	0.617	0.770
Slept under an ITN last night in households with at least one ITN	0.855	0.025	281	77	1.064	0.030	0.805	0.906
Had fever in last 2 weeks	0.292	0.049	314	88	1.773	0.167	0.194	0.389
Sought care/treatment from a health facility	0.792	0.076	92	26	1.750	0.096	0.640	0.944
Took ACT	0.882	0.060	40	11	1.140	0.068	0.762	1.001
Has anaemia (haemoglobin <8.0 g/dl)	0.036	0.009	301	83	0.799	0.240	0.019	0.054
Has malaria (based on rapid test)	0.226	0.037	301	83	1.463	0.163	0.152	0.300
Has malaria (based on microscopy test)	0.105	0.023	301	83	1.265	0.221	0.059	0.152
PREGNANT WOMEN								
Slept under any mosquito net last night	0.725	0.062	33	9	0.773	0.086	0.601	0.850
Slept under an ITN last night	0.725	0.062	33	9	0.773	0.086	0.601	0.850
Slept under an ITN last night in households with at least one ITN	0.821	0.076	29	8	1.033	0.093	0.669	0.973
Received 1+ doses of SP/Fansidar	0.949	0.029	133	37	1.509	0.031	0.891	1.007
Received 2+ doses of SP/Fansidar	0.877	0.039	133	37	1.340	0.044	0.800	0.954
Received 3+ doses of SP/Fansidar	0.778	0.054	133	37	1.494	0.070	0.670	0.887

DATA QUALITY TABLES

Table C.1 Household age distribution

Single-year age distribution of the de facto household population by sex (weighted), Ghana MIS 2019

	Female		Male			Female		Male	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
0	284	2.5	305	2.9	37	120	1.1	122	1.2
1	297	2.6	283	2.7	38	144	1.3	131	1.2
2	297	2.6	339	3.2	39	100	0.9	87	0.8
3	308	2.7	297	2.8	40	176	1.6	157	1.5
4	289	2.6	305	2.9	41	62	0.5	74	0.7
5	305	2.7	295	2.8	42	127	1.1	100	1.0
6	296	2.6	304	2.9	43	92	0.8	79	0.8
7	306	2.7	320	3.0	44	89	0.8	59	0.6
8	299	2.6	320	3.0	45	127	1.1	165	1.6
9	258	2.3	292	2.8	46	83	0.7	61	0.6
10	299	2.6	288	2.7	47	66	0.6	74	0.7
11	233	2.1	258	2.5	48	89	0.8	73	0.7
12	339	3.0	307	2.9	49	90	0.8	47	0.4
13	322	2.8	268	2.6	50	112	1.0	92	0.9
14	237	2.1	248	2.4	51	96	0.9	54	0.5
15	195	1.7	250	2.4	52	112	1.0	69	0.7
16	217	1.9	204	1.9	53	87	0.8	42	0.4
17	151	1.3	165	1.6	54	73	0.6	53	0.5
18	169	1.5	203	1.9	55	103	0.9	73	0.7
19	183	1.6	183	1.7	56	71	0.6	61	0.6
20	188	1.7	210	2.0	57	64	0.6	54	0.5
21	155	1.4	119	1.1	58	59	0.5	56	0.5
22	172	1.5	193	1.8	59	61	0.5	44	0.4
23	177	1.6	142	1.3	60	87	0.8	63	0.6
24	162	1.4	162	1.5	61	38	0.3	19	0.2
25	225	2.0	215	2.0	62	62	0.5	48	0.5
26	146	1.3	131	1.2	63	45	0.4	42	0.4
27	200	1.8	155	1.5	64	58	0.5	34	0.3
28	187	1.7	191	1.8	65	73	0.6	60	0.6
29	161	1.4	141	1.3	66	19	0.2	23	0.2
30	226	2.0	200	1.9	67	41	0.4	36	0.3
31	105	0.9	82	0.8	68	27	0.2	28	0.3
32	149	1.3	138	1.3	69	22	0.2	29	0.3
33	133	1.2	113	1.1	70+	508	4.5	318	3.0
34	139	1.2	115	1.1	Don't know/				
35	172	1.5	150	1.4	missing	8	0.1	4	0.0
36	148	1.3	98	0.9	Total	11,322	100.0	10,521	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, Ghana MIS 2019

Age group	Household population of women age 10-54	Interviewed women age 15-49		Percentage of eligible women interviewed
		Number	Percentage	
10-14	1,429	na	na	na
15-19	915	903	17.8	98.8
20-24	854	844	16.7	98.8
25-29	920	908	17.9	98.8
30-34	752	747	14.7	99.3
35-39	685	680	13.4	99.3
40-44	545	535	10.6	98.2
45-49	455	449	8.9	98.7
50-54	480	na	na	na
15-49	5,125	5,067	100.0	98.9

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 Completeness of reporting

Percentage of observations missing information for selected demographic and health questions (weighted), Ghana MIS 2019

Subject	Percentage with information missing	Number of cases
Day only (births in the 5 years preceding the survey)	0.52	3,362
Month only (births in the 5 years preceding the survey)	0.20	3,362
Month and year (births in the 5 years preceding the survey)	0.04	3,362
Respondent's education (all women age 15-49)	0.00	5,181
Anaemia (children age 6-59 months from the Biomarker Questionnaire)	3.67	2,721

Table C.4 Births by calendar years

Number of births, percentage with complete birth date, sex ratio at birth, and calendar year ratio by calendar year, according to living, dead, and total children (weighted), Ghana MIS 2019

Calendar year	Number of births			Percentage with year and month of birth given			Sex ratio at birth[1]			Calendar year ratio[2]		
	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total
2019	495	12	507	100.0	100.0	100.0	103.7	84.6	103.2	na	na	na
2018	559	21	580	100.0	100.0	100.0	98.5	331.6	102.5	na	na	na
2017	587	12	599	100.0	92.1	99.8	114.4	113.1	114.4	104.3	49.6	102.0
2016	566	28	594	99.7	100.0	99.7	103.5	169.7	105.9	103.7	221.0	106.4
2015	505	13	518	99.2	100.0	99.3	101.3	41.8	99.2	90.4	64.1	89.5
2014	552	13	564	99.8	96.3	99.7	105.6	177.1	106.8	218.4	197.0	217.9
2015-2019	2,712	86	2,798	99.8	98.9	99.8	104.3	135.3	105.1	na	na	na
All	3,263	99	3,362	99.8	98.6	99.8	104.5	140.0	105.4	na	na	na

na = Not applicable
[1] (Bm/Bf)x100, where Bm and Bf are the numbers of male and female births, respectively
[2] [2Bx/(Bx-1+Bx+1)]x100, where Bx is the number of births in calendar year x

Table C.5 Number of enumeration areas completed by month, according to region, Ghana MIS 2019

Region	Month September	October	November	Total
Western	1	11	8	20
Central	3	12	6	21
Greater Accra	0	11	13	24
Volta	1	14	5	20
Eastern	0	15	6	21
Ashanti	1	12	12	25
Brong Ahafo	1	12	7	20
Northern	1	9	8	18
Upper East	1	10	5	16
Upper West	0	11	4	15
Percent	4.5	58.5	37.0	100.0
Total	9	117	74	200

Note: Enumeration areas are classified by month according to the date by which the last Biomarker Questionnaire in the enumeration area was completed.

Table C.6 Percentage of children age 6-59 months classified as having malaria according to rapid diagnostic test (RDT), by month and region, Ghana MIS 2019

Region	Month September	October	November	Total
Western	*	34.5	26.2	31.2
Central	30.0	29.7	30.1	29.9
Greater Accra	*	1.9	0.0	1.0
Volta	*	38.7	12.1	33.3
Eastern	*	22.8	38.2	26.4
Ashanti	*	16.1	13.7	15.8
Brong Ahafo	*	31.4	36.8	35.4
Northern	(27.6)	12.6	28.3	18.7
Upper East	*	29.7	29.8	30.6
Upper West	*	14.4	39.3	22.6
Total	30.9	23.0	21.5	23.0

Note: Figures in parentheses are based on 25-49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases or that there were no children measured for malaria in the region during the month.

Table C.7 Number of children age 6-59 months measured for malaria via rapid diagnostic test (RDT), by month and region (unweighted), Ghana MIS 2019

Region	Month September	October	November	Total
Western	15	164	107	286
Central	53	104	94	251
Greater Accra	0	101	85	186
Volta	9	178	63	250
Eastern	21	122	79	222
Ashanti	12	136	132	280
Brong Ahafo	17	156	88	261
Northern	29	254	226	509
Upper East	22	158	117	297
Upper West	17	173	111	301
Total	195	1,546	1,102	2,843

PERSONS INVOLVED IN THE 2019 GMIS *Appendix* **D**

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QUESTIONNAIRES

2019 GHANA MALARIA INDICATOR SURVEY
HOUSEHOLD QUESTIONNAIRE

MINISTRY OF HEALTH   GHANA STATISTICAL SERVICE

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

REGION . . . .

DISTRICT . . . .

CLUSTER NUMBER . . . .

HOUSEHOLD NUMBER . . . .

INTERVIEWER VISITS

	1	2	3	FINAL VISIT			
DATE	_____	_____	_____	DAY			
				MONTH			
				YEAR	2	0	1	9
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   03 GA   05 DAGBANI
02 AKAN   04 EWE   06 OTHER _____
(SPECIFY)

SUPERVISOR

_____   ☐☐☐☐
NAME   NUMBER

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<u>INTRODUCTION AND CONSENT</u>

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

GIVE CARD 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		

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	DATE OF BIRTH	ELIGIBILITY	
1	2	3	4	5	6	7	7A	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 LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD '95'.	What is (NAME)'s date of birth? On what day, month, and year was (NAME) born? IF DON'T KNOW DAY, RECORD '98'. IF DON'T KNOW MONTH, RECORD '98'. IF DON'T KNOW YEAR, RECORD '9998.'	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-5
			M F	Y N	Y N	IN YEARS	DAY MONTH YEAR		
01			1 2	1 2	1 2			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

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

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

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

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

01 = HEAD
02 = WIFE OR HUSBAND
03 = SON OR DAUGHTER
04 = SON-IN-LAW OR DAUGHTER-IN-LAW
05 = GRANDCHILD
06 = PARENT

07 = PARENT-IN-LAW
08 = BROTHER OR SISTER
09 = OTHER RELATIVE
10 = ADOPTED/FOSTER/ STEPCHILD
11 = NOT RELATED
98 = DON'T KNOW

			+				
			6+				

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	DATE OF BIRTH	ELIGIBILITY	
1	**2**	**3**	**4**	**5**	**6**	**7**	**7A**	**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 LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD '95'.	What is (NAME)'s date of birth? On what day, month, and year was (NAME) born? IF DON'T KNOW DAY, RECORD '98'. IF DON'T KNOW MONTH, RECORD '98'. IF DON'T KNOW YEAR, RECORD '9998.'	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-5
			M F 1 2	Y N 1 2	Y N 1 2	IN YEARS	DAY MONTH YEAR		
11		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	11	11
12		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	12	12
13		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	13	13
14		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	14	14
15		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	15	15
16		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	16	16
17		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	17	17
18		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	18	18
19		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	19	19
20		☐☐	1 2	1 2	1 2	☐☐	☐☐ ☐☐ ☐☐☐☐	20	20

TICK HERE IF CONTINUATION SHEET USED ☐

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

01 = HEAD	07 = PARENT-IN-LAW
02 = WIFE OR HUSBAND	08 = BROTHER OR SISTER
03 = SON OR DAUGHTER	09 = OTHER RELATIVE
04 = SON-IN-LAW OR DAUGHTER-IN-LAW	10 = ADOPTED/FOSTER/ STEPCHILD
05 = GRANDCHILD	11 = NOT RELATED
06 = PARENT	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
		
		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
		SACHET WATER 92
		
		OTHER _____ 96
		           (SPECIFY)
			→ 105
			
			→ 103
			
			→ 103

102	What is the main source of water used by your household for other purposes such as cooking and handwashing?	**PIPED WATER**
		   PIPED INTO DWELLING 11
		   PIPED TO YARD/PLOT 12
		   PIPED TO NEIGHBOR 13
		   PUBLIC TAP/STANDPIPE 14
		
		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	

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
		   FLUSH, BIO-DIGESTER (BIOFIL) 16
		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)
			→ 108

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
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	What type of fuel does your household mainly use for cooking?	ELECTRICITY .... 01 LPG .... 02 NATURAL GAS .... 03 BIOGAS .... 04 KEROSENE .... 05 COOKING GEL .... 06 CHARCOAL .... 07 WOOD .... 08 STRAW/SHRUBS/GRASS .... 09 AGRICULTURAL CROP RESIDUE............ 10 ANIMAL DUNG .... 11 NO FOOD COOKED IN HOUSEHOLD .... 95 OTHER _____ 96 (SPECIFY)	
109	How many rooms in this household are used for sleeping?	ROOMS .... [ ] [ ]	
110	Does this household own any livestock, herds, other farm animals, or poultry?	YES .... 1 NO 2	→ 112
111	How many of the following animals does this household own? IF NONE, RECORD '00'. IF 95 OR MORE, RECORD '95'. IF UNKNOWN, RECORD '98'. a) Milk cows or bulls? b) Other cattle? c) Horses, donkeys, or mules? d) Goats? e) Sheep? f) Chickens or other poultry? g) Pigs? h) Rabbits? i) Grasscutter?	a) COWS/BULLS .... [ ] [ ] b) OTHER CATTLE .... [ ] [ ] c) HORSES/DONKEYS/MULES ..... [ ] [ ] d) GOATS .... [ ] [ ] e) SHEEP .... [ ] [ ] f) CHICKENS/POULTRY .... [ ] [ ] g) PIGS ..... [ ] [ ] h) RABBITS .... [ ] [ ] i) GRASSCUTTER .... [ ] [ ]	
112	Does any member of your household own any agricultural land?	YES .... 1 NO 2	→ 114
113	How many hectares or acres or plots of agricultural land do members of this household own? IF 95 OR MORE HECTARES, RECORD '950' IF 95 OR MORE ACRES, RECORD IN HECTARES IF 95 OR MORE PLOTS, RECORD IN ACRES	HECTARES .... 1 [ ] [ ] . [ ] ACRES .... 2 [ ] [ ] . [ ] PLOTS .... 3 [ ] [ ] . [ ] 95 OR MORE HECTARES .... 950 DON'T KNOW 998	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
114	Does your household have: a) Electricity? b) A radio? c) A television? d) A non-mobile telephone? e) A computer/Tablet computer? f) A refrigerator? g) A freezer? h) An electric generator/Invertor? i) A washing machine? j) A photo camera? (NOT ON PHONE) k) A video deck/DVD/VCD? l) A sewing machine? m) A bed? n) A table? o) A chair? p) A cabinet/cupboard?	YES NO a) ELECTRICITY .... 1 2 b) RADIO .... 1 2 c) TELEVISION .... 1 2 d) NON-MOBILE TELEPHONE .. 1 2 e) COMPUTER .... 1 2 f) REFRIGERATOR .... 1 2 g) FREEZER .... 1 2 h) GENERATOR .... 1 2 i) WASHING MACHINE .... 1 2 j) CAMERA .... 1 2 k) VIDEO/DVD/VCD .... 1 2 l) SEWING MACHINE .... 1 2 m) BED .... 1 2 n) TABLE .... 1 2 o) CHAIR .... 1 2 p) CABINET 1 2	
115	Does any member of this household own: a) A wrist watch? b) A mobile phone? c) A bicycle? d) A motorcycle or motor scooter? e) An animal-drawn cart? f) A car or truck? g) A boat with a motor? h) A boat without a motor?	YES NO a) WRIST WATCH .... 1 2 b) MOBILE PHONE .... 1 2 c) BICYCLE .... 1 2 d) MOTORCYCLE/SCOOTER ..... 1 2 e) ANIMAL-DRAWN CART ..... 1 2 f) CAR/TRUCK .... 1 2 g) BOAT WITH MOTOR .... 1 2 h) BOAT WITHOUT MOTOR 1 2	
116	Does any member of this household have a bank account?	YES .... 1 NO 2	
117	At any time in the past 12 months, has anyone come into your dwelling to spray the interior walls against mosquitoes?	YES .... 1 NO .... 2 DON'T KNOW 8	→ 119
118	Who sprayed the dwelling?	GOVERNMENT WORKER/PROGRAM .... A PRIVATE COMPANY .... B NONGOVERNMENTAL ORGANIZATION (NGO) .. C OTHER _____ X (SPECIFY) DON'T KNOW .... Z	
119	Does your household have any mosquito nets?	YES .... 1 NO 2	→ 131
120	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS .... [ ]	

		NET #1	NET #2	NET #3
121	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD. IF MORE THAN 3 NETS, USE ADDITIONAL QUESTIONNAIRE(S).	OBSERVED HANGING . . 1 OBSERVED NOT HANGING/ PACKAGED ..... 2 NOT OBSERVED 3	OBSERVED HANGING . . 1 OBSERVED NOT HANGING/ PACKAGED ..... 2 NOT OBSERVED 3	OBSERVED HANGING . . 1 OBSERVED NOT HANGING/ PACKAGED ..... 2 NOT OBSERVED 3
122	How many months ago did your household get the mosquito net? IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS AGO ..... ☐☐ MORE THAN 36 MONTHS AGO ..... 95 NOT SURE 98	MONTHS AGO ..... ☐☐ MORE THAN 36 MONTHS AGO ..... 95 NOT SURE 98	MONTHS AGO ..... ☐☐ MORE THAN 36 MONTHS AGO ..... 95 NOT SURE 98
123	OBSERVE OR ASK BRAND/TYPE OF MOSQUITO NET. IF BRAND IS UNKNOWN AND YOU CANNOT OBSERVE THE NET, SHOW PICTURES OF TYPICAL NET TYPES/BRANDS TO RESPONDENT.	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET .... 11 PERMANET .... 12 INTERCEPTOR ..... 13 ROYAL SENTRY .. 14 DURANET .... 15 LIFE NET .... 16 DAWA PLUS .... 17 MAGNET .... 18 YORKOOL .... 19 OTHER/DON'T KNOW BRAND .... 20 OTHER TYPE .... 96 DON'T KNOW TYPE .. 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET .... 11 PERMANET .... 12 INTERCEPTOR ..... 13 ROYAL SENTRY .. 14 DURANET .... 15 LIFE NET .... 16 DAWA PLUS .... 17 MAGNET .... 18 YORKOOL .... 19 OTHER/DON'T KNOW BRAND .... 20 OTHER TYPE .... 96 DON'T KNOW TYPE .. 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET .... 11 PERMANET .... 12 INTERCEPTOR ..... 13 ROYAL SENTRY .. 14 DURANET .... 15 LIFE NET .... 16 DAWA PLUS .... 17 MAGNET .... 18 YORKOOL .... 19 OTHER/DON'T KNOW BRAND .... 20 OTHER TYPE .... 96 DON'T KNOW TYPE .. 98
126	Did you get the net through the 2018 mass distribution campaign, during an antenatal care visit, during an immunization visit, or during a school distribution?	YES, 2018 MASS DIST. CAMPAIGN .... 1 YES, ANC .... 2 YES, IMMUNIZATION VISIT .... 3 YES, SCHOOL DIST. .. 4 (SKIP TO 128) ◄ NO 5	YES, 2018 MASS DIST. CAMPAIGN .... 1 YES, ANC .... 2 YES, IMMUNIZATION VISIT .... 3 YES, SCHOOL DIST. .. 4 (SKIP TO 128) ◄ NO 5	YES, 2018 MASS DIST. CAMPAIGN .... 1 YES, ANC .... 2 YES, IMMUNIZATION VISIT .... 3 YES, SCHOOL DIST. .. 4 (SKIP TO 128) ◄ NO 5
127	Where did you get the net?	PRIVATE HEALTH FACILITY .... 01 PHARMACY/ CHEMIST/ DRUG STORE ..... 02 SHOP/MARKET ..... 03 RELIGIOUS INSTITUTION ..... 04 NGO .... 05 COMMUNITY BASED .. AGENTS (CBAs) ..... 06 PETROL STATION/ MOBILE MART ..... 07 PRIOR MASS DIST. 08 CAMPAIGN OTHER .... 96 DON'T KNOW 98	PRIVATE HEALTH FACILITY .... 01 PHARMACY/ CHEMIST/ DRUG STORE ..... 02 SHOP/MARKET ..... 03 RELIGIOUS INSTITUTION ..... 04 NGO .... 05 COMMUNITY BASED .. AGENTS (CBAs) ..... 06 PETROL STATION/ MOBILE MART ..... 07 PRIOR MASS DIST. 08 CAMPAIGN OTHER .... 96 DON'T KNOW 98	PRIVATE HEALTH FACILITY .... 01 PHARMACY/ CHEMIST/ DRUG STORE ..... 02 SHOP/MARKET ..... 03 RELIGIOUS INSTITUTION ..... 04 NGO .... 05 COMMUNITY BASED .. AGENTS (CBAs) ..... 06 PETROL STATION/ MOBILE MART ..... 07 PRIOR MASS DIST. 08 CAMPAIGN OTHER .... 96 DON'T KNOW 98

		NET #1	NET #2	NET #3
128	Did anyone sleep under this mosquito net last night?	YES .... 1 NO .... 2 (SKIP TO 129A) ← NOT SURE 8	YES .... 1 NO .... 2 (SKIP TO 129A) ← NOT SURE 8	YES .... 1 NO .... 2 (SKIP TO 129A) ← NOT SURE 8
129	Who slept under this mosquito net last night? RECORD THE PERSON'S NAME AND LINE NUMBER FROM HOUSEHOLD SCHEDULE.	NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ (SKIP TO 130) ←	NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ (SKIP TO 130) ←	NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ NAME _____ LINE NO. ..... ☐☐ (SKIP TO 130) ←

129A	Why was this net not used last night?
	
	 RECORD ALL MENTIONED
		TOO HOT .... A
		 NO MOSQUITOES .... B
		 NO MALARIA C
		 PREFER OTHER
		    METHOD (COILS,
		    SPRAY, FANS) .... D
		 NET TOO OLD/TORN .. E
		 CHEMICALS IN NET
		    ARE UNSAFE .... F
		 DON'T LIKE SMELL .... G
		 NET TOO SHORT/
		    SMALL .... H
		 USUAL USER DID NOT
		    SLEEP HERE I
		 EXTRA NET/SAVING
		    FOR LATER ...... J
		 NET WAS BEING
		    WASHED/DRIED/
		    AIRED .... K
		 SLEPT OUTSIDE L
		 NET BROUGHT
		    BUGS .... M
		 DON'T LIKE SHAPE ..... N
		 OTHER X
			TOO HOT .... A
			 NO MOSQUITOES .... B
			 NO MALARIA C
			 PREFER OTHER
			    METHOD (COILS,
			    SPRAY, FANS) .... D
			 NET TOO OLD/TORN .. E
			 CHEMICALS IN NET
			    ARE UNSAFE .... F
			 DON'T LIKE SMELL .... G
			 NET TOO SHORT/
			    SMALL .... H
			 USUAL USER DID NOT
			    SLEEP HERE I
			 EXTRA NET/SAVING
			    FOR LATER ...... J
			 NET WAS BEING
			    WASHED/DRIED/
			    AIRED .... K
			 SLEPT OUTSIDE L
			 NET BROUGHT
			    BUGS .... M
			 DON'T LIKE SHAPE ..... N
			 OTHER X
				TOO HOT .... A
				 NO MOSQUITOES .... B
				 NO MALARIA C
				 PREFER OTHER
				    METHOD (COILS,
				    SPRAY, FANS) .... D
				 NET TOO OLD/TORN .. E
				 CHEMICALS IN NET
				    ARE UNSAFE .... F
				 DON'T LIKE SMELL .... G
				 NET TOO SHORT/
				    SMALL .... H
				 USUAL USER DID NOT
				    SLEEP HERE I
				 EXTRA NET/SAVING
				    FOR LATER ...... J
				 NET WAS BEING
				    WASHED/DRIED/
				    AIRED .... K
				 SLEPT OUTSIDE L
				 NET BROUGHT
				    BUGS .... M
				 DON'T LIKE SHAPE ..... N
				 OTHER X

130		GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO TO 121 IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE NETS, GO TO 131.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

131	OBSERVE MAIN MATERIAL OF THE FLOOR OF THE DWELLING.
	
	RECORD OBSERVATION.
		NATURAL FLOOR
		   EARTH/SAND 11
		   DUNG 12
		RUDIMENTARY FLOOR
		   WOOD PLANKS 21
		   PALM/BAMBOO 22
		FINISHED FLOOR
		   PARQUET OR POLISHED WOOD 31
		   VINYL OR ASPHALT STRIPS 32
		   CERAMIC/MARBLE/PORCELAIN
		      TILES/TERRAZO 33
		   CEMENT 34
		   WOOLEN CARPET/SYNTHETIC CARPET . . 35
		   LINOLEUM/RUBBER CARPET 36
		
		   OTHER _____ 96
		             (SPECIFY)	

132	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
		FINISHED ROOFING
		   ZINC/ALUMINIUM 31
		   WOOD 32
		   CERAMIC/BRICK TILES 33
		   CEMENT 34
		   ROOFING SHINGLES 35
		   ASBESTOS/SLATE ROOFING SHEETS . . 36
		
		   OTHER _____ 96
		             (SPECIFY)	

133	OBSERVE MAIN MATERIAL OF THE EXTERIOR WALLS OF THE DWELLING.
	
	RECORD OBSERVATION.
		NATURAL WALLS
		   NO WALLS 11
		   CANE/PALM/TRUNKS 12
		   MUD/LANDCRETE 13
		RUDIMENTARY WALLS
		   BAMBOO WITH MUD 21
		   STONE WITH MUD 22
		   UNCOVERED ADOBE 23
		   PLYWOOD 24
		   CARDBOARD 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
		
		   OTHER _____ 96
		             (SPECIFY)	

134	RECORD THE TIME.	HOURS . . . . ☐☐ MINUTES . . . . ☐☐	

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

_____

_____

_____

_____

_____

_____

COMMENTS ON SPECIFIC QUESTIONS:

_____

_____

_____

_____

_____

_____

_____

ANY OTHER COMMENTS:

_____

_____

_____

_____

_____

_____

_____

SUPERVISOR'S OBSERVATIONS

_____

_____

_____

_____

_____

2019 GHANA MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

MINISTRY OF HEALTH   GHANA STATISTICAL SERVICE

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

REGION . . . .

DISTRICT . . . .

CLUSTER NUMBER . . . .

HOUSEHOLD NUMBER . . . .

NAME AND LINE NUMBER OF WOMAN _____

INTERVIEWER VISITS

	1	2	3	FINAL VISIT		
DATE	_____	_____	_____	DAY		
				MONTH		
				YEAR	2 0	1 9
INTERVIEWER'S NAME	_____	_____	_____	INT. NO.		
RESULT*	_____	_____	_____	RESULT*		
NEXT VISIT: DATE	_____	_____		TOTAL NUMBER OF VISITS		
TIME	_____	_____				

*RESULT CODES: 1 COMPLETED   4 REFUSED
2 NOT AT HOME   5 PARTLY COMPLETED   7 OTHER _____
3 POSTPONED   6 INCAPACITATED   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   03 GA   05 DAGBANI
02 AKAN   04 EWE   06 OTHER _____
                                              (SPECIFY)

SUPERVISOR

_____   [ ][ ][ ][ ]
NAME   NUMBER

INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with Ghana Statistical Service and the Ministry of Health. We are conducting a survey about malaria all over Ghana. The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 30 to 60 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	⟶ 108
105	What is the highest level of school you attended: primary, middle, JSS/JHS, SSS/SHS, secondary, or higher?	PRIMARY . . . . 1 MIDDLE . . . . 2 JSS/JHS . . . . 3 SSS/SHS . . . . 4 SECONDARY . . . . 5 HIGHER 6	
106	What is the highest grade you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE . . . . ☐☐	
107	CHECK 105: PRIMARY, MIDDLE, JSS/JHS ☐ SSS/SHS OR SECONDARY ↓	HIGHER ☐	⟶109

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

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	

109	What is your religion?	CATHOLIC . . . . 01 ANGLICAN . . . . 02 METHODIST . . . . 03 PRESBYTERIAN . . . . 04 PENTECOSTAL/CHARISMATIC . . . . 05 OTHER CHRISTIAN . . . . 06 ISLAM . . . . 07 TRADITIONAL/SPIRITUALIST . . . . 08 NO RELIGION . . . . 95 OTHER 96 (SPECIFY)	
110	To which ethnic group do you belong?	AKAN . . . . 01 GA/DANGME . . . . 02 EWE . . . . 03 GUAN . . . . 04 MOLE-DAGBANI . . . . 05 GRUSI . . . . 06 GURMA . . . . 07 MANDE . . . . 08 OTHER 96 (SPECIFY)	
111	I will now ask you a few questions about health insurance. Are you registered by any health insurance?	YES . . . . 1 NO 2	→ 114
112	Are you currently covered by any health insurance?	YES . . . . 1 NO 2	→ 114

113	What type of health insurance are you (covered/registered) by?
	
	RECORD ALL MENTIONED.
		NATIONAL / DISTRICT HEALTH
		   INSURANCE (NHIS) . . . . A
		HEALTH INSURANCE THROUGH EMPLOYER . . B
		MUTUAL HEALTH ORGANIZATION/
		   COMMUNITY-BASED HEALTH INSURANCE . . C
		OTHER PRIVATELY PURCHASED
		   COMMERCIAL HEALTH INSURANCE . . . . D
		
		OTHER X
		                 (SPECIFY)	

114	Are you aware that malaria care is covered under the NHIS?	YES . . . . 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES .... 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES .... 1 NO 2	→ 204
203	a) How many sons live with you? b) And how many daughters live with you? IF NONE, RECORD '00'.	a) SONS AT HOME . . . . ☐☐ b) DAUGHTERS AT HOME . . . . ☐☐	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES .... 1 NO 2	→ 206
205	a) How many sons are alive but do not live with you? b) And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	a) SONS ELSEWHERE . . . . ☐☐ b) DAUGHTERS ELSEWHERE . . . . . ☐☐	
206	Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried, who made any movement, sound, or effort to breathe, or who showed any other signs of life even if for a very short time?	YES .... 1 NO 2	→ 208
207	a) How many boys have died? b) And how many girls have died? IF NONE, RECORD '00'.	a) BOYS DEAD . . . . ☐☐ b) GIRLS DEAD . . . . ☐☐	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL BIRTHS . . . . ☐☐	

209	CHECK 208:
	
	 Just to make sure that I have this right: you have had in TOTAL _____ births during your life. Is that correct?
	
	                YES NO ☐
	
	              ☐ PROBE AND
	                      CORRECT 201-208 ←
	                       AS NECESSARY.	

210	CHECK 208:
	
	      ONE OR MORE ☐ NO BIRTHS ☐
	        BIRTHS
			→ 225

211	Now I would like to ask you about your most recent births. How many births have you had in 2014-2019? RECORD NUMBER OF LIVE BIRTHS IN 2014-2019	TOTAL IN 2014-2019 . . . . ☐☐ NONE 00	→ 225

212	Now I would like to record the names of all your births in 2014-2019, whether still alive or not, starting with the most recent one you had.
	RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2014-2019. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. IF THERE ARE MORE THAN 5 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE STARTING WITH THE SECOND ROW.

213 What name was given to your (most recent/ previous) baby? RECORD NAME. BIRTH HISTORY NUMBER.	214 Is (NAME) a boy or a girl?	215 Were any of these births twins?	216 On what day, month, and year was (NAME) born?	217 Is (NAME) still alive?	218 IF ALIVE: How old was (NAME) at (NAME)'s last birthday? RECORD AGE IN COMP-LETED YEARS.	219 IF ALIVE: Is (NAME) living with you?	220 IF ALIVE: RECORD HOUSEHOLD LINE NUMBER OF CHILD. RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD.	221 Were there any other live births between (NAME) and (NAME OF PREVIOUS BIRTH), including any children who died after birth?
01	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ YEAR	YES 1 NO 2 ↓ (NEXT BIRTH)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐ ↓ (NEXT BIRTH)	
02	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ YEAR	YES 1 NO 2 ↓ (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO 2 (NEXT BIRTH)
03	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ YEAR	YES 1 NO 2 ↓ (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO 2 (NEXT BIRTH)
04	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ YEAR	YES 1 NO 2 ↓ (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO . . . . 2 (NEXT BIRTH)
05	BOY 1 GIRL 2	SING 1 MULT 2	DAY ☐☐ MONTH ☐☐ ☐☐☐☐ YEAR	YES 1 NO 2 ↓ (SKIP TO 221)	AGE IN YEARS ☐☐	YES 1 NO 2	HOUSEHOLD LINE NUMBER ☐☐	YES 1 (ADD BIRTH) NO . . . . 2 (NEXT BIRTH)

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
222	Have you had any live births since the birth of (NAME OF MOST RECENT BIRTH)?"	YES . . . . 1 (RECORD BIRTH(S) IN TABLE) ◄ NO 2	
223	COMPARE 211 WITH NUMBER OF BIRTHS IN BIRTH HISTORY NUMBERS ARE SAME ↓	NUMBERS ARE DIFFERENT ☐ (PROBE AND RECONCILE) ◄	
224	CHECK 211: ENTER THE NUMBER OF BIRTHS IN 2014-2019	NUMBER OF BIRTHS . . . . ☐ NONE 0	
225	Are you pregnant now?	YES . . . . 1 NO . . . . 2 UNSURE 8	→ 227
226	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS.	MONTHS . . . . ☐☐	
227	CHECK 224: ONE OR MORE BIRTHS IN 2014-2019 ☐ (GO TO 301) ◄	NO BIRTHS IN ☐ 2014-2019 Q. 224 IS BLANK ☐	→ 501 → 501

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	RECORD THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH FROM 213 AND 217,	MOST RECENT BIRTH NAME _____ LIVING ☐↓ DEAD ☐↓	
302	Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. When you got pregnant with (NAME), did you see anyone for antenatal care for this pregnancy?	YES . . . . 1 NO 2	→ 304

303	Whom did you see?
	
	Anyone else?
	
	PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.
		HEALTH PERSONNEL
		     DOCTOR . . . . A
		     NURSE/MIDWIFE . . . . B
		     COM. HEALTH OFFICER/NURSE C
		
		OTHER PERSON
		     TRADITIONAL BIRTH ATTENDANT . . . . D
		     COMMUNITY/VILLAGE HEALTH WORKER . . E
		     TRADITIONAL HEALTH PRACTITIONER . . F
		
		OTHER _____ X
		                          (SPECIFY)	

303A	Where did you receive antenatal care for this pregnancy?
	
	Anywhere else?
	
	     PROBE TO IDENTIFY THE TYPE OF SOURCE.
	     IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE.
	
	_____
	          (NAME OF PLACE)
		HOME
		     HER HOME . . . . A
		     OTHER HOME . . . . B
		
		PUBLIC SECTOR
		     GOVERNMENT HOSPITAL C
		     GOVERNMENT HEALTH . . . . D
		          CENTER
		     GOVERNMENT HEALTH POST . . . . E
		
		     OTHER PUBLIC SECTOR
		
		     _____ F
		                          (SPECIFY)
		
		PRIVATE MEDICAL SECTOR
		     PRIVATE HOSPITAL/
		          CLINIC . . . . G
		     OTHER PRIVATE
		          MEDICAL SECTOR
		
		     _____ H
		                          (SPECIFY)
		
		OTHER _____ X
		                          (SPECIFY)	

303B	How many months pregnant were you when you first received antenatal care for this pregnancy?	MONTHS . . . . ☐☐ DON'T KNOW 98	
303C	How many times did you receive antenatal care during this pregnancy?	NUMBER OF TIMES . . . . ☐☐ DON'T KNOW 98	
304	During this pregnancy, did you take SP/Fansidar to keep you from getting malaria?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	→ 307
305	How many times did you take SP/Fansidar during this pregnancy?	TIMES . . . . ☐☐	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
305A	CHECK 305: TOOK SP ONLY 1 OR 2 TIMES DURING THIS PREGNANCY	CODE '01' OR '02' TIMES ENTERED ☐ OTHER ☐	306
305B	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 OTHER _____ X (SPECIFY) DON'T KNOW . . . . Z	
306	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	
307	CHECK 216 AND 217: ONE OR MORE LIVING CHILDREN BORN IN 2014-2019 ☐ NO LIVING CHILDREN BORN IN 2014-2019 ☐ (GO TO 401) ←		501

401	CHECK 213: RECORD THE BIRTH HISTORY NUMBER IN 402 AND THE NAME AND SURVIVAL STATUS IN 403 FOR EACH BIRTH IN 2014-2019. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE MOST RECENT BIRTH. IF THERE ARE MORE THAN 2 BIRTHS, USE ADDITIONAL QUESTIONNAIRE(S).
	Now I would like to ask some questions about the health of your children born since January 2014. (We will talk about each separately.)

		MOST RECENT BIRTH	NEXT MOST RECENT BIRTH
402	BIRTH HISTORY NUMBER FROM 213 IN BIRTH HISTORY.	BIRTH HISTORY NUMBER . . . . ☐☐	BIRTH HISTORY NUMBER . . . . ☐☐
403	FROM 213 AND 217:	NAME _____ LIVING DEAD ☐ (SKIP TO 428) ←	NAME _____ LIVING DEAD ☐ (SKIP TO 428) ←
403A	Since 2017, was (NAME) enrolled in a program to receive a dose of medicine, every month for four months, to prevent malaria? IF YES: were you enrolled in that program in 2017, 2018 or in 2017 and 2018?	YES, IN 2017 . . . . 1 YES, IN 2018 . . . . 2 YES, IN 2017 AND IN 2018 . . 3 NO, NEVER ENROLLED . . . . . 4 ¬ (SKIP TO 404) ←	YES, IN 2017 . . . . 1 YES, IN 2018 . . . . 2 YES, IN 2017 AND IN 2018 . . 3 NO, NEVER ENROLLED . . . . . 4 ¬ (SKIP TO 404) ←
403B	How many rounds/months did (NAME) take in 2017 or 2018?	ROUNDS IN 2017 1. ☐☐ ROUNDS IN 2018 2. ☐☐	ROUNDS IN 2017 1. ☐☐ ROUNDS IN 2018 2. ☐☐
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 428) ← DON'T KNOW . . . . 8 ┘	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 428) ← DON'T KNOW . . . . 8 ┘
405	At any time during the illness, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 406) ← DON'T KNOW . . . . 8 ┘	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 406) ← DON'T KNOW . . . . 8 ┘
405A	When (NAME) had blood taken from (NAME)'s finger or heel for testing, were you told that (NAME) had malaria?	POSITIVE MALARIA . . . . 1 POSITIVE OTHER ILLNESS . . . . . 2 NEGATIVE . . . . 3 DON'T KNOW/DON'T REMEMBER 8	POSITIVE MALARIA . . . . 1 POSITIVE OTHER ILLNESS . . . . . 2 NEGATIVE . . . . 3 DON'T KNOW/DON'T REMEMBER 8
406	Did you seek advice or treatment for the illness from any source?	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 411) ←	YES . . . . 1 NO . . . . 2 ¬ (SKIP TO 411) ←

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____

407	Where did you seek advice or treatment?
	
	Anywhere else?
	
	PROBE TO IDENTIFY THE TYPE OF SOURCE.
	
	IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE(S).
	
	_____
	(NAME OF PLACE)
		PUBLIC SECTOR
		GOVERNMENT HOSPITAL . . A
		GOVERNMENT HEALTH
		   CENTER . . . . B
		GOVERNMENT HEALTH
		   POST/CHPS C
		MOBILE CLINIC . . . . D
		FIELDWORKER/CHW . . . . . E
		OTHER PUBLIC SECTOR
		
		_____ F
		(SPECIFY)
		
		PRIVATE MEDICAL SECTOR
		PRIVATE HOSPITAL/
		   CLINIC . . . . G
		PHARMACY . . . . H
		CHEMIST/DRUG STORE . . I
		FPG/PPAG CLINIC . . . . . J
		PRIVATE DOCTOR . . . . K
		MOBILE CLINIC L
		FIELDWORKER/CHW . . . . . M
		OTHER PRIVATE
		   MEDICAL SECTOR
		
		_____ N
		(SPECIFY)
		
		OTHER SOURCE
		SHOP . . . . O
		TRADITIONAL
		   PRACTITIONER . . . . P
		MARKET . . . . Q
		ITINERANT DRUG
		   SELLER . . . . R
		
		OTHER _____ X
		(SPECIFY)
			PUBLIC SECTOR
			GOVERNMENT HOSPITAL . . A
			GOVERNMENT HEALTH
			   CENTER . . . . B
			GOVERNMENT HEALTH
			   POST/CHPS C
			MOBILE CLINIC . . . . D
			FIELDWORKER/CHW . . . . . E
			OTHER PUBLIC SECTOR
			
			_____ F
			(SPECIFY)
			
			PRIVATE MEDICAL SECTOR
			PRIVATE HOSPITAL/
			   CLINIC . . . . G
			PHARMACY . . . . H
			CHEMIST/DRUG STORE . . I
			FPG/PPAG CLINIC . . . . . J
			PRIVATE DOCTOR . . . . K
			MOBILE CLINIC L
			FIELDWORKER/CHW . . . . . M
			OTHER PRIVATE
			   MEDICAL SECTOR
			
			_____ N
			(SPECIFY)
			
			OTHER SOURCE
			SHOP . . . . O
			TRADITIONAL
			   PRACTITIONER . . . . P
			MARKET . . . . Q
			ITINERANT DRUG
			   SELLER . . . . R
			
			OTHER _____ X
			(SPECIFY)

407A	CHECK 407: ONLY CODE O-R CIRCLED?	YES NO ☐
		       (SKIP TO 408) ←
			YES NO ☐
			       (SKIP TO 408) ←

407B	Why did you seek advice or treatment from this source?	CHILD JUST FELL ILL . . . . A
		CHILD NOT VERY ILL . . . . B
		CLINIC TOO FAR C
		HAVE NO MONEY . . . . D
		WAITING FOR CHILD'S
		   FATHER . . . . E
		DON'T KNOW WHAT
		   TO DO . . . . F
		THIS SITE WAS CLOSER . . . . . G
		TRUST THIS SOURCE . . . . H
		INSTRUCTION BY
		   HOUSEHOLD HEAD I
		
		OTHER _____ X
		(SPECIFY)
			CHILD JUST FELL ILL . . . . A
			CHILD NOT VERY ILL . . . . B
			CLINIC TOO FAR C
			HAVE NO MONEY . . . . D
			WAITING FOR CHILD'S
			   FATHER . . . . E
			DON'T KNOW WHAT
			   TO DO . . . . F
			THIS SITE WAS CLOSER . . . . . G
			TRUST THIS SOURCE . . . . H
			INSTRUCTION BY
			   HOUSEHOLD HEAD I
			
			OTHER _____ X
			(SPECIFY)

408	CHECK 407:	TWO OR ONLY
		MORE ONE ☐
		CODES CODE
		CIRCLED CIRCLED
		       (SKIP TO 410) ←
			TWO OR ONLY
			MORE ONE ☐
			CODES CODE
			CIRCLED CIRCLED
			       (SKIP TO 410) ←

409	Where did you first seek advice or treatment? USE LETTER CODE FROM 407	FIRST PLACE . . . . ☐	FIRST PLACE . . . . ☐
410	How many days after the illness began did you first seek advice or treatment for (NAME)? IF THE SAME DAY RECORD '00'.	DAYS . . . . ☐☐	DAYS . . . . ☐☐

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____
411	At any time during the illness, did (NAME) take any drugs for the illness?	YES .... 1 NO .... 2⌐ 　　　　　　　(SKIP TO 428) ◄ DON'T KNOW .... 8⌐	YES .... 1 NO .... 2⌐ 　　　　　　　(SKIP TO 428) ◄ DON'T KNOW .... 8⌐
412	What drugs did (NAME) take? Any other drugs? RECORD ALL MENTIONED. PLEASE NOTE BRAND NAMES: ARTEMISININ COMBINATION THERAPY (ACT) 　Coartem 　Lumarterm 　Artefan 　Lonart 　Gen-m 　Artemos plus 　P-alaxin 　Duo-cotexcin 　Artesunate amodiaquine wintrhop 　Arsuamoon 　Camoquine plus 　G sunate 　Co-arsucam	**ANTIMALARIAL DRUGS** 　ARTEMISININ 　　COMBINATION 　　　THERAPY (ACT) ..... A 　SP/FANSIDAR .... B 　CHLOROQUINE .... C 　AMODIAQUINE .... D 　QUININE 　　PILLS .... E 　　INJECTION/IV .... F 　ARTESUNATE 　　RECTAL .... G 　　INJECTION/IV .... H 　OTHER ANTIMALARIAL 　_____ I 　　　(SPECIFY) **ANTIBIOTIC DRUGS** 　PILL/SYRUP .... J 　INJECTION/IV .... K **OTHER DRUGS** 　ASPIRIN .... L 　ACETAMINOPHEN .... M 　IBUPROFEN .... N 　HERBAL MEDICINE .... O OTHER _____ X 　　　(SPECIFY) DON'T KNOW .... Z	**ANTIMALARIAL DRUGS** 　ARTEMISININ 　　COMBINATION 　　　THERAPY (ACT) ..... A 　SP/FANSIDAR .... B 　CHLOROQUINE .... C 　AMODIAQUINE .... D 　QUININE 　　PILLS .... E 　　INJECTION/IV .... F 　ARTESUNATE 　　RECTAL .... G 　　INJECTION/IV .... H 　OTHER ANTIMALARIAL 　_____ I 　　　(SPECIFY) **ANTIBIOTIC DRUGS** 　PILL/SYRUP .... J 　INJECTION/IV .... K **OTHER DRUGS** 　ASPIRIN .... L 　ACETAMINOPHEN .... M 　IBUPROFEN .... N 　HERBAL MEDICINE .... O OTHER _____ X 　　　(SPECIFY) DON'T KNOW .... Z
412A	CHECK 412: ONLY CODE J-O CIRCLED?	YES ☐　　NO ☐ 　　　　(SKIP TO 413) ◄	YES ☐　　NO ☐ 　　　　(SKIP TO 413) ◄
412B	Why did you not take an antimalarial drug?	FEVER WAS NOT MALARIA .. A NONE AVAILABLE 　AT FACILITY .... B PROVIDER DID NOT OFFER 　ANTIMALARIAL DRUG .. .. C PROVIDER REFUSED TO 　GIVE ANTIMALARIAL ..... D AFRAID OF EFFECTS OF DRUGS 　ON HEALTH .... E CHILD NOT VERY ILL .... F CLINIC TOO FAR .... G HAVE NO MONEY .... H DO NOT KNOW TO TAKE 　ANTIMALARIAL .... I MEDICINE AT HOME .... J DID NOT THINK IT WAS 　MALARIA .... K OTHER _____ X 　　(SPECIFY)	FEVER WAS NOT MALARIA .. A NONE AVAILABLE 　AT FACILITY .... B PROVIDER DID NOT OFFER 　ANTIMALARIAL DRUG .. .. C PROVIDER REFUSED TO 　GIVE ANTIMALARIAL ..... D AFRAID OF EFFECTS OF DRUGS 　ON HEALTH .... E CHILD NOT VERY ILL .... F CLINIC TOO FAR .... G HAVE NO MONEY .... H DO NOT KNOW TO TAKE 　ANTIMALARIAL .... I MEDICINE AT HOME .... J DID NOT THINK IT WAS 　MALARIA .... K OTHER _____ X 　　(SPECIFY)
413	CHECK 412: ANY CODE A-I CIRCLED?	YES ☐　　NO ☐ 　　　(SKIP TO 428) ◄	YES ☐　　NO ☐ 　　　(SKIP TO 428) ◄
414	CHECK 412: ARTEMISININ COMBINATION THERAPY ('A') GIVEN	CODE 'A'　　CODE 'A' CIRCLED　　NOT ☐ ☐　　　CIRCLED 　　　(SKIP TO 416) ◄	CODE 'A'　　CODE 'A' CIRCLED　　NOT ☐ ☐　　　CIRCLED 　　　(SKIP TO 416) ◄
415	How long after the fever started did (NAME) first take an artemisinin combination therapy?	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER 　FEVER .... 2 THREE OR MORE DAYS 　AFTER FEVER .... 3 DON'T KNOW 8	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER 　FEVER .... 2 THREE OR MORE DAYS 　AFTER FEVER .... 3 DON'T KNOW 8

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____

416	CHECK 412:
	SP/FANSIDAR ('B') GIVEN
		CODE 'B' CODE 'B'
		CIRCLED NOT ☐
		       CIRCLED
		☐
		↓ (SKIP TO 418) ←
			CODE 'B' CODE 'B'
			CIRCLED NOT ☐
			       CIRCLED
			☐
			↓ (SKIP TO 418) ←

417	How long after the fever started did (NAME) first take SP/Fansidar?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		   FEVER 2
		THREE OR MORE DAYS
		   AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			   FEVER 2
			THREE OR MORE DAYS
			   AFTER FEVER 3
			DON'T KNOW 8

418	CHECK 412:
	CHLOROQUINE ('C') GIVEN
		CODE 'C' CODE 'C' ☐
		CIRCLED NOT
		       CIRCLED
		☐
		↓ (SKIP TO 420) ←
			CODE 'C' CODE 'C' ☐
			CIRCLED NOT
			       CIRCLED
			☐
			↓ (SKIP TO 420) ←

419	How long after the fever started did (NAME) first take chloroquine?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		   FEVER 2
		THREE OR MORE DAYS
		   AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			   FEVER 2
			THREE OR MORE DAYS
			   AFTER FEVER 3
			DON'T KNOW 8

420	CHECK 412:
	AMODIAQUINE ('D') GIVEN
		CODE 'D' CODE 'D' ☐
		CIRCLED NOT
		       CIRCLED
		☐
		↓ (SKIP TO 422) ←
			CODE 'D' CODE 'D' ☐
			CIRCLED NOT
			       CIRCLED
			☐
			↓ (SKIP TO 422) ←

421	How long after the fever started did (NAME) first take amodiaquine?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		   FEVER 2
		THREE OR MORE DAYS
		   AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			   FEVER 2
			THREE OR MORE DAYS
			   AFTER FEVER 3
			DON'T KNOW 8

422	CHECK 412:
	QUININE ('E' OR 'F') GIVEN
		CODE CODE
		'E' OR 'F' 'E' OR 'F' ☐
		CIRCLED NOT
		       CIRCLED
		☐
		↓ (SKIP TO 424) ←
			CODE CODE
			'E' OR 'F' 'E' OR 'F' ☐
			CIRCLED NOT
			       CIRCLED
			☐
			↓ (SKIP TO 424) ←

423	How long after the fever started did (NAME) first take quinine?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		   FEVER 2
		THREE OR MORE DAYS
		   AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			   FEVER 2
			THREE OR MORE DAYS
			   AFTER FEVER 3
			DON'T KNOW 8

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____
424	CHECK 412: ARTESUNATE ('G' OR 'H') GIVEN	CODE 'G' OR 'H' CIRCLED CODE 'G' OR 'H' NOT CIRCLED ☐ (SKIP TO 426) ←	CODE 'G' OR 'H' CIRCLED CODE 'G' OR 'H' NOT CIRCLED ☐ (SKIP TO 426) ←

425	How long after the fever started did (NAME) first take artesunate?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		    FEVER 2
		THREE OR MORE DAYS
		    AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			    FEVER 2
			THREE OR MORE DAYS
			    AFTER FEVER 3
			DON'T KNOW 8

426	CHECK 412: OTHER ANTIMALARIAL ('I') GIVEN	CODE 'I' CIRCLED CODE 'I' NOT CIRCLED ☐ (SKIP TO 428) ←	CODE 'I' CIRCLED CODE 'I' NOT CIRCLED ☐ (SKIP TO 428) ←

427	How long after the fever started did (NAME) first take (OTHER ANTIMALARIAL)?	SAME DAY 0
		NEXT DAY 1
		TWO DAYS AFTER
		    FEVER 2
		THREE OR MORE DAYS
		    AFTER FEVER 3
		DON'T KNOW 8
			SAME DAY 0
			NEXT DAY 1
			TWO DAYS AFTER
			    FEVER 2
			THREE OR MORE DAYS
			    AFTER FEVER 3
			DON'T KNOW 8

428		GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 501.	GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 501.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	In the past six months, have you seen or heard any messages about malaria?	YES .... 1 NO 2	→ 508
502	Where did you see or hear these messages? Where else? RECORD ALL MENTIONED.	RADIO .... A TELEVISION .... B POSTER/BILLBOARD .... C NEWSPAPER/MAGAZINE .... D LEAFLET/BROCHURE .... E HEALTH WORKER .... F COMMUNITY HEALTH WORKER .... G COMMUNITY VOLUNTEER/CBA .... H WORD OF MOUTH .... I COMMUNITY EVENT/DURBAR MEETING .... J ANYWHERE ELSE _____ X (SPECIFY) DON'T REMEMBER .... Z	
503	CHECK 502: IF A COMMUNICATION CHANNEL WAS MENTIONED IN 502, CIRCLE 0; IF NOT ASK: Have you seen or heard these messages: a) On the radio? b) On the television? c) On a poster or a billboard? d) In a newspaper or a magazine? e) On a leaflet or a brochure? f) From a health worker? g) From a community health worker (CHW)? h) A community volunteer or a community based agent i) Word of mouth? j) At a community event/durbar meeting?	MENT. YES NO a) RADIO .... O 1 2 b) TELEVISION .... O 1 2 c) POSTER/BILLBOARD ..... O 1 2 d) NEWSPAPER/MAGAZINE .. O 1 2 e) LEAFLET/BROCHURE ..... O 1 2 f) HEALTH WORKER .... O 1 2 g) CHW ....O 1 2 h) VOLUNTEER/CBA ....O 1 2 i) WORD OF MOUTH . . . . O 1 2 j) COMMUNITY EVENT/ DURBAR MEETING . . . . . . O 1 2	

504	What messages about malaria have you seen or heard in the past 6 months?
	
	What else?
	
	RECORD ALL MENTIONED.
		IF HAVE FEVER GO TO HEALTH FACILITY ..... A
		SLEEP UNDER AN INSECTICIDE-TREATED
		    MOSQUITO NET .... B
		PREGNANT WOMEN SHOULD TAKE DRUGS
		    TO PREVENT MALARIA C
		SP PROTECTS PREGNANT WOMEN AND
		    UNBORN BABY FROM GETTING MALARIA D
		ALWAYS TEST BEFORE TREATING MALARIA .. E
		TREAT MALARIA WITH ACTs .... F
		MALARIA KILLS .... G
		
		OTHER _____ X
		         (SPECIFY)
		DON'T KNOW/DON'T REMEMBER .... Z	

505	In the past six months, have you seen/heard any of the following malaria messages on television or radio: a) Goodlife campaign recommending pregnant women to sleep under treated bed nets b) Goodlife campaign recommending sleeping under treated bed nets every night all through the night c) Advert about "My net my life" addressing availability of different types (shapes, sizes and colour) of treated bednet on sale at designated points d) Advert where people were asked to test first before treated	YES,TV YES, RADIO YES, TV AND RADIO NO a) 1 2 3 4 b) 1 2 3 4 c) 1 2 3 4 d) 1 2 3 4	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
506	During the past six months, have you seen/heard any advert on the use of ACTs/ malaria medicines?	YES . . . . 1 NO 2	→ 508
507	Where did you see/hear the advert on the use of ACTs/ malaria medicines? Any other media? RECORD ALL MENTIONED.	TELEVISION . . . . A RADIO . . . . B NEWSPAPER/MAGAZINE . . . . C POSTER /LEAFLETS . . . . D BILLBOARD . . . . E OTHER _____ X (SPECIFY) DON'T KNOW/DON'T REMEMBER . . . . Z	
508	What are the things that people can do to prevent themselves from getting malaria? RECORD ALL MENTIONED.	SLEEP UNDER A MOSQUITO NET . . . . A SLEEP UNDER AN INSECTICIDE-TREATED MOSQUITO NET . . . . B USE MOSQUITO REPELLENT . . . . C TAKE PREVENTATIVE MEDICATIONS . . . . . . D SPRAY HOUSE WITH INSECTICIDE . . . . E FILL IN STAGNANT WATERS (PUDDLES) . . . . . F KEEP SURROUNDING CLEAN . . . . G PUT MOSQUITO SCREEN ON WINDOWS . . . . . H OTHER _____ X (SPECIFY) DON'T KNOW . . . . Z	
509	When a child has a fever, you almost always worry it might be malaria.	AGREE . . . . 1 DISAGREE . . . . 2 DON'T KNOW 8	
510	You don't worry about malaria because it can be easily treated.	AGREE . . . . 1 DISAGREE . . . . 2 DON'T KNOW 8	
511	Have you heard about the malaria vaccine?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
512	Would you allow your child to be vaccinated against malaria?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	
513	RECORD THE TIME.	HOURS . . . . MINUTES	

<u>INTERVIEWER'S OBSERVATIONS</u>

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

_____

_____

_____

_____

_____

_____

COMMENTS ON SPECIFIC QUESTIONS:

_____

_____

_____

_____

_____

_____

ANY OTHER COMMENTS:

_____

_____

_____

_____

_____

_____

<u>SUPERVISOR'S OBSERVATIONS</u>

_____

_____

_____

_____

_____

2019 GHANA MALARIA INDICATOR SURVEY
BIOMARKER QUESTIONNAIRE

MINISTRY OF HEALTH   GHANA STATISTICAL SERVICE

	IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER . . . .   ☐ ☐ ☐ ☐

HOUSEHOLD NUMBER . . . .   ☐ ☐ ☐ ☐

BIOMARKER TECHNICIAN VISITS

	1	2	3	FINAL VISIT	
DATE BIOMARKER TECH'S NAME	_____ _____	_____ _____	_____ _____	DAY MONTH YEAR	☐ ☐ ☐ ☐ 2 0 1 9
NEXT VISIT: DATE TIME	_____ _____	_____ _____		TOTAL NUMBER OF VISITS	☐
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   03 GA   05 DAGBANI
02 AKAN   04 EWE   06 OTHER _____
                                        (SPECIFY)

HOUSEHOLD INTERVIEWER
_____   NAME

SUPERVISOR	
_____ NAME	☐ ☐ ☐ ☐ NUMBER

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-5 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 1	CHILD 2	CHILD 3
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____
103	COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM HOUSEHOLD SCHEDULE. IF COMPLETE DATE OF BIRTH NOT PROVIDED ASK: What is (NAME)'s date of birth?	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐
104	CHECK 103: CHILD BORN IN 2014-2019?	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2
106	NAME OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD.	NAME _____	NAME _____	NAME _____
107	ASK CONSENT FOR ANEMIA TEST FROM PARENT/OTHER ADULT.	As part of this survey, we are asking children all over the country to take an anemia test. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. This survey will assist the government to develop programs to prevent and treat anemia. We ask that all children born in 2014 or later take part in anemia testing in this survey and give 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 anemia immediately, and the result will be told to you right away. The result will be kept strictly confidential and will not be shared with anyone other than members of our survey team. 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 anemia test?		
108	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3

		CHILD 1	CHILD 2	CHILD 3
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____
109	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT.	As part of this survey, we are asking children all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria. We ask that all children born in 2014 or later take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in the malaria test?		
110	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED .... 1 REFUSED .... 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3	GRANTED .... 1 REFUSED .... 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3	GRANTED .... 1 REFUSED .... 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ... 99994 REFUSED .... 99995 OTHER .... 99996 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 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 PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	G/DL .... ☐☐.☐ NOT PRESENT .... 994 REFUSED ....995 OTHER 996	G/DL .... ☐☐.☐ NOT PRESENT .... 994 REFUSED ....995 OTHER 996	G/DL .... ☐☐.☐ NOT PRESENT .... 994 REFUSED ....995 OTHER 996
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED .... 1 NOT PRESENT ...... 2 REFUSED .... 3 OTHER .... 6 (SKIP TO 116)	TESTED .... 1 NOT PRESENT ...... 2 REFUSED .... 3 OTHER .... 6 (SKIP TO 116)	TESTED .... 1 NOT PRESENT ...... 2 REFUSED .... 3 OTHER .... 6 (SKIP TO 116)

		CHILD 1	CHILD 2	CHILD 3
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____
115	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE . . . . 2 OTHER 6	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE . . . . 2 OTHER 6	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE . . . . 2 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 8.0 G/DL OR ABOVE . . . 2 ⌐ NOT PRESENT . . . . . . 3 ⌐ REFUSED . . . . 4 ⌐ OTHER . . . . 6 ⌐ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 8.0 G/DL OR ABOVE . . . 2 ⌐ NOT PRESENT . . . . . . 3 ⌐ REFUSED . . . . 4 ⌐ OTHER . . . . 6 ⌐ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 8.0 G/DL OR ABOVE . . . 2 ⌐ NOT PRESENT . . . . . . 3 ⌐ REFUSED . . . . 4 ⌐ OTHER . . . . 6 ⌐ (SKIP TO 130) ←
117	**SEVERE ANEMIA REFERRAL** RECORD THE RESULT OF THE ANEMIA TEST ON THE REFERRAL FORM.	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. (SKIP TO 130)		
118	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 WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2
119	CHECK 118: ANY 'YES' CIRCLED?	NO YES ☐ ↓ (SKIP TO 122) ←	NO YES ☐ ↓ (SKIP TO 122) ←	NO YES ☐ ↓ (SKIP TO 122) ←
120	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE . . . 2 NOT PRESENT . . . . . . 3 REFUSED . . . . 4 OTHER 6	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE . . . 2 NOT PRESENT . . . . . . 3 REFUSED . . . . 4 OTHER 6	BELOW 8.0 G/DL, SEVERE ANEMIA . . . 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE . . . 2 NOT PRESENT . . . . . . 3 REFUSED . . . . 4 OTHER 6
121	In the past two weeks has (NAME) taken or is taking ACT given by a doctor or health professional to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES . . . . 1 ⌐ (SKIP TO 123) ← NO . . . . 2 ⌐ (SKIP TO 124) ←	YES . . . . 1 ⌐ (SKIP TO 123) ← NO . . . . 2 ⌐ (SKIP TO 124) ←	YES . . . . 1 ⌐ (SKIP TO 123) ← NO . . . . 2 ⌐ (SKIP TO 124) ←

		CHILD 1	CHILD 2	CHILD 3
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____

122	**SEVERE MALARIA REFERRAL** RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	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. (SKIP TO 128)		
123	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 two days after the last dose of ACT, you should take the child to the nearest health facility for further examination. (SKIP TO 130)		
124	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called ACT. ACT is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 ⌐ _____(SIGN)_____ ← REFUSED .... 2 ⌐ OTHER 6	ACCEPTED MEDICINE . 1 ⌐ _____(SIGN)_____ ← REFUSED .... 2 ⌐ OTHER 6	ACCEPTED MEDICINE . 1 ⌐ _____(SIGN)_____ ← REFUSED .... 2 ⌐ OTHER 6
126	CHECK 125: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED .... 2 ⌐ OTHER .... 6 ⌐ (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED .... 2 ⌐ OTHER .... 6 ⌐ (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED .... 2 ⌐ OTHER .... 6 ⌐ (SKIP TO 130) ←
127	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	TREATMENT WITH ARTESUNATE-AMODIAQUINE (AA) Weight (in kg) – Approximate age Dosage ≥4.5kg to 9kg (under 1 year) 1 tablet AS- AQ (25 mg/67.5 mg) daily for 3 days >9kg - <18kg (age 1-5 years) 1 tablet AS-AQ (50mg/135mg) daily for 3 days Give the child one tablet each day for three consecutive days. Take the medicine with fatty food or drinks like milk or breast milk. For smaller children, put the tablet in a little water, mix water and tablet well, and give to the child. If your child vomits within an hour of taking the medicine, repeat the dose and get additional tablets. ALSO TELL THE PARENT / OTHER ADULT: If (NAME OF CHILD) has any of the following symptoms, you should take him/her to a health professional for further assessment and treatment right away: -- A high temperature or fever -- Fast or difficulty breathing -- Not able to drink or breastfeed -- Gets sicker or does not get better in two days (SKIP TO 130) ←		
128	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ⌐ NOT PRESENT 3 ⌐ REFUSED 4 ⌐ OTHER 6 ⌐ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ⌐ NOT PRESENT 3 ⌐ REFUSED 4 ⌐ OTHER 6 ⌐ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ⌐ NOT PRESENT 3 ⌐ REFUSED 4 ⌐ OTHER 6 ⌐ (SKIP TO 130) ←
129	**SEVERE ANEMIA REFERRAL** RECORD THE RESULT OF THE ANEMIA TEST ON THE 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.		
130	GO BACK TO 103 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-5 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 4	CHILD 5	CHILD 6
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____
103	COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM HOUSEHOLD SCHEDULE. IF COMPLETE DATE OF BIRTH NOT PROVIDED ASK: What is (NAME)'s date of birth?	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐	DAY . . . . ☐☐ MONTH . . . . ☐☐ YEAR . . . ☐☐☐☐
104	CHECK 103: CHILD BORN IN 2014-2019?	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←	YES . . . . 1 NO . . . . 2 (SKIP TO 130) ←
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2	0-5 MONTHS . . . . 1 (SKIP TO 130) ← OLDER 2
106	NAME OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD.	NAME _____ _____	NAME _____ _____	NAME _____ _____
107	ASK CONSENT FOR ANEMIA TEST FROM PARENT/OTHER ADULT.	As part of this survey, we are asking children all over the country to take an anemia test. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. This survey will assist the government to develop programs to prevent and treat anemia. We ask that all children born in 2014 or later take part in anemia testing in this survey and give 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 anemia immediately, and the result will be told to you right away. The result will be kept strictly confidential and will not be shared with anyone other than members of our survey team. 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 anemia test?		
108	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3	GRANTED . . . . 1 _____ (SIGN) ← REFUSED . . . . 2 NOT PRESENT/OTHER . 3

		CHILD 4	CHILD 5	CHILD 6
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____
109	ASK CONSENT FOR MALARIA TEST FROM PARENT/OTHER ADULT.	As part of this survey, we are asking children all over the country to take a test to see if they have malaria. Malaria is a serious illness caused by a parasite transmitted by a mosquito bite. This survey will assist the government to develop programs to prevent malaria. We ask that all children born in 2014 or later take part in malaria testing in this survey and give a few drops of blood from a finger or heel. One blood drop will be tested for malaria immediately, and the result will be told to you right away. A few blood drops will be collected on slide(s) and taken to a laboratory for testing. You will not be told the results of the laboratory testing. All results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in the malaria test?		
110	CIRCLE THE CODE, SIGN YOUR NAME, AND ENTER YOUR FIELDWORKER NUMBER.	GRANTED . . . . 1 REFUSED . . . . 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3	GRANTED . . . . 1 REFUSED . . . . 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3	GRANTED . . . . 1 REFUSED . . . . 2 (SIGN AND ENTER YOUR FIELDWORKER NUMBER) ☐☐☐☐ NOT PRESENT/OTHER . 3
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT . . . 99994 REFUSED . . . . 99995 OTHER . . . . 99996 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 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 PUT THE 2ND BAR CODE LABEL ON THE SLIDE AND THE 3RD ON THE TRANSMITTAL FORM.
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	G/DL . . . . ☐☐.☐ NOT PRESENT . . . . 994 REFUSED . . . . 995 OTHER 996	G/DL . . . . ☐☐.☐ NOT PRESENT . . . . 994 REFUSED . . . . 995 OTHER 996	G/DL . . . . ☐☐.☐ NOT PRESENT . . . . 994 REFUSED . . . . 995 OTHER 996
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED . . . . 1 NOT PRESENT . . . . . . 2 REFUSED . . . . 3 OTHER . . . . 6 (SKIP TO 116)	TESTED . . . . 1 NOT PRESENT . . . . . . 2 REFUSED . . . . 3 OTHER . . . . 6 (SKIP TO 116)	TESTED . . . . 1 NOT PRESENT . . . . . . 2 REFUSED . . . . 3 OTHER . . . . 6 (SKIP TO 116)

		CHILD 4	CHILD 5	CHILD 6
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____	LINE NUMBER ...... ☐☐ NAME _____
115	RECORD THE RESULT OF THE MALARIA RDT HERE AND IN THE ANEMIA AND MALARIA PAMPHLET.	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE .... 2 OTHER 6	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE .... 2 OTHER 6	POSITIVE .... 1 ⌐ (SKIP TO 118) ← NEGATIVE .... 2 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 8.0 G/DL OR ABOVE ... 2 ⌐ NOT PRESENT ...... 3 REFUSED .... 4 OTHER .... 6 (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 8.0 G/DL OR ABOVE ... 2 ⌐ NOT PRESENT ...... 3 REFUSED .... 4 OTHER .... 6 (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 8.0 G/DL OR ABOVE ... 2 ⌐ NOT PRESENT ...... 3 REFUSED .... 4 OTHER .... 6 (SKIP TO 130) ←
117	**SEVERE ANEMIA REFERRAL** RECORD THE RESULT OF THE ANEMIA TEST ON THE REFERRAL FORM.	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. (SKIP TO 130)		
118	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 WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2	YES NO a) EXTREME WEAKNESS 1 2 b) HEART PROBLEMS 1 2 c) LOSS OF CONSCIOUS. 1 2 d) RAPID BREATHING 1 2 e) SEIZURES 1 2 f) BLEEDING 1 2 g) JAUNDICE 1 2 h) DARK URINE 1 2
119	CHECK 118: ANY 'YES' CIRCLED?	NO YES ☐ ↓ (SKIP TO 122) ←	NO YES ☐ ↓ (SKIP TO 122) ←	NO YES ☐ ↓ (SKIP TO 122) ←
120	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ...... 3 REFUSED .... 4 OTHER 6	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ...... 3 REFUSED .... 4 OTHER 6	BELOW 8.0 G/DL, SEVERE ANEMIA ... 1 ⌐ (SKIP TO 122) ← 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ...... 3 REFUSED .... 4 OTHER 6
121	In the past two weeks has (NAME) taken or is taking ACT given by a doctor or health professional to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES .... 1 ⌐ (SKIP TO 123) ← NO .... 2 ⌐ (SKIP TO 124) ←	YES .... 1 ⌐ (SKIP TO 123) ← NO .... 2 ⌐ (SKIP TO 124) ←	YES .... 1 ⌐ (SKIP TO 123) ← NO .... 2 ⌐ (SKIP TO 124) ←

		CHILD 4	CHILD 5	CHILD 6
	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____	LINE NUMBER . . . . . . ☐☐ NAME _____

122	**SEVERE MALARIA REFERRAL** RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	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. (SKIP TO 128)		
123	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 two days after the last dose of ACT, you should take the child to the nearest health facility for further examination. (SKIP TO 130)		
124	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called ACT. ACT is very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE . 1 ┐ ___(SIGN)___ ←┘ REFUSED . . . . 2 ┘ OTHER 6	ACCEPTED MEDICINE . 1 ┐ ___(SIGN)___ ←┘ REFUSED . . . . 2 ┘ OTHER 6	ACCEPTED MEDICINE . 1 ┐ ___(SIGN)___ ←┘ REFUSED . . . . 2 ┘ OTHER 6
126	CHECK 125: MEDICATION ACCEPTED	ACCEPTED MEDICINE . 1 REFUSED . . . . 2 ┐ OTHER . . . . 6 ┘ (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED . . . . 2 ┐ OTHER . . . . 6 ┘ (SKIP TO 130) ←	ACCEPTED MEDICINE . 1 REFUSED . . . . 2 ┐ OTHER . . . . 6 ┘ (SKIP TO 130) ←
127	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER ADULT.	<table><tr><td colspan="2" align="center">TREATMENT WITH ARTESUNATE-AMODIAQUINE (AA)</td></tr><tr><td>Weight (in kg) – Approximate age</td><td>Dosage</td></tr><tr><td>≥4.5kg to 9kg (under 1 year)</td><td>1 tablet AS- AQ (25 mg/67.5 mg) daily for 3 days</td></tr><tr><td>>9kg - <18kg (age 1-5 years)</td><td>1 tablet AS-AQ (50mg/135mg) daily for 3 days</td></tr></table> Give the child one tablet each day for three consecutive days. Take the medicine with fatty food or drinks like milk or breast milk. For smaller children, put the tablet in a little water, mix water and tablet well, and give to the child. If your child vomits within an hour of taking the medicine, repeat the dose and get additional tablets. ALSO TELL THE PARENT / OTHER ADULT: If (NAME OF CHILD) has any of the following symptoms, you should take him/her to a health professional for further assessment and treatment right away: -- A high temperature or fever -- Fast or difficulty breathing -- Not able to drink or breastfeed -- Gets sicker or does not get better in two days (SKIP TO 130) ←		
128	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ┐ NOT PRESENT 3 ┤ REFUSED 4 ┤ OTHER 6 ┘ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ┐ NOT PRESENT 3 ┤ REFUSED 4 ┤ OTHER 6 ┘ (SKIP TO 130) ←	BELOW 8.0 G/DL, SEVERE ANEMIA 1 8.0 G/DL OR ABOVE 2 ┐ NOT PRESENT 3 ┤ REFUSED 4 ┤ OTHER 6 ┘ (SKIP TO 130) ←
129	**SEVERE ANEMIA REFERRAL** RECORD THE RESULT OF THE ANEMIA TEST ON THE 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.		
130	GO BACK TO 103 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

FIELDWORKER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING BIOMARKERS

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SUPERVISOR'S OBSERVATIONS

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2019 GHANA MALARIA INDICATOR SURVEY
FIELDWORKER QUESTIONNAIRE

GHANA
GHANA STATISTICAL SERVICE

LANGUAGE OF
QUESTIONNAIRE **ENGLISH**

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
100	What is your name/phone number?	NAME _____ PHONE NUMBER ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚	
101	RECORD FIELDWORKER NUMBER	NUMBER . . . . ⬚⬚⬚⬚	

INSTRUCTIONS

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

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
102	In what REGION do you live?	WESTERN . . . . 01 CENTRAL . . . . 02 GREATER ACCRA . . . . 03 VOLTA . . . . 04 EASTERN . . . . 05 ASHANTI . . . . 06 BRONG AHAFO . . . . 07 NORTHERN . . . . 08 UPPER EAST . . . . 09 UPPER WEST 10	
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	
109 (1)	What is the highest level of school you attended: primary, secondary, or higher?	PRMARY . . . . 1 JHS . . . . 2 SHS/SSS . . . . 3 SECONDARY . . . . 4 BACHELORS . . . . 5 MASTERS 6	
110 (1)	What is the highest [GRADE/FORM/YEAR] you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	[GRADE/FORM/YEAR] . . . . ⬚⬚	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111 (2)	What is your religion?	CATHOLIC . . . . 01 ANGLICAN . . . . 02 METHODIST . . . . 03 PRESBYTERIA . . . . 04 PENTECOSTAL/CHARISMATIC . . . . 05 OTHER CHRISTIAN . . . . 06 ISLAM . . . . 07 TRADITIONAL/SPIRITUALIST . . . . 08 NO RELIGION . . . . 95 OTHER _____ 96 (SPECIFY)	
112 (2)	What is your ethnicity?	AKAN . . . . 01 GA/DANGME . . . . 02 EWE . . . . 03 GUAN . . . . 04 MOLE-DAGBANI . . . . 05 GRUSI . . . . 06 GURMA . . . . 07 MANDE . . . . 08 OTHER _____ (SPECIFY) 96	
113	What languages can you speak? RECORD ALL LANGUAGES YOU CAN SPEAK.	AKAN . . . . A GA/DANGME . . . . B EWE . . . . C DAGBANI . . . . D NZEMA . . . . E BRONG . . . . F OTHER _____ X (SPECIFY)	
114	What is your mother tongue/native language (language spoken at home growing up)?	AKAN . . . . 01 GA/DANGME . . . . 02 EWE . . . . 03 DAGBANI . . . . 04 NZEMA . . . . 05 BRONG . . . . 06 OTHER _____ 96 (SPECIFY)	
115 (3)	Have you ever worked on: a) a GDHS prior to this survey? b) a GMIS prior to this survey? c) any other survey prior to this survey?	YES NO a) GDHS . . . . 1 2 b) GMIS . . . . 1 2 c) OTHER SURVEY 1 2	
116	Were you already working for the National Public Health Reference Laboratory (NPHRL) or the Ghana Statistical Service (GSS) at the time you were employed to work on this MIS?	YES, NPHRL . . . . 1 YES, GSS . . . . 2 NO 3	→ 118
117	Are you a permanent or temporary employee of the National Public Health Reference Laboratory (NPHRL) or the Ghana Statistical Service (GSS)?	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	

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Twitter www.twitter.com/ DHSprogram			