Ghana

Malaria Indicator Survey

2016

GHANA
Malaria Indicator Survey
2016

Ghana Statistical Service
Accra, Ghana

National Malaria Control Programme
Accra, Ghana

National Public Health Reference Laboratory
Accra, Ghana

The DHS Program
ICF
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The 2016 Ghana Malaria Indicator Survey (2016 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 Reference Laboratory (NPHRL) of the Ghana Health Service. Financial support for the survey was provided by the United States Agency for International Development, the Global Fund to Fight AIDS, Tuberculosis, and Malaria, 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.

Additional information about the 2016 GMIS may be obtained from the Ghana Statistical Service, Head Office, P.O. Box GP 1098, Accra, Ghana; Telephone: 233-302-682-661/233-302-663-578; Fax: 233-302-664-301; Email: info@statsghana.gov.gh.

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

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CONTENTS

TABLES AND FIGURES ..... **v**
FOREWORD ..... **ix**
READING AND UNDERSTANDING TABLES FROM THE 2016 GHANA MIS (GMIS) ..... **xi**
ACRONYMS AND ABBREVIATIONS ..... **xix**
MAP OF GHANA ..... **xx**

1 INTRODUCTION AND SURVEY METHODOLOGY **1**
1.1 Survey Objectives 1
1.2 Sample Design 1
1.3 Questionnaires 2
1.4 Anaemia and Malaria Testing 3
1.5 Pretest 4
1.6 Training of Field Staff 4
1.7 Fieldwork 4
1.8 Data Processing 4
1.9 Ethical Considerations 5
1.10 Response Rates 5

2 HOUSING CHARACTERISTICS, HOUSEHOLD POPULATION, AND WOMEN'S CHARACTERISTICS **7**
2.1 Drinking Water Sources and Treatment 7
2.2 Sanitation (Toilet Facility) 8
2.3 Housing Characteristics 9
2.4 Household Wealth 10
2.5 Household Population and Composition 11
2.6 Background Characteristics of Women Respondents 12
2.7 Educational Attainment of Women 12
2.8 Literacy of Women 12
2.9 Health Insurance Coverage 13

3 MALARIA PREVENTION **25**
3.1 Ownership of Mosquito Nets 26
3.2 Household Access and Use of LLINs 28
3.3 Use of ITNs by Children and Pregnant Women 30
3.4 Malaria in Pregnancy 31

4 MALARIA IN CHILDREN **41**
4.1 Care Seeking for Fever in Children 41
4.2 Diagnostic Testing of Children with Fever 42
4.3 Use of Recommended Antimalarials 43
4.4 Prevalence of Low Haemoglobin in Children 43
4.5 Prevalence of Malaria in Children 45

5 MALARIA KNOWLEDGE AND MESSAGING **55**
5.1 Exposure to Malaria Messages 56
5.2 Knowledge and Awareness 57
5.3 Self-report of Malaria Episodes and Care Seeking 58

REFERENCES **69**

APPENDIX A SAMPLE DESIGN **71**
A.1 Introduction 71
A.2 Sample Frame 71
A.3 Sample Allocation and Sampling Procedures 72
A.4 Sample Probabilities and Sampling Weights 74
A.5 Survey Implementation 75

APPENDIX B ESTIMATES OF SAMPLING ERRORS **77**

APPENDIX C DATA QUALITY TABLES **87**

APPENDIX D PERSONS INVOLVED IN THE 2016 GMIS **91**

APPENDIX E QUESTIONNAIRES **95**

TABLES AND FIGURES

1 INTRODUCTION AND SURVEY METHODOLOGY 1

Table 1.1 Results of the household and individual interviews 5

2 HOUSING CHARACTERISTICS, HOUSEHOLD POPULATION, AND WOMEN'S CHARACTERISTICS 7

Table 2.1 Household drinking water 16
Table 2.2 Household sanitation facilities 16
Table 2.3 Household characteristics 17
Table 2.4 Household possessions 18
Table 2.5 Wealth quintiles 18
Table 2.6 Household population by age, sex, and residence 19
Table 2.7 Household composition 19
Table 2.8 Women's background characteristics 20
Table 2.9 Women's educational attainment 21
Table 2.10 Women's literacy 22
Table 2.11 Women's health insurance coverage 23

Figure 2.1 Household drinking water by residence 8
Figure 2.2 Household sanitation facilities by residence 9
Figure 2.3 Household wealth by residence 10
Figure 2.4 Population pyramid 11
Figure 2.5 Educational attainment of women by residence 12
Figure 2.6 Trends in national health insurance coverage by region 14

3 MALARIA PREVENTION 25

Table 3.1 Household possession of mosquito nets 34
Table 3.2 Source of mosquito nets 35
Table 3.3 Access to a long-lasting insecticidal net 36
Table 3.4 Use of mosquito nets by persons in the household 37
Table 3.5 Use of existing long-lasting insecticidal nets 37
Table 3.6 Use of mosquito nets by children 38
Table 3.7 Use of mosquito nets by pregnant women 39
Table 3.8 Use of intermittent preventive treatment (IPTp) by women during pregnancy ... 40

Figure 3.1 Household ownership of LLINs 26
Figure 3.2 Trends in household ownership of LLINs 27
Figure 3.3 LLIN ownership by household wealth 27
Figure 3.4 LLIN ownership by region 27
Figure 3.5 Source of mosquito nets 28
Figure 3.6 Access to and use of LLINs 28
Figure 3.7 LLIN access by region 29
Figure 3.8 LLIN use by household population 29
Figure 3.9 LLIN use by children and pregnant women 30
Figure 3.10 Trends in IPTp use by pregnant women 32

4 MALARIA IN CHILDREN 41

Table 4.1 Prevalence, diagnosis, and prompt treatment of children with fever 48

Table 4.2 Source of advice or treatment for children with fever 49
Table 4.3 Type of antimalarial drugs used 50
Table 4.4 Coverage of testing for anaemia and malaria in children 51
Table 4.5 Haemoglobin <8.0 g/dl in children 52
Table 4.6 Prevalence of malaria in children 53

Figure 4.1 Trends in care seeking for fever in children under age 5 42
Figure 4.2 Diagnostic testing of children with fever by region 43
Figure 4.3 Prevalence of low haemoglobin in children by region 44
Figure 4.4 Low haemoglobin in children by household wealth 44
Figure 4.5 Trends in malaria prevalence among children 45
Figure 4.6 Prevalence of malaria in children by region 46
Figure 4.7 Prevalence of malaria in children by household wealth 46

5 MALARIA KNOWLEDGE AND MESSAGING 55
Table 5.1 Exposure to messages on malaria by media source 61
Table 5.2 Exposure to specific messages and information on malaria 62
Table 5.3 Exposure to messages on malaria treatment by media source 63
Table 5.4 Women's knowledge of malaria causes, symptoms, and treatment 64
Table 5.5 Self-reported episodes, diagnosis, and treatment of malaria 65
Table 5.6 Source of advice or treatment for malaria in the previous 12 months 66
Table 5.7 Use of specific antimalarial drugs 67

Figure 5.1 Reach of behaviour change communication messages 56
Figure 5.2 Reach of behaviour change communication messages by region 57
Figure 5.3 Reach of behaviour change communication messages by household wealth 57
Figure 5.4 Knowledge of malaria causes, symptoms, and treatment 58
Figure 5.5 Self-reported episodes, diagnosis, and treatment of malaria 59
Figure 5.6 Malaria testing and treatment 59

REFERENCES 69

APPENDIX A SAMPLE DESIGN 71
Table A.1 Distribution of residential population by region and type of residence 71
Table A.2 Distribution of residential households by region and type of residence 72
Table A.3 Enumeration areas and households 72
Table A.4 Sample allocation of clusters and households 73
Table A.5 Sample allocation of expected number of women age 15-49 and expected number of children under age 5 74
Table A.6 Sample implementation 76

APPENDIX B ESTIMATES OF SAMPLING ERRORS 77
Table B.1 List of indicators for sampling errors, Ghana MIS 2016 79
Table B.2 Sampling errors: Total sample, Ghana MIS 2016 79
Table B.3 Sampling errors: Urban sample, Ghana MIS 2016 80
Table B.4 Sampling errors: Rural sample, Ghana MIS 2016 80
Table B.5 Sampling errors: Western sample, Ghana MIS 2016 81
Table B.6 Sampling errors: Central sample, Ghana MIS 2016 81
Table B.7 Sampling errors: Greater Accra sample, Ghana MIS 2016 82
Table B.8 Sampling errors: Volta sample, Ghana MIS 2016 82
Table B.9 Sampling errors: Eastern sample, Ghana MIS 2016 83
Table B.10 Sampling errors: Ashanti sample, Ghana MIS 2016 83
Table B.11 Sampling errors: Brong Ahafo sample, Ghana MIS 2016 84

Table B.12 Sampling errors: Northern sample, Ghana MIS 2016 84
Table B.13 Sampling errors: Upper East sample, Ghana MIS 2016 85
Table B.14 Sampling errors: Upper West sample, Ghana MIS 2016 85

APPENDIX C DATA QUALITY TABLES 87
Table C.1 Household age distribution 87
Table C.2 Age distribution of eligible and interviewed women 88
Table C.3 Completeness of reporting 89
Table C.4 Births by calendar years 89

FOREWORD

The Ghana Statistical Service (GSS), in collaboration with the Ministry of Health/Ghana Health Service, conducted the 2016 Ghana Malaria Indicator Survey (MIS). The 2016 Ghana MIS 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 Ghana's malaria control programme. The survey provides information on malaria prevention, treatment, and prevalence in Ghana. More specifically, the survey collected data on the ownership and use of mosquito bednets, assessed the 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.

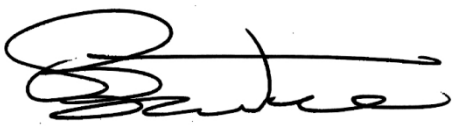
The data were collected via the computer-assisted personal interviewing (CAPI) system on tablet computers and paper questionnaires. Three questionnaires were used in the 2016 Ghana MIS: the Household Questionnaire, the Woman's Questionnaire, and the Biomarker Questionnaire. Interviewers completed the Household Questionnaire and the Woman's Questionnaire with the CAPI system, while health technicians completed the Biomarker Questionnaire on paper.

The Statistical Service is grateful to the Ministry of Health, the Ghana Health Service, and the National Malaria Control Programme for their valuable partnership and especially for providing vehicles and artemisinin-based combination therapy (ACT) for the field work. The GSS extends its appreciation to the National Public Health & Reference Laboratory for its contribution during the training of field personnel, field supervision, and microscopic reading of the malaria slides to determine malaria parasite infections, and to the Noguchi Memorial Institute for Medical Research for conducting the external quality assurance. The GSS would also like to thank the Ethical Review Committee for the ethical clearance that allowed the performance of the anaemia and malaria testing, and is also grateful to the Global Fund, USAID, and the Government of Ghana for co-funding the survey.

The GSS further acknowledges the technical assistance provided by ICF through the DHS program during the preparation and finalization of the survey instruments, pre-test of the instruments, training of fieldworkers, monitoring of the field data collection, and preparation of the final report.

We extend our appreciation to all who participated in this survey: the authors, who are cited in this report, the field staff, and other survey personnel. We appreciate the co-operation of all survey respondents for making the 2016 GMIS a success.

We hope that this report will be useful for advocacy, evidence-based decision making, and informed service delivery. We encourage data users to conduct further analytical work to deepen understanding on the topics in the survey.



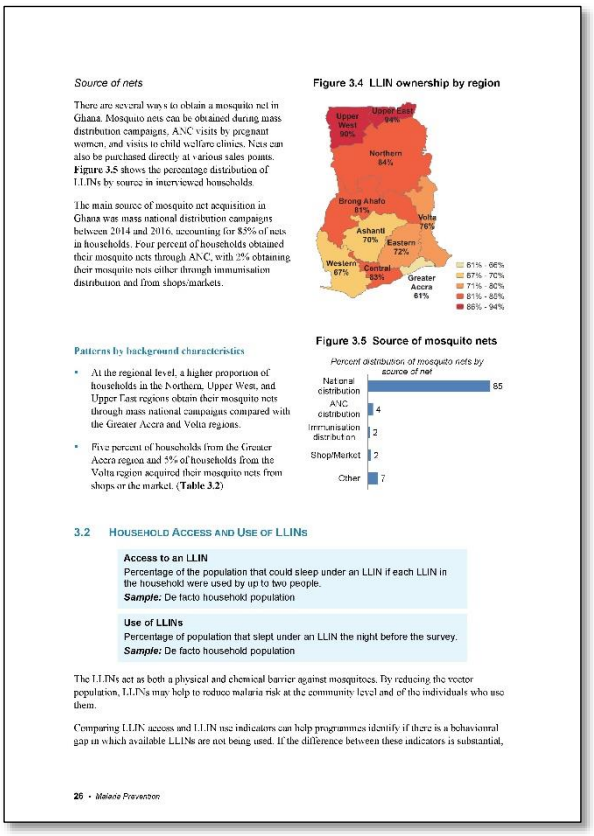
Baah Wadieh
Acting Government Statistician
Ghana Statistical Service

READING AND UNDERSTANDING TABLES FROM THE 2016 GHANA MIS (GMIS)

The 2016 GMIS final report is based on tables of data located for quick reference through links in the text (electronic version) and at the end of each chapter. In addition, the report features figures that clearly highlight trends, subnational patterns, and background characteristics. Large colourful maps display data by the regions in Ghana. The text has been simplified to highlight key points in bullets and to clearly identify indicator definitions in boxes.

Although the text and figures featured in each chapter highlight some of the most important findings, not every finding can be discussed or displayed graphically. For this reason, 2016 GMIS data users should be comfortable reading and interpreting data tables.

The following pages provide an introduction to the organization of the 2016 GMIS tables, the presentation of background characteristics, and a brief summary of sampling prodedures used and understanding denominators. In addition, this section provides some exercises for users as they practice their new skills in interpreting 2016 GMIS tables.



Source of nets

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

The main source of mosquito net acquisition in Ghana was mass national distribution campaigns between 2014 and 2016, accounting for 85% of nets in households. Four percent of households obtained their mosquito nets through ANC, with 2% obtaining their mosquito nets either through immunisation distribution and from shops/markets.

Figure 3.4 LLIN ownership by region

Patterns by background characteristics

- At the regional level, a higher proportion of households in the Northern, Upper West, and Upper East regions obtain their mosquito nets through mass national campaigns compared with the Greater Accra and Volta regions.
- Five percent of households from the Greater Accra region and 5% of households from the Volta region acquired their mosquito nets from shops or the market. (**Table 3.2**)

Figure 3.5 Source of mosquito nets

Percent distribution of mosquito nets by source of net

3.2 HOUSEHOLD ACCESS AND USE OF LLINS

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

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

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

Comparing LLIN access and LLIN use indicators can help programmes identify if there is a behavioural gap in which available LLINs are not being used. If the difference between these indicators is substantial,

26 • Malaria Prevention

Example 1: Exposure to Messages on Malaria Treatment by Media Source

A Question Asked of All Survey Respondents

Table 5.3 Exposure to messages on malaria treatment by media source 1

Percentage of women age 15-49 who, in the past 6 months, have seen or heard an advertisement on the use of ACTs or malaria medicines by media sources, according to background characteristics, Ghana MIS 2016

Background characteristic 3	2 Sources of exposure to messages on the use of ACTs/malaria treatment medicines in the past 6 months						Percentage of women who, in past 6 months, saw or heard an advertisement on the use of ACTs or malaria medicines	Number of women
	Television	Radio	Newspaper/ magazine	Poster/ leaflets	Billboard	Other		
Age								
15-19	17.6	6.3	0.2	0.3	0.1	1.6	19.5	891
20-24	18.8	6.7	0.2	0.5	0.6	3.3	24.2	860
25-29	26.5	10.0	0.0	0.8	0.3	3.4	31.7	886
30-34	26.7	10.9	0.0	0.5	0.1	3.6	34.2	842
35-39	22.3	10.6	0.2	1.2	0.2	3.7	29.3	695
40-44	19.6	11.3	0.1	0.8	0.4	3.9	27.9	561
45-49	20.6	13.5	0.0	1.1	0.3	3.6	26.8	416
Residence								
Urban	31.2	11.0	0.2	0.9	0.5	3.0	35.4	2,768
Rural	11.2	7.7	0.1	0.5	0.0	3.5	18.5	2,382
Region								
Western	13.4	3.5	0.6	0.7	0.5	2.0	17.0	420
Central	22.7	15.8	0.2	0.0	1.4	5.1	35.4	564
Greater Accra	48.2	18.1	0.2	0.9	0.4	2.4	52.1	993
Volta	17.5	5.2	0.1	0.9	0.1	2.0	20.6	410
Eastern	15.7	8.0	0.0	0.3	0.0	4.4	22.6	477
Ashanti	15.2	6.9	0.0	0.2	0.0	2.5	18.8	998
Brong Ahafo	16.9	7.5	0.0	0.8	0.0	3.1	21.8	436
Northern	7.4	3.3	0.0	0.3	0.0	1.0	10.0	520
Upper East	17.8	7.9	0.0	0.6	0.0	12.6	33.0	197
Upper West	14.6	8.1	0.0	7.3	0.3	5.5	29.8	135
Education								
No education	7.8	3.5	0.0	0.4	0.1	1.9	12.3	986
Primary	16.5	8.4	0.0	0.1	0.0	2.4	21.0	882
Middle/JSS/JHS	21.5	10.1	0.0	0.3	0.2	3.9	28.2	2,010
Secondary/SSS/SHS or higher	37.4	13.8	0.5	1.8	0.8	3.8	43.1	1,271
Wealth quintile								
Lowest	3.1	5.7	0.0	0.7	0.0	4.4	12.3	834
Second	10.4	6.4	0.1	0.2	0.0	3.7	16.6	957
Middle	17.2	7.5	0.0	0.6	0.3	2.6	22.4	1,046
Fourth	28.8	12.0	0.0	0.7	0.5	2.7	32.8	1,100
Highest	41.8	13.9	0.4	1.2	0.5	3.0	46.5	1,213
Total	21.9	9.5	0.1	0.7	0.3	3.2	27.6	5,150 4

5

ACT = Artemisinin-based combination therapy

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

Step 2: Scan the column headings—highlighted in green. The headings describe the categories of information. In this table, the first six columns of data show different sources of messages on the use of artemisinin-based combination therapy (ACT)/malaria medicines that women were exposed to in the 6 months before the survey. The seventh column shows women who were exposed to messages on the use of ACT or malaria medicines via any source in the 6 months before the survey. The last column lists the number of women interviewed in the survey.

Step 3: Scan the row headings—the first column highlighted in blue. These headings show the different ways in which the data are divided into categories based on population characteristics. In this example, the table presents women's exposure to messages about ACTs or malaria medicines by age, urban-rural

residence, region, educational level, and wealth quintile. Most of the tables in the 2016 GMIS report are divided into these same categories.

Step 4: Look at the row at the bottom of the table highlighted in pink. These percentages represent the totals of all women age 15-49 and their exposure to messages about ACTs or malaria medicines by different media sources. In this example, 21.9%* of women saw a message about ACTs or malaria medicines on television and 9.5% heard a message about ACTs or malaria medicines on the radio in the 6 months before the survey. Television and radio were the most common sources for messages about ACTs or malaria medicines.

Step 5: To determine the percentage of women with secondary/SSS/SHS or higher education who saw a message on ACTs or malaria medicines on a poster or leaflets in the 6 months before the survey, draw two imaginary lines, as shown on the table. This shows that 1.8% of women with secondary/SSS/SHS or higher education saw a message on ACTs or malaria medicines on a poster or leaflets in the 6 months before the survey.

By looking at patterns by background characteristics, you can see how exposure to messages about ACTs or malaria medicines varies across Ghana. Mass media are often used to communicate health messages. Knowing how mass media exposure varies among different groups can help program planners and policy makers determine how to most effectively reach their target populations.

*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:
a) What percentage of women in Ghana were exposed to a message on ACTs or malaria medicines via any source in the 6 months before the survey?
b) What age group was most likely to have heard a message on ACTs or malaria medicines on the radio in the 6 months before the survey?
c) Compare women in urban areas to women in rural areas—which group is more likely to have seen a message on ACTs or malaria medicines on television in the 6 months before the survey?
d) What are the lowest and highest percentages (range) of women who were exposed to a message on ACTs or malaria medicines via any media source in the six months before the survey by region?
e) Is there a clear pattern in exposure to messages on ACTs or malaria medicines via television by education level?
f) Is there a clear pattern in exposure to messages on ACTs or malaria medicines via posters/leaflets by wealth quintile?

Answers:
a) 27.6%
b) Women age 45-49: 13.5% of women in this age group heard a message on ACTs or malaria medicines on the radio in the 6 months before the survey.
c) Women in urban areas: 31.2% of women in urban areas saw a message on ACTs or malaria medicines on television in the 6 months before the survey, compared to 11.2% of women in rural areas.
d) 10.0% of women in Northern were exposed to a message on ACTs or malaria medicines via any media source in the 6 months before the survey, compared to 52.1% of women in Greater Accra.
e) Exposure to messages on ACTs or malaria medicines on television increases as a woman's level of education increases; 7.8% of women with no education saw a message on ACTs or malaria medicines on television in the 6 months before the survey, compared to 37.4% of women secondary/SSS/SHS or higher education.
f) There is no clear pattern in exposure to messages on ACTs or malaria medicines via posters/leaflets by wealth quintile.

Example 2: Use of Mosquito Nets by Pregnant Women

A Question Asked of a Subgroup of Survey Respondents

Table 3.7 Use of mosquito nets by pregnant women 1

Percentages of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated), and under a long-lasting insecticidal net (LLIN); and among pregnant women age 15-49 in households with at least one LLIN, percentage who slept under an LLIN the night before the survey, according to background characteristics, Ghana MIS 2016

Background characteristic	2 Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one LLIN	
	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of women	Percentage who slept under a LLIN last night	Number of women
Residence					
Urban	39.5	39.0	167	48.9	133
Rural	59.8	59.8	186	67.6	164
Region					
Western	*	*	23	*	14
Central	(58.2)	(58.2) 4	43	(66.6)	37
Greater Accra	(36.6)	(36.6)	49	*	43
Volta	(56.3)	(56.3)	19	* 4	17
Eastern	(40.9)	(40.9)	24	*	19
Ashanti	(46.2)	(46.2)	77	(56.5)	63
Brong Ahafo	(57.7)	(55.6)	34	(64.3)	30
Northern	58.8	58.8	54	69.9	45
Upper East	(72.9)	(72.9)	19	(72.9)	19
Upper West	(67.1)	(67.1)	11	(71.0)	10
Education					
No education	67.9	67.9	67	73.6	62
Primary	49.7	49.7	68	58.3	58
Middle/JSS/JHS	43.4	43.4	133	54.5	106
Secondary/SSS/SHS or Higher	47.1	46.3	85	54.7	72
Wealth quintile					
Lowest	70.2	70.2	61	73.4	58
Second	62.5	62.5	74	69.9	66
Middle	43.7	43.7	76	59.0	56
Fourth	43.8	43.8	64	(53.0)	53
Highest	34.5	33.6	79	(41.0)	64
Total	50.2	50.0	3 353	59.3	3 297

a b

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.

Step 1: Read the title and subtitle. In this example, the table describes two separate groups of pregnant women age 15-49: pregnant women in all households (a) and pregnant women in households with at least one long-lasting insecticidal net (LLIN) (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 long-lasting insecticidal net (LLIN) (b).

Step 3: Look at the first panel.

- How many pregnant women age 15-49 in all households were interviewed? 353.
- Now look at the second panel. How many pregnant women age 15-49 in households with at least one LLIN were interviewed? 297. The second panel is a subset of the first panel.

Step 4: Now examine the table for signs that the data should be interpreted with caution. Only 353 pregnant women age 15-49 in all households and 297 pregnant women age 15-49 in households with at least one LLIN were interviewed in the 2016 GMIS. After 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 Central Region slept under an LLIN the night before the survey? 58.2%. 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 LLIN in Volta region slept under an LLIN the night before the survey? There is no number in this cell—only an asterisk. This is because fewer than 25 pregnant women in households with at least one LLIN in Volta region were interviewed in the 2016 GMIS. Results for this group are not reported. The subgroup is very small, and therefore the data are not reliable.

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

Example 3: Understanding Sampling Weights in 2016 GMIS Tables

A sample is a group of people who have been selected for a survey. In the 2016 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 2016 GMIS, the survey sample is representative at the national and regional levels, and for urban and rural areas.

Table 2.8 Women's background characteristics

Percent distribution of women age 15-49 by selected background characteristics, Ghana MIS 2016

Background characteristic	Number of women		
	Weighted percent (3)	Weighted number (2)	Unweighted number (1)
Western	8.1	420	451
Central	11.0	564	502
Greater Accra	19.3	993	560
Volta	8.0	410	553
Eastern	9.3	477	465
Ashanti	19.4	998	563
Brong Ahafo	8.5	436	500
Northern	10.1	520	591
Upper East	3.8	197	528
Upper West	2.6	135	437
Total	100.0	5,150	5,150

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 region for analysis. To solve this problem, regions with small populations are oversampled. For example, let's say that you have sufficient funds to interview 5,150 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, are heavily populated while others, such as the Upper East are not. Thus, the Upper East must be oversampled.

A sampling statistician determines how many women should be interviewed in each region in order to obtain 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 437 in the Upper West to 591 in the Northern region. The number of interviews is sufficient to obtain 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 is about 19% of the population in Ghana, while the Upper East's population contributes only about 4% of the population in Ghana. As the blue column illustrates, the number of women interviewed in Ashanti accounts for only about 11% of the total sample of women interviewed (563/5,150) and the number of women interviewed in Upper East accounts for almost the same percentage of the total sample of women interviewed (10%, or 528/5,150). This unweighted distribution of women does not accurately represent the population.

In order to obtain statistics that are representative of Ghana, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) so that it resembles the true distribution in the Ghana. Women from a small region, like the Upper East, should only contribute a small amount to the national total. Women from a large region, like Ashanti, should contribute much more. Therefore, DHS statisticians mathematically calculate a "weight" which 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 5,150 women has not changed after weighting, although 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

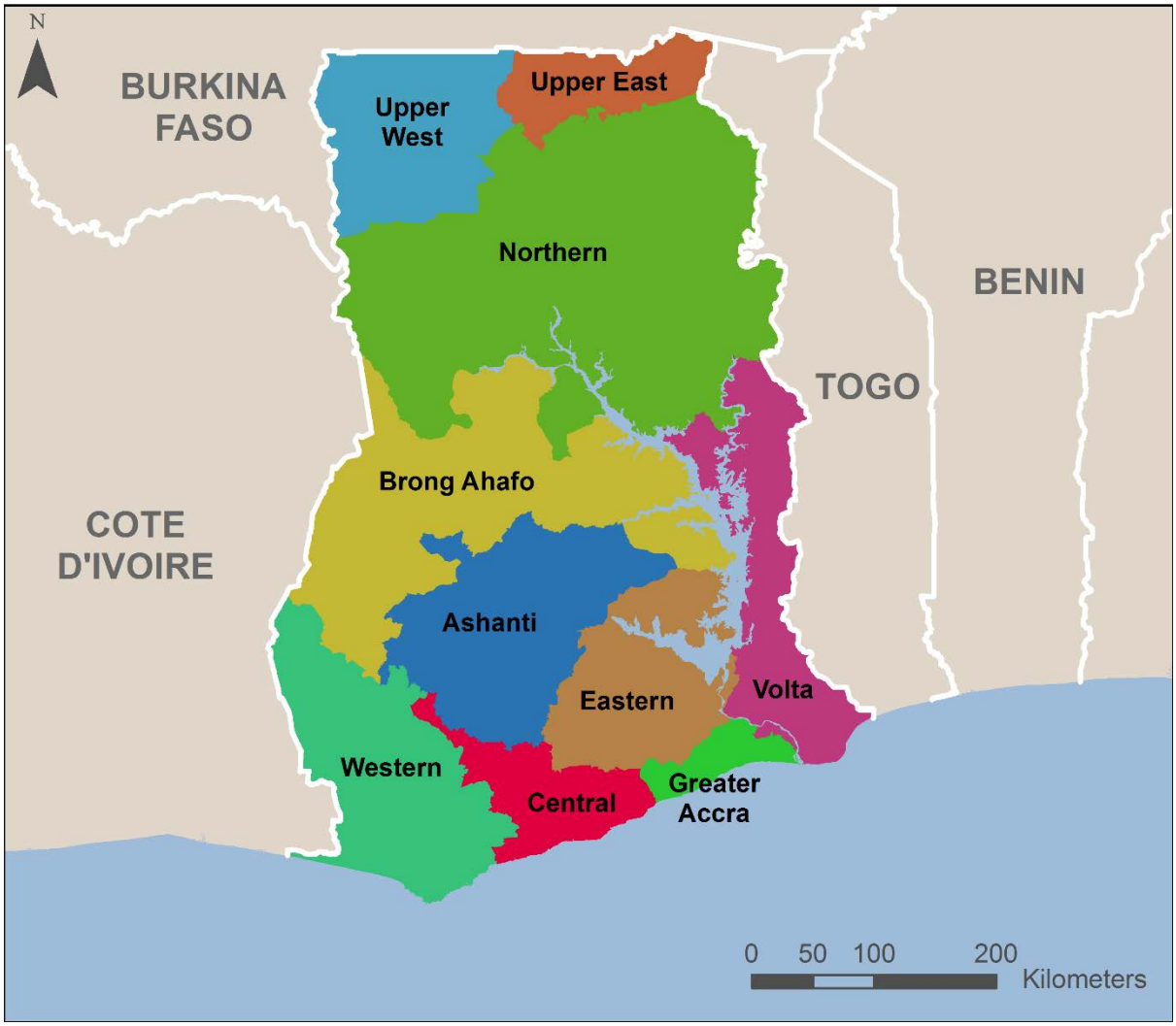
weight that they contribute to the population of the Ghana. The weighted number of women in the survey now accurately represents the proportion of women who live in Ashanti region and the proportion of women who live in the Upper East region.

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 2016 GMIS tables, so don't be surprised if these numbers seem low: they may actually represent a larger number of women who were interviewed.

ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
CAPI	computer-assisted personal interviewing
CHPS	community-based health planning and services
CSPro	Census and Survey Processing System
EA	enumeration area
GDHS	Ghana Demographic and Health Survey
GFATM	Global Fund to Fight AIDs, Tuberculosis, and Malaria
GHS	Ghana Health Service
GMIS	Ghana Malaria Indicator Survey
GSS	Ghana Statistical Service
ILO	International Labour Organization
IPTp	intermittent preventive treatment in pregnancy
ITN	insecticide-treated net
LLIN	long-lasting insecticidal net
LPG	liquified petroleum gas
MoH	Ministry of Health
NHIS	National Health Insurance Scheme
NMCP	National Malaria Control Programme
NMIMR	Noguchi Memorial Institute for Medical Research
NPHRL	National Public Health and Reference Laboratory
PHC	population and housing census
RDT	rapid diagnostic test
USAID	United States Agency for International Development
WASH	water, sanitation, and hygiene
WHO	World Health Organization

GHANA


N
BURKINA FASO
Upper West
Upper East
Northern
BENIN
TOGO
Brong Ahafo
COTE D'IVOIRE
Ashanti
Eastern
Volta
Western
Central
Greater Accra
0 50 100 200
Kilometers

INTRODUCTION AND SURVEY METHODOLOGY 1

The 2016 Ghana Malaria Indicator Survey (2016 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 Reference Laboratory (NPHRL) of the Ghana Health Service. 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.

1.1 SURVEY OBJECTIVES

The primary objective of the 2016 GMIS is to provide current estimates of key malaria indicators. Specific objectives were:

- To measure the extent of ownership and use of mosquito bednets
- 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 about malaria
- To measure the prevalence of malaria and anaemia among children age 6-59 months

The findings from the 2016 GMIS will assist policy makers and program managers in evaluating and designing programs and strategies for improving malaria control interventions in Ghana.

1.2 SAMPLE DESIGN

The sample for the 2016 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 in Ghana (Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East, and Upper West).

The sampling frame used for the 2016 GMIS is the frame of the 2010 Population and Housing Census (PHC) conducted in Ghana. The 2010 PHC frame is being maintained by GSS and updated periodically as new information is received from various surveys. The frame is a complete list of all census enumeration areas (EAs) created for the PHC. An EA is a geographic area that covers an average of 145 households. The EA size is the number of residential households in the EA according to the 2010 PHC. The average size of urban EAs is slightly larger than the average size of rural EAs; the urban EA average size is 185 households compared with an average size of 114 households in rural EAs. The sampling frame contains information about the EAs location, type of residence (urban or rural), and the estimated number of residential households.

The 2016 GMIS sample was stratified and selected from the sampling frame in two stages. Each region was separated into urban and rural areas; this yielded 20 sampling strata. Samples of EAs were selected independently in each stratum in two stages. Implicit stratification and proportional allocation were achieved at each of the lower administrative levels by sorting the sampling frame within each sampling

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

In the first stage, 200 EAs, including 93 EAs in urban areas and 107 EAs in rural areas, were selected with probability proportional to the EA size and with independent selection in each sampling stratum. A household listing operation was implemented from July to August 2016 in all the selected EAs, and the resulting lists of households then 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 2016 GMIS was segmented. Only one segment was selected for the survey with the probability proportional to the segment size. Household listing was conducted only in the selected segment. Thus, in the 2016 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 a supervisor or mapper, 3 listers, 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 2016 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.

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

Three types of questionnaires were used for the 2016 GMIS —the Household Questionnaire, the Woman's Questionnaire, and the Biomarker Questionnaire. The questionnaires were adapted to reflect issues relevant to Ghana. Modifications were determined after a series of meetings with various stakeholders from the National Malaria Control Programme (NMCP) and other government ministries and agencies, nongovernmental organisations, and international partners. The questionnaires in English and three local Ghanaian languages (Akan, Ewe, and Ga) were programmed into tablet computers, which enabled the use of computer-assisted personal interviewing (CAPI) for the survey.

The Household Questionnaire was used to list all 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 the age and sex of household members, obtained from the Household Questionnaire, were used to identify women eligible for an individual interview 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 the 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 who were asked questions on the following topics:

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

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

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

1.4 Anaemia and Malaria Testing

Blood samples for anaemia and malaria testing were collected by finger- or heel-prick from children age 6-59 months.

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® analyser, which produces a result in less than one 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 of children with a haemoglobin level under 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 health facility.

Malaria testing with a rapid diagnostic test (RDT). Another drop of blood was tested for malaria with SD BIOLINE Malaria Ag P.f./pan rapid diagnostic test (RDT). This test detects the histidine-rich protein II (HRP-II)™ antigen of malaria, *Plasmodium falciparum* (Pf), and other species in human whole blood. The diagnostic test includes a disposable sample applicator that comes in a standard package. A tiny volume of blood is captured on the applicator and placed in the well of the testing device. Like the anaemia testing, malaria RDT results were recorded in the Biomarker Questionnaire and the result shared with the child's parent or guardian.

Children who tested positive for malaria and had one of these conditions - Hb less than 8 g/dl, signs and symptoms of severe malaria, or who had taken antimalarial medication within the two weeks before the survey - were considered to have severe malaria and were referred to a health facility. Children who tested positive with uncomplicated malaria were offered a full course of medication according to the standard treatment protocol in Ghana. Prior to treatment, the health technicians asked about any medications the child had taken or was currently taking. Age-appropriate doses of Artemisinin-Based Combination Therapy (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 bar code label, with a duplicate affixed to the Biomarker Questionnaire. An additional copy of the bar code label was affixed to a blood sample transmittal form to track the blood samples from the field to the National Public Health and Reference Laboratory (NPHRL). 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 laboratory for logging and microscopic reading.

Upon arrival at NPHRL, thick blood smears were stained with Giemsa stain and examined to determine the presence of *Plasmodium* infection. All stained slides were read by two independent microscopists who were masked from the RDT results. Slides with discordant results were reanalysed by a third microscopist for final validation. The microscopic results were quality checked by internal and external quality control processes. Internal quality control included an independent microscopist who read 5% of all slides in the study. 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 a 95% agreement between NPHRL and NMIMR results

1.5 PRETEST

Prior to the start of the main fieldwork, a pretest training workshop was conducted to test the data collection programs on tablet computers, survey instruments, and procedures. The training for the pretest took place from 25 July–12 August 2016. Seventeen (17) field officers with 3 supervisors, 5 biomarker technicians, 7 interviewers, and 2 laboratory scientists participated in the training. Officers from GSS, NMCP, NPHRL and ICF facilitated the training and supervised the pretest fieldwork. Participants were trained on administering paper questionnaires, using computer-assisted personal interviewing (CAPI), and collecting blood samples for anaemia and parasitaemia testing. The pretest fieldwork was conducted in rural and urban clusters that were not selected for the actual survey sample. At the end of the fieldwork, a debriefing session was held, and the questionnaires and CAPI application were modified based upon feedback from the field.

1.6 TRAINING OF FIELD STAFF

The training for the main fieldwork was facilitated by GSS, NMCP, NPHRL, and ICF. The training was held from 12–27 September 2016 at Winneba, Central Region. Seventy-two field staff including 15 biomarker technicians, 43 interviewers, and 14 supervisors were trained for 3 weeks. Sixty-one field staff were selected for the fieldwork and 11 were placed on stand-by. The training course 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.

There were three days of field practice exercises. Health technicians were also trained on recording children's anaemia and malaria results in the respective brochures and completing the referral slip for any child who was found to be severely anaemic or to have severe malaria. The health technicians completed a separate field practice at the Winneba Municipal Hospital and two other communities to enhance their skills.

1.7 FIELDWORK

Field data collection was conducted during a 6-week period from 3 October–1 December 2016. Twelve teams were formed, with each including a supervisor, 3 interviewers, a driver, and a health technician. Each team was allocated at least 16 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 provided to each team for easy location. When eligible respondents were absent from their homes, two or more calls were made to offer respondents the opportunity to participate in the survey.

Two officers were responsible for the timely collection of slides and blood samples from the field teams to the NPHRL. In addition to the field supervisors, there were national and regional monitors who supervised field activities and assured the collection and transmission of the blood slides to the laboratory.

1.8 DATA PROCESSING

Data for the 2016 GMIS were collected through questionnaires programmed into the CAPI application. The CAPI application was programmed by ICF and loaded into the computers along with the Household, Biomarker, and Woman's Questionnaires. Using the cloud, 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 field worker was assigned a unique identification number.

The Census and Survey Processing (CSPro) system 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 at ICF and then used for analysis in producing tables for the final report.

1.9 ETHICAL CONSIDERATIONS

The protocol for the 2016 GMIS was approved by the Ghana Health Service Ethical Review Committee and ICF's Institutional Review Board. All data and other information collected were confidential. Respondents' names and identification numbers were removed from the electronic database during analysis. Blood samples were stored with barcodes identifiers to protect the respondents' identity. The risk and benefits of participation in the survey were explained to respondents, and informed consent for the interview or blood collection was sought and obtained from all respondents.

1.10 RESPONSE RATES

Table 1.1 presents the results of the household and individual interviews. A total of 6,003 households were selected for the survey of which 5,929 were occupied at the time of fieldwork. Among the occupied households, 5,841 were successfully interviewed, for a response rate of 99%. In the interviewed households, 5,186 eligible women were identified for individual interview and 5,150 were successfully interviewed, for 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 2016

Result	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	2,912	3,091	6,003
Households occupied	2,876	3,053	5,929
Households interviewed	2,815	3,026	5,841
Household response rate[1]	97.9	99.1	98.5
Interviews with women age 15-49			
Number of eligible women	2,395	2,791	5,186
Number of eligible women interviewed	2,369	2,781	5,150
Eligible women response rate[2]	98.9	99.6	99.3

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

HOUSING CHARACTERISTICS, HOUSEHOLD POPULATION, AND WOMEN'S CHARACTERISTICS 2

Key Findings

- ***Drinking water:*** Most urban households (95%) have access to an improved source of drinking water, while only three-quarters (76%) of rural households have such access.
- ***Sanitation:*** Eighty-five percent of households use unimproved sanitation; 59% have a toilet facility that would be classified as improved if not shared with other households, 12% use an unimproved toilet facility, and 14% practice open defecation.
- ***Household Wealth:*** Thirty-five percent of the population in urban areas is in the highest wealth quintile compared with only 6% of the population in the rural areas.
- ***Electricity:*** Nine in ten (90%) urban households and 67% of rural households have electricity.
- ***Education:*** Nineteen percent of women age 15-49 have no education.
- ***Literacy:*** Overall, 55% of women age 15-49 are literate.

Information on the socioeconomic characteristics of the household population in the 2016 GMIS provides context for interpreting 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 the sources of drinking water, sanitation, wealth, ownership of durable goods, and composition of the household population. In addition, the chapter presents 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, and rainwater. Households that use bottled or sachet water for drinking are classified as using an improved source only if their water for cooking and handwashing come from an improved source.

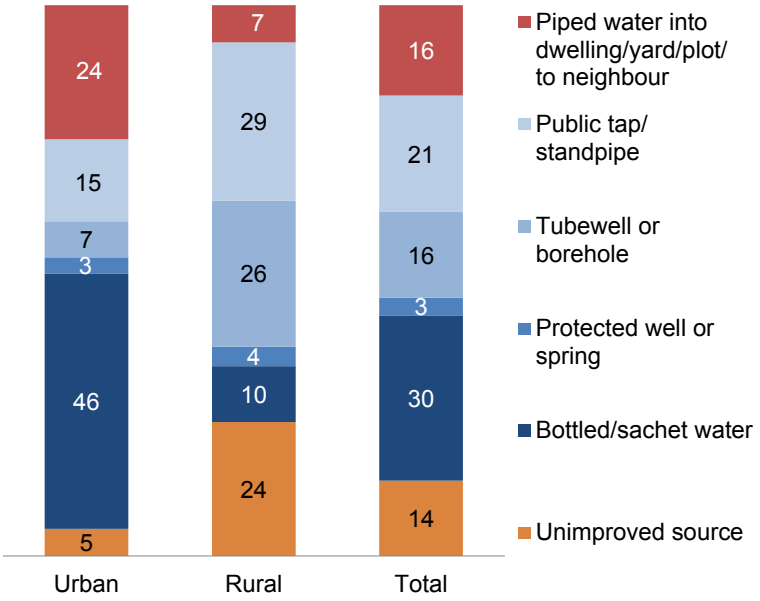
Sample: Households

Improved sources of water protect against outside contamination so that water is more likely to be safe to drink. In Ghana, 86% of households have access to an improved source of drinking water (**Table 2.1**). Ninety-five percent of urban households and 76% of rural households have access to improved water sources.

Urban and rural households rely on different sources of drinking water. Nearly a quarter (24%) of urban households have piped water in their dwelling, yard, plot or to neighbour (**Figure 2.1**). A high percentage (46%) of households in urban areas access drinking water from bottled/ sachet water but also have water for cooking and handwashing, which comes from an improved source. In contrast, rural households rely on public tap/ standpipe (29%) and tube well or borehole (26%). Nearly a quarter (24%) of rural households use an unimproved source of water for drinking.

Figure 2.1 **Household drinking water by residence**

Percent distribution of households by source of drinking water



Forty percent of total households have water on their premises or piped from a neighbour and do not spend much time fetching drinking water. On the other hand, 9% spend 30 minutes or more to fetch drinking water outside their premises and 50% spend less than 30 minutes (**Table 2.1**). Households in rural areas are 5 times more likely (17% versus 3%) to spend 30 minutes or longer in obtaining drinking water than households in urban areas.

2.2 SANITATION (TOILET FACILITY)

Improved toilet facilities

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

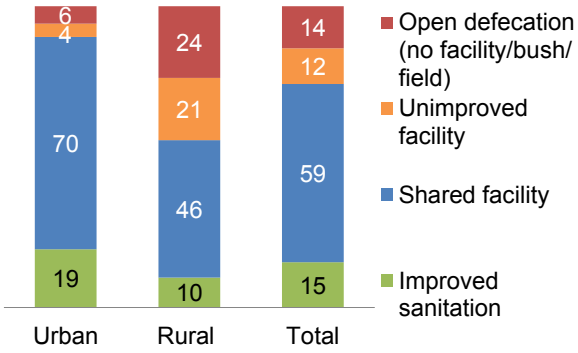
Sample: Households

Nationally, only 15% of households use an improved toilet facility, which is defined as a non-shared facility with other households and constructed to prevent likely contact with human waste and reduce the transmission of cholera, typhoid, and other diseases. Eighty-five percent of households use unimproved sanitation; 59% of the households have a toilet facility that would be classified as improved if not shared with other households, 12% use an unimproved toilet facility, and 14% practice open defecation (**Table 2.2**).

Households in urban areas are more likely to use improved toilet facilities (19%) compared with rural households (10%) (**Figure 2.2**). Seventy percent of urban households use a toilet facility that would be classified as improved if it was not shared with other households, compared with 46% of rural households. Households in rural areas are more likely to practice open defecation than households in urban areas (24% versus 6%).

Figure 2.2 **Household sanitation facilities by residence**

Percent distribution of households by type of toilet/latrine facilities



2.3 HOUSING CHARACTERISTICS

The 2016 GMIS collected data on housing characteristics such as access to electricity, flooring material, number of sleeping rooms, and types of fuel used for cooking. The information on these characteristics, along with other information on the ownership of household durable goods, contributes to the creation of the household wealth index and provides information that may be relevant for other health indicators.

Exposure to smoke, especially smoke produced from solid fuels, is potentially harmful to health. Seven in ten households (71%) use solid fuels for cooking in Ghana. While charcoal (45%), and liquefied petroleum gas (LPG), natural gas or biogas (37%) are the two most common types of cooking fuel in urban areas, rural households rely primarily on wood (65%) and charcoal (21%) (**Table 2.3**).

Overall, 79% of households in Ghana have access to electricity. Ninety percent of urban households and 67% of rural households have access to electricity.

The most common flooring material for dwelling units in Ghana is cement (61%). Carpet is the second most common flooring material, used by 17% of all households. Sixteen percent of rural households have floors made of earth or sand compared with 10% of households in urban areas.

The number of rooms a household uses for sleeping is an indicator of socioeconomic level and crowding in the household, which can facilitate the spread of disease. In Ghana, 60% of households use only one room for sleeping, while 15% use three rooms or more for sleeping.

Household Durable Goods

Table 2.4 provides data on the ownership of household effects, means of transport, agricultural land, and farm animals. Higher proportions of urban households than rural households own a radio (68% versus 62%), television (77% versus 47%), mobile telephone (95% versus 85%), and car or truck (13% versus 4%). In contrast, higher percentages of rural households than urban households own agricultural land (64% versus 22%) and farm animals (52% versus 19%)**.**

2.4 HOUSEHOLD WEALTH

Wealth index

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

Sample: Households

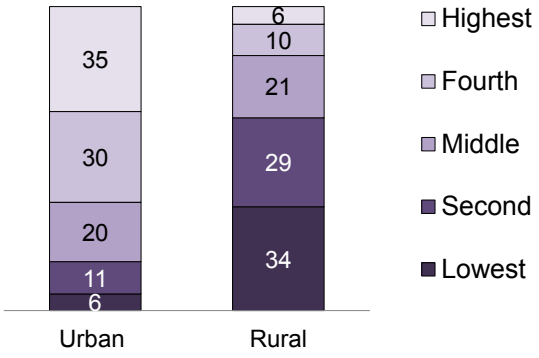
The majority of the population in the urban areas is in the upper two of the wealth quintiles, while in the rural areas, the majority of the population is in the bottom two of the wealth quintiles.

Table 2.5 shows that there are variations in the distribution of wealth quintiles at the regional level. The Upper East, Upper West, and Northern regions have the highest percentage of population in the lowest quintile (68%, 60%, and 54% respectively) while Greater Accra (less than 1%) and Ashanti (7%) have the lowest percentage of the population in the lowest wealth quintile. On the other hand, Greater Accra has the highest percentage of population in the highest wealth quintile (48%).

Thirty-five percent of the urban population is in the highest wealth quintile (35%) while 6% is in the lowest wealth quintile. In contrast, 34% of rural population is in the lowest wealth quintile while 6% are in the highest wealth quintile (**Figure 2.3**).

Figure 2.3 **Household wealth by residence**

Percent distribution of the de jure population by wealth quintiles



2.5 HOUSEHOLD POPULATION AND COMPOSITION

Household

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

De facto population

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

De jure population

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

How data are calculated

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

In the 2016 GMIS, 20,708 people stayed overnight in 5,841 households. The sex ratio is 92 males per 100 females. The sex ratio is 86 males per 100 females in urban areas and 97 males to 100 females in rural areas. Fifty-one percent of the population lives in rural areas.

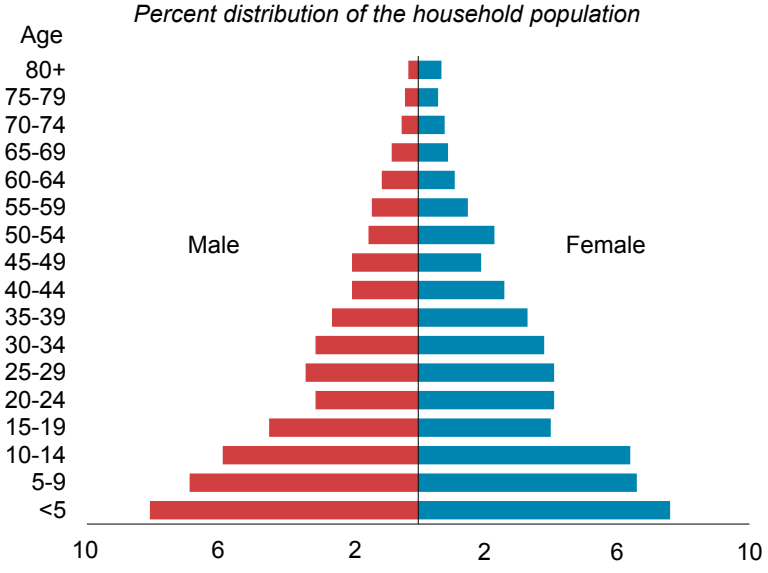
Age and sex are important demographic variables and are the primary basis of demographic classification. **Table 2.6** shows the distribution of the population by 5-year age groups, sex, and residence.

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 shows that the Ghana population is young, which is typical of developing countries with a high fertility rate and low life expectancy. Forty-one percent of the population is under age 15, 53% is age 15-64, and only 5% of the population is age 65 and older (**Table 2.6**).

On average, households in Ghana include four persons (**Table 2.7**). Men predominantly head households (69%). The percentage of households headed by women is higher in urban areas than in rural areas (36% versus 26%).

Figure 2.4 **Population pyramid**

Percent distribution of the household population



2.6 Background Characteristics of Women Respondents

The purpose of this section is to describe the demographic and socioeconomic profile of women in Ghana. **Table 2.8** shows the weighted and unweighted numbers and the weighted percent distributions of women who were interviewed in the 2016 GMIS, by background characteristics.

More than half of the respondents age 15-49 (51% of women) are under age 30, which reflects the young age of the population. The vast majority of respondents are Christians. More than 4 in 10 women (42%) are Pentecostal or Charismatic, and 36% of women are Catholic, Anglican, Methodist, Presbyterian, or other Christian. Nineteen percent of women are Muslims.

As expected, the Akans form the largest ethnic group, with half of respondents (50%) belonging to this group, followed by the Mole-Dagbanis, which account for 18% of women, and the Ewes, which account for 12% of women.

More than 5 out of 10 women (54%) live in urban areas. By region, the largest percentage of women is in Greater Accra and Ashanti (19% each), and the smallest percentage is in the Upper West region (3%).

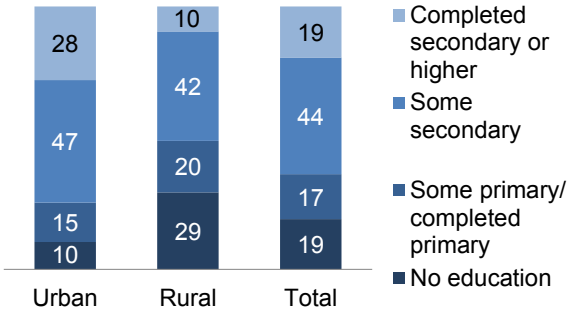
In general, most women in Ghana have some formal education. However, 19% have never attended school. Almost one-fourth of women (25%) have a secondary or higher education.

2.7 Educational Attainment of Women

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. The results show that about 19% of women age 15-49 have no education. Only 19% of women have completed secondary education or higher (**Figure 2.5**). Overall, women have completed a median of 8 years of education.

***Figure 2.5* Educational attainment of women by residence**

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



Patterns by background characteristics

- Three in ten (29%) women in rural areas have no education compared with 10% in urban areas (**Table 2.9**).
- At the regional level, the Northern region recorded the highest percentage of women with no education (60%), while Ashanti and Greater Accra regions recorded the lowest percentages (8% and 9% respectively).
- The percentage of women with no education decreases with increasing wealth quintile, from 52% of women in the lowest quintile to 4% of women in the highest quintile.

2.8 Literacy of Women

Literacy

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

The ability to read and write is an important personal asset that empowers women and men by increasing opportunities in life. Knowing the distribution of the literate population of a country can help programme managers—especially those concerned with health and family planning—reach their targeted audiences with their messages.

The 2016 GMIS assessed literacy by asking women to read a simple sentence in the local language or in English. Respondents were scored on whether they could not read at all, or could read part or the entire sentence shown to them. Women who had never attended school and those who had primary, middle/JSS/JHS, or secondary/SSS/SHS education were asked to read the sentence in the language with which they were most familiar. Only those who have gone to "higher than secondary school" were assumed to be literate; all others, including those who have attended or completed secondary school, are asked to read the literacy card. In previous DHS surveys, however, women and men who had attended at least some secondary education were assumed to be literate and only those with primary education and below were asked to read a card in their local language or in English to test for literacy.

Respondents with higher than secondary education were assumed to be literate. Those who were blind or visually impaired were excluded. In past DHS surveys, persons who have attended secondary school and higher were considered literate.

The results show that 8% of women have higher than secondary education. Among those with secondary education or lower and those with no schooling, 38% can read a whole sentence, 10% can read part of a sentence, and 45% cannot read at all. Overall, 55% of women age 15-49 are literate (**Table 2.10**).

Patterns by background characteristics

- Literacy is much higher among the youngest women age 15-19 (81%), and decreases steadily with age to 34% among the oldest women age 40-49 (**Table 2.10**).
- Literacy varies by place of residence; 67% of women in urban areas are literate, compared with 42% of rural women.
- Regional differences in literacy are notable; literacy is highest among women in the Greater Accra region (69%) and lowest among women in the Northern region (31%).
- By wealth, literacy ranges from 26% among women in the lowest wealth quintile to 83% among women in the highest quintile.

2.9 Health Insurance Coverage

The National/District Health Insurance Scheme (N/DHIS) 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.

Table 2.11 shows the percentage of women age 15-49 with specific types of health insurance coverage, according to the background characteristics. More than 4 out of 10 (42%) of women are not covered by any type of health insurance.

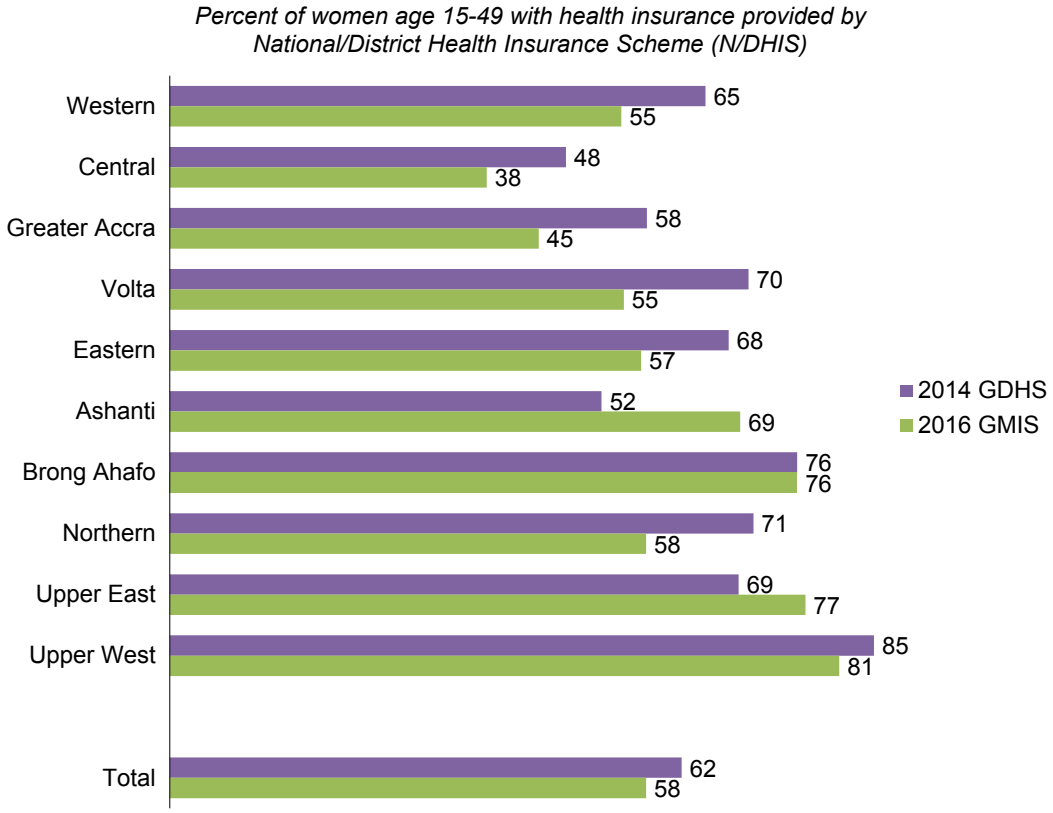
Patterns by background characteristics

- The percentage of women with no health insurance coverage is higher in rural than in urban areas (44% versus 39%).

- Sixty-one percent of women in Central region have no health insurance compared with 19% of their counterparts in the Upper West.
- Forty-nine percent of women with no education have no health insurance compared with 33% of those with higher education.

Trends: At the national level, the percentage of women with no health insurance increased slightly from 38% in the 2014 GDHS to 42% in the 2016 GMIS. With the same period, the N/DHIS coverage decreased slightly from 62% to 58%. In contrast to the trend at the national level and in most regions, the N/DHIS coverage increased in Ashanti and Upper East regions between 2014 GDHS and 2016 GMIS (from 52% in 2014 to 69% in 2016) and remained at the same level in Brong Ahafo region (76% both in 2014 and in 2016) (**Figure 2.6**).

Figure 2.6 Trends in national health insurance coverage by region



LIST OF TABLES

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

- **Table 2.1 Household drinking water**
- **Table 2.2 Household sanitation facilities**
- **Table 2.3 Household characteristics**
- **Table 2.4 Household possessions**
- **Table 2.5 Wealth quintiles**
- **Table 2.6 Household population by age, sex, and residence**
- **Table 2.7 Household composition**
- **Table 2.8 Women's background characteristics**
- **Table 2.9 Women's educational attainment**
- **Table 2.10 Women's literacy**
- **Table 2.11 Women's health insurance coverage**

Table 2.1 Household drinking water

Percent distribution of households and de jure population by source of drinking water and by time to obtain drinking water, according to residence, Ghana MIS 2016

	Households			Population		
Characteristic	Urban	Rural	Total	Urban	Rural	Total
Source of drinking water						
Improved source	**95.0**	**75.8**	**86.3**	**94.0**	**73.8**	**83.8**
Piped into dwelling/yard/plot	15.5	3.9	10.3	16.9	3.9	10.4
Piped to neighbour	8.7	2.8	6.0	8.9	2.6	5.7
Public tap/standpipe	14.8	28.6	21.0	17.0	28.7	22.9
Tube well/borehole	6.5	26.4	15.5	7.6	27.1	17.5
Protected dug well	2.2	3.0	2.6	2.5	3.2	2.9
Protected spring	0.7	0.5	0.6	0.8	0.5	0.6
Rainwater	0.4	0.5	0.5	0.3	0.4	0.4
Bottled water/sachet water, improved source for cooking/handwashing[1]	46.1	10.1	29.8	39.9	7.3	23.4
Unimproved source	**4.9**	**24.2**	**13.6**	**6.0**	**26.2**	**16.2**
Unprotected dug well	1.3	4.4	2.7	1.9	4.5	3.2
Unprotected spring	0.1	3.0	1.4	0.1	3.1	1.6
Tanker truck/cart with small tank	0.2	0.4	0.3	0.3	0.3	0.3
Surface water	1.5	14.6	7.4	1.9	17.2	9.6
Bottled water/sachet water, unimproved source for cooking/handwashing1	1.8	1.8	1.8	1.8	1.0	1.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Time to obtain drinking water (round trip)						
Water on premises[2]	60.6	14.2	39.6	58.7	13.0	35.6
Less than 30 minutes	34.2	68.2	49.6	35.4	68.1	51.9
30 minutes or longer	3.1	16.5	9.2	3.7	17.8	10.8
Don't know/missing	2.2	1.1	1.7	2.3	1.0	1.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	3,195	2,646	5,841	10,442	10,646	21,088

[1] Households using bottled water or sachet water for drinking are classified as using an improved or unimproved source according to their water source for cooking and handwashing.
[2] Includes water piped to a neighbour.

Table 2.2 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities, according to residence, Ghana MIS 2016

	Households			Population		
Type of toilet/latrine facility	Urban	Rural	Total	Urban	Rural	Total
Improved sanitation	**19.3**	**9.9**	**15.0**	**22.6**	**11.0**	**16.7**
Flush/pour flush to piped sewer system	0.2	0.0	0.2	0.3	0.1	0.2
Flush/pour flush to septic tank	13.9	2.7	8.8	15.4	2.8	9.0
Flush/pour flush to pit latrine	0.6	0.4	0.5	0.7	0.7	0.7
Ventilated improved pit (VIP) latrine	2.9	2.6	2.7	3.7	2.6	3.1
Pit latrine with a slab	1.7	4.1	2.8	2.5	4.8	3.7
Unimproved sanitation	**80.7**	**90.1**	**85.0**	**77.4**	**89.0**	**83.3**
Shared facility[1]	**70.4**	**45.7**	**59.2**	**66.0**	**39.0**	**52.4**
Flush/pour flush to piped sewer system	0.7	0.1	0.4	0.6	0.1	0.3
Flush/pour flush to septic tank	21.7	2.6	13.0	17.8	1.6	9.6
Flush/pour flush to pit latrine	4.6	1.6	3.3	4.1	1.1	2.6
Ventilated improved pit (VIP) latrine	29.9	15.1	23.2	30.6	13.5	21.9
Pit latrine with a slab	13.4	26.2	19.2	13.0	22.7	17.9
Unimproved facility	**4.4**	**20.7**	**11.8**	**4.1**	**20.0**	**12.2**
Flush/pour flush not to sewer/septic tank/pit latrine	0.6	0.1	0.3	0.4	0.1	0.3
Pit latrine without slab/open pit	3.8	20.5	11.3	3.6	19.8	11.7
Bucket	0.1	0.1	0.1	0.1	0.1	0.1
Hanging toilet/hanging latrine	0.0	0.0	0.0	0.0	0.1	0.0
Open defecation (no facility/bush/field)	**5.8**	**23.8**	**14.0**	**7.3**	**29.9**	**18.7**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	3,195	2,646	5,841	10,442	10,646	21,088

[1] Facilities that would be considered improved if they were not shared by two or more households.

Table 2.3 Household characteristics

Percent distribution of households and de jure population by housing characteristics, percentage using solid fuel for cooking, according to residence, Ghana MIS 2016

Housing characteristic	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Electricity						
Yes	89.8	66.6	79.3	89.8	64.0	76.8
No	10.2	33.4	20.7	10.2	36.0	23.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Flooring material						
Earth/sand	10.1	16.4	13.0	12.2	17.3	14.8
Dung	0.0	0.2	0.1	0.0	0.2	0.1
Wood/planks	0.2	0.1	0.2	0.2	0.1	0.1
Parquet or polished wood	0.1	0.0	0.1	0.2	0.0	0.1
Vinyl or asphalt strips	0.0	0.1	0.1	0.1	0.1	0.1
Ceramic tiles	12.5	2.6	8.0	11.9	2.5	7.1
Cement	55.8	68.0	61.3	57.5	69.8	63.7
Carpet	21.1	12.6	17.3	17.9	10.1	14.0
Other	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
Rooms used for sleeping						
One	63.7	56.4	60.4	49.5	40.2	44.8
Two	23.8	25.6	24.6	29.6	30.0	29.8
Three or more	12.5	18.0	15.0	20.9	29.8	25.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Cooking fuel						
Electricity	1.2	0.3	0.8	0.6	0.2	0.4
LPG/natural gas/biogas	37.0	9.3	24.5	33.1	6.6	19.7
Kerosene	0.2	0.2	0.2	0.1	0.3	0.2
Coal/lignite	0.1	0.0	0.1	0.1	0.0	0.0
Charcoal	44.8	21.2	34.1	48.3	18.2	33.1
Wood	10.9	65.4	35.6	14.9	72.7	44.1
Straw/shrubs/grass	0.3	0.6	0.4	0.5	0.7	0.6
Agricultural crop residue	0.2	0.5	0.4	0.4	0.7	0.5
No food cooked in household	5.2	2.4	3.9	2.0	0.6	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Percentage using solid fuel for cooking[1]	56.4	87.8	70.6	64.2	92.2	78.4
Number of households/ population	3,195	2,646	5,841	10,442	10,646	21,088

LPG = Liquefied petroleum gas.
[1] Includes coal/lignite, charcoal, wood, straw/shrubs/grass, agricultural crop residue, and animal dung.

Table 2.4 Household possessions

Percentage of households that possess various household effects, means of transportation, agricultural land, and livestock/farm animals by residence, Ghana MIS 2016

Possession	Residence		Total
	Urban	Rural	
Household effects			
Radio	67.8	62.3	65.3
Television	77.1	46.7	63.4
Mobile phone	95.3	84.6	90.4
Non-mobile telephone	1.1	0.4	0.8
Computer/tablet computer	20.8	7.8	14.9
Refrigerator	47.9	18.8	34.7
Electric generator/invertor	3.4	1.9	2.7
Means of transport			
Bicycle	15.8	25.9	20.4
Animal drawn cart	0.4	0.7	0.5
Motorcycle/scooter	9.1	13.2	11.0
Car/truck	12.6	4.4	8.9
Boat with a motor	0.3	0.5	0.4
Boat without a motor	0.3	0.4	0.3
Ownership of agricultural land	21.6	63.5	40.6
Ownership of farm animals[1]	19.4	51.9	34.1
Number of households	3,195	2,646	5,841

[1] Cows, bulls, other cattle, horses, donkeys, mules, goats, sheep, chickens or other poultry, pigs, rabbits, or grasscutter.

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 2016

Residence/region	Wealth quintile					Total	Number of persons	Gini coefficient
	Lowest	Second	Middle	Fourth	Highest			
Residence								
Urban	5.5	10.6	19.5	29.8	34.5	100.0	10,442	0.14
Rural	34.2	29.3	20.5	10.3	5.8	100.0	10,646	0.24
Region								
Western	10.5	28.8	25.5	20.7	14.5	100.0	1,701	0.32
Central	17.9	34.1	25.3	12.8	10.0	100.0	2,317	0.25
Greater Accra	0.5	3.9	14.4	32.7	48.4	100.0	3,617	0.15
Volta	18.3	29.3	23.3	16.6	12.6	100.0	1,694	0.31
Eastern	19.7	25.5	22.1	16.1	16.6	100.0	2,013	0.30
Ashanti	7.4	13.7	22.9	29.7	26.3	100.0	4,166	0.23
Brong Ahafo	19.9	28.9	21.2	17.3	12.5	100.0	1,699	0.29
Northern	53.6	20.3	16.4	6.2	3.5	100.0	2,396	0.39
Upper East	68.3	14.8	7.1	5.6	4.2	100.0	941	0.34
Upper West	60.2	18.1	12.0	7.7	2.0	100.0	544	0.33
Total	20.0	20.0	20.0	20.0	20.0	100.0	21,088	0.23

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 2016

	Urban			Rural			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	15.7	13.1	14.3	17.9	16.0	16.9	16.8	14.5	15.6
5-9	13.0	11.5	12.2	15.7	13.7	14.7	14.4	12.6	13.4
10-14	12.1	11.9	12.0	12.4	12.6	12.5	12.3	12.2	12.2
15-19	8.9	7.4	8.1	9.9	8.1	9.0	9.4	7.7	8.5
20-24	7.3	8.5	8.0	5.8	7.2	6.5	6.5	7.9	7.2
25-29	8.7	8.8	8.7	5.7	6.8	6.3	7.1	7.8	7.5
30-34	7.0	7.7	7.4	5.9	6.7	6.3	6.4	7.2	6.8
35-39	5.4	6.5	6.0	5.6	6.0	5.8	5.5	6.3	5.9
40-44	4.7	5.7	5.2	3.9	4.3	4.1	4.3	5.0	4.7
45-49	4.4	3.5	3.9	4.0	3.8	3.9	4.2	3.6	3.9
50-54	3.5	4.9	4.2	3.0	3.9	3.4	3.2	4.4	3.8
55-59	2.9	2.9	2.9	2.9	3.0	3.0	2.9	2.9	2.9
60-64	2.1	1.9	2.0	2.4	2.1	2.3	2.2	2.0	2.1
65-69	1.7	1.8	1.8	1.8	1.6	1.7	1.8	1.7	1.7
70-74	0.9	1.4	1.2	1.3	1.5	1.4	1.1	1.4	1.3
75-79	0.8	1.1	0.9	0.8	1.2	1.0	0.8	1.1	0.9
80 +	0.7	1.4	1.0	0.8	1.3	1.1	0.7	1.4	1.1
Don't know/missing	0.4	0.1	0.2	0.2	0.3	0.2	0.3	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dependency age groups									
0-14	40.8	36.4	38.4	46.0	42.2	44.1	43.5	39.3	41.3
15-64	54.8	57.8	56.4	49.1	52.0	50.5	51.8	54.9	53.4
65+	4.0	5.7	4.9	4.7	5.6	5.1	4.4	5.6	5.0
Don't know/missing	0.4	0.1	0.2	0.2	0.3	0.2	0.3	0.2	0.2
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	46.2	41.1	43.5	51.9	47.5	49.7	49.2	44.2	46.6
18+	53.4	58.8	56.3	47.9	52.3	50.1	50.5	55.6	53.2
Don't know/missing	0.4	0.1	0.2	0.2	0.3	0.2	0.3	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Adolescents 10-19	21.0	19.2	20.0	22.3	20.7	21.5	21.7	20.0	20.8
Number of persons	4,750	5,499	10,249	5,160	5,299	10,460	9,910	10,798	20,708

Table 2.7 Household composition

Percent distribution of households by sex of head of household, and by household size and mean size of household, according to residence, Ghana MIS 2016

	Residence		
Characteristic	Urban	Rural	Total
Household headship			
Male	64.4	73.6	68.6
Female	35.6	26.4	31.4
Total	100.0	100.0	100.0
Number of usual members			
0	0.0	0.0	0.0
1	27.2	19.4	23.7
2	16.1	13.0	14.7
3	16.1	15.3	15.7
4	14.0	14.2	14.1
5	11.3	12.5	11.8
6	7.8	9.7	8.6
7	3.9	6.5	5.1
8	1.9	4.1	2.9
9+	1.7	5.3	3.3
Total	100.0	100.0	100.0
Mean size of households	3.3	4.0	3.6
Number of households	3,195	2,646	5,841

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

Table 2.8 Women's background characteristics

Percent distribution of women age 15-49 by selected background characteristics, Ghana MIS 2016

Background characteristic	Number of women		
	Weighted percent	Weighted number	Unweighted number
Age			
15-19	17.3	891	964
20-24	16.7	860	844
25-29	17.2	886	880
30-34	16.3	842	799
35-39	13.5	695	675
40-44	10.9	561	569
45-49	8.1	416	419
Religion			
Catholic	9.1	469	631
Anglican/ Methodist/ Presbyterian	14.6	748	645
Pentecostal/Charismatic	41.5	2,137	1,898
Other Christian	12.4	639	600
Islam	19.3	996	1,147
Traditional/spiritualist	1.4	72	128
No religion	1.7	86	99
Other	0.0	2	2
Ethnic group			
Akan	50.3	2,593	2,066
Ga/Dangme	6.6	341	248
Ewe	12.0	619	630
Guan	2.4	123	152
Mole-Dagbani	17.8	917	1,293
Grusi	2.3	120	223
Gurma	4.9	250	313
Mande	0.8	41	69
Other	2.9	147	156
Residence			
Urban	53.7	2,768	2,369
Rural	46.3	2,382	2,781
Region			
Western	8.1	420	451
Central	11.0	564	502
Greater Accra	19.3	993	560
Volta	8.0	410	553
Eastern	9.3	477	465
Ashanti	19.4	998	563
Brong Ahafo	8.5	436	500
Northern	10.1	520	591
Upper East	3.8	197	528
Upper West	2.6	135	437
Education			
No education	19.1	986	1,283
Primary	17.1	882	918
Middle/JSS/JHS	39.0	2,010	1,838
Secondary/SSS/SHS or higher	24.7	1,271	1,111
Wealth quintile			
Lowest	16.2	834	1,440
Second	18.6	957	946
Middle	20.3	1,046	916
Fourth	21.4	1,100	936
Highest	23.6	1,213	912
Total	100.0	5,150	5,150

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

Table 2.9 Women's educational attainment

Percent distribution of women age 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, Ghana MIS 2016

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	8.8	9.1	5.8	55.0	17.4	3.9	100.0	8.1	1,751
15-19	5.1	10.3	6.0	69.9	7.9	0.8	100.0	7.6	891
20-24	12.7	7.9	5.6	39.5	27.3	7.1	100.0	8.5	860
25-29	16.3	11.2	5.3	39.5	14.3	13.4	100.0	8.3	886
30-34	21.3	11.6	5.2	38.8	8.8	14.3	100.0	8.1	842
35-39	28.7	15.8	4.3	38.6	8.0	4.8	100.0	6.0	695
40-44	29.9	17.1	4.1	37.6	5.5	5.8	100.0	5.5	561
45-49	34.0	13.6	4.5	39.0	5.0	3.8	100.0	5.5	416
Residence									
Urban	10.4	10.6	4.4	46.6	16.1	11.9	100.0	8.5	2,768
Rural	29.3	13.6	6.0	41.6	7.0	2.5	100.0	5.8	2,382
Region									
Western	20.9	10.6	3.8	50.3	9.4	5.0	100.0	7.7	420
Central	14.0	16.8	6.4	50.5	7.9	4.5	100.0	6.8	564
Greater Accra	8.9	11.3	3.2	43.7	18.3	14.6	100.0	8.6	993
Volta	20.4	13.3	4.0	45.1	8.6	8.6	100.0	8.0	410
Eastern	11.7	10.5	8.0	52.2	12.1	5.5	100.0	8.2	477
Ashanti	7.9	12.2	3.9	54.8	14.4	6.8	100.0	8.4	998
Brong Ahafo	18.0	12.7	6.6	48.9	9.7	4.2	100.0	7.6	436
Northern	60.3	6.5	5.9	14.0	8.0	5.4	100.0	0.0	520
Upper East	35.5	15.1	11.0	23.8	7.2	7.3	100.0	4.9	197
Upper West	38.1	16.1	3.5	27.8	8.8	5.7	100.0	4.2	135
Wealth quintile									
Lowest	52.4	13.4	6.9	23.8	3.0	0.5	100.0	0.0	834
Second	23.6	18.5	6.9	45.0	5.7	0.3	100.0	5.8	957
Middle	15.7	12.7	6.1	53.9	9.8	1.8	100.0	7.5	1,046
Fourth	10.2	12.3	4.6	51.9	15.9	5.1	100.0	8.3	1,100
Highest	3.9	5.1	2.1	42.5	21.0	25.3	100.0	10.6	1,213
Total	19.1	12.0	5.1	44.3	11.9	7.5	100.0	8.0	5,150

[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, level of literacy, and percentage literate, according to background characteristics, Ghana MIS 2016

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	3.9	58.1	11.0	26.8	0.2	0.0	100.0	73.0	1,751
15-19	0.8	66.6	13.1	19.0	0.5	0.0	100.0	80.5	891
20-24	7.1	49.2	8.9	34.8	0.0	0.0	100.0	65.2	860
25-29	13.4	37.2	7.3	42.0	0.1	0.0	100.0	57.9	886
30-34	14.3	27.9	10.4	47.2	0.0	0.2	100.0	52.6	842
35-39	4.8	25.1	9.8	60.2	0.1	0.0	100.0	39.7	695
40-44	5.8	20.0	8.4	65.5	0.0	0.3	100.0	34.2	561
45-49	3.8	19.3	11.1	65.2	0.2	0.4	100.0	34.2	416
Residence									
Urban	11.9	44.6	10.2	32.9	0.2	0.2	100.0	66.7	2,768
Rural	2.5	29.9	9.4	58.1	0.1	0.0	100.0	41.8	2,382
Region									
Western	5.0	37.0	9.9	48.1	0.0	0.0	100.0	51.9	420
Central	4.5	32.9	11.8	50.7	0.0	0.0	100.0	49.3	564
Greater Accra	14.6	48.2	6.4	30.0	0.4	0.3	100.0	69.2	993
Volta	8.6	37.1	14.7	39.6	0.0	0.0	100.0	60.4	410
Eastern	5.5	43.8	14.8	35.8	0.0	0.0	100.0	64.2	477
Ashanti	6.8	43.1	10.0	39.9	0.3	0.0	100.0	59.8	998
Brong Ahafo	4.2	30.2	13.8	51.4	0.0	0.4	100.0	48.2	436
Northern	5.4	20.6	4.7	69.3	0.0	0.0	100.0	30.7	520
Upper East	7.3	28.8	6.5	57.4	0.0	0.0	100.0	42.6	197
Upper West	5.7	30.9	4.6	58.7	0.0	0.1	100.0	41.2	135
Wealth quintile									
Lowest	0.5	18.6	7.2	73.7	0.0	0.0	100.0	26.3	834
Second	0.3	29.2	10.1	60.2	0.1	0.1	100.0	39.6	957
Middle	1.8	38.5	10.9	48.7	0.1	0.0	100.0	51.3	1,046
Fourth	5.1	47.6	11.0	35.5	0.4	0.4	100.0	63.7	1,100
Highest	25.3	48.4	9.4	16.9	0.1	0.0	100.0	83.0	1,213
Total	7.5	37.8	9.8	44.6	0.1	0.1	100.0	55.2	5,150

[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 with specific types of health insurance coverage, according to background characteristics, Ghana MIS 2016

Background characteristic	National/District Health Insurance (N/DHIS)	Employer based health insurance	Mutual Health Organization/ community based insurance	Privately purchased commercial insurance	None	Number of women
Age						
15-19	58.9	0.0	0.7	0.0	40.5	891
20-24	54.6	0.2	0.0	0.0	45.1	860
25-29	60.8	0.7	0.0	0.1	38.6	886
30-34	62.3	1.1	0.3	0.8	35.8	842
35-39	57.1	0.1	0.0	0.3	42.8	695
40-44	52.7	1.1	0.5	0.0	45.7	561
45-49	53.3	0.5	0.2	0.0	45.9	416
Residence						
Urban	59.6	0.9	0.0	0.4	39.3	2,768
Rural	55.5	0.1	0.4	0.0	44.0	2,382
Region						
Western	54.7	0.1	0.0	0.0	45.2	420
Central	38.4	0.0	0.2	0.2	61.4	564
Greater Accra	44.7	1.8	0.0	0.9	52.8	993
Volta	55.0	1.0	0.3	0.0	44.0	410
Eastern	57.1	0.3	0.0	0.0	42.6	477
Ashanti	69.1	0.2	0.8	0.0	30.0	998
Brong Ahafo	76.0	0.0	0.2	0.0	23.8	436
Northern	57.7	0.3	0.0	0.0	42.1	520
Upper East	77.0	0.0	0.0	0.0	23.0	197
Upper West	81.1	0.0	0.0	0.0	18.9	135
Education						
No education	50.4	0.4	0.0	0.1	49.1	986
Primary	54.2	0.0	0.0	0.0	45.8	882
Middle/JSS/JHS	58.1	0.2	0.3	0.0	41.4	2,010
Secondary/SSS/SHS or higher	65.2	1.5	0.4	0.7	32.7	1,271
Wealth quintile						
Lowest	53.2	0.0	0.1	0.0	46.7	834
Second	49.4	0.0	0.6	0.0	50.0	957
Middle	58.7	0.3	0.0	0.0	41.0	1,046
Fourth	60.4	0.1	0.2	0.0	39.3	1,100
Highest	63.9	1.9	0.2	0.9	33.7	1,213
Total	57.7	0.5	0.2	0.2	41.5	5,150

MALARIA PREVENTION 3

Key Findings

Ownership of long-lasting insecticidal nets (LLINs):

- Seventy-three percent of households in Ghana own at least one LLIN.
- Fifty-one percent of households have one LLIN for every two people who stayed in the household the night before the survey.

Sources of LLINs:

- More than 8 in 10 (85%) LLINs owned by households were obtained from mass distribution campaigns.

Access to an LLIN:

- Two-thirds (66%) of the household population in Ghana have access to an LLIN.
- The percentage of the population with access to an LLIN decreases with increasing level of household wealth from 76% in the lowest wealth quintile to 57% in the highest wealth quintile.

Use of LLINs:

- Forty-two percent of the household population slept under an LLIN the night before the survey.
- About half of children under age 5 and women age 15-49 slept under an LLIN the night before the survey.

Intermittent Preventive Therapy (IPTp):

- Six in ten women received three or more doses of SP/Fansider for the prevention of malaria in pregnancy.

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

The 2014-2020 Ghana Strategic Plan also seeks to increase the coverage of long-lasting insecticidal nets (LLINs) by distribution through mass campaigns and continuous distribution at antenatal clinics (ANC), child welfare clinics (CWC), and primary schools in order to reduce the burden of malaria (NMCP 2014).

In Ghana, LLINs are routinely distributed free to children under age 1 on successful completion of Penta 3 immunisation (third dose of a vaccine against diphtheria, pertussis, tetanus; *Haemophilus influenzae* type b; and hepatitis B) and to pregnant women during their first antenatal care (ANC) visit.

3.1 OWNERSHIP OF MOSQUITO NETS

Ownership of long-lasting insecticidal nets
Households that have at least one long-lasting insecticidal net (LLIN). An LLIN is a factory-treated net that does not require any further treatment.
Sample: Households

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

The distribution and use of LLINs is one of the central interventions for preventing malaria infection in Ghana. The 2014-2020 National Malaria Control Programme Strategic Plan aims to achieve universal coverage with LLINs, defined as one net for every two people (GMOP 2016). To achieve this objective, the Plan supports time-limited, national, free distribution campaigns of LLINs. In the recent past, Ghana has implemented two major LLIN mass distribution campaigns. In the first campaign that ended in 2012, more than 12.4 million LLINs were distributed in all 10 regions of Ghana. During this campaign, volunteers distributed nets door-to-door and hung them immediately in the recipient households.

Between 2014 and 2016, a second LLIN mass distribution campaign was implemented in all ten regions of Ghana. In the Eastern and Volta regions, the LLIN distribution was conducted in 2014 while Ashanti, Brong Ahafo, and the Central and Western regions were covered in 2015. In the remaining four regions (Greater Accra, Northern, Upper East, and Upper West), the LLIN distribution campaign was conducted in 2016.

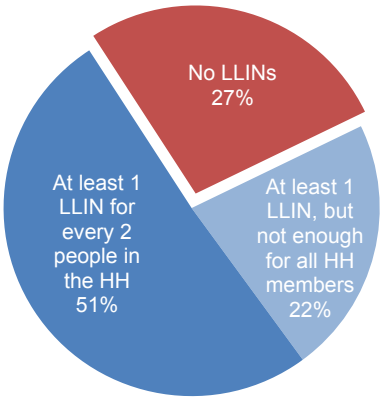
The longer the time between the most recent LLIN distribution campaign and the 2016 GMIS data collection, the lower the coverage of the LLINs. While mass campaigns rapidly increase the ownership of LLINs, the coverage gaps appear almost immediately post-campaign through net deterioration, loss of nets, and population growth. Thus, complementary continuous distribution channels are required.

Data from the National Malaria Control Programme (NMCP) show that for the Greater Accra and Western regions, the 2014-2106 campaign reached only approximately 80% of the households. In contrast, the 2014-2016 LLIN distribution campaign reached 95% of the households or more in all the other regions.

The 2016 GMIS indicates that 73% of households in Ghana own at least one LLIN (**Table 3.1**). Fifty-one percent of households have one LLIN for every two people who stayed in the household the night before the survey, while 22% of households own at least one LLIN but have an insufficient supply for the number of household members and 27% of households do not own any LLINs. (**Figure 3.1**).

Figure 3.1 **Household ownership of LLINs**

Percent distribution of households



Trends: The data show an increase in households that own at least one LLIN from 2008 to 2016. In 2008, only 31% of households owned at least one LLIN. In 2014, the percentage of households owning at least one LLIN more than doubled to 64%. This increased to 73% in 2016 (**Figure 3.2).**

Patterns by background characteristics

- Ownership of LLINs is higher in rural households (82%) compared with urban households (65%) (**Table 3.1**).
- Sixty-three percent of households in the highest wealth quintile and 66% of households in the fourth wealth quintile own an LLIN, while 86% of households in the lowest wealth quintile and 81% of households in the second wealth quintile own at least one LLIN (**Figure 3.3**).
- The Upper East region has the highest household ownership of LLINs (94%) followed by the Upper West region with household ownership of LLIN of 90%. The Greater Accra region (61%) and the Western region (67%) are the regions with the lowest household ownership of LLINs (**Figure 3.4**).

Figure 3.2 Trends in household ownership of LLINs

Percentage of households owning at least one long-lasting insecticidal net (LLIN)

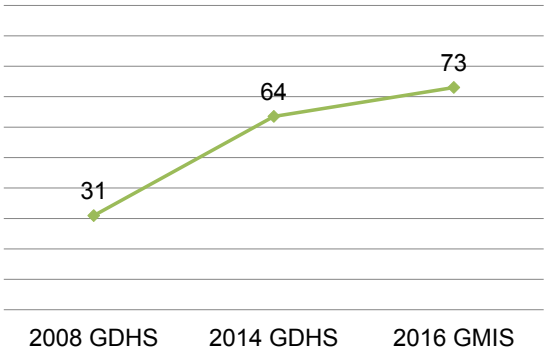


Figure 3.3 LLIN ownership by household wealth

Percentage of households with at least one LLIN

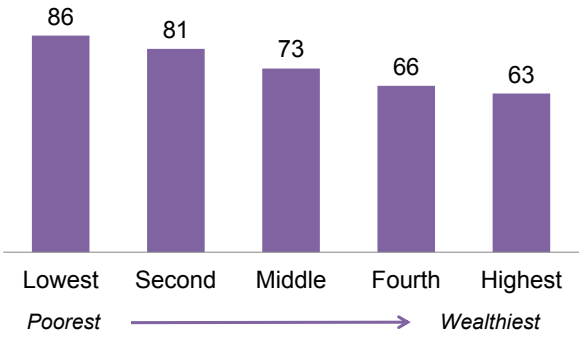
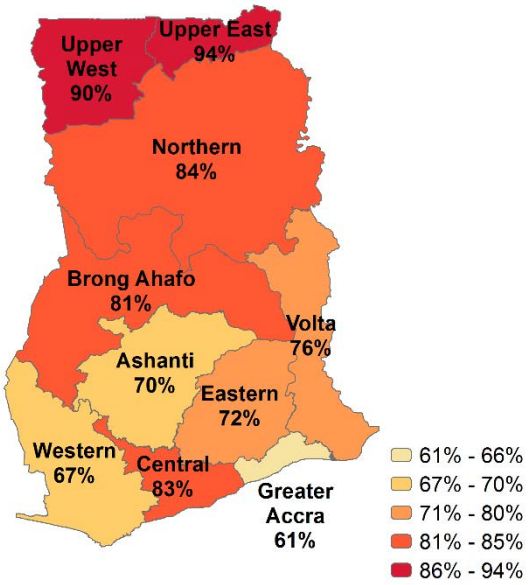


Figure 3.4 LLIN ownership by region

Percentage of households with at least one LLIN



Source of nets

There are several ways to obtain a mosquito net in Ghana. Mosquito nets can be obtained during mass distribution campaigns, ANC visits by pregnant women, and visits to child welfare clinics. Nets can also

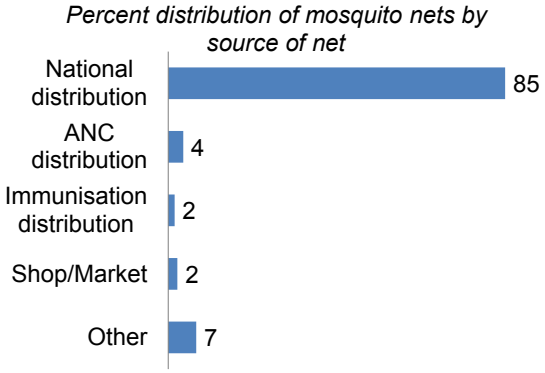
be purchased directly at various sales points. **Figure 3.5** shows the percentage distribution of LLINs by source in interviewed households.

The main source of mosquito net acquisition in Ghana was mass national distribution campaigns between 2014 and 2016, accounting for 85% of nets in households. Four percent of households obtained their mosquito nets through ANC, with 2% obtaining their mosquito nets either through immunisation distribution or from shops/markets.

Patterns by background characteristics

- At the regional level, a higher proportion of households in the Northern, Upper West, and Upper East regions obtain their mosquito nets through mass national campaigns compared with the Greater Accra and Volta regions.

Figure 3.5 **Source of mosquito nets**



- Five percent of households from the Greater Accra region and 5% of households from the Volta region acquired their mosquito nets from shops or the market (**Table 3.2)**.

3.2 HOUSEHOLD ACCESS AND USE OF LLINS

Access to an LLIN

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

Sample: De facto household population

Use of LLINs

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

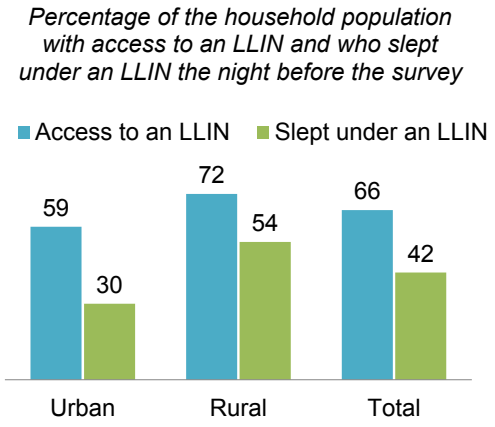
Sample: De facto household population

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

Comparing LLIN access and LLIN use indicators can help programmes identify if there is a behavioural gap in which available LLINs are not being used. If the difference between these indicators is substantial, the programme may need to focus on behaviour change and identification of the main drivers or barriers to LLIN use to design an appropriate intervention. This analysis helps LLIN programmes determine whether they need to achieve higher LLIN coverage, promote LLIN use, or both.

Figure 3.6 indicates that 66% of the household population in Ghana have access to an LLIN, while only 42% of the household population slept under an LLIN the night before the survey (**Figure 3.6**). The

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



gap between access to and use of LLINs is larger in urban (59% versus 30%) than in rural households (72% versus 54%).

In households with at least one LLIN, 53% of the population slept under an LLIN the previous night (**Table 3.4**). Overall, 48% of all existing LLINs were used the night before the survey (**Table 3.5**).

Patterns by background characteristics

- The percentage of the population with access to an LLIN decreases with increasing level of household wealth from 76% in the highest wealth quintile to 57% in the lowest wealth quintile (**Table 3.3**).
- The three northern regions in Ghana have the highest percentage of the population with access to an LLIN compared with regions in the southern part of the country. The Upper East region has the highest percentage (88%) of the population with access to a LLIN, while the Greater Accra region has the lowest percentage (54%) of the population with access to a LLIN **(Figure 3.7).**

Similar to access to an LLIN, the Upper East region has the highest percentage (63%) of the population that slept under an LLIN the night before the survey, while the Greater Accra region has the lowest percentage (18%) of the population that used an LLIN (**Figure 3.8**).

Figure 3.8 LLIN use by household population

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

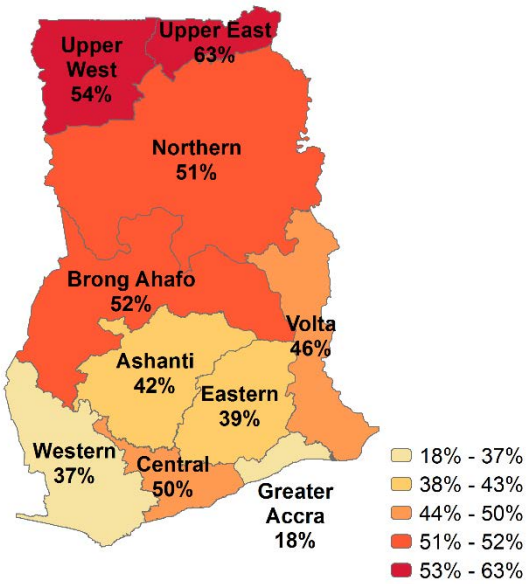
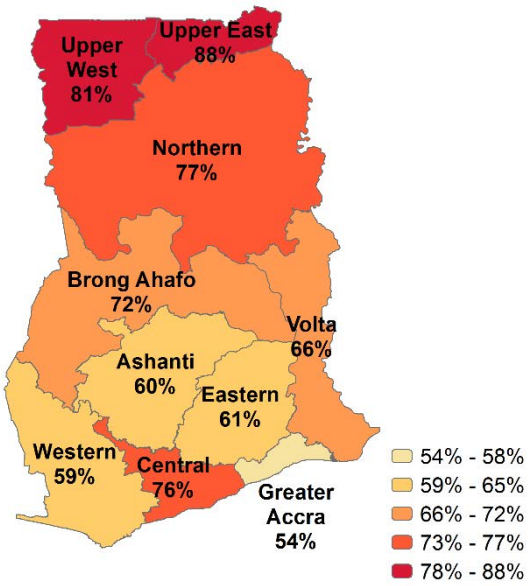


Figure 3.7 LLIN access by region

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



- Children under age 5 are more likely to sleep under an LLIN than persons age 50 and older (52% versus 41%) (**Table 3.4**).
- The percentage of the household population that slept under an LLIN the night before the survey decreases substantially with increasing level of wealth. Six in ten household members (61%) from the lowest wealth quintile slept under an LLIN the previous night, as compared with 23% of the household population from the highest wealth quintile.

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 for those living in the 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 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).

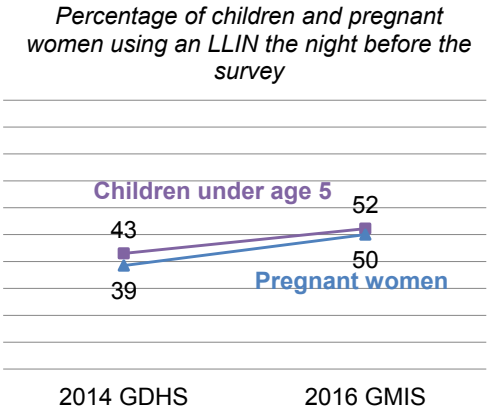
Adults usually acquire some degree of immunity. However, since pregnancy suppresses immunity, women in their first pregnancies are at increased risk for severe malaria. Malaria in pregnancy is frequently associated with the development of anaemia, which interferes with the maternal-foetus exchange and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

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

Fifty-two percent of children under age 5 slept under an LLIN the night before the survey and 62% of children under age 5 in households with at least one LLIN slept under an LLIN the night before the survey (**Table 3.6**). Overall, 50% of pregnant women age 15-49 slept under an LLIN the night before the survey and 59% of pregnant women who live in households with at least one LLIN slept under an LLIN the night before the survey (**Table 3.7**).

Trends: The percentage of children under age 5 who slept under an LLIN the night before the survey increased from 43% in 2014 to 52% in 2016. The percentage of pregnant women who slept under an LLIN increased from 39% in 2014 to 50% in 2016 (**Figure 3.9**).

***Figure 3.9* LLIN use by children and pregnant women**



Patterns by background characteristics

- Children in rural areas are more likely than children in urban areas to sleep under an LLIN (62% and 41% respectively) (**Table 3.6**).
- The use of LLINs among children under age 5 decreases with an increase in wealth quintile. Sixty-seven percent of children in the lowest wealth quintile slept under an LLIN compared with 36% of children in the highest wealth quintile.
- The use of LLINs among children under age 5 is highest in the Upper East region (76%) and lowest in the Greater Accra region (33%).
- Pregnant women in the rural areas are more likely to use LLINs than those who live in urban areas (60% versus 39%) (**Table 3.7**).

- Sleeping under an LLIN is highest among women with no education (68%) and among those in the lowest wealth quintile (70%)**.**

3.4 MALARIA IN PREGNANCY

Intermittent preventive treatment (IPTp) during pregnancy (IPTp2+)
Percentage of women who took at least two doses of SP/Fansidar.
Sample: Women age 15-49 with a live birth in the 2 years before the survey

Intermittent preventive treatment (IPTp) during pregnancy (IPTp3+)
Percentage of women who took at least three doses of SP/Fansidar.
Sample: Women age 15-49 with a live birth in the 2 years before the survey

In Ghana, intermittent preventive treatment of malaria in pregnancy (IPTp) is a full therapeutic course of antimalarial medicine given to pregnant women at routine ANC visits to prevent malaria. IPTp helps prevent maternal malaria episodes, maternal and foetal anaemia, placental parasitaemia, low birth weight, and neonatal mortality.

The World Health Organization (WHO) recommends a three-pronged approach for reducing the negative health effects associated with malaria in pregnancy (MIP): prompt diagnosis and treatment of confirmed infection, use of long-lasting insecticidal nets (LLINs), and IPTp (WHO 2004).

Sulfadoxine-pyrimethamine (SP), also known as Fansidar, is the recommended drug for IPTp in Ghana. Over the years, the Ministry of Health (MoH) and the Ghana Health Service (GHS) have been implementing IPTp, defined as provision of sulfadoxine-pyrimethamine (SP)/Fansidar to protect the mother and her unborn child from malaria during routine ANC visits after the first trimester of pregnancy with one month between doses. In 2013, the National Malaria Control Programme revised its policy based on a WHO recommendation from only three doses to three or more doses (WHO 2012a; WHO 2012b). The 2016 GMIS measured coverage of this intervention among women with a live birth in the 2 years before the survey.

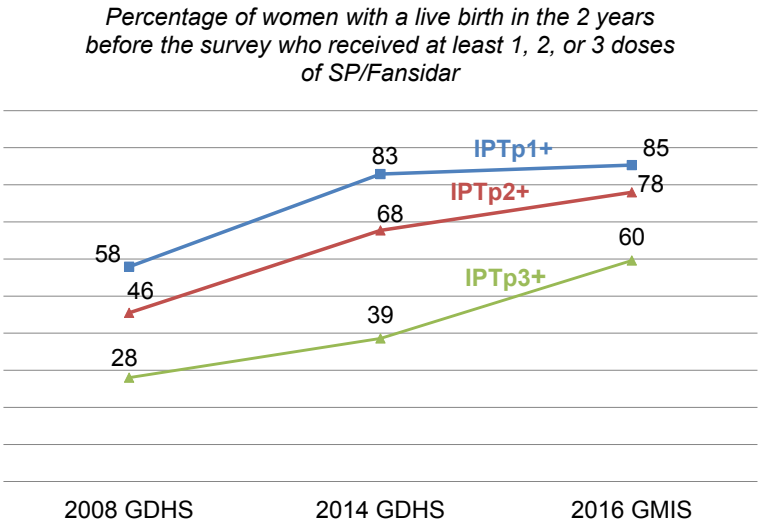
Eighty-five percent of women age 15-49 with live birth in the 2 years before the survey reported receiving one or more doses of SP/Fansider during the pregnancy of the most recent live birth and 78% received two or more doses. Six in ten women received three or more doses of SP/Fansider as recommended by the National Malaria Control Strategy (**Table 3.8**).

Trends: The percentage of women with a live birth in the 2 years before the survey who received 2 doses of SP/Fansider increased from 46% in 2008 to 68% in 2014 and to 78% in 2016. The percentage of women with a live birth in the 2 years before the survey who received 3 doses of SP/Fansider was estimated at 28% in 2008 but has more than doubled since then (**Figure 3.10**).

Patterns by background characteristics

- Sixty-four percent of urban pregnant women received at least three doses of SP/Fansider during pregnancy compared with 56% of rural women (**Table 3.8**).
- Receiving at least three doses of SP/Fansider increases with an increase in a woman's education. Fifty-one percent of pregnant women with no education received at least three doses of SP/Fansider, compared with 71% of women with a secondary or higher education.

Figure 3.10 **Trends in IPTp use by pregnant women**



A higher percentage of women in the wealthiest households (68%) received at least three doses of SP/Fansider compared with women in the lowest wealth quintiles (51%).

LIST OF TABLES

For detailed information on malaria, see the following tables:

- **Table 3.1 Household possession of mosquito nets**
- **Table 3.2 Source of mosquito nets**
- **Table 3.3 Access to a long-lasting insecticidal net**
- **Table 3.4 Use of mosquito nets by persons in the household**
- **Table 3.5 Use of existing long-lasting insecticidal nets**
- **Table 3.6 Use of mosquito nets by children**
- **Table 3.7 Use of mosquito nets by pregnant women**
- **Table 3.8 Use of intermittent preventive treatment by women during pregnancy**

Table 3.1 Household possession of mosquito nets

Percentage of households with at least one mosquito net (treated or untreated), and long-lasting insecticidal net (LLIN); average number of nets, and LLINs per household; and percentage of households with at least one net, and LLIN per two persons who stayed in the household last night, according to background characteristics, Ghana MIS 2016

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	Long-lasting insecticidal net (LLIN)	Any mosquito net	Long-lasting insecticidal net (LLIN)		Any mosquito net	Long-lasting insecticidal net (LLIN)	
Residence								
Urban	66.1	65.2	1.4	1.4	3,195	46.6	45.8	3,151
Rural	83.4	82.4	2.0	1.9	2,646	58.4	57.0	2,619
Region								
Western	69.1	66.9	1.5	1.5	482	47.7	46.1	472
Central	84.3	82.8	2.0	2.0	646	63.7	61.7	643
Greater Accra	61.7	60.9	1.2	1.2	1,177	42.4	41.9	1,151
Volta	77.8	76.1	1.9	1.8	423	55.2	52.3	418
Eastern	72.7	71.6	1.4	1.4	574	45.4	44.6	571
Ashanti	70.2	69.7	1.4	1.4	1,278	47.8	47.2	1,267
Brong Ahafo	81.2	80.6	1.7	1.7	490	59.0	58.0	482
Northern	83.8	83.7	2.4	2.4	464	60.3	59.9	461
Upper East	95.2	93.9	3.0	3.0	180	74.3	72.0	179
Upper West	89.7	89.7	2.1	2.1	126	65.2	65.2	125
Wealth quintile								
Lowest	86.7	86.3	2.3	2.2	906	59.9	59.2	902
Second	82.6	81.0	1.9	1.9	1,143	61.3	59.6	1,129
Middle	74.3	73.2	1.6	1.6	1,203	51.6	50.5	1,181
Fourth	67.0	66.3	1.4	1.4	1,310	45.9	45.1	1,300
Highest	63.9	63.2	1.3	1.3	1,278	44.4	43.4	1,258
Total	73.9	73.0	1.7	1.6	5,841	51.9	50.9	5,770

Table 3.2 Source of mosquito nets

Percent distribution of mosquito nets by source of net, according to background characteristics, Ghana MIS 2016

Background characteristic	2014-2016 mass distribution campaign	ANC visit	Immunization visit	Government health facility	Private health facility	Pharmacy/ chemist/drug store	Shop/market	Community health worker	Religious institution	Community based agent	Primary school	Other	Don't know	Total	Number of mosquito nets
Residence															
Urban	81.6	4.0	1.3	1.3	0.1	1.1	3.1	0.1	0.2	0.2	1.6	4.3	1.1	100.0	4,444
Rural	88.3	3.6	1.8	0.9	0.1	0.4	1.7	0.1	0.0	0.1	1.6	1.0	0.4	100.0	5,251
Region															
Western	85.3	3.7	0.9	0.7	0.1	1.0	1.3	0.1	0.0	0.0	2.9	2.5	1.4	100.0	721
Central	89.7	1.2	3.2	1.0	0.0	0.3	0.7	0.0	0.0	0.1	1.5	1.6	0.7	100.0	1,292
Greater Accra	74.5	3.2	2.0	1.2	0.2	2.1	4.9	0.0	0.5	0.0	0.7	9.3	1.3	100.0	1,432
Volta	74.1	10.2	4.9	1.8	0.1	0.9	5.2	0.3	0.0	0.0	1.3	1.1	0.1	100.0	800
Eastern	86.4	3.0	0.6	3.2	0.2	0.8	1.1	0.6	0.0	0.2	1.4	0.9	1.5	100.0	827
Ashanti	84.1	5.7	0.9	0.7	0.0	0.5	3.3	0.1	0.0	0.0	1.9	1.9	1.0	100.0	1,839
Brong Ahafo	86.4	3.7	1.1	0.6	0.2	0.2	1.7	0.0	0.1	0.0	4.6	1.3	0.0	100.0	837
Northern	96.6	1.5	0.2	0.1	0.0	0.0	0.5	0.1	0.0	0.1	0.3	0.4	0.1	100.0	1,135
Upper East	90.4	3.0	0.8	1.3	0.0	0.4	0.7	0.0	0.0	1.8	0.9	0.4	0.2	100.0	548
Upper West	96.6	1.8	0.0	0.0	0.0	0.3	0.7	0.0	0.0	0.0	0.0	0.5	0.0	100.0	265
Wealth quintile															
Lowest	92.9	2.3	1.0	0.5	0.0	0.1	0.8	0.0	0.0	0.4	1.3	0.6	0.3	100.0	2,060
Second	88.8	2.6	2.1	0.8	0.1	0.0	1.7	0.2	0.0	0.1	2.1	0.7	0.7	100.0	2,156
Middle	87.3	3.1	1.3	1.3	0.0	0.4	2.1	0.1	0.0	0.2	1.6	2.2	0.4	100.0	1,955
Fourth	82.7	5.1	1.4	1.0	0.1	0.5	2.9	0.1	0.1	0.1	1.3	4.3	0.2	100.0	1,806
Highest	71.9	6.5	2.1	1.9	0.1	3.0	4.7	0.1	0.4	0.0	1.6	5.5	2.3	100.0	1,719
Total	85.2	3.8	1.6	1.1	0.1	0.7	2.3	0.1	0.1	0.1	1.6	2.5	0.7	100.0	9,696

ANC = Antenatal care.

Table 3.3 Access to a long-lasting insecticidal net

Percentage of the de facto population with access to a long-lasting insecticidal net (LLIN) in the household, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage of the de facto population with access to an LLIN[1]
Residence	
Urban	59.4
Rural	72.1
Region	
Western	59.1
Central	76.1
Greater Accra	53.9
Volta	66.4
Eastern	60.5
Ashanti	59.9
Brong Ahafo	72.1
Northern	76.7
Upper East	88.1
Upper West	80.5
Wealth quintile	
Lowest	75.6
Second	72.0
Middle	64.5
Fourth	59.9
Highest	57.2
Total	65.8

[1] Percentage of the de facto household population who could sleep under an LLIN if each LLIN in the household were used by up to two people.

Table 3.4 Use of mosquito nets by persons in the household

Percentage of the de facto household population who slept the night before the survey under a mosquito net (treated or untreated), and under a long-lasting insecticidal net (LLIN); and among the de facto household population in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey, according to background characteristics, Ghana MIS 2016

	Household population			Household population in households with at least one LLIN	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of persons	Percentage who slept under an LLIN last night	Number of persons
Age					
<5	52.8	52.2	3,234	62.0	2,723
5-14	42.3	41.8	5,318	51.2	4,344
15-34	36.8	36.1	6,244	47.9	4,708
35-49	42.9	41.9	2,984	53.0	2,357
50+	42.6	41.4	2,880	53.3	2,238
Sex					
Male	41.2	40.6	9,910	51.7	7,774
Female	43.4	42.6	10,798	53.4	8,629
Residence					
Urban	30.1	29.5	10,249	40.9	7,400
Rural	54.4	53.5	10,460	62.2	9,003
Region					
Western	37.4	37.0	1,667	50.6	1,218
Central	51.2	50.2	2,264	56.6	2,008
Greater Accra	18.4	18.3	3,563	27.3	2,382
Volta	47.7	46.0	1,666	57.8	1,326
Eastern	40.6	39.4	1,938	51.9	1,472
Ashanti	43.5	42.5	4,120	56.5	3,100
Brong Ahafo	52.8	51.9	1,668	60.9	1,422
Northern	50.9	50.7	2,364	57.7	2,080
Upper East	63.9	63.2	916	64.6	896
Upper West	54.1	54.0	541	58.7	498
Wealth quintile					
Lowest	61.9	61.4	4,144	68.7	3,705
Second	53.7	52.8	4,158	62.2	3,527
Middle	40.2	39.4	4,100	50.6	3,192
Fourth	32.4	31.8	4,154	43.4	3,044
Highest	23.7	22.8	4,153	32.2	2,934
Total	42.4	41.6	20,708	52.6	16,403

Note: Total includes 49 persons for whom information on age is missing.

Table 3.5 Use of existing long-lasting insecticidal nets

Percentage of long-lasting insecticidal nets (LLINs) that were used by anyone the night before the survey, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage of existing LLINs used last night	Number of LLINs
Residence		
Urban	37.7	4,356
Rural	56.1	5,152
Region		
Western	47.1	704
Central	46.4	1,262
Greater Accra	23.3	1,412
Volta	55.6	767
Eastern	51.6	811
Ashanti	51.1	1,804
Brong Ahafo	57.4	821
Northern	52.5	1,127
Upper East	56.6	536
Upper West	57.9	265
Wealth quintile		
Lowest	62.7	2,038
Second	55.6	2,115
Middle	45.9	1,910
Fourth	38.9	1,773
Highest	30.7	1,672
Total	47.7	9,508

Table 3.6 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 a long-lasting insecticidal net (LLIN); and among children under age 5 in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey, according to background characteristics, Ghana MIS 2016

	Children under age 5 in all households			Children under age 5 in households with at least one LLIN	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of children	Percentage who slept under an LLIN last night	Number of children
Age in months					
<12	56.1	55.3	635	64.1	548
12-23	54.8	54.5	655	64.4	554
24-35	52.2	51.4	678	62.0	563
36-47	50.4	49.9	598	59.3	504
48-59	50.5	49.9	667	60.0	555
Sex					
Male	52.1	51.4	1,670	61.8	1,389
Female	53.5	53.0	1,564	62.2	1,334
Residence					
Urban	41.3	40.8	1,466	51.9	1,151
Rural	62.3	61.7	1,768	69.4	1,572
Region					
Western	45.5	45.5	241	58.2	189
Central	61.9	61.2	310	66.6	285
Greater Accra	32.6	32.6	490	41.8	383
Volta	54.8	52.5	252	65.8	201
Eastern	49.6	48.2	264	59.4	214
Ashanti	51.7	51.2	705	63.7	566
Brong Ahafo	62.0	60.5	261	67.8	233
Northern	61.2	61.0	511	68.1	458
Upper East	75.5	75.5	118	76.9	116
Upper West	60.7	60.7	83	63.3	79
Wealth quintile					
Lowest	66.9	66.6	728	74.5	650
Second	60.0	59.4	666	67.4	587
Middle	51.4	50.9	645	62.9	522
Fourth	44.2	43.3	657	53.5	532
Highest	37.0	36.3	539	45.2	432
Total	52.8	52.2	3,234	62.0	2,723

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

Table 3.7 Use of mosquito nets by pregnant women

Percentages of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated),, and under a long-lasting insecticidal net (LLIN); and among pregnant women age 15-49 in households with at least one LLIN, percentage who slept under an LLIN the night before the survey, according to background characteristics, Ghana MIS 2016

	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one LLIN	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of women	Percentage who slept under a LLIN last night	Number of women
Residence					
Urban	39.5	39.0	167	48.9	133
Rural	59.8	59.8	186	67.6	164
Region					
Western	*	*	23	*	14
Central	(58.2)	(58.2)	43	(66.6)	37
Greater Accra	(36.6)	(36.6)	49	*	43
Volta	(56.3)	(56.3)	19	*	17
Eastern	(40.9)	(40.9)	24	*	19
Ashanti	(46.2)	(46.2)	77	(56.5)	63
Brong Ahafo	(57.7)	(55.6)	34	(64.3)	30
Northern	58.8	58.8	54	69.9	45
Upper East	(72.9)	(72.9)	19	(72.9)	19
Upper West	(67.1)	(67.1)	11	(71.0)	10
Education					
No education	67.9	67.9	67	73.6	62
Primary	49.7	49.7	68	58.3	58
Middle/JSS/JHS	43.4	43.4	133	54.5	106
Secondary/SSS/SHS or Higher	47.1	46.3	85	54.7	72
Wealth quintile					
Lowest	70.2	70.2	61	73.4	58
Second	62.5	62.5	74	69.9	66
Middle	43.7	43.7	76	59.0	56
Fourth	43.8	43.8	64	(53.0)	53
Highest	34.5	33.6	79	(41.0)	64
Total	50.2	50.0	353	59.3	297

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.

Table 3.8 Use of intermittent preventive treatment (IPTp) by women during pregnancy

Percentage of women age 15-49 with a live birth in the 2 years before the survey who, during the pregnancy of the most recent live birth, received one or more doses of SP/Fansidar, two or more doses of SP/Fansidar, and three or more doses of SP/Fansidar, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage who received one or more doses of SP/Fansidar	Percentage who received two or more doses of SP/Fansidar	Percentage who received three or more doses of SP/Fansidar	Number of women with a live birth in the 2 years preceding the survey
Residence				
Urban	89.9	82.6	63.9	577
Rural	81.5	74.3	56.1	708
Region				
Western	88.2	77.3	48.3	101
Central	93.0	84.5	58.5	131
Greater Accra	87.4	78.7	57.6	207
Volta	83.6	75.1	65.3	110
Eastern	93.4	89.2	70.6	100
Ashanti	85.4	79.6	61.0	238
Brong Ahafo	91.9	85.0	68.7	111
Northern	67.4	61.0	49.6	211
Upper East	96.5	90.8	78.9	45
Upper West	89.4	82.2	57.5	30
Education				
No education	72.7	64.6	50.7	318
Primary	80.7	74.5	55.6	252
Middle/JSS/JHS	93.8	84.6	61.5	456
Secondary/SSS/SHS or higher	90.1	86.4	71.2	259
Wealth quintile				
Lowest	78.6	69.1	50.7	282
Second	82.9	74.9	54.3	269
Middle	84.4	78.3	55.0	265
Fourth	90.2	83.5	73.4	237
Highest	92.1	86.6	67.9	231
Total	85.3	78.0	59.6	1,285

MALARIA IN CHILDREN 4

Key Findings

- ***Fever prevalence:*** One in three children (30%) under age 5 had fever in the 2 weeks before the survey.
- ***Care-seeking for fever:*** Advice or treatment was sought for 72% of children with fever in the 2 weeks before the survey.
- ***Source of advice or treatment:*** Among children with recent fever for whom care was sought, 51% received advice or treatment from the private health sector, 48% from the public health sector, and 2% elsewhere.
- ***Testing:*** Thirty percent of children with a recent fever received a finger or heel prick for testing.
- ***Type of antimalarial drug used:*** Among children under age 5 with a recent fever who received an antimalarial, 59% received artemisinin combination therapy.
- ***Severe anaemia:*** Seven percent of children age 6-59 months have a haemoglobin level less than 8 g/dl.
- ***Malaria:*** Two in ten children age 6-59 months tested positive for malaria via microscopy.

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

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 suspected malaria cases have access to confirmatory diagnosis and receive effective treatment if positive for malaria.

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 fever in the 2 weeks before the survey. Advice or treatment was sought for 72% of the children with

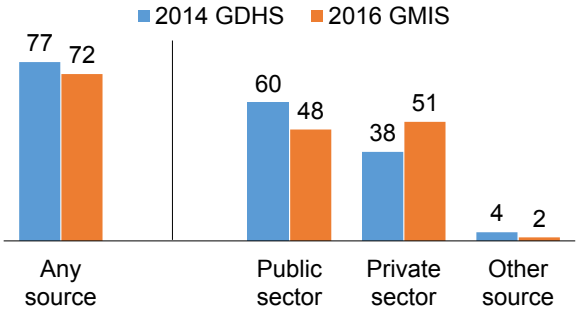
fever in the 2 weeks before the survey, and timely care seeking (the same or next day after fever onset) occurred for 48% of the febrile children (**Table 4.1**).

Among children with recent fever for whom care was sought, most received advice or treatment from the private health sector (51%), including 30% who sought care from a pharmacy/chemist/drug store, 20% from a private hospital/ clinic, and 1% from a private doctor. Forty-eight percent of children with recent fever sought care from public health sector (**Table 4.2**).

Trends: Among those with fever, advice or treatment seeking was slightly less likely in the 2016 GMIS than in the 2014 GDHS (72% to 77%). While the percentage of children with fever in the 2 weeks before the survey for whom advice or treatment was sought from the public sector decreased between 2014 and 2016 (from 60% to 48%), the percentage of those for whom advice or treatment was sought in the private sector increased from 38% to 51% within the same period (**Figure 4.1**).

Figure 4.1 Trends in care seeking for fever in children under age 5

Among children under age 5 with fever for whom advice or treatment was sought, percentage for whom advice or treatment was sought from specific source



Patterns by background characteristics

- Advice or treatment for children with fever was sought for 75% of children age 12-23 months and those age 24-35 months, compared with 68% of children age 48-59 months **(Table 4.1)**.
- The percentage of children with fever for whom advice or treatment was sought is higher in the urban areas than the rural areas (80% and 66%).
- The percentage of children with fever for whom advice or treatment was sought ranges from 85% in the Upper East region to 58% in the Western region.
- Advice or treatment for children with fever was higher among children whose mothers have secondary or higher education than among those whose mothers have less education.

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 two weeks before the survey

The NMCP policy recommends prompt parasitological confirmation by microscopy or, alternatively, rapid diagnostic tests (RDTs) for all patients suspected of malaria before treatment is started. Adherence to this policy cannot be directly measured through household surveys. However, the 2016 GMIS asked 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 2016 GMIS, 30% of children with a fever in the 2 weeks before the survey had blood taken from a finger or heel, presumably for malaria testing (**Table 4.1**).

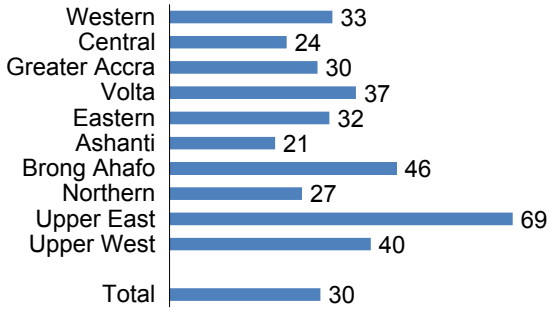
Trends: The percentage of children who had blood taken from a finger or heel for testing decreased from 34% in the 2014 GDHS to 30% in the 2016 GMIS.

Patterns by background characteristics

- Thirty-five percent of children under age 5 with recent fever from urban areas had blood taken from a finger or heel for testing, compared with 27% in rural areas.
- Sixty-nine percent of children under age 5 with recent fever in the Upper East region had blood taken from a finger or heel for testing, compared with 21% in the Ashanti region (**Figure 4.2**).

Figure 4.2 **Diagnostic testing of children with fever by region**

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



4.3 USE OF RECOMMENDED ANTIMALARIALS

Artemisinin-based combination therapy (ACT) for children under 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 took an artemisinin-based combination therapy (ACT).

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

Artemisinin-based combination therapy (ACT) is the recommended first-line antimalarial drug for the treatment of uncomplicated malaria in Ghana. According to the results shown in **Table 4.3**, 59% of children under age 5 with recent fever who received an antimalarial took an ACT, either artemether + lumefantrine (AL) (37%), artesunate + amodiaquine (ASAQ) tablet (22%), or dihydroartemisinin piperaquine (less than 1%). Although monotherapy is not recommended for the treatment of uncomplicated malaria, 31% of children with fever who received an antimalarial took SP/Fansidar, 1% took chloroquine, 8% took quinine pills, and 1% received a quinine injection.

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 cut-off 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 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, or 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 reflect malaria morbidity, and respond to changes in the coverage of malaria

interventions (Korenromp 2004). Malaria interventions have been associated with a 60% reduction in the risk of anaemia using a cut-off of 8 g/dl (RBM 2003). During the 2016 GIMS, consent was obtained and testing for anaemia was conducted on almost all (99%) 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 severe anaemia defined as a haemoglobin concentration of less than 8 g/dl. Overall, 7% of children age 6-59 months are severely anaemic.

Patterns by background characteristics

- The prevalence of low haemoglobin in children age 6-59 months is more than twice as high in rural compared with urban areas (9% and 4%, respectively).
- The Central region has the highest percentage of children age 6-59 months with low haemoglobin (14%). The Northern region has the second highest (12%), and Greater Accra the lowest (1%) (**Figure 4.3**).
- The prevalence of low haemoglobin in children age 6-59 months decreases as mother's level of education increases, from 11% for mothers with no education to 2% for mothers with secondary or higher education
- The prevalence of low haemoglobin in children age 6-59 months decreases with increasing wealth quintile, from 12% among children in the lowest and in the second lowest wealth quintile to 1% among children 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

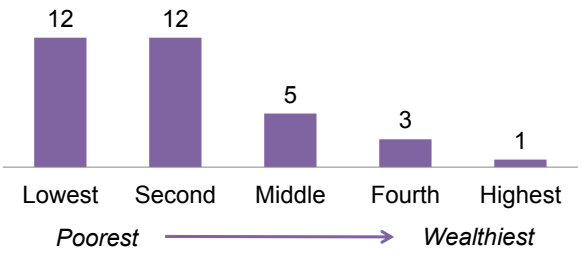
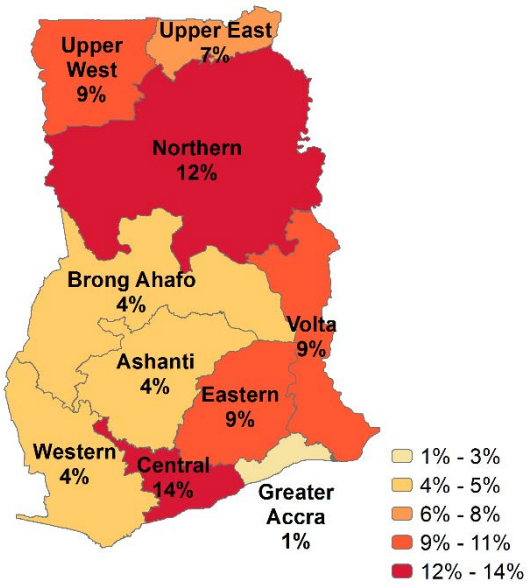


Figure 4.3 Prevalence of low haemoglobin in children by region

Percentage of children age 6-59 months with haemoglobin <8g/dl



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 infection not only contributes to further transmission of malaria, but also increases the risk of anaemia and other associated morbidity among the infected individuals.

In the 2016 GMIS, 21% of children age 6-59 months were positive for malaria parasites according to microscopy results (**Table 4.6**). Rapid diagnostic tests (RDTs) were done in conjunction with microscopy to facilitate the treatment of infected children during the survey fieldwork. Results from these RDTs are also presented in **Table 4.6** for reference. Twenty-eight percent of children age 6-59 months tested positive for malaria antigens with RDTs.

The differences in malaria prevalence observed between the RDT and microscopy results are expected. Microscopic detection of malaria parasites depends on the visualisation of stained parasites under a microscope, whereas the diagnosis of malaria by RDT relies on the interaction between a parasite antigen present in the blood and an antibody in the RDT formulation. Therefore, direct comparisons of malaria results from microscopy with those from RDTs should be avoided. The First Response SD Bioline, like many other commercially available RDTs, detects the *P. falciparum*-specific, histidine-rich protein-2 (HRP-2) rather than the parasite itself. The HRP-2 remains in the blood for up to a month after parasite clearance with antimalarials (Moody 2002). In areas highly endemic for *P. falciparum*, its persistence often leads to higher malaria prevalence estimates detected with RDTs as compared with those measured with microscopy.

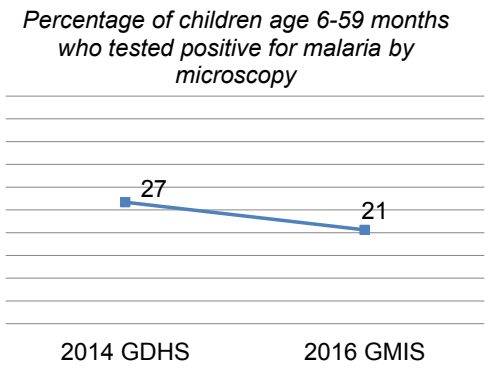
Results presented in this section are based on the microscopy analysis of blood samples.

Trends: National malaria prevalence has decreased between the 2014 GDHS and the 2016 GMIS, from 27% to 21% (**Figure 4.5**).

Patterns by background characteristics

- By age, malaria prevalence is highest (25%) in children age 48-59 months and lowest (16%) in children age 18-23 months (**Table 4.6**).
- Malaria prevalence is more than twice as high in rural areas (28%) as in urban areas (11%).
- According to region, the Eastern and Central regions have the highest (31%) and the second highest (30%) malaria prevalence, followed by the Volta (28%) and Northern (25%) regions. Malaria prevalence is lowest (5%) in the Greater Accra region (**Figure 4.6**).

Figure 4.5 **Trends in malaria prevalence among children**



- Malaria prevalence decreases with an increase in mother's level of education, from 30% among children whose mothers have no formal education to 5% among those whose mothers have secondary or higher education.
- Malaria prevalence decreases with increase in wealth quintile, from 37% among children in the lowest wealth quintiles to 2% in the highest wealth quintile (**Figure 4.7**).

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

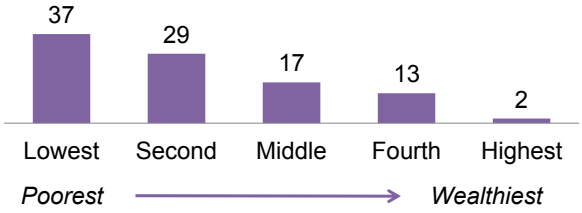
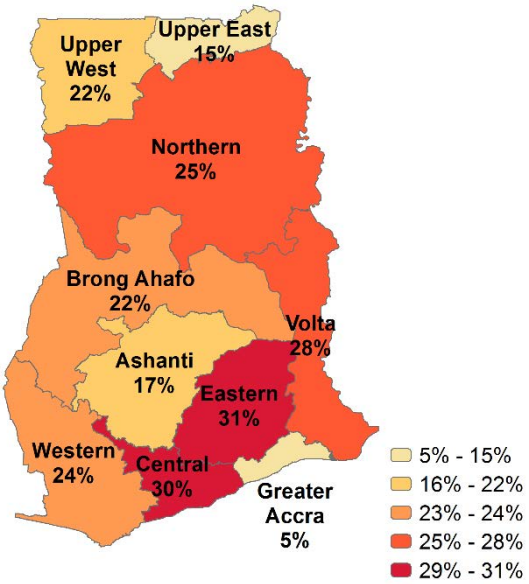


Figure 4.6 Prevalence of malaria in children by region

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



List of Tables

For detailed information on malaria, see the following tables:

- **Table 4.1 Prevalence, diagnosis, and treatment of children with fever**
- **Table 4.2 Source of advice or treatment for children with fever**
- **Table 4.3 Types of antimalarial drugs used**
- **Table 4.4 Coverage of testing for anaemia and malaria in children**
- **Table 4.5 Haemoglobin <8.0 g/dl in children**
- **Table 4.6 Prevalence of malaria in children**

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

Percentage of children under age 5 with fever in the 2 weeks before 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 after the onset of fever, and percentage who had blood taken from a finger or heel for testing, according to background characteristics, Ghana MIS 2016

	Children under age 5		Children under age 5 with fever			
Background characteristic	Percentage with fever in the 2 weeks before 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	Percentage who had blood taken from a finger or heel for testing	Number of children
Age in months						
<12	26.5	653	70.5	45.9	28.2	173
12-23	35.3	641	74.7	49.4	30.7	226
24-35	30.8	642	74.6	49.5	31.4	197
36-47	30.1	561	69.7	46.6	27.6	169
48-59	28.3	625	68.4	45.4	33.0	177
Sex						
Male	31.4	1,593	71.8	50.8	29.7	500
Female	28.9	1,528	71.9	43.9	30.9	442
Residence						
Urban	27.6	1,418	79.7	55.3	34.8	391
Rural	32.4	1,703	66.2	42.1	27.0	551
Region						
Western	35.9	237	58.3	28.4	32.7	85
Central	43.9	294	70.3	47.5	23.5	129
Greater Accra	23.8	506	75.7	54.1	29.7	120
Volta	21.0	246	79.0	37.9	37.4	52
Eastern	31.8	259	82.7	54.7	32.1	82
Ashanti	34.7	647	60.6	41.7	21.2	224
Brong Ahafo	32.6	259	75.8	52.7	45.6	84
Northern	24.1	482	84.9	59.9	26.6	116
Upper East	26.5	116	85.3	52.7	68.9	31
Upper West	23.6	76	63.9	49.1	40.4	18
Mother's education						
No education	27.8	821	72.6	49.5	25.0	228
Primary	35.0	623	75.0	58.8	32.7	218
Middle/JSS/JHS	32.3	1,103	66.2	40.7	26.5	356
Secondary/SSS/SHS or higher	24.3	574	79.9	44.3	44.6	140
Wealth quintile						
Lowest	32.7	675	68.1	44.8	30.2	221
Second	29.6	632	69.5	47.3	21.2	187
Middle	33.6	624	76.8	51.2	28.6	210
Fourth	27.2	635	73.6	43.5	28.9	173
Highest	27.5	555	71.2	51.4	45.2	152
Total	30.2	3,121	71.8	47.6	30.3	942

[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 fever in the 2 weeks before the survey for whom advice or treatment was sought from specific sources; and among children under age 5 with fever in the 2 weeks before the survey for whom advice or treatment was sought, the percentage for whom advice or treatment was sought from specific sources, by background characteristics, Ghana MIS 2016

	Percentage for whom advice or treatment was sought from each source:	
Background characteristic	Among children with fever	Among children with fever for whom advice or treatment was sought
Any public sector source	34.6	47.9
Government hospital	17.9	24.8
Government health centre	12.6	17.4
Government health post/CHPS	3.5	4.9
Mobile clinic	0.9	1.2
Fieldworker/CHW	0.1	0.2
Any private sector source	37.0	51.2
Private hospital/clinic	14.4	19.9
Pharmacy	10.4	14.5
Chemist/Drug Store	11.4	15.7
Private doctor	0.8	1.1
Fieldworker/CHW	0.1	0.1
Any other source	1.1	1.5
Traditional practitioner	0.2	0.3
Itinerant drug seller	0.7	1.0
Other	0.1	0.2
Number of children	942	680

CHW = Community health worker.
CHPS = Community-Based Health Planning and Services.

Table 4.3 Type of antimalarial drugs used

Among children under age 5 with fever in the 2 weeks before the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage of children who took:											Number of children with fever who took anti-malarial drug
	Any ACT	Artemether-Lumefantrine	Dihydroartemisinin + piperaquine	Artesunate + amodiaquine tablet	Artesunate + amodiaquine injection/IV	SP/Sulphadoxine-Pyrimethamine	Chloroquine	Artemisinin	Quinine pills	Quinine injection/IV	Other anti-malarial	
Age in months												
< 6	*	*	*	*	*	*	*	*	*	*	*	6
6-11	53.7	27.7	2.1	24.0	3.4	31.9	0.0	0.0	13.6	0.0	0.0	53
12-23	60.9	31.6	0.0	29.4	0.3	27.7	0.2	1.0	9.4	1.7	0.0	100
24-35	51.8	36.7	0.0	15.1	2.7	38.5	0.9	0.0	6.9	0.9	0.0	103
36-47	55.9	31.4	0.0	25.1	6.2	27.2	0.4	0.0	11.9	0.0	0.0	95
48-59	68.2	50.2	0.0	18.0	3.8	28.3	1.3	0.5	1.5	0.0	0.6	117
Sex												
Male	56.7	36.8	0.2	19.7	4.3	32.8	1.1	0.6	7.0	0.7	0.0	256
Female	60.8	36.3	0.2	24.5	1.9	27.9	0.1	0.4	9.3	0.4	0.3	218
Residence												
Urban	58.1	39.0	0.0	19.4	4.5	30.0	1.5	0.0	8.9	0.0	0.4	184
Rural	58.9	35.0	0.4	23.6	2.4	30.9	0.1	0.8	7.6	0.9	0.0	290
Mother's education												
No education	37.1	22.5	0.5	14.6	3.5	55.0	0.0	1.2	6.7	0.0	0.0	115
Primary	63.7	38.9	0.5	24.3	4.8	31.3	0.2	0.0	3.8	0.0	0.0	116
Middle/JSS/JHS	62.9	34.5	0.0	28.4	2.5	19.0	1.4	0.6	13.8	1.0	0.0	175
Secondary/SSS/SHS or higher	75.0	61.2	0.0	13.8	1.9	17.9	0.6	0.0	2.9	1.3	0.9	69
Wealth quintile												
Lowest	47.7	22.5	0.0	25.8	1.8	44.7	1.5	0.9	6.1	0.0	0.0	113
Second	58.3	29.6	1.1	27.5	3.9	24.0	0.0	0.9	13.0	0.8	0.0	95
Middle	48.9	24.7	0.0	24.2	1.5	43.0	0.0	0.0	7.2	0.9	0.0	102
Fourth	66.3	51.2	0.0	15.1	4.4	17.4	0.5	0.7	10.0	1.1	0.8	85
Highest	(78.6)	(64.4)	(0.0)	(14.2)	(5.2)	(16.2)	(1.1)	(0.0)	(4.1)	(0.0)	(0.0)	80
Total	58.6	36.5	0.2	21.9	3.2	30.5	0.6	0.5	8.1	0.6	0.1	474

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.

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 2016

Background characteristic	Percentage tested for: Anaemia	Malaria with RDT	Malaria with microscopy	Number of eligible children
Age in months				
6-8	99.4	99.4	99.4	165
9-11	98.7	98.7	98.7	156
12-17	98.3	98.3	98.3	357
18-23	100.0	100.0	100.0	335
24-35	98.7	98.7	98.7	704
36-47	99.1	99.1	99.1	678
48-59	98.7	98.7	98.7	685
Sex				
Male	99.0	99.0	99.0	1,577
Female	98.8	98.8	98.8	1,503
Mother's interview status				
Interviewed	99.2	99.2	99.2	2,687
Not interviewed	96.9	96.9	96.9	393
Residence				
Urban	98.0	98.0	98.0	1,168
Rural	99.5	99.5	99.5	1,912
Region				
Western	99.6	99.6	99.6	247
Central	98.9	98.9	98.9	261
Greater Accra	94.9	94.9	94.9	257
Volta	98.8	98.8	98.8	334
Eastern	97.5	97.5	97.5	242
Ashanti	99.2	99.2	99.2	359
Brong Ahafo	100.0	100.0	100.0	276
Northern	99.8	99.8	99.8	516
Upper East	99.4	99.4	99.4	321
Upper West	100.0	100.0	100.0	267
Mother's education[1]				
No education	99.9	99.9	99.9	929
Primary	99.1	99.1	99.1	545
Middle/JSS/JHS	99.3	99.3	99.3	846
Secondary/SSS/SHS or higher	97.5	97.5	97.5	367
Wealth quintile				
Lowest	99.4	99.4	99.4	1,102
Second	99.5	99.5	99.5	600
Middle	99.2	99.2	99.2	502
Fourth	99.0	99.0	99.0	496
Highest	96.3	96.3	96.3	380
Total	98.9	98.9	98.9	3,080

RDT = Rapid diagnostic test.
[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 2016

Background characteristic	Haemoglobin <8.0 g/dl	Number of children
Age in months		
6-8	8.0	166
9-11	12.4	144
12-17	14.4	344
18-23	8.9	304
24-35	6.3	670
36-47	4.5	591
48-59	3.2	655
Sex		
Male	8.2	1,478
Female	5.5	1,396
Mother's interview status		
Interviewed	7.3	2,501
Not interviewed	3.8	373
Residence		
Urban	4.1	1,276
Rural	9.1	1,598
Region		
Western	3.9	213
Central	14.0	281
Greater Accra	1.3	406
Volta	8.7	217
Eastern	8.6	224
Ashanti	3.7	656
Brong Ahafo	4.4	233
Northern	12.4	464
Upper East	7.4	105
Upper West	9.1	75
Mother's education[1]		
No education	11.3	683
Primary	9.3	508
Middle/JSS/JHS	5.9	900
Secondary/SSS/SHS or higher	1.6	410
Wealth quintile		
Lowest	12.1	645
Second	12.1	593
Middle	5.0	581
Fourth	2.6	588
Highest	0.7	466
Total	6.9	2,874

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).

[1] Excludes children whose mothers were not interviewed.

Table 4.6 Prevalence of malaria in children

Percentage of children age 6-59 months classified as having malaria, according to RDT and microscopy, and according to background characteristics, Ghana MIS 2016

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	18.1	166	17.1	166
9-11	21.1	144	16.9	144
12-17	23.7	344	19.6	344
18-23	23.2	304	15.8	304
24-35	28.4	670	19.7	670
36-47	31.9	591	21.6	591
48-59	31.9	655	25.3	655
Sex				
Male	29.0	1,478	21.8	1,478
Female	26.7	1,396	19.4	1,396
Mother's interview status				
Interviewed	28.4	2,501	21.2	2,501
Not interviewed	24.3	373	17.0	373
Residence				
Urban	12.8	1,276	11.2	1,276
Rural	39.9	1,598	28.2	1,598
Region				
Western	38.1	213	23.5	213
Central	44.6	281	30.2	281
Greater Accra	4.6	406	4.8	406
Volta	37.3	217	27.5	217
Eastern	34.6	224	31.3	224
Ashanti	17.9	656	16.6	656
Brong Ahafo	29.9	233	22.4	233
Northern	39.3	464	25.2	464
Upper East	25.8	105	14.7	105
Upper West	27.8	75	21.5	75
Mother's education[1]				
No education	47.1	683	30.0	683
Primary	30.3	508	25.4	508
Middle/JSS/JHS	23.5	900	19.7	900
Secondary/SSS/SHS or higher	5.8	410	4.6	410
Wealth quintile				
Lowest	51.4	645	37.2	645
Second	42.3	593	29.0	593
Middle	25.0	581	17.0	581
Fourth	10.5	588	12.5	588
Highest	2.3	466	1.9	466
Total	27.9	2,874	20.6	2,874

RDT = Rapid diagnostic test.
[1] Excludes children whose mothers were not interviewed.

MALARIA KNOWLEDGE AND MESSAGING 5

Key Findings

Exposure to malaria messages:

- Forty-six percent of women reported having seen or heard general malaria messages.
- Television (38%), radio (33%), and a health worker (26%) are the most common sources of exposure to malaria messages.
- Thirty percent have heard or seen an advertisement in which people were asked to "test first before taking malaria medicines."
- Twenty-eight percent have heard or seen an advertisement by Kwabena Kwabena, a musician, who recommends "everyone should sleep under a treated net."

Knowledge and awareness:

- Eighty-four percent of women age 15-49 reported mosquito bites as the cause of malaria.
- Seventy-seven percent reported the use of a mosquito net as a malaria prevention method.
- Only 55% recognized fever as a symptom of malaria.

Self-reported malaria episodes and care seeking:

- Thirty-four percent of women reported experiencing an episode of malaria in the 12 months before the survey.
- Among women who reported experiencing an episode of malaria in the 12 months before the survey, 85% sought advice or treatment.

This chapter assesses the extent to which malaria communication messages reach women age 15-49 and the channels through which women receive such messages. The chapter also provides data on women's basic knowledge about causes, symptoms, treatment, and prevention of malaria. Using self-report of malaria episodes, the chapter presents malaria prevalence among women age 15-49 over a 12-month period and care seeking behaviour.

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

Exposure of the target population to communication messages is the primary outcome of behaviour change communication. Exposure is the critical first step in increasing knowledge of the malaria prevention methods, as well as attitudes and practices about malaria. The target populations' ability to recall messages about malaria is an indicator of how widely malaria communications have penetrated the target audience.

Women age 15-49 were asked if they had seen or heard any messages about malaria in the 6 months before the survey. Those who had heard or seen malaria messages were asked to indicate the medium from which they saw or heard the messages. Forty-six percent reported that they saw or heard a message on malaria from the various media sources in the 6 months before the survey **(Figure 5.1)**.

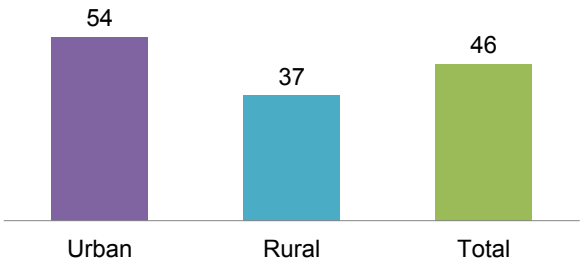
Television (38%), radio (33%), and a health worker (26%) are the most common sources of exposure to malaria messages. In addition, 1 in 5 women age 15-49 saw malaria messages on posters or billboards (**Table 5.1**).

Women age 15-49 were asked if they had seen or heard certain specific messages about malaria in the 6 months before the survey. Forty-one percent indicated that they had seen or heard specific messages about malaria (**Table 5.2**).

"Sleep under an insecticide treated net" (25%) and "malaria kills" (22%) are the most common malaria messages heard or seen from any source.

Figure 5.1 **Reach of behaviour change communication messages**

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



"Me a menya me net, Ntontom mpo suro"[1] music video/song (35%) was the most common message heard or seen on radio or television. Thirty percent have heard or seen an advertisement in which people were asked to "test first before taking malaria medicines" and 28% have heard or seen an advertisement that recommends "everyone should sleep under treated net" by Kwabena, a musician.

Twenty-eight percent of women age 15-49 have seen or heard an advertisement on the use of ACTs or malaria medicines through various media sources (**Table 5.3**).

Patterns by background characteristics

- Fifty-four percent of women in urban areas have been exposed to malaria messages from any source compared with 37% of women in rural areas (**Table 5.1**).
- A higher percentage of women in the Greater Accra (69%) and Upper East (68%) regions have been exposed to malaria messages compared with 21% in the Northern region (**Figure 5.2**).

[1] "I have gotten my net, even mosquito fears."

- Exposure to malaria messages increases with an increase in women's education, from 29% among women with no education to 61% among those with secondary or higher education.
- Exposure to malaria messages increases with an increase in wealth quintile, from 30% among women in the lowest quintile to 64% among those in the highest quintile (**Figure 5.3**).

Figure 5.3 Reach of behaviour change communication messages by household wealth

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

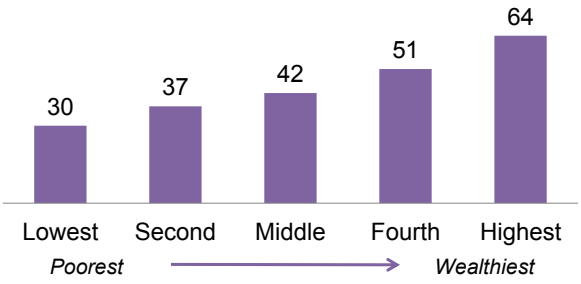
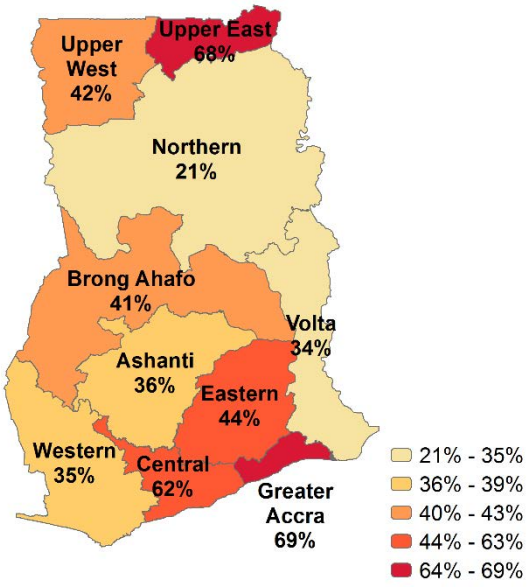


Figure 5.2 Reach of behaviour change communication messages by region

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



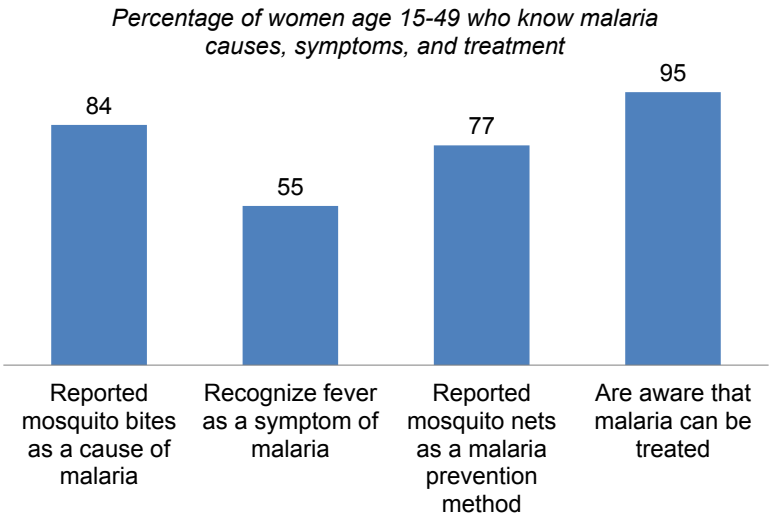
5.2 KNOWLEDGE AND AWARENESS

Perceptions, beliefs, and attitudes about malaria causation, symptom identification, treatment, and prevention influence efforts to address malaria and are often overlooked in malaria control. Understanding who already knows about malaria, malaria prevention, and mosquito avoidance practices and who is at risk of malaria infection are necessary precursors to identifying and targeting vulnerable populations and ensuring the successful implementation and sustainability of malaria control efforts. The failure to consider knowledge, attitudes, and practices about malaria contributes to the inability of programs to achieve sustainable control.

Eighty-four percent of women age 15-49 reported mosquito bites as the cause of malaria, while 77% reported the use of a mosquito net as a malaria prevention method. Ninety-five percent of women age 15-49 are aware that malaria can be treated, although only 55% recognized fever as a symptom of malaria (**Figure 5.4**).

Table 5.4 provides a composite indicator that measures the basic knowledge of malaria causes, symptoms, and prevention method. tBasic knowledge is defined as knowing that mosquito bite is a cause of malaria, fever is a sign or symptom of malaria, and sleeping under a mosquito net can protect against malaria. Overall, 41% of women age 15-49 have basic knowledge of malaria causes, symptoms, and a prevention method.

Figure 5.4 **Knowledge of malaria causes, symptoms, and treatment**



Patterns by background characteristics

- The percentage of women with basic knowledge of malaria causes, symptoms, and a prevention method is lowest in the Western region (28%) and highest in the Northern region (50%) (**Table 5.4**).
- Women with secondary or higher education are more likely (47%) to have basic knowledge of malaria causes, symptoms, and a prevention method compared with women with lower or no education.

5.3 Self-report of Malaria Episodes and Care Seeking

Early diagnosis and appropriate treatment are essential to reducing morbidity and mortality related to malaria. This is always influenced by treatment-seeking behaviour and is related to cultural beliefs about the cause and cure of illness. The choice of treatment source is found to be influenced by accessibility, disease type and severity, the patient's gender, and the parents' educational level. Attitude toward providers is also an important factor. Patients are more likely to begin with self-treatment at home since this allows them to decrease the cost of treatment.

To ensure an efficient malaria control program, it is necessary to evaluate the attitudes and practices of those living in at-risk areas. This will help to identify approaches for involving the full participation of the community in surveillance and control activities such as early, prompt treatment of confirmed cases.

The strategic plan for malaria control in Ghana recommends that all suspected malaria cases are confirmed in accordance with the T3 initiative (Test, Treat, and Track).

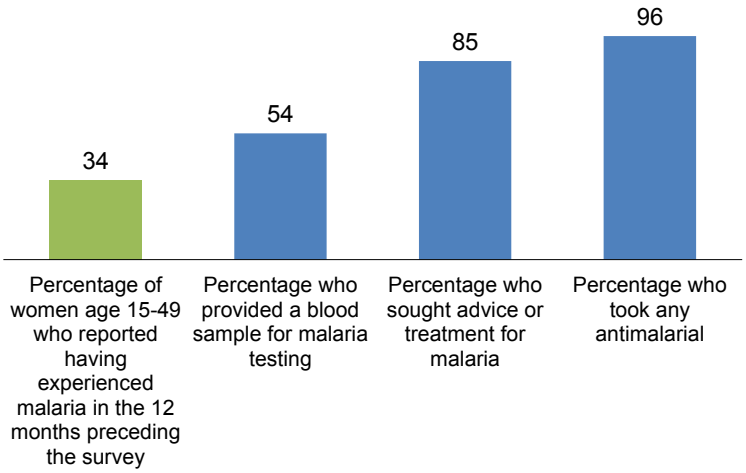
Thirty-four percent of women reported experiencing an episode of malaria in the 12 months before the survey. Among these women, 85% sought advice or treatment. However, only 54% of women who reported experiencing malaria provided a blood sample for malaria testing to confirm the diagnosis. Most (96%) of the women who reported experiencing an episode of malaria in the 12 months before the survey took an antimalarial drug. (**Table 5.5** and **Figure 5.5**).

Among women age 15-49 who sought advice or treatment for malaria and took an antimalarial drug, 36% had not provided a blood sample for malaria testing to confirm the diagnosis (**Figure 5.6**).

Fifty-six percent of women who reported experiencing recent malaria sought advice or treatment from the public sector. Government hospitals (29%) and government health centres (23%) are the main sources of advice or treatment seeking in the public sector. The private sector provides advice or treatment for 46% of women with malaria. Among women in urban areas, 56% sought advice or treatment from the private health sector, compared with 46% who sought advice or treatment from the public health sector. In the rural areas, however, 68% of women sought advice or treatment from the public health sector, compared with 33% from the private health sector (**Table 5.6**).

Figure 5.5 **Self-reported episodes, diagnosis, and treatment of malaria**

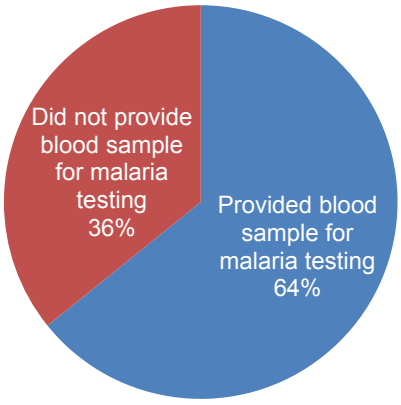
Among women age 15-49 having experienced malaria



According to the results shown in **Table 5.7**, 72% of women with recent malaria who took antimalarial medication took an ACT, either artesunate + amodiaquine (ASAQ), artemether + lumefantrine (AL) or Dihydroartemisinin piperaquine. Artemether + lumefantrine was the most commonly used ACT for treatment (44%).

Figure 5.6 **Malaria testing and treatment**

Percent distribution of women age 15-49 who sought advice or treatment for malaria, and took an antimalarial drug



LIST OF TABLES

For detailed information on malaria, see the following tables:

- **Table 5.1 Exposure to messages on malaria by media source**
- **Table 5.2 Exposure to specific messages and information on malaria**
- **Table 5.3 Exposure to messages on malaria treatment by media source**
- **Table 5.4 Women's knowledge of malaria causes, symptoms, and treatment**
- **Table 5.5 Self-reported episodes, diagnosis, and treatment of malaria**
- **Table 5.6 Source of advice or treatment for malaria in the previous 12 months**
- **Table 5.7 Use of specific antimalarial drugs**

Table 5.1 Exposure to messages on malaria by media source

Percentage of women age 15-49 who, in past 6 weeks, saw or heard a message on malaria through various sources, according to background characteristics, Ghana MIS 2016

	Sources of exposure to malaria messages in the past 6 months												
Background characteristic	Radio	Television	Poster/ billboard	Newspaper/ magazine	Leaflets/ brochure	Health worker	Community health worker	Volunteer/ CBA	Word of mouth	Community event	Other[1]	Percentage of women age 15-49 who, in past 6 weeks, saw or heard a message on malaria	Number of women
Age													
15-19	24.7	31.5	18.5	7.9	5.2	18.2	9.0	6.3	22.2	6.6	3.2	37.1	891
20-24	30.3	37.5	18.2	7.6	5.3	23.5	12.8	6.4	21.6	6.9	0.4	44.3	860
25-29	35.4	42.1	26.9	9.3	11.0	31.5	16.7	11.3	26.4	9.7	0.3	49.1	886
30-34	36.5	44.0	23.4	7.8	7.6	28.9	16.0	12.0	26.7	10.3	0.0	52.0	842
35-39	34.7	37.8	22.0	6.1	5.7	29.2	17.3	9.8	26.2	8.4	0.0	47.3	695
40-44	36.6	36.2	19.8	6.2	3.8	28.5	13.9	10.3	23.2	9.4	0.0	47.4	561
45-49	39.0	34.9	17.2	9.1	8.7	26.4	15.9	10.5	25.0	8.9	0.0	47.0	416
Residence													
Urban	38.6	49.1	27.0	10.7	8.9	29.9	15.3	10.1	29.8	9.2	0.8	54.1	2,768
Rural	26.9	25.1	14.4	4.4	4.3	22.3	13.1	8.5	18.2	7.7	0.5	36.8	2,382
Region													
Western	21.8	27.7	6.6	3.0	3.0	13.2	6.0	2.5	7.7	2.8	0.9	35.1	420
Central	42.2	48.9	27.8	10.6	5.7	36.3	20.8	8.5	26.3	13.1	1.6	61.9	564
Greater Accra	47.5	65.4	38.8	17.5	13.6	33.7	18.3	10.4	38.1	12.8	1.2	68.8	993
Volta	19.8	25.5	10.9	3.5	3.4	21.5	8.4	1.9	14.3	1.6	0.0	33.8	410
Eastern	37.9	36.1	24.9	8.1	6.2	27.1	18.0	17.3	28.7	8.2	0.0	44.3	477
Ashanti	32.3	33.3	17.8	6.5	6.7	23.3	9.8	8.4	18.9	6.8	0.2	36.4	998
Brong Ahafo	31.2	31.0	19.2	2.4	4.9	32.2	12.7	11.8	31.7	9.4	0.1	41.1	436
Northern	12.5	13.8	5.9	2.1	2.7	9.7	5.0	3.8	9.7	5.1	0.3	21.2	520
Upper East	48.3	37.2	26.6	5.1	5.8	44.0	40.3	27.5	50.8	18.2	2.4	67.9	197
Upper West	20.9	19.6	10.5	2.8	9.8	27.3	24.9	15.0	18.5	6.0	0.4	42.3	135
Education													
No education	19.4	17.2	7.3	1.5	1.9	16.8	11.2	7.1	14.9	5.2	0.0	29.1	986
Primary	28.9	29.3	13.1	4.2	3.5	22.1	12.8	7.8	19.1	8.6	0.4	39.8	882
Middle/JSS/JHS	34.5	39.7	23.9	7.1	6.9	27.7	14.4	9.4	26.5	9.0	1.1	47.5	2,010
Secondary/SSS/SHS or higher	44.9	57.6	33.3	16.1	12.7	34.7	17.6	12.0	32.2	10.2	0.7	61.3	1,271
Wealth quintile													
Lowest	21.4	10.1	8.5	1.1	2.5	17.2	14.3	9.3	17.2	5.9	0.5	29.5	834
Second	26.9	25.1	14.5	4.6	4.4	22.2	11.4	7.8	18.5	7.1	0.7	36.9	957
Middle	29.2	35.4	16.4	3.8	3.8	23.2	11.1	6.6	20.9	8.0	0.6	42.0	1,046
Fourth	37.7	47.4	24.6	9.6	8.0	27.3	14.3	9.1	26.4	9.3	0.7	51.1	1,100
Highest	45.6	61.2	36.2	16.5	13.2	37.8	19.4	13.2	35.2	11.2	0.8	63.8	1,213
Total	33.2	38.0	21.2	7.7	6.8	26.4	14.3	9.3	24.4	8.5	0.7	46.1	5,150

CBA = Community based agents.

[1] Other includes school and other.

Table 5.2 Exposure to specific messages and information on malaria

Percentage of women age 15-49 who heard or saw a specific message or information on malaria in the past 6 months, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage of women who, in the past 6 months, heard or saw the information:							Percentage of women who saw or heard any of the 7 specific message or information on malaria in past 6 months	Percentage of women who, in the past 6 months, heard or saw on television or radio:			Percentage of women who, in past 6 months, saw or heard any of the 3 specific message or information on TV or radio	Number of women
	If have fever go to health facility	Sleep under an insecticide treated mosquito net	Pregnant women should take drugs to prevent malaria	SP protects pregnant women and unborn baby from getting malaria	Always test before treating malaria	Treat malaria with ACTs	Malaria kills		"Mea menya me net, Ntontom mpo suro" music video/song	Advert that recommended everyone should sleep under treated net by Kwabena (musician)	Advert where people were asked to test first before taking malaria medicines		
Age													
15-19	5.2	18.8	0.5	0.5	2.7	2.4	17.2	33.1	26.9	19.9	22.7	32.6	891
20-24	6.0	23.1	1.1	0.3	4.4	3.3	21.0	39.6	32.4	26.3	27.2	39.1	860
25-29	6.5	29.3	1.9	1.0	5.4	4.9	22.3	44.8	39.3	31.0	34.5	45.2	886
30-34	6.1	26.0	3.0	1.8	5.5	4.5	22.8	46.0	39.8	33.2	33.9	47.9	842
35-39	5.3	25.7	0.9	0.6	3.0	5.8	23.3	42.4	39.1	27.6	31.8	42.3	695
40-44	6.7	24.6	1.6	0.9	2.2	4.5	23.0	42.1	35.8	28.1	29.4	41.2	561
45-49	6.9	24.3	1.5	0.5	3.0	6.3	22.3	42.0	35.6	25.9	30.0	41.5	416
Residence													
Urban	6.6	27.7	2.1	0.9	5.6	5.5	28.2	49.3	44.1	34.1	37.4	50.3	2,768
Rural	5.3	20.8	0.8	0.8	2.0	3.0	13.6	31.9	25.3	19.7	21.0	30.9	2,382
Region													
Western	3.2	14.8	1.6	1.6	4.1	2.2	16.3	30.1	28.2	22.0	19.3	31.8	420
Central	5.9	32.9	2.0	3.5	3.1	5.8	20.6	50.6	45.9	33.8	33.3	54.2	564
Greater Accra	3.7	30.4	3.0	1.2	8.3	6.6	37.1	60.7	59.5	48.4	53.3	66.0	993
Volta	12.2	13.2	1.1	0.0	4.3	6.5	21.4	32.3	19.0	15.6	24.5	29.3	410
Eastern	5.2	21.3	1.8	0.3	2.4	3.1	27.0	40.2	35.4	19.9	29.2	38.7	477
Ashanti	4.2	20.5	0.8	0.0	3.3	4.7	20.2	34.0	30.3	23.7	22.2	34.7	998
Brong Ahafo	11.3	28.9	0.3	0.1	1.3	1.6	18.1	39.0	28.8	28.6	28.1	36.6	436
Northern	4.8	16.3	0.3	0.1	1.5	0.9	2.7	18.8	12.3	9.9	10.6	15.8	520
Upper East	4.8	49.2	2.2	0.0	0.6	2.6	16.8	62.2	42.9	23.8	32.2	51.4	197
Upper West	18.1	32.8	0.9	1.1	6.4	8.4	6.5	41.0	23.2	24.0	26.5	29.3	135
Education													
No education	5.1	16.7	0.5	0.2	0.9	2.1	10.2	24.6	18.4	12.9	13.1	21.6	986
Primary	4.1	21.2	0.8	0.4	1.8	2.5	17.5	35.2	30.8	24.1	24.1	35.9	882
Middle/JSS/JHS	6.1	23.8	1.3	1.0	3.7	3.3	24.1	42.0	36.6	28.3	31.1	43.0	2,010
Secondary/SSS/SHS or higher	8.0	34.0	3.0	1.4	8.1	9.1	28.8	57.1	49.7	39.7	44.9	57.7	1,271
Wealth quintile													
Lowest	5.1	18.8	0.2	0.1	0.9	2.5	8.1	26.5	14.9	9.1	13.0	19.1	834
Second	5.1	20.2	0.9	0.9	1.7	1.7	15.3	31.5	26.6	21.5	18.4	32.5	957
Middle	6.1	21.8	0.9	0.4	2.6	3.4	20.0	36.6	32.1	22.5	26.0	37.6	1,046
Fourth	5.7	25.4	1.6	0.9	5.2	4.2	26.0	45.9	40.9	30.7	35.9	47.5	1,100
Highest	7.6	33.4	3.3	1.6	7.7	8.6	32.7	58.9	54.3	46.2	48.4	61.1	1,213
Total	6.0	24.5	1.5	0.8	3.9	4.3	21.5	41.2	35.4	27.5	29.9	41.3	5,150

ACT = Artemisinin-based combination therapy

Table 5.3 Exposure to messages on malaria treatment by media source

Percentage of women age 15-49 who, in the past 6 months, have seen or heard an advertisement on the use of ACTs or malaria medicines by media sources, according to background characteristics, Ghana MIS 2016

Background characteristic	Sources of exposure to messages on the use of ACTs/malaria treatment medicines in the past 6 months						Percentage of women who, in past 6 months, saw or heard an advertisement on the use of ACTs or malaria medicines	Number of women
	Television	Radio	Newspaper/ magazine	Poster/ leaflets	Billboard	Other		
Age								
15-19	17.6	6.3	0.2	0.3	0.1	1.6	19.5	891
20-24	18.8	6.7	0.2	0.5	0.6	3.3	24.2	860
25-29	26.5	10.0	0.0	0.8	0.3	3.4	31.7	886
30-34	26.7	10.9	0.0	0.5	0.1	3.6	34.2	842
35-39	22.3	10.6	0.2	1.2	0.2	3.7	29.3	695
40-44	19.6	11.3	0.1	0.8	0.4	3.9	27.9	561
45-49	20.6	13.5	0.0	1.1	0.3	3.6	26.8	416
Residence								
Urban	31.2	11.0	0.2	0.9	0.5	3.0	35.4	2,768
Rural	11.2	7.7	0.1	0.5	0.0	3.5	18.5	2,382
Region								
Western	13.4	3.5	0.6	0.7	0.5	2.0	17.0	420
Central	22.7	15.8	0.2	0.0	1.4	5.1	35.4	564
Greater Accra	48.2	18.1	0.2	0.9	0.4	2.4	52.1	993
Volta	17.5	5.2	0.1	0.9	0.1	2.0	20.6	410
Eastern	15.7	8.0	0.0	0.3	0.0	4.4	22.6	477
Ashanti	15.2	6.9	0.0	0.2	0.0	2.5	18.8	998
Brong Ahafo	16.9	7.5	0.0	0.8	0.0	3.1	21.8	436
Northern	7.4	3.3	0.0	0.3	0.0	1.0	10.0	520
Upper East	17.8	7.9	0.0	0.6	0.0	12.6	33.0	197
Upper West	14.6	8.1	0.0	7.3	0.3	5.5	29.8	135
Education								
No education	7.8	3.5	0.0	0.4	0.1	1.9	12.3	986
Primary	16.5	8.4	0.0	0.1	0.0	2.4	21.0	882
Middle/JSS/JHS	21.5	10.1	0.0	0.3	0.2	3.9	28.2	2,010
Secondary/SSS/SHS or higher	37.4	13.8	0.5	1.8	0.8	3.8	43.1	1,271
Wealth quintile								
Lowest	3.1	5.7	0.0	0.7	0.0	4.4	12.3	834
Second	10.4	6.4	0.1	0.2	0.0	3.7	16.6	957
Middle	17.2	7.5	0.0	0.6	0.3	2.6	22.4	1,046
Fourth	28.8	12.0	0.0	0.7	0.5	2.7	32.8	1,100
Highest	41.8	13.9	0.4	1.2	0.5	3.0	46.5	1,213
Total	21.9	9.5	0.1	0.7	0.3	3.2	27.6	5,150

ACT = Artemisinin-based combination therapy

Table 5.4 Women's knowledge of malaria causes, symptoms, and treatment

Percentage of women age 15-49 who reported mosquito bites as the cause of malaria, percentage who can recognize fever as a sign or symptom of malaria, percentage who reported that sleeping under a mosquito net can protect against malaria, percentage with basic knowledge of malaria causes, symptoms, and prevention method, and percentage of women aware that malaria can be treated, according to background characteristics, Ghana MIS 2016

Background characteristic	Percentage who reported mosquito bites as a cause of malaria	Percentage who recognize fever as a sign or symptom of malaria	Percentage who reported that sleeping under a mosquito net can protect against malaria	Percentage of women with basic knowledge of malaria causes, symptoms, and prevention method[1]	Percent of women respondents aware that malaria can be treated	Number of women
Age						
15-19	80.1	47.7	72.1	34.2	94.5	891
20-24	83.3	54.6	82.1	42.3	95.7	860
25-29	84.6	60.1	78.6	45.9	94.4	886
30-34	84.4	61.2	74.3	44.7	96.1	842
35-39	85.7	57.4	77.5	40.9	94.1	695
40-44	83.4	51.5	72.7	34.8	94.1	561
45-49	85.1	53.5	77.2	39.3	96.3	416
Residence						
Urban	84.0	58.5	74.7	41.3	96.2	2,768
Rural	83.2	51.8	78.6	39.9	93.6	2,382
Region						
Western	73.7	42.4	70.8	27.7	93.5	420
Central	77.7	48.6	71.8	34.6	93.3	564
Greater Accra	83.1	59.2	70.0	42.8	95.5	993
Volta	91.5	51.1	87.6	43.4	96.7	410
Eastern	77.9	58.7	75.9	39.0	96.2	477
Ashanti	87.4	60.1	74.3	42.2	93.3	998
Brong Ahafo	87.6	50.1	81.9	39.5	95.7	436
Northern	90.0	60.7	86.3	49.7	96.6	520
Upper East	78.6	59.6	82.0	44.3	97.0	197
Upper West	82.4	52.5	82.2	40.6	94.6	135
Education						
No education	82.9	51.5	76.9	38.9	93.3	986
Primary	81.5	48.4	71.8	34.7	91.9	882
Middle/JSS/JHS	83.6	54.1	76.3	40.4	95.5	2,010
Secondary/SSS/SHS or Higher	85.7	65.2	79.6	46.6	97.8	1,271
Wealth quintile						
Lowest	83.1	51.9	79.2	40.6	93.7	834
Second	80.8	47.7	76.5	36.8	92.7	957
Middle	85.4	52.8	77.0	39.2	95.9	1,046
Fourth	85.4	58.2	75.4	43.2	94.7	1,100
Highest	83.1	63.4	75.1	42.9	97.2	1,213
Total	83.6	55.4	76.5	40.7	95.0	5,150

[1] Basic knowledge means stating that mosquito bites are a cause of malaria, fever is a sign or symptom of malaria, and sleeping under a mosquito net can protect against malaria.

Table 5.5 Self-reported episodes, diagnosis, and treatment of malaria

Percentage of women age 15-49 who reported having experienced malaria in the 12 months before the survey, and among those who have experienced malaria, percentage who provided a blood sample for malaria testing to confirm the diagnosis, percentage who sought advice or treatment for malaria, and percentage who took any antimalarial, according to background characteristics, Ghana MIS 2016

	Among all women		Among those who reported experiencing malaria in the 12 months before the survey			
Background characteristic	Percentage that reported having experienced an episode of malaria in the 12 months before the survey	Number of women	Percentage who provided a blood sample for malaria testing to confirm the diagnosis	Percentage who sought advice or treatment	Percentage who took any anti-malarial[1]	Number of women
Age						
15-19	25.0	891	59.5	88.1	97.1	223
20-24	36.7	860	49.5	86.2	95.9	316
25-29	33.9	886	55.0	85.4	94.5	300
30-34	34.1	842	56.8	84.2	96.5	287
35-39	40.6	695	53.1	85.0	97.2	282
40-44	35.7	561	50.9	82.9	96.2	200
45-49	37.6	416	57.7	85.7	95.5	156
Residence						
Urban	34.0	2,768	54.6	86.9	95.9	942
Rural	34.5	2,382	54.0	83.6	96.4	823
Region						
Western	36.8	420	63.1	92.0	96.6	154
Central	45.1	564	48.6	79.5	94.8	255
Greater Accra	33.2	993	47.5	84.4	92.7	330
Volta	30.5	410	53.5	84.3	94.9	125
Eastern	34.6	477	50.4	88.1	98.2	165
Ashanti	28.2	998	42.1	73.5	98.7	281
Brong Ahafo	39.3	436	78.1	96.4	96.2	171
Northern	32.2	520	55.4	93.7	98.3	167
Upper East	42.6	197	71.9	87.0	97.2	84
Upper West	23.7	135	80.7	96.6	96.7	32
Education						
No education	31.6	986	54.6	87.9	97.6	312
Primary	34.9	882	50.3	80.8	96.6	308
Middle/JSS/JHS	33.7	2,010	53.4	84.6	95.1	677
Secondary/SSS/SHS or higher	36.9	1,271	58.2	87.7	96.4	469
Wealth quintile						
Lowest	30.7	834	53.9	82.2	96.4	256
Second	33.8	957	48.3	82.7	96.3	324
Middle	38.4	1,046	54.0	87.7	96.2	402
Fourth	34.4	1,100	54.7	84.3	97.2	378
Highest	33.4	1,213	59.5	88.1	94.8	405
Total	34.3	5,150	54.3	85.4	96.1	1,765

[1] Antimalarials were either prescribed or taken without prescription.

Table 5.6 Source of advice or treatment for malaria in the previous 12 months

Percentage of women age 15-49 who reported having received advice or treatment for malaria in the 12 months before the survey, according to source of assistance, Ghana MIS 2016

Source	Percentage of women	Residence		Total
		Urban	Rural	
Public sector	55.7	45.8	67.5	839
Government hospital	29.0	28.9	29.1	437
Government health centre	22.6	15.5	31.0	340
Government health post/CHPS	3.8	0.9	7.2	57
Mobile clinic	0.1	0.1	0.1	2
Fieldworker/CHW	0.2	0.3	0.1	3
Private sector	45.6	56.4	32.6	686
Private hospital/clinic	23.3	30.3	15.0	351
Pharmacy	13.3	18.1	7.5	200
Chemist/drug store	8.7	7.5	10.0	131
Private doctor	0.2	0.3	0.0	2
Fieldworker/CHW	0.2	0.2	0.2	3
Number of women	1,507	819	688	1,507

CHW = Community health worker.

Table 5.7 Use of specific antimalarial drugs

Among women who, in the 12 months before the survey, experienced malaria and took antimalarial drugs, percentage who used specific types of antimalarial drugs, according to background characteristics, Ghana MIS 2016

Background characteristic	Type of antimalarial drugs taken										Number of women
	Any ACT	Artemether-lumefantrine	SP/Fansidar	Chloroquine	Dihydro-artemisinin-Piperaquine	Quinine	Artesunate Amodiaquine	Artemisinin	Herbal medicine	Other antimalarial	
Age											
15-19	74.5	47.8	12.6	0.3	1.1	0.0	26.3	0.5	5.2	1.0	217
20-24	76.7	48.1	15.0	0.0	0.6	0.4	28.2	0.3	3.9	1.9	303
25-29	73.6	44.1	11.5	0.0	0.3	1.0	29.9	0.5	7.4	0.2	284
30-34	68.6	39.8	13.2	0.0	0.1	0.0	28.7	0.5	9.9	0.6	277
35-39	67.9	38.8	19.2	0.3	1.1	0.0	28.1	0.0	4.5	0.6	274
40-44	72.7	42.8	12.6	0.0	1.6	0.0	29.4	1.9	10.8	0.0	193
45-49	72.4	44.2	9.6	0.4	0.7	0.0	28.2	0.0	9.6	1.4	149
Residence											
Urban	76.5	47.8	11.9	0.0	1.1	0.4	28.1	0.4	6.9	0.8	904
Rural	67.6	38.8	15.9	0.2	0.4	0.1	28.9	0.6	7.1	0.8	793
Region											
Western	78.6	48.2	12.1	0.5	0.0	0.0	30.5	0.3	1.9	0.0	149
Central	67.2	40.1	13.0	0.0	0.4	0.0	27.1	0.0	13.4	0.8	241
Greater Accra	77.2	55.4	8.7	0.0	1.0	0.0	21.2	0.4	10.8	0.0	305
Volta	83.5	50.7	6.9	1.0	0.0	0.0	33.7	2.2	5.1	1.1	119
Eastern	77.1	45.2	9.3	0.0	0.0	0.0	32.5	0.0	6.6	0.6	162
Ashanti	68.6	49.0	12.5	0.0	1.8	0.0	17.9	0.8	8.7	2.7	278
Brong Ahafo	74.5	39.5	13.2	0.0	1.5	1.9	34.0	0.9	3.7	0.5	165
Northern	61.1	20.8	32.6	0.0	0.5	0.0	41.0	0.0	0.7	0.0	165
Upper East	58.1	29.2	26.1	0.0	0.0	0.7	29.4	0.0	2.4	0.0	82
Upper West	85.5	28.1	7.8	0.0	1.9	0.5	55.4	1.3	2.7	3.9	31
Education											
No education	58.4	29.9	26.2	0.0	0.3	0.8	28.2	1.2	4.3	0.3	305
Primary	72.5	42.2	11.9	0.0	0.8	0.2	30.6	0.6	9.2	0.3	297
Middle/JSS/JHS	71.6	42.6	11.8	0.2	0.7	0.0	28.7	0.2	9.0	1.0	643
Secondary/SSS/SHS or Higher	82.8	55.2	9.3	0.1	1.1	0.2	26.9	0.3	4.6	1.2	452
Wealth quintile											
Lowest	58.1	27.8	22.3	0.0	1.5	0.1	29.3	0.4	10.2	0.6	247
Second	72.0	40.8	15.3	0.4	0.5	0.1	31.6	0.8	5.4	0.6	312
Middle	68.9	43.1	10.3	0.0	0.0	0.0	26.1	0.7	9.3	1.1	386
Fourth	75.5	43.1	15.0	0.0	0.3	0.6	32.6	0.2	6.4	1.4	368
Highest	82.2	57.1	9.2	0.2	1.6	0.3	23.8	0.4	4.5	0.3	384
Total	72.3	43.6	13.7	0.1	0.8	0.2	28.5	0.5	7.0	0.8	1,697

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SAMPLE DESIGN

APPENDIX A

A.1 INTRODUCTION

The 2016 Ghana Malaria Indicator Survey (GMIS 2016) was the first independent Malaria Indicator Survey conducted in Ghana. In 2008 and 2014, Ghana implemented DHS surveys that included the primary malaria indicators. The 2016 GMIS used a nationally representative sample of 200 clusters and about 6 000 households. The survey was designed to provide information on key malaria control indicators such as the proportion of households with at least one long-lasting insecticidal net (LLIN); the proportion of children under age 5 who slept under a net the previous night and under a LLIN; the proportion of pregnant women who slept under an LLIN the previous night and the proportion of pregnant women who received intermittent preventive treatment (IPT) for malaria during their last pregnancy; and on the prevalence of anemia and malaria parasitemia among children under age 5.

The survey was designed to provide estimates of key malaria indicators for the country as a whole, urban and rural areas separately, and each of the 10 administrative regions (Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East and Upper West).

A.2 SAMPLE FRAME

The sampling frame used for the 2016 GMIS is the frame of the Population and Housing Census (PHC) conducted in Ghana in 2010, provided by the Ghana Statistical Service (GSS), with updated information on identification of the 216 administrative districts defined after the census. The census frame is a complete list of all census enumeration areas (EAs) created for the PHC 2010. Ghana is administratively divided into ten geographical regions, with each region sub-divided into a number of districts. In total, there are 216 districts in Ghana.

Table A.1 provides the population distribution by region and type of residence. The size of the regions in number of population varies greatly from 2.8% for the Upper West region, to 19.4% for the Ashanti region. The urbanization of the regions also varies greatly, with the Greater Accra region 90.5% urban, to the Upper West region, where the urban area represents only 16.3%. In Ghana, 50.9% of the population lives in urban areas.

Table A.1 Distribution of residential population by region and type of residence

Distribution of residential population in the sampling frame and the percentage that each region contributes to the total number of population and percentage of each region that is urban, Ghana MIS 2016

	Number of residential population			Percentage region contributes to the total number of population	Percentage of region that is urban
Region	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 by region and residence type. 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 the households live in urban areas.

Table A.2 Distribution of residential households by region and type of residence

Distribution of residential households in the sampling frame and the percentage that each region contributes to the total number of households and percentage of each region that is urban, Ghana MIS 2016

	Number of residential households			Percentage region contributes to the total number households	Percentage of region that is 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 37,675 EAs, with 16,503 in urban areas and 21,172 in rural areas. The average EA size is 145 households. The urban EAs have a slightly larger size, with an average of 185 households per EA, while the rural EAs are smaller with an average of 114 households per EA. The EA size is adequate for the primary sampling unit (PSU) with a sample take of 30 households per EA.

Table A.3 Enumeration areas and households

Distribution of enumeration areas (EAs) and the average number of households in a EA by region, according to residence, Ghana MIS 2016

	Number of EAs			Average EA size		
Region	Urban	Rural	Total	Urban	Rural	Total
Western	1239	2300	3539	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 ALLOCATION AND SAMPLING PROCEDURES

The sample for the 2016 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, by a two-stage selection. In the first stage, 200 EAs were selected with probability proportional to size (PPS) selection procedure according to the sample allocation given in **Table A.4**. The EA size is the number of residential

households in the EA censured in 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 of the explicit stratum, and by using a probability proportional to size selection procedure.

Table A.4 Sample allocation of clusters and households

Number of clusters and households allocated by region according to residence, Ghana MIS 2016

	Number of clusters allocated			Number of households allocated		
Region	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**	**2910**	**3090**	**6000**

After the selection of EAs and before the main survey, a household listing operation was conducted in all of the selected EAs. The household listing operation consists 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 households. The resulting list of households served as sampling frame for the selection of households in the second stage. Some of the selected EAs are large. To reduce the workload during the household listing, 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 the segment size. Household listing was conducted only in the selected segment. Thus, a GMIS 2016 cluster is either an EA or a segment of an EA.

In the second stage of selection, a fixed number of 30 households were selected in each cluster, by an equal probability systematic sampling based on the newly updated household listing. A spreadsheet that indicated the selected household numbers for each cluster was prepared. The survey interviewers were asked to interview 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.4 presents the sample allocation of EAs and households by region and type of residence. The sample allocation of EAs and households were converted to women and children under age 5 allocations by taking into account non-response and the average number of women 15-49 and children under 5 per household. **Table A.5** shows the sample allocation of expected number of women interviews and expected number of children under age 5 included in the survey. The sample allocation features a power allocation with a small adjustment because a proportional allocation would result in a very small sample size for the small regions such as the Upper East and Upper West regions.

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

Sample allocation of number of women age 15-49 expected to be interviewed and expected number of children under age 5 by region according to residence, Ghana MIS 2016

	Number of women expected to be interviewed			Expected number of children under age 5		
Region	Urban	Rural	Total	Urban	Rural	Total
Western	198	241	439	115	139	254
Central	220	241	461	127	139	266
Greater Accra	484	44	528	280	25	305
Volta	154	286	440	89	165	254
Eastern	220	241	461	127	139	266
Ashanti	351	198	549	203	115	318
Brong Ahafo	220	220	440	127	127	254
Northern	131	264	395	76	153	229
Upper East	89	264	353	51	153	204
Upper West	66	264	330	38	153	191
Ghana	**2133**	**2263**	**4396**	**1233**	**1308**	**2541**

The parameters used in the sample calculation came from the previous DHS conducted in Ghana in 2014 (2014 GDHS). The 2014 GDHS showed that there were an average of 0.82 women 15-49 per household and women's response rate was 97.3%. Household completion rate was 92.2%. On average, there were 0.5 children under 5 per household.

A.4 SAMPLE PROBABILITIES AND SAMPLING WEIGHTS

Due to the nonproportional allocation of the sample across districts and the differential response rates, sampling weights must be used in all analyses of the 2016 GMIS results to ensure that survey results are representative at the national and domain levels. Since the 2016 GMIS sample is a two-stage stratified cluster sample, sampling weights are based on sampling probabilities calculated separately for each sampling stage and for each cluster where:

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

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

The following describes the calculation of these probabilities:

Let a_h be the number of clusters selected in stratum h, M_{hi} the number of households according to the sampling frame in the i^{th} cluster, and $\sum M_{hi}$ the total number of households in the stratum. The probability of selecting the i^{th} cluster in stratum h in the 2016 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 segment compared with the total number of households in cluster i in stratum h if the cluster 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* in the 2016 GMIS is therefore the product of the two stages' selection probabilities:

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

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

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

A spreadsheet with all the sampling parameters and selection probabilities was prepared to facilitate the calculation of the design weights. Design weights were adjusted for household non-response and individual non-response to obtain the sampling weights, for households and women, respectively. The differences of the household sampling weights and the women's individual sampling weights are introduced by individual non-response. The final sampling weights were normalized in order to achieve the total number of un-weighted cases equal to the total number of weighted cases at national level, for both household weights and the women's individual weights, respectively. The normalized weights are relative weights, which are valid for estimating means, proportions, and ratios, but are not valid for estimating population totals and pooled data. No weights were calculated for children under age 5. For the biomarker indicators for children under age 5, the household weight was applied. For the prevalence of fever and the treatment fever, the child's mother's weight was applied.

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

A.5 SURVEY IMPLEMENTATION

An examination of response rates for the 2016 GMIS indicates that the survey was successfully implemented. **Table A.5** present interview completion rates for household and individual women in the 2016 GMIS by urban and rural areas, and region. The rates of completed household and women interviews are generally higher than expected and the average number of women per household slightly higher than in the 2014 GDHS.

Table A.6 Sample implementation

Percent distribution of households and eligible women by results of the household and individual interviews and household, eligible women and overall women response rates, according to urban-rural residence and region (unweighted), Ghana MIS 2016

	Residence		Region										
Result	Urban	Rural	Western	Central	Greater Accra	Volta	Eastern	Ashanti	Brong Ahafo	Northern	Upper East	Upper West	Total
Selected households													
Completed (C)	96.7	97.9	95.3	94.1	95.7	98.5	95.4	98.9	97.8	99.1	99.6	100.0	97.3
Household present but no competent respondent at home (HP)	1.4	0.8	2.0	3.3	1.5	0.5	1.1	0.0	1.7	0.2	0.0	0.0	1.1
Refused (R)	0.5	0.1	1.0	0.2	1.2	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.3
Dwelling not found (DNF)	0.1	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Household absent (HA)	0.8	1.1	1.5	1.9	0.4	0.2	2.5	0.9	0.3	0.7	0.4	0.0	0.9
Dwelling vacant/address not a dwelling (DV)	0.4	0.2	0.2	0.5	1.0	0.0	0.9	0.1	0.0	0.0	0.0	0.0	0.3
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	3,091	600	630	721	600	632	750	600	540	480	450	6,003
Household response rate (HRR)[1]	97.9	99.1	96.9	96.4	97.0	98.7	98.9	100.0	98.2	99.8	100.0	100.0	98.5
Eligible women													
Completed (EWC)	98.9	99.6	98.9	99.8	97.2	99.8	98.3	99.8	99.8	100.0	99.4	100.0	99.3
Not at home (EWNH)	0.7	0.3	1.1	0.2	1.7	0.2	1.3	0.2	0.2	0.0	0.2	0.0	0.5
Refused (EWR)	0.3	0.0	0.0	0.0	0.9	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
Incapacitated (EWI)	0.1	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.1
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	2,395	2,791	456	503	576	554	473	564	501	591	531	437	5,186
Eligible women response rate (EWRR)[2]	98.9	99.6	98.9	99.8	97.2	99.8	98.3	99.8	99.8	100.0	99.4	100.0	99.3
Overall women response rate (ORR)[3]	96.8	98.8	95.9	96.2	94.4	98.5	97.2	99.8	98.0	99.8	99.4	100.0	97.8

[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: (1) nonsampling errors and (2) sampling errors. Nonsampling errors result from mistakes made in implementing data collection and data processing, such as the failure to locate and interview the selected households, misunderstanding of the questions by interviewers or respondents, and data entry errors. Although numerous efforts were made during the implementation of the 2016 GMIS to minimize nonsampling errors, they are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected for the 2016 GMIS is one of many samples that could have been selected from the same population, with the same design and identical size. Each of these samples would yield results that differ somewhat from the results of the actual sample. Sampling error is a measure of the variability between all possible samples. The exact degree of variability is unknown, but can be estimated from the survey results.

A sampling error is usually measured in terms of the *standard error* for a particular statistic (such as the mean or percentage), 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 were selected as a simple random sample, it would have been possible to use straightforward formulas for calculating sampling errors. However, the 2016 GMIS sample is the result of a multi-stage, stratified design. Consequently, it was necessary to use more complex formulae. The computer software used to calculate sampling errors for the 2016 GMIS is a SAS program that used the Taylor linearization method for variance estimation for survey estimates that are means or proportions.

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 with the formula below, with the standard error being the square root of the variance:

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

in which

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

where h represents the stratum which varies from 1 to H
m_h is the total number of clusters selected in the h^{th} stratum
y_{hi} is the sum of the weighted values of variable y in the i^{th} cluster in the h^{th} stratum
x_{hi} is the sum of the weighted number of cases in the i^{th} cluster in the h^{th} stratum
f_h is the sampling fraction of PSU in the h^{th} stratum which is small and ignored

In addition to the standard error, the program computes the design effect (DEFT) for each estimate, which is defined as the ratio between the standard error that uses 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. A value greater than 1.0 indicates that the increase in the sampling error is due to the use of a more complex, less statistically efficient design, such as multistage and cluster selection. The program also computes the relative standard error and the confidence limits for the estimates.

Sampling errors for the 2016 GMIS are calculated for selected variables of primary interest for households, children under age 5, and pregnant women, respectively. The results are presented in this appendix for the country as a whole, urban and rural areas separately, and each of the ten regions. For each variable, the type of statistic (mean, proportion, or rate) and the base population are provided in Table B.1. Tables B.2 to B.14 present the value of the statistic (R), its standard error (SE), the number of unweighted (N-UNWE) and weighted (N-WEIG) cases, the design effect (DEFT), the relative standard error (SE/R), and the 95% confidence limits (R±2SE) for each variable. The DEFT is considered undefined when the standard error for the simple random sample is zero (when the estimate is close to 0 or 1). In the case of the total fertility rate, the number of unweighted cases is not relevant, since there is no known unweighted value for woman-years of exposure to childbearing.

The confidence interval (as calculated for the average number of mosquito nets per household) can be interpreted as the overall average from the total sample at 1.66, with its standard error at 0.04. Therefore, to obtain the 95% confidence limits, twice the standard error is added or subtracted to the sample estimate, i.e., 1.66±2×0.04. There is a high probability (95%) that the *true* average number of mosquito nets per household falls between 1.58 and 1.74.

For the total sample, the value of the design effect (DEFT), averaged over all variables, is 1.769**. T**his means that, due to multistage and clustering of the sample, the average standard error increases by a factor of 1.769 above that in an equivalent simple random sample.

Table B.1 List of indicators for sampling errors, Ghana MIS 2016

Variable	Type of Estimate	Base Population
HOUSEHOLDS		
Ownership of at least one mosquito net of any type	Proportion	All households
Number of any mosquito nets	Mean	All households
Ownership of at least one LLIN	Proportion	All households
Number of LLIN	Mean	All households
Ownership of at least one LLIN for two persons	Proportion	Households with at least one LLIN
CHILDREN		
Slept under any mosquito net last night	Proportion	All children under age 5
Slept under an LLIN last night	Proportion	All children under age 5
Slept under an LLIN last night in household with at least one LLIN	Proportion	Children under age 5 in households with at least one LLIN
Had fever in last 2 weeks	Proportion	All children under age 5
Had a haemoglobin level less than 8 g/dl	Proportion	Children under age 5 who were tested
Has malaria (based on rapid test)	Proportion	Children under age 5 who were tested
Has malaria (based on microscopy test)	Proportion	Children under age 5 who were tested
PREGNANT WOMEN		
Slept under any mosquito net last night	Proportion	Pregnant women age 15-49
Slept under an LLIN last night	Proportion	Pregnant women age 15-49
Slept under an LLIN last night in household with at least one LLIN	Proportion	Pregnant women age 15-49 in households with at least one LLIN
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	Proportion	Women age 15-49 with a live birth in the 2 years preceding the survey
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	Proportion	Women age 15-49 with a live birth in the 2 years preceding the survey

Table B.2 Sampling errors: Total sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.739	0.010	5,841	5,841	1.760	0.014	0.719	0.760
Number of any mosquito nets	1.660	0.040	5,841	5,841	1.991	0.024	1.581	1.739
Ownership of at least one LLIN	0.730	0.011	5,841	5,841	1.885	0.015	0.708	0.752
Number of LLIN	1.628	0.040	5,841	5,841	2.012	0.024	1.548	1.707
Ownership of at least one LLIN for two persons	0.509	0.014	5,774	5,770	2.115	0.027	0.481	0.536
CHILDREN								
Slept under any mosquito net last night	0.528	0.016	3,429	3,234	1.492	0.031	0.496	0.561
Slept under an LLIN last night	0.522	0.016	3,429	3,234	1.486	0.031	0.490	0.554
Slept under an LLIN last night in household with at least one LLIN	0.620	0.017	2,957	2,723	1.473	0.027	0.586	0.654
Had fever in last 2 weeks	0.302	0.013	3,145	3,121	1.465	0.043	0.276	0.328
Had a haemoglobin level less than 8 g/dl	0.069	0.008	3,047	2,874	1.590	0.114	0.053	0.085
Has malaria (based on rapid test)	0.279	0.021	3,047	2,874	2.165	0.075	0.237	0.320
Has malaria (based on microscopy test)	0.206	0.017	3,047	2,874	2.035	0.084	0.172	0.241
PREGNANT WOMEN								
Slept under any mosquito net last night	0.502	0.039	351	353	1.472	0.078	0.423	0.580
Slept under an LLIN last night	0.500	0.039	351	353	1.471	0.078	0.421	0.578
Slept under an LLIN last night in household with at least one LLIN	0.593	0.039	304	297	1.387	0.067	0.514	0.672
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.853	0.026	1,291	1,285	2.597	0.030	0.801	0.904
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.780	0.023	1,291	1,285	1.990	0.029	0.734	0.826

Table B.3 Sampling errors: Urban sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.661	0.014	2,815	3,195	1.540	0.021	0.634	0.689
Number of any mosquito nets	1.391	0.045	2,815	3,195	1.657	0.033	1.301	1.482
Ownership of at least one LLIN	0.652	0.015	2,815	3,195	1.695	0.023	0.622	0.683
Number of LLIN	1.363	0.046	2,815	3,195	1.697	0.034	1.271	1.456
Ownership of at least one LLIN for two persons	0.458	0.019	2,772	3,151	2.029	0.042	0.419	0.496
CHILDREN								
Slept under any mosquito net last night	0.413	0.023	1,309	1,466	1.373	0.055	0.368	0.459
Slept under an LLIN last night	0.408	0.023	1,309	1,466	1.377	0.056	0.362	0.453
Slept under an LLIN last night in household with at least one LLIN	0.519	0.025	1,026	1,151	1.334	0.048	0.469	0.570
Had fever in last 2 weeks	0.276	0.016	1,209	1,418	1.153	0.057	0.244	0.308
Had a haemoglobin level less than 8 g/dl	0.041	0.013	1,145	1,276	1.965	0.308	0.016	0.066
Has malaria (based on rapid test)	0.128	0.019	1,145	1,276	1.661	0.146	0.091	0.166
Has malaria (based on microscopy test)	0.112	0.016	1,145	1,276	1.539	0.140	0.080	0.143
PREGNANT WOMEN								
Slept under any mosquito net last night	0.395	0.063	143	167	1.565	0.159	0.269	0.520
Slept under an LLIN last night	0.390	0.063	143	167	1.569	0.161	0.264	0.516
Slept under an LLIN last night in household with at least one LLIN	0.489	0.068	112	133	1.490	0.140	0.353	0.626
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.899	0.019	492	577	1.414	0.021	0.861	0.938
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.826	0.023	492	577	1.358	0.028	0.779	0.872

Table B.4 Sampling errors: Rural sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.834	0.011	3,026	2,646	1.683	0.014	0.811	0.857
Number of any mosquito nets	1.985	0.062	3,026	2,646	2.222	0.031	1.861	2.108
Ownership of at least one LLIN	0.824	0.012	3,026	2,646	1.752	0.015	0.799	0.848
Number of LLIN	1.947	0.061	3,026	2,646	2.190	0.031	1.825	2.069
Ownership of at least one LLIN for two persons	0.570	0.018	3,002	2,619	1.938	0.031	0.535	0.605
CHILDREN								
Slept under any mosquito net last night	0.623	0.026	2,120	1,768	1.945	0.042	0.571	0.676
Slept under an LLIN last night	0.617	0.026	2,120	1,768	1.932	0.042	0.565	0.669
Slept under an LLIN last night in household with at least one LLIN	0.694	0.025	1,931	1,572	1.838	0.036	0.644	0.743
Had fever in last 2 weeks	0.324	0.020	1,936	1,703	1.801	0.063	0.283	0.364
Had a haemoglobin level less than 8 g/dl	0.091	0.011	1,902	1,598	1.554	0.118	0.070	0.113
Has malaria (based on rapid test)	0.399	0.039	1,902	1,598	2.987	0.098	0.321	0.476
Has malaria (based on microscopy test)	0.282	0.032	1,902	1,598	2.722	0.114	0.218	0.346
PREGNANT WOMEN								
Slept under any mosquito net last night	0.598	0.049	208	186	1.462	0.082	0.499	0.696
Slept under an LLIN last night	0.598	0.049	208	186	1.462	0.082	0.499	0.696
Slept under an LLIN last night in household with at least one LLIN	0.676	0.044	192	164	1.284	0.065	0.588	0.764
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.815	0.041	799	708	2.931	0.050	0.734	0.896
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.743	0.034	799	708	2.165	0.045	0.676	0.810

Table B.5 Sampling errors: Western sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.691	0.032	572	482	1.637	0.046	0.628	0.755
Number of any mosquito nets	1.496	0.092	572	482	1.441	0.061	1.313	1.680
Ownership of at least one LLIN	0.669	0.033	572	482	1.650	0.049	0.604	0.734
Number of LLIN	1.460	0.088	572	482	1.380	0.061	1.284	1.637
Ownership of at least one LLIN for two persons	0.461	0.028	561	472	1.321	0.060	0.406	0.517
CHILDREN								
Slept under any mosquito net last night	0.455	0.059	274	241	1.609	0.130	0.336	0.574
Slept under an LLIN last night	0.455	0.059	274	241	1.609	0.130	0.336	0.574
Slept under an LLIN last night in household with at least one LLIN	0.582	0.060	214	189	1.438	0.103	0.462	0.702
Had fever in last 2 weeks	0.359	0.026	252	237	0.789	0.071	0.308	0.410
Had a haemoglobin level less than 8 g/dl	0.039	0.017	246	213	1.394	0.431	0.005	0.073
Has malaria (based on rapid test)	0.381	0.050	246	213	1.468	0.132	0.280	0.481
Has malaria (based on microscopy test)	0.235	0.047	246	213	1.639	0.198	0.142	0.328
PREGNANT WOMEN								
Slept under any mosquito net last night	0.242	0.092	21	23	1.122	0.379	0.058	0.426
Slept under an LLIN last night	0.242	0.092	21	23	1.122	0.379	0.058	0.426
Slept under an LLIN last night in household with at least one LLIN	0.399	0.111	13	14	0.925	0.278	0.177	0.621
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.882	0.023	104	101	0.716	0.026	0.836	0.927
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.773	0.042	104	101	1.018	0.054	0.689	0.857

Table B.6 Sampling errors: Central sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.843	0.025	593	646	1.639	0.029	0.794	0.892
Number of any mosquito nets	2.001	0.146	593	646	2.280	0.073	1.709	2.293
Ownership of at least one LLIN	0.828	0.028	593	646	1.780	0.033	0.773	0.883
Number of LLIN	1.955	0.150	593	646	2.318	0.077	1.656	2.254
Ownership of at least one LLIN for two persons	0.617	0.042	589	643	2.111	0.069	0.533	0.702
CHILDREN								
Slept under any mosquito net last night	0.619	0.066	286	310	1.937	0.106	0.487	0.751
Slept under an LLIN last night	0.612	0.068	286	310	1.987	0.111	0.477	0.748
Slept under an LLIN last night in household with at least one LLIN	0.666	0.062	255	285	1.814	0.094	0.542	0.791
Had fever in last 2 weeks	0.439	0.034	259	294	1.023	0.078	0.371	0.508
Had a haemoglobin level less than 8 g/dl	0.140	0.039	258	281	1.805	0.279	0.062	0.218
Has malaria (based on rapid test)	0.446	0.044	258	281	1.310	0.098	0.359	0.534
Has malaria (based on microscopy test)	0.302	0.036	258	281	1.202	0.119	0.230	0.374
PREGNANT WOMEN								
Slept under any mosquito net last night	0.582	0.118	35	43	1.501	0.203	0.345	0.818
Slept under an LLIN last night	0.582	0.118	35	43	1.501	0.203	0.345	0.818
Slept under an LLIN last night in household with at least one LLIN	0.666	0.109	29	37	1.355	0.164	0.448	0.885
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.930	0.023	113	131	0.969	0.025	0.883	0.977
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.845	0.029	113	131	0.853	0.034	0.787	0.903

Table B.7 Sampling errors: Greater Accra sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.617	0.027	690	1,177	1.483	0.045	0.562	0.672
Number of any mosquito nets	1.216	0.075	690	1,177	1.484	0.062	1.066	1.366
Ownership of at least one LLIN	0.609	0.032	690	1,177	1.718	0.053	0.545	0.673
Number of LLIN	1.199	0.081	690	1,177	1.598	0.067	1.037	1.361
Ownership of at least one LLIN for two persons	0.419	0.038	674	1,151	1.987	0.090	0.343	0.494
CHILDREN								
Slept under any mosquito net last night	0.326	0.030	290	490	0.884	0.092	0.266	0.386
Slept under an LLIN last night	0.326	0.030	290	490	0.884	0.092	0.266	0.386
Slept under an LLIN last night in household with at least one LLIN	0.418	0.040	227	383	1.007	0.097	0.337	0.499
Had fever in last 2 weeks	0.238	0.025	279	506	0.919	0.105	0.188	0.288
Had a haemoglobin level less than 8 g/dl	0.013	0.008	244	406	1.152	0.655	0.000	0.029
Has malaria (based on rapid test)	0.046	0.022	244	406	1.632	0.477	0.002	0.090
Has malaria (based on microscopy test)	0.048	0.013	244	406	0.945	0.266	0.023	0.074
PREGNANT WOMEN								
Slept under any mosquito net last night	0.366	0.138	27	49	1.536	0.378	0.089	0.642
Slept under an LLIN last night	0.366	0.138	27	49	1.536	0.378	0.089	0.642
Slept under an LLIN last night in household with at least one LLIN	0.419	0.151	22	43	1.524	0.359	0.118	0.720
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.874	0.044	116	207	1.417	0.050	0.785	0.962
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.787	0.045	116	207	1.177	0.057	0.697	0.877

Table B.8 Sampling errors: Volta sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.778	0.024	591	423	1.423	0.031	0.729	0.827
Number of any mosquito nets	1.892	0.102	591	423	1.527	0.054	1.688	2.095
Ownership of at least one LLIN	0.761	0.023	591	423	1.308	0.030	0.715	0.807
Number of LLIN	1.812	0.098	591	423	1.487	0.054	1.616	2.009
Ownership of at least one LLIN for two persons	0.523	0.036	585	418	1.760	0.070	0.451	0.596
CHILDREN								
Slept under any mosquito net last night	0.548	0.037	377	252	1.125	0.068	0.474	0.622
Slept under an LLIN last night	0.525	0.036	377	252	1.109	0.069	0.452	0.598
Slept under an LLIN last night in household with at least one LLIN	0.658	0.031	298	201	0.944	0.047	0.596	0.720
Had fever in last 2 weeks	0.210	0.035	351	246	1.382	0.166	0.140	0.280
Had a haemoglobin level less than 8 g/dl	0.087	0.018	330	217	1.026	0.206	0.051	0.123
Has malaria (based on rapid test)	0.373	0.085	330	217	2.552	0.228	0.203	0.543
Has malaria (based on microscopy test)	0.275	0.042	330	217	1.526	0.153	0.191	0.359
PREGNANT WOMEN								
Slept under any mosquito net last night	0.563	0.115	27	19	1.205	0.204	0.333	0.792
Slept under an LLIN last night	0.563	0.115	27	19	1.205	0.204	0.333	0.792
Slept under an LLIN last night in household with at least one LLIN	0.627	0.119	24	17	1.211	0.189	0.389	0.865
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.836	0.058	159	110	1.935	0.069	0.721	0.951
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.751	0.059	159	110	1.704	0.078	0.633	0.869

Table B.9 Sampling errors: Eastern sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.727	0.020	603	574	1.107	0.028	0.687	0.768
Number of any mosquito nets	1.440	0.064	603	574	1.156	0.044	1.312	1.567
Ownership of at least one LLIN	0.716	0.020	603	574	1.091	0.028	0.676	0.757
Number of LLIN	1.412	0.061	603	574	1.110	0.043	1.290	1.534
Ownership of at least one LLIN for two persons	0.446	0.022	599	571	1.086	0.049	0.402	0.490
CHILDREN								
Slept under any mosquito net last night	0.496	0.041	278	264	1.170	0.082	0.414	0.578
Slept under an LLIN last night	0.482	0.041	278	264	1.169	0.085	0.400	0.564
Slept under an LLIN last night in household with at least one LLIN	0.594	0.048	231	214	1.302	0.081	0.498	0.690
Had fever in last 2 weeks	0.318	0.051	256	259	1.651	0.159	0.217	0.419
Had a haemoglobin level less than 8 g/dl	0.086	0.019	236	224	1.039	0.221	0.048	0.124
Has malaria (based on rapid test)	0.346	0.049	236	224	1.470	0.142	0.248	0.444
Has malaria (based on microscopy test)	0.313	0.051	236	224	1.520	0.163	0.211	0.415
PREGNANT WOMEN								
Slept under any mosquito net last night	0.409	0.107	25	24	1.092	0.263	0.194	0.623
Slept under an LLIN last night	0.409	0.107	25	24	1.092	0.263	0.194	0.623
Slept under an LLIN last night in household with at least one LLIN	0.513	0.120	21	19	1.069	0.233	0.274	0.752
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.934	0.027	99	100	1.091	0.029	0.879	0.989
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.892	0.033	99	100	1.055	0.037	0.826	0.958

Table B.10 Sampling errors: Ashanti sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.702	0.021	742	1,278	1.231	0.030	0.660	0.743
Number of any mosquito nets	1.439	0.061	742	1,278	1.223	0.042	1.317	1.560
Ownership of at least one LLIN	0.697	0.022	742	1,278	1.288	0.031	0.654	0.741
Number of LLIN	1.411	0.060	742	1,278	1.233	0.043	1.291	1.532
Ownership of at least one LLIN for two persons	0.472	0.032	738	1,267	1.748	0.068	0.407	0.536
CHILDREN								
Slept under any mosquito net last night	0.517	0.035	389	705	1.134	0.068	0.446	0.587
Slept under an LLIN last night	0.512	0.035	389	705	1.140	0.069	0.441	0.583
Slept under an LLIN last night in household with at least one LLIN	0.637	0.036	300	566	1.070	0.057	0.564	0.710
Had fever in last 2 weeks	0.347	0.031	342	647	1.195	0.089	0.285	0.409
Had a haemoglobin level less than 8 g/dl	0.037	0.024	356	656	2.154	0.646	0.000	0.085
Has malaria (based on rapid test)	0.179	0.042	356	656	1.743	0.236	0.094	0.264
Has malaria (based on microscopy test)	0.166	0.030	356	656	1.380	0.183	0.105	0.226
PREGNANT WOMEN								
Slept under any mosquito net last night	0.462	0.101	37	77	1.357	0.220	0.259	0.665
Slept under an LLIN last night	0.462	0.101	37	77	1.357	0.220	0.259	0.665
Slept under an LLIN last night in household with at least one LLIN	0.565	0.099	30	63	1.209	0.176	0.366	0.763
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.854	0.037	125	238	1.150	0.043	0.781	0.927
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.796	0.044	125	238	1.208	0.055	0.709	0.884

Table B.11 Sampling errors: Brong Ahafo sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.812	0.018	587	490	1.126	0.022	0.775	0.848
Number of any mosquito nets	1.708	0.082	587	490	1.415	0.048	1.543	1.872
Ownership of at least one LLIN	0.806	0.018	587	490	1.107	0.022	0.770	0.842
Number of LLIN	1.676	0.076	587	490	1.330	0.045	1.524	1.828
Ownership of at least one LLIN for two persons	0.580	0.025	577	482	1.228	0.044	0.530	0.631
CHILDREN								
Slept under any mosquito net last night	0.620	0.047	307	261	1.491	0.076	0.526	0.714
Slept under an LLIN last night	0.605	0.045	307	261	1.401	0.074	0.515	0.694
Slept under an LLIN last night in household with at least one LLIN	0.678	0.041	273	233	1.310	0.060	0.596	0.759
Had fever in last 2 weeks	0.326	0.046	292	259	1.628	0.141	0.234	0.417
Had a haemoglobin level less than 8 g/dl	0.044	0.017	276	233	1.281	0.380	0.010	0.077
Has malaria (based on rapid test)	0.299	0.065	276	233	2.108	0.218	0.169	0.430
Has malaria (based on microscopy test)	0.224	0.065	276	233	2.227	0.292	0.093	0.355
PREGNANT WOMEN								
Slept under any mosquito net last night	0.577	0.069	39	34	0.888	0.119	0.440	0.714
Slept under an LLIN last night	0.556	0.067	39	34	0.869	0.121	0.421	0.691
Slept under an LLIN last night in household with at least one LLIN	0.643	0.084	34	30	1.047	0.131	0.474	0.812
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.919	0.030	125	111	1.239	0.033	0.858	0.980
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.850	0.033	125	111	1.035	0.039	0.784	0.917

Table B.12 Sampling errors: Northern sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.838	0.023	535	464	1.443	0.027	0.792	0.884
Number of any mosquito nets	2.445	0.192	535	464	2.498	0.079	2.060	2.830
Ownership of at least one LLIN	0.837	0.023	535	464	1.428	0.027	0.791	0.882
Number of LLIN	2.428	0.187	535	464	2.445	0.077	2.053	2.802
Ownership of at least one LLIN for two persons	0.599	0.028	530	461	1.331	0.047	0.543	0.656
CHILDREN								
Slept under any mosquito net last night	0.612	0.060	582	511	2.263	0.098	0.491	0.732
Slept under an LLIN last night	0.610	0.060	582	511	2.249	0.098	0.491	0.729
Slept under an LLIN last night in household with at least one LLIN	0.681	0.056	529	458	2.094	0.082	0.569	0.793
Had fever in last 2 weeks	0.241	0.023	532	482	1.194	0.097	0.194	0.288
Had a haemoglobin level less than 8 g/dl	0.124	0.020	515	464	1.351	0.158	0.085	0.163
Has malaria (based on rapid test)	0.393	0.110	515	464	4.401	0.279	0.173	0.612
Has malaria (based on microscopy test)	0.252	0.085	515	464	3.831	0.338	0.082	0.422
PREGNANT WOMEN								
Slept under any mosquito net last night	0.588	0.081	59	54	1.291	0.138	0.426	0.749
Slept under an LLIN last night	0.588	0.081	59	54	1.291	0.138	0.426	0.749
Slept under an LLIN last night in household with at least one LLIN	0.699	0.071	52	45	1.105	0.101	0.557	0.840
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.674	0.084	219	211	2.612	0.125	0.506	0.842
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.610	0.063	219	211	1.897	0.103	0.484	0.736

Table B.13 Sampling errors: Upper East sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.952	0.007	478	180	0.694	0.007	0.938	0.965
Number of any mosquito nets	3.047	0.128	478	180	1.699	0.042	2.791	3.302
Ownership of at least one LLIN	0.939	0.012	478	180	1.059	0.012	0.916	0.963
Number of LLIN	2.979	0.126	478	180	1.665	0.042	2.727	3.230
Ownership of at least one LLIN for two persons	0.720	0.039	474	179	1.903	0.055	0.641	0.799
CHILDREN								
Slept under any mosquito net last night	0.755	0.059	354	118	2.192	0.078	0.637	0.874
Slept under an LLIN last night	0.755	0.059	354	118	2.192	0.078	0.637	0.874
Slept under an LLIN last night in household with at least one LLIN	0.769	0.059	349	116	2.209	0.077	0.651	0.887
Had fever in last 2 weeks	0.265	0.028	329	116	1.028	0.106	0.209	0.321
Had a haemoglobin level less than 8 g/dl	0.074	0.014	319	105	0.903	0.196	0.045	0.103
Has malaria (based on rapid test)	0.258	0.035	319	105	1.254	0.135	0.188	0.328
Has malaria (based on microscopy test)	0.147	0.029	319	105	1.352	0.195	0.089	0.204
PREGNANT WOMEN								
Slept under any mosquito net last night	0.729	0.066	49	19	1.071	0.091	0.597	0.861
Slept under an LLIN last night	0.729	0.066	49	19	1.071	0.091	0.597	0.861
Slept under an LLIN last night in household with at least one LLIN	0.729	0.066	49	19	1.071	0.091	0.597	0.861
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.965	0.011	130	45	0.692	0.012	0.942	0.987
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.908	0.029	130	45	1.121	0.031	0.851	0.965

Table B.14 Sampling errors: Upper West sample, Ghana MIS 2016

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: R-2SE	Confidence limits: R+2SE
HOUSEHOLDS								
Ownership of at least one mosquito net of any type	0.897	0.017	450	126	1.193	0.019	0.863	0.931
Number of any mosquito nets	2.098	0.073	450	126	1.220	0.035	1.951	2.245
Ownership of at least one LLIN	0.897	0.017	450	126	1.193	0.019	0.863	0.931
Number of LLIN	2.093	0.072	450	126	1.193	0.034	1.949	2.237
Ownership of at least one LLIN for two persons	0.652	0.034	447	125	1.520	0.053	0.583	0.721
CHILDREN								
Slept under any mosquito net last night	0.607	0.065	292	83	1.877	0.106	0.478	0.736
Slept under an LLIN last night	0.607	0.065	292	83	1.877	0.106	0.478	0.736
Slept under an LLIN last night in household with at least one LLIN	0.633	0.066	281	79	1.901	0.104	0.502	0.765
Had fever in last 2 weeks	0.236	0.033	253	76	1.199	0.140	0.170	0.303
Had a haemoglobin level less than 8 g/dl	0.091	0.018	267	75	0.987	0.196	0.055	0.126
Has malaria (based on rapid test)	0.278	0.059	267	75	1.975	0.211	0.160	0.395
Has malaria (based on microscopy test)	0.215	0.050	267	75	1.887	0.233	0.115	0.315
PREGNANT WOMEN								
Slept under any mosquito net last night	0.671	0.127	32	11	1.667	0.189	0.418	0.925
Slept under an LLIN last night	0.671	0.127	32	11	1.667	0.189	0.418	0.925
Slept under an LLIN last night in household with at least one LLIN	0.710	0.152	30	10	2.004	0.214	0.407	1.013
Received one or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.894	0.029	101	30	0.949	0.033	0.836	0.953
Received 2 or more doses of SP/Fansidar during pregnancy of the most recent live birth	0.822	0.029	101	30	0.750	0.035	0.765	0.879

DATA QUALITY TABLES

APPENDIX C

Table C.1 Household age distribution

Single-year age distribution of the de facto household population by sex (weighted), Ghana MIS 2016

	Female		Male			Female		Male	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
0	307	2.8	327	3.3	36	141	1.3	112	1.1
1	296	2.7	359	3.6	37	140	1.3	88	0.9
2	376	3.5	304	3.1	38	128	1.2	126	1.3
3	274	2.5	323	3.3	39	110	1.0	84	0.8
4	314	2.9	357	3.6	40	185	1.7	173	1.7
5	318	2.9	258	2.6	41	84	0.8	50	0.5
6	231	2.1	282	2.8	42	115	1.1	90	0.9
7	277	2.6	306	3.1	43	60	0.6	63	0.6
8	266	2.5	297	3.0	44	96	0.9	49	0.5
9	265	2.4	284	2.9	45	91	0.8	160	1.6
10	285	2.6	254	2.6	46	74	0.7	61	0.6
11	222	2.1	241	2.4	47	58	0.5	68	0.7
12	292	2.7	260	2.6	48	87	0.8	75	0.8
13	250	2.3	249	2.5	49	84	0.8	52	0.5
14	269	2.5	211	2.1	50	133	1.2	93	0.9
15	174	1.6	193	1.9	51	79	0.7	27	0.3
16	227	2.1	207	2.1	52	110	1.0	92	0.9
17	135	1.3	161	1.6	53	67	0.6	43	0.4
18	171	1.6	218	2.2	54	82	0.8	65	0.7
19	130	1.2	154	1.6	55	98	0.9	75	0.8
20	188	1.7	149	1.5	56	62	0.6	77	0.8
21	123	1.1	121	1.2	57	54	0.5	45	0.5
22	215	2.0	122	1.2	58	51	0.5	51	0.5
23	156	1.4	108	1.1	59	53	0.5	40	0.4
24	168	1.6	145	1.5	60	80	0.7	98	1.0
25	186	1.7	155	1.6	61	30	0.3	23	0.2
26	192	1.8	147	1.5	62	39	0.4	38	0.4
27	162	1.5	133	1.3	63	22	0.2	32	0.3
28	166	1.5	165	1.7	64	48	0.4	31	0.3
29	138	1.3	108	1.1	65	58	0.5	52	0.5
30	235	2.2	180	1.8	66	37	0.3	39	0.4
31	113	1.0	100	1.0	67	22	0.2	31	0.3
32	177	1.6	163	1.6	68	36	0.3	35	0.4
33	137	1.3	100	1.0	69	32	0.3	17	0.2
34	118	1.1	93	0.9	70+	422	3.9	259	2.6
35	158	1.5	136	1.4	Don't know/ missing	18	0.2	30	0.3
					Total	10,798	100.0	9,910	100.0

Note: The de facto population includes all residents and non residents 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 2016

Age group	Household population of women age 10-54	Interviewed women age 15-49		Percentage of eligible women interviewed
		Number	Percentage	
10-14	1,318	na	na	na
15-19	837	830	17.0	99.2
20-24	850	838	17.2	98.7
25-29	844	836	17.2	99.1
30-34	779	774	15.9	99.3
35-39	677	674	13.8	99.6
40-44	541	532	10.9	98.4
45-49	394	388	8.0	98.6
50-54	472	na	na	na
15-49	4,921	4,873	100.0	99.0

Note: The de facto population includes all residents and non residents 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 2016

Subject	Percentage with information missing	Number of cases
Month Only (Births in the 15 years before the survey)	0.94	3,676
Month and Year (Births in the 15 years before the survey)	0.00	3,676
Respondent's education (All women age 15-49)	0.00	5,150
Anaemia (Living children age 6-59 months from the Household Questionnaire)	2.09	2,935

[1] Both year and age missing.

Table C.4 Births by calendar years

Number of births, percentage with complete birth date, sex ratio at birth, and calendar year ratio by calendar year, according to living (L), dead (D), and total (T) children (weighted), Ghana MIS 2016

	Number of births			Percentage with complete birth date[1]			Sex ratio at birth[2]			Calendar year ratio[3]		
Calendar year	L	D	T	L	D	T	L	D	T	L	D	T
2016	560	12	573	100.0	100.0	100.0	104.4	95.7	104.2	na	na	na
2015	643	26	668	100.0	88.4	99.6	107.0	97.1	106.6	na	na	na
2014	640	24	664	99.7	97.3	99.6	92.4	66.0	91.3	106.9	102.3	106.7
2013	554	22	576	98.6	72.2	97.6	105.1	103.1	105.0	87.3	124.0	88.3
2012	630	11	641	98.9	88.2	98.7	111.1	62.3	110.0	114.8	68.5	113.5
2011	543	10	553	98.9	90.9	98.8	82.4	81.6	82.4	172.3	188.7	172.6
2012-2016	3,027	96	3,123	99.5	88.4	99.1	103.7	84.7	103.1	na	na	na
2007-2011	543	10	553	98.9	90.9	98.8	82.4	81.6	82.4	na	na	na
All	3,570	106	3,676	99.4	88.7	99.1	100.2	84.4	99.7	na	na	na

na = Not applicable.
[1] Both year and month of birth given.
[2] (Bm/Bf)x100, where Bm and Bf are the numbers of male and female births, respectively.
[3] [2Bx/(Bx-1+Bx+1)]x100, where Bx is the number of births in calendar year x.

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QUESTIONNAIRES

APPENDIX **E**

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2016 GHANA MALARIA INDICATOR SURVEY
HOUSEHOLD QUESTIONNAIRE

MINISTRY OF HEALTH — GHANA STATISTICAL SERVICES

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

REGION . . . . . | | |

DISTRICT . . . . . | | | |

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

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

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY
				MONTH
				YEAR 2016
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** 01 — LANGUAGE OF INTERVIEW** | | — NATIVE LANGUAGE OF RESPONDENT** | | — TRANSLATOR USED (YES = 1, NO = 2) |

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:
01 ENGLISH
02 AKAN
03 GA
04 EWE
06 OTHER _____ (SPECIFY)

SUPERVISOR

NAME _____ NUMBER | | | | |

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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. 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 . . . . . [ ][ ]

HOUSEHOLD SCHEDULE

							IF AGE 0-6 YEARS		
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
01			M F 1 2	Y N 1 2	Y N 1 2	IN YEARS	DAY MONTH YEAR	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/
11 = NOT RELATED
98 = DON'T KNOW

HOUSEHOLD SCHEDULE

							IF AGE 0-6 YEARS		
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
11			M F 1 2	Y N 1 2	Y N 1 2	IN YEARS	DAY MONTH YEAR	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
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

STEPCHILD

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	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
105	What kind of toilet facility do members of your household usually use? IF NOT POSSIBLE TO DETERMINE, ASK PERMISSION TO OBSERVE THE FACILITY.	**FLUSH OR POUR FLUSH TOILET** FLUSH TO PIPED SEWER SYSTEM . . . . . 11 FLUSH TO SEPTIC TANK . . . . . 12 FLUSH TO PIT LATRINE . . . . . 13 FLUSH TO SOMEWHERE ELSE . . . . . 14 FLUSH, DON'T KNOW WHERE . . . . . 15 **PIT LATRINE** VENTILATED IMPROVED PIT LATRINE . . . . . 21 PIT LATRINE WITH SLAB . . . . . 22 PIT LATRINE WITHOUT SLAB/OPEN PIT . . 23 COMPOSTING TOILET . . . . . 31 BUCKET TOILET . . . . . 41 HANGING TOILET/HANGING LATRINE . . . . . 51 NO FACILITY/BUSH/FIELD . . . . . 61 OTHER _____ 96 (SPECIFY)	→ 108
106	Do you share this toilet facility with other households?	YES . . . . . 1 NO 2	→ 108
107	Including your own household, how many households use this toilet facility?	NO. OF HOUSEHOLDS IF LESS THAN 10 . . . . . 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 COAL, LIGNITE . . . . . 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?	a) COWS/BULLS . . . . . [ ][ ]	
	b) Other cattle?	b) OTHER CATTLE . . . . . [ ][ ]	
	c) Horses, donkeys, or mules?	c) HORSES/DONKEYS/MULES . . . . . [ ][ ]	
	d) Goats?	d) GOATS . . . . . [ ][ ]	
	e) Sheep?	e) SHEEP . . . . . [ ][ ]	
	f) Chickens or other poultry?	f) CHICKENS/POULTRY . . . . . [ ][ ]	
	g) Pigs?	g) PIGS . . . . . [ ][ ]	
	h) Rabbits?	h) RABBITS . . . . . [ ][ ]	
	i) Grasscutter?	i) GRASSCUTTER . . . . . [ ][ ]	

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
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, CIRCLE '950' IF 95 OR MORE ACRES, RECORD IN HECTARES IF 95 OR MORE PLOTS, RECORD IN ACCRES	HECTARES . . . . . 1 ☐☐.☐ ACRES . . . . . 2 ☐☐.☐ PLOTS . . . . . 3 ☐☐.☐ 95 OR MORE HECTARES . . . . . 950 DON'T KNOW 998	
114	Does your household have:		
	a) Electricity?	a) ELECTRICITY 1 2	
	b) A radio?	b) RADIO 1 2	
	c) A television?	c) TELEVISION 1 2	
	d) A non-mobile telephone?	d) NON-MOBILE TELEPHONE . . 1 2	
	e) A computer/Tablet computer?	e) COMPUTER 1 2	
	f) A refrigerator?	f) REFRIGERATOR 1 2	
	g) A freezer	g) FREEZER 1 2	
	h) An electric generator/Invertor?	h) GENERATOR 1 2	
	i) A washing machine?	i) WASHING MACHINE 1 2	
	j) A photo camera? (NOT ON PHONE)	j) CAMERA 1 2	
	k) A video deck/DVD/VCD?	k) VIDEO/DVD/VCD 1 2	
	l) A sewing machine?	l) SEWING MACHINE 1 2	
	m) A bed?	m) BED 1 2	
	n) A table?	n) TABLE 1 2	
	o) A chair	o) CHAIR 1 2	
	p) A Cabinet/cupboard?	p) CABINET 1 2	
115	Does any member of this household own:		
	a) A wrist watch?	a) WRIST WATCH 1 2	
	b) A mobile phone?	b) MOBILE PHONE 1 2	
	c) A bicycle?	c) BICYCLE 1 2	
	d) A motorcycle or motor scooter?	d) MOTORCYCLE/SCOOTER 1 2	
	e) An animal-drawn cart?	e) ANIMAL-DRAWN CART 1 2	
	f) A car or truck?	f) CAR/TRUCK 1 2	
	g) A boat with a motor?	g) BOAT WITH MOTOR 1 2	
	h) A boat without a motor?	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 NETPROTEC . . . . . 14 DURANET . . . . . 15 LIFE NET . . . . . 16 DAWA PLUS . . . . . 17 MAGNET . . . . . 18 YORKOOL . . . . . 19 OTHER/DON'T KNOW BRAND . . . . . 20 (SKIP TO 126) OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET . . . . . 11 PERMANET . . . . . 12 INTERCEPTOR . . . . . 13 NETPROTEC . . . . . 14 DURANET . . . . . 15 LIFE NET . . . . . 16 DAWA PLUS . . . . . 17 MAGNET . . . . . 18 YORKOOL . . . . . 19 OTHER/DON'T KNOW BRAND . . . . . 20 (SKIP TO 126) OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET . . . . . 11 PERMANET . . . . . 12 INTERCEPTOR . . . . . 13 NETPROTEC . . . . . 14 DURANET . . . . . 15 LIFE NET . . . . . 16 DAWA PLUS . . . . . 17 MAGNET . . . . . 18 YORKOOL . . . . . 19 OTHER/DON'T KNOW BRAND . . . . . 20 (SKIP TO 126) OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98
124	Since you got the net, was it ever soaked or dipped in a liquid to kill or repel mosquitoes?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 126) NOT SURE 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 126) NOT SURE 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 126) NOT SURE 8
125	How many months ago was the net last soaked or dipped? IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS AGO . . . . . [ ][ ] MORE THAN 24 MONTHS AGO . . . . . 95 NOT SURE 98	MONTHS AGO . . . . . [ ][ ] MORE THAN 24 MONTHS AGO . . . . . 95 NOT SURE 98	MONTHS AGO . . . . . [ ][ ] MORE THAN 24 MONTHS AGO . . . . . 95 NOT SURE 98
126	Did you get the net through the 2014-2016 mass distribution campaign, during an antenatal care visit, or during an immunization visit?	YES, 2014-2016 MASS DIST. CAMPAIGN . . . . . 1 YES, ANC . . . . . 2 YES, IMMUNIZATION VISIT . . . . . 3 (SKIP TO 128) NO 4	YES, 2014-2015 MASS DIST. CAMPAIGN . . . . . 1 YES, ANC . . . . . 2 YES, IMMUNIZATION VISIT . . . . . 3 (SKIP TO 128) NO 4	YES, 2014-2015 MASS DIST. CAMPAIGN . . . . . 1 YES, ANC . . . . . 2 YES, IMMUNIZATION VISIT . . . . . 3 (SKIP TO 128) NO 4
127	Where did you get the net?	GOVERNMENT HEALTH FACILITY . . . . . 01 PRIVATE HEALTH FACILITY . . . . . 02 PHARMACY/ CHEMIST/ DRUG STORE . . . . . 03 SHOP/MARKET . . . . . 04 COMMUNITY HEALTH WORKER (CHW) . . . . . 05 RELIGIOUS INSTITUTION . . . . . 06 NGO . . . . . 07 COMMUNITY BASED AGENTS (CBAs) . . . . . 08 PETROL STATION/ MOBILE MART . . . . . 09 PRIMARY SCHOOLS . . 10 OTHER . . . . . 96 DON'T KNOW 98	GOVERNMENT HEALTH FACILITY . . . . . 01 PRIVATE HEALTH FACILITY . . . . . 02 PHARMACY/ CHEMIST/ DRUG STORE . . . . . 03 SHOP/MARKET . . . . . 04 COMMUNITY HEALTH WORKER (CHW) . . . . . 05 RELIGIOUS INSTITUTION . . . . . 06 NGO . . . . . 07 COMMUNITY BASED AGENTS (CBAs) . . . . . 08 PETROL STATION/ MOBILE MART . . . . . 09 PRIMARY SCHOOLS . . 10 OTHER . . . . . 96 DON'T KNOW 98	GOVERNMENT HEALTH FACILITY . . . . . 01 PRIVATE HEALTH FACILITY . . . . . 02 PHARMACY/ CHEMIST/ DRUG STORE . . . . . 03 SHOP/MARKET . . . . . 04 COMMUNITY HEALTH WORKER (CHW) . . . . . 05 RELIGIOUS INSTITUTION . . . . . 06 NGO . . . . . 07 COMMUNITY BASED AGENTS (CBAs) . . . . . 08 PETROL STATION/ MOBILE MART . . . . . 09 PRIMARY SCHOOLS . . 10 OTHER . . . . . 96 DON'T KNOW 98

MOSQUITO NETS

		NET #1	NET #2	NET #3
128	Did anyone sleep under this mosquito net last night?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130) NOT SURE 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130) NOT SURE 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130) 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.	NAME _____ LINE NO.	NAME _____ LINE NO. . . . .
		NAME _____ LINE NO.	NAME _____ LINE NO.	NAME _____ LINE NO. . . . .
		NAME _____ LINE NO.	NAME _____ LINE NO.	NAME _____ LINE NO. . . . .
130		GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO BACK TO 121 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 131.	GO TO 121 IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE NETS, GO TO 131.

ADDITIONAL HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
131	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 CALAMINE/CEMENT FIBER . . . . . 33 CERAMIC/BRICK TILES . . . . . 34 CEMENT . . . . . 35 ROOFING SHINGLES . . . . . 36 ASBESTOS/SLATE ROOFING SHEETS . . 37 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	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

FORMATTING DATE: 29 Sep. 2016
ENGLISH LANGUAGE: 29 Sep. 2016

2016 GHANA MALARIA INDICATOR SURVEY
BIOMARKER QUESTIONNAIRE

MINISTRY OF HEALTH GHANA STATISTICAL SERVICES

IDENTIFICATION

LOCALITY NAME _____

NAME OF HOUSEHOLD HEAD _____

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

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

BIOMARKER TECHNICIAN VISITS

	1	2	3	FINAL VISIT
DATE				DAY
FIELDWORKER TECH'S NAME				MONTH YEAR 2016
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS
TIME				

NOTES:

TOTAL ELIGIBLE CHILDREN

LANGUAGE OF QUESTIONNAIRE** 01 | LANGUAGE OF INTERVIEW** | | NATIVE LANGUAGE OF RESPONDENT** | | TRANSLATOR (YES = 1, NO = 2) |

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:
01 ENGLISH
02 AKAN
03 GA
04 EWE
06 OTHER _____ (SPECIFY)

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 2011-2016?	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 2011 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

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-5

		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 2011 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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)

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-5

		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, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6	POSITIVE, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6	POSITIVE, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER ..... 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER ..... 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 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:	YES NO	YES NO	YES NO
	a) Extreme weakness?	a) EXTREME WEAKNESS 1 2	a) EXTREME WEAKNESS 1 2	a) EXTREME WEAKNESS 1 2
	b) Inability to drink or breastfeed?	b) FAILURE TO DRINK/FEED 1 2	b) FAILURE TO DRINK/FEED 1 2	b) FAILURE TO DRINK/FEED 1 2
	c) Vomiting everything?	c) VOMITING 1 2	c) VOMITING 1 2	c) VOMITING 1 2
	d) Loss of consciousness?	d) LOSS OF CONSCIOUS. 1 2	d) LOSS OF CONSCIOUS. 1 2	d) LOSS OF CONSCIOUS. 1 2
	e) Deep and laboured breathing?	e) DEEP BREATHING 1 2	e) DEEP BREATHING 1 2	e) DEEP BREATHING 1 2
	f) Multiple convulsions?	f) CONVULSIONS 1 2	f) CONVULSIONS 1 2	f) CONVULSIONS 1 2
	g) Abnormal spontaneous bleeding?	g) BLEEDING 1 2	g) BLEEDING 1 2	g) BLEEDING 1 2
	h) Yellow eyes/jaundice?	h) JAUNDICE 1 2	h) JAUNDICE 1 2	h) JAUNDICE 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 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER 6	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER 6	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 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 center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)

		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 taked 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 consucutive 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 7.0 G/DL, SEVERE ANEMIA 1 7.0 G/DL OR ABOVE 2 NOT PRESENT 3 REFUSED 4 OTHER 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA 1 7.0 G/DL OR ABOVE 2 NOT PRESENT 3 REFUSED 4 OTHER 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA 1 7.0 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 2011-2016?	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 2011 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 2011 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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 RDT, THE 3RD ON THE SLIDE AND THE 4TH 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)

HEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-5

		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, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6	POSITIVE, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6	POSITIVE, Pf ..... 1 POSITIVE, PAN ..... 2 POSITIVE, Pf and PAN . 3 (SKIP TO 118) NEGATIVE ..... 4 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER ..... 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER ..... 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 7.0 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:	YES NO	YES NO	YES NO
	a) Extreme weakness?	a) EXTREME WEAKNESS 1 2	a) EXTREME WEAKNESS 1 2	a) EXTREME WEAKNESS 1 2
	b) Inability to drink or breastfeed?	b) FAILURE TO DRINK/FEED 1 2	b) FAILURE TO DRINK/FEED 1 2	b) FAILURE TO DRINK/FEED 1 2
	c) Vomiting everything?	c) VOMITING 1 2	c) VOMITING 1 2	c) VOMITING 1 2
	d) Loss of consciousness?	d) LOSS OF CONSCIOUS. 1 2	d) LOSS OF CONSCIOUS. 1 2	d) LOSS OF CONSCIOUS. 1 2
	e) Deep and laboured breathing?	e) DEEP BREATHING 1 2	e) DEEP BREATHING 1 2	e) DEEP BREATHING 1 2
	f) Multiple convulsions?	f) CONVULSIONS 1 2	f) CONVULSIONS 1 2	f) CONVULSIONS 1 2
	g) Abnormal spontaneous bleeding?	g) BLEEDING 1 2	g) BLEEDING 1 2	g) BLEEDING 1 2
	h) Yellow eyes/jaundice?	h) JAUNDICE 1 2	h) JAUNDICE 1 2	h) JAUNDICE 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 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER 6	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 3 REFUSED ..... 4 OTHER 6	BELOW 7.0 G/DL, SEVERE ANEMIA ... 1 (SKIP TO 122) 7.0 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 center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)

		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 taked 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 consucutive 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 7.0 G/DL, SEVERE ANEMIA 1 7.0 G/DL OR ABOVE 2 NOT PRESENT 3 REFUSED 4 OTHER 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA 1 7.0 G/DL OR ABOVE 2 NOT PRESENT 3 REFUSED 4 OTHER 6 (SKIP TO 130)	BELOW 7.0 G/DL, SEVERE ANEMIA 1 7.0 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

SUPERVISOR'S OBSERVATIONS

FORMATTING DATE: 29 Sep. 2016
ENGLISH LANGUAGE: 29 Sep. 2016

2016 GHANA MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

MINISTRY OF HEALTH — GHANA STATISTICAL SERVICES

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	6
INTERVIEWER'S NAME				INT. NO.				
RESULT*				RESULT*	
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS	
TIME					

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

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

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:
01 ENGLISH; 02 AKAN; 03 GA; 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 SECONDARY . . . . . 4 SSS/SHS . . . . . 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

SECTION 1. RESPONDENT'S BACKGROUND

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)	
110A	Now I would like you to talk about malaria. In your opinion, what causes malaria? What else? RECORD ALL MENTIONED.	EATING SWEET FOODS . . . . . A STANDING/ WORKING IN THE SUN . . . . . B EATING CONTAMINATED FOOD . . . . . C MOSQUITO BITES . . . . . D MALARIA PARASITE (P. FALCIPARUM) . . . . . E HEREDITARY . . . . . F DIRTY SURROUNDINGS . . . . . G WEEDY SURROUNDINGS . . . . . H STAGNANT WATER . . . . . I OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
110B	How would you know that someone has malaria? What else? RECORD ALL MENTIONED.	HOT BODY FEVER . . . . . A VOMITING/DIARRHEA . . . . . B STRONG HEADACHES/DIZZINESS . . . . . C LOSS OF APPETITE . . . . . D WEAKNESS OF THE BODY . . . . . E COUGH . . . . . F CHILLS . . . . . G BITTERNESS IN THE MOUTH . . . . . H OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
110C	How can one protect him/herself against malaria? RECORD ALL MENTIONED.	SLEEP UNDER A MOSQUITO NET . . . . . A SLEEP UNDER AN INSECTICIDE-TREATED MOSQUITO NET . . . . . B USE MOSQUITO REPELLENT . . . . . C SPRAY THE HOUSE/ROOMS WITH INSECTICIDE D CLEAR WEEDS AROUND THE HOUSE . . . . . E FILL IN STAGNANT WATERS (PUDDLES) . . . . . F KEEP SURROUNDING CLEAN . . . . . G PUT MOSQUITO SCREEN ON WINDOWS . . . . . H OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
110D	Can malaria be treated?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
111	In the past six months, have you seen or heard any messages about malaria?	YES . . . . . 1 NO 2	→ 117
112A	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 . . . . . J ANYWHERE ELSE _____ X (SPECIFY) DON'T REMEMBER . . . . . Z	
112	CHECK 112A: IF A COMMUNICATION CHANNEL WAS MENTIONNED AT 112A, CIRCLE 0; IF NOT ASK:		

Have you seen or heard these messages:

		MENT.	YES	NO
a) On the radio?	a) RADIO	O	1	2
b) On the television?	b) TELEVISION	O	1	2
c) On a poster or a billboard?	c) POSTER/BILLBOARD	O	1	2
d) In a newspaper or a magazine?	d) NEWSPAPER/MAGAZINE . .	O	1	2
e) On a leaflet or a brochure?	e) LEAFLET/BROCHURE	O	1	2
f) From a health worker?	f) HEALTH WORKER	O	1	2
g) From a community health worker (CHW)?	g) CHW	O	1	2
h) A community volunteer or a community based agent	h) VOLUNTEER/CBA	O	1	2
i) Word of mouth?	i) WORD OF MOUTH	O	1	2
j) At a community event?	j) COMMUNITY EVENT	O	1	2

113	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	

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
114	In the past six months, have you seen/heard any of the following malaria messages on television or radio: a) "Mea menya me net, Ntontom mpo suro" music video/song? b) Advert that recommended everyone should sleep under treated net by Kwabena Kwabena (musician)? c) Advert where people were asked to test first before taking malaria medicines?	YES,TV / YES, RADIO / YES, TV AND RADIO / NO a) 1 2 3 4 b) 1 2 3 4 c) 1 2 3 4	
115	During the past six months, have you seen/heard any advert on the use of ACTs/ malaria medicines?	YES . . . . . 1 NO 2	→ 117
116	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	
117	Have you participated in any community event (durbar/meeting), educating community members on prevention and control of malaria?	YES . . . . . 1 NO 2	
118	I will now ask you a few questions about health insurance. Are you currently covered by any health insurance? PROBE TO MAKE SURE THAT THE INSURANCE COVERAGE IS ACTIVE AT THE TIME OF INTERVIEW	YES . . . . . 1 NO 2	→ 120
119	What type of health insurance are you currently covered 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)	
120	Now I would like to ask you a few questions about episodes of malaria. During the past 12 months, have you experienced an episode of malaria?	YES . . . . . 1 NO 2	→ 132
121	The last time you had malaria, did you seek advice or treatment from any source?	YES . . . . . 1 NO 2	→ 124

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
122	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/CLINIC . . 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 _____ X (SPECIFY)	
123	To confirm the malaria diagnosis, did you provide a blood sample for malaria testing?	YES . . . . . 1 NO 2	
124	To treat the malaria, were you prescribed any antimalaria medicine or did you take any antimalaria without a prescription?	YES, PRESCRIBED . . . . . 1 YES, TOOK WITHOUT PRESCRIPTION . . . . . 2 NEITHER PRESCRIBED NOR TAKEN 3	→ 132
125	What antimalaria medicine (were you prescribed/did you take) to treat the malaria? RECORD ALL MENTIONED. PLEASE NOTE BRAND NAMES: SP/SULPHADOXINE-PYRIMETHAMINE Fansidar Malafan Palidar Suldox DP/DIHYDROARTEMISININ-PIPERAQUINE P-alaxin Duo-cotexcin AA/ARTESUNATE AMODIAQUINE Artesunate amodiaquine wintrhop Arsuamoon Camoquine plus G sunate Co-arsucam AL/ARTEMETHER LUMEFANTRINE Coartem Lumarterm Artefan Lonart Gen-m Artemos plus	SP/SULFADOXINE PYRIMETHAMINE . . . . . A CHLOROQUINE . . . . . B DP/DIHYDROARTEMISININ-PIPERAQUINE . . C QUININE . . . . . D AA/ARTESUNATE AMODIAQUINE . . . . . E ARTEMISININ . . . . . F AL/ARTEMETHER-LUMEFANTRINE . . . . . G HERBAL MEDICINE . . . . . H OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
126	Did you purchase the antimalaria medicine?	YES . . . . . 1 NO 2	→ 132
127	Did you have to pay out of pocket for the antimalaria medicines?	YES . . . . . 1 NO 2	

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
128	CHECK 124: YES, PRESCRIBED ☐ ↓ YES, TOOK WITHOUT PRESCRIPTION OR NOT ASKED ☐ →		132
129	Did you purchase the antimalaria medicine at the same place where you sought care?	YES . . . . . 1 NO 2	→ 131
130	Where did you purchase the antimalaria medicine?	**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)	
131	Did you have to pay out of pocket for other services you received related to the malaria infection?	YES . . . . . 1 NO 2	
132	Are you aware that malaria care is covered under the NHIS?	YES . . . . . 1 NO 2	

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES . . . . . 1 NO 2	→ 204
203	a) How many sons live with you? b) And how many daughters live with you? IF NONE, RECORD '00'.	a) SONS AT HOME . . . . . [ ][ ] 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 BIRTHS NO BIRTHS		→ 225
211	Now I'd like to ask you about your most recent births. How many births have you had in 2011-2016? RECORD NUMBER OF LIVE BIRTHS IN 2011-2016	TOTAL IN 2011-2016 . . . . . [ ][ ] NONE 00	→ 225

212 Now I would like to record the names of all your births in 2011-2016, whether still alive or not, starting with the most recent one you had.
RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2011-2016. 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 2011-2016	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 2011-2016 (GO TO 301) NO BIRTHS IN 2011-2016 Q. 224 IS BLANK		→ 431 → 431

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	RECORD THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH FROM 213 AND 217,	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 . . . . . E COMMUNITY/VILLAGE HEALTH WORKER . . F TRADITIONAL HEALTH PRACTITIONER . . G OTHER _____ X (SPECIFY)	
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 . . . . . ☐☐	
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 2011-2016 ☐ → (GO TO 401) NO LIVING CHILDREN BORN IN 2011-2016 ☐		→ 431

SECTION 4. FEVER IN CHILDREN

401	CHECK 213: RECORD THE BIRTH HISTORY NUMBER IN 402 AND THE NAME AND SURVIVAL STATUS IN 403 FOR EACH BIRTH IN 2011-2016. 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 2011. (We will talk about each separately.)		
402	BIRTH HISTORY NUMBER FROM 213 IN BIRTH HISTORY.	MOST RECENT BIRTH BIRTH HISTORY NUMBER	NEXT MOST RECENT BIRTH BIRTH HISTORY NUMBER . . . . .
403	FROM 213 AND 217:	NAME _____ LIVING / DEAD (SKIP TO 430)	NAME _____ LIVING / DEAD (SKIP TO 430)
403A	Since 2015, 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 2015, 2016 or in 2015 and 2016?	YES, IN 2015 . . . . . 1 YES, IN 2016 . . . . . 2 YES, IN 2015 AND IN 2016 . . 3 NO, NEVER ENROLLED . . . . . 4 (SKIP TO 404)	YES, IN 2015 . . . . . 1 YES, IN 2016 . . . . . 2 YES, IN 2015 AND IN 2016 . . 3 NO, NEVER ENROLLED . . . . . 4 (SKIP TO 404)
403B	How many doses did (NAME) take in 2015 or 2016?	DOSES IN 2015 1. ____ DOSES IN 2016 2. ____	DOSES IN 2015 1. ____ DOSES IN 2016 2. ____
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 430) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 430) 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	What was the result of (NAME)'s blood test?	POSITIVE MALARIA . . . . . 1 POSITIVE OTHER ILLNES . . . . 2 NEGATIVE . . . . . 3 DON'T KNOW/DON'T REMEMBEF 8	POSITIVE MALARIA . . . . . 1 POSITIVE OTHER ILLNES . . . . 2 NEGATIVE . . . . . 3 DON'T KNOW/DON'T REMEMBEF 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)

SECTION 4. FEVER IN CHILDREN

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

SECTION 4. FEVER IN CHILDREN

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 430) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 430) DON'T KNOW 8
412	What drugs did (NAME) take? Any other drugs? RECORD ALL MENTIONED. PLEASE NOTE BRAND NAMES: SP/SULPHADOXINE-PYRIMETHAMINE Fansidar Malafan Palidar Suldox DP/DIHYDROARTEMISININ-PIPERAQUINE P-alaxin Duo-cotexcin AA/ARTESUNATE AMODIAQUINE Artesunate amodiaquine wintrhop Arsuamoon Camoquine plus G sunate Co-arsucam AL/ARTEMETHER LUMEFANTRINE Coartem Lumarterm Artefan Lonart Gen-m Artemos plus	**ANTIMALARIAL DRUGS** SP/SULFADOXINE PYRIMETH. . . . . A CHLOROQUINE . . . . . B DIHIDROARTEMIS.-PIPERAQUINE . . . . . C QUININE PILLS . . . . . D INJECTION/IV . . . . . E ARTESUNATE AMODIAQUINE RECTAL/TABLETS . . F INJECTION/IV . . . . . G ARTEMISININ . . . . . H ARTEMETHER-LUMEFANTRINE . . . . . I OTHER ANTIMALARIAL _____ J (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP . . . . . K INJECTION/IV . . . . . L **OTHER DRUGS** ASPIRIN . . . . . M PARACETAMOL/PANADOl . . N ACETAMINOPHEN . . . . . O IBUPROFEN . . . . . P HERBAL MEDICINE . . . . . Q OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	**ANTIMALARIAL DRUGS** SP/SULFADOXINE PYRIMETH. . . . . A CHLOROQUINE . . . . . B DIHIDROARTEMIS.-PIPERAQUINE . . . . . C QUININE PILLS . . . . . D INJECTION/IV . . . . . E ARTESUNATE AMODIAQUINE RECTAL/TABLETS . . F INJECTION/IV . . . . . G ARTEMISININ . . . . . H ARTEMETHER-LUMEFANTRINE . . . . . I OTHER ANTIMALARIAL _____ J (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP . . . . . K INJECTION/IV . . . . . L **OTHER DRUGS** ASPIRIN . . . . . M PARACETAMOL/PANADOl . . N ACETAMINOPHEN . . . . . O IBUPROFEN . . . . . P HERBAL MEDICINE . . . . . Q OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z
413	CHECK 412: ANY CODE A-J CIRCLED?	YES NO (SKIP TO 430)	YES NO (SKIP TO 430)
414	CHECK 412: SP/SULFADOXINE PYRIMETH. ('A') GIVEN	CODE 'A' CIRCLED CODE 'A' NOT CIRCLED (SKIP TO 416)	CODE 'A' CIRCLED CODE 'A' NOT CIRCLED (SKIP TO 416)
415	How long after the fever started did (NAME) first take SP/sulphadoxine-pyrimethamine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____
416	CHECK 412: CHLOROQUINE ('B') GIVEN	CODE 'B' CIRCLED CODE 'B' NOT CIRCLED (SKIP TO 418)	CODE 'B' CIRCLED CODE 'B' NOT CIRCLED (SKIP TO 418)
417	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
418	CHECK 412: DIHYDROARTEMISININ-PIPERAQUINE ('C') GIVEN	CODE 'C' CIRCLED CODE 'C' NOT CIRCLED (SKIP TO 420)	CODE 'C' CIRCLED CODE 'C' NOT CIRCLED (SKIP TO 420)
419	How long after the fever started did (NAME) first take dihydroartemisinin-piperaquine?	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: QUININE ('D' OR 'E) GIVEN	CODE 'D' OR 'E' CIRCLED CODE 'D' 'D' OR 'E' NOT CIRCLED (SKIP TO 422)	CODE 'D' OR 'E' CIRCLED CODE 'D' 'D' OR 'E' NOT CIRCLED (SKIP TO 422)
421	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
422	CHECK 412: ARTESUNATE AMODIAQUINE ('F' OR 'G') GIVEN	CODE 'F' OR 'G' CIRCLED CODE 'F' OR 'G' NOT CIRCLED (SKIP TO 424)	CODE 'F' OR 'G' CIRCLED CODE 'F' OR 'G' NOT CIRCLED (SKIP TO 424)
423	How long after the fever started did (NAME) first take artesunate with 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

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	MOST RECENT BIRTH NAME_____	NEXT MOST RECENT BIRTH NAME_____
424	CHECK 412: ARTEMISININ ('H') GIVEN	CODE 'H' CIRCLED CODE 'H' NOT CIRCLED (SKIP TO 426)	CODE 'H' CIRCLED CODE 'H' NOT CIRCLED (SKIP TO 426)
425	How long after the fever started did (NAME) first take artemisinin?	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: ARTEMETHER LUMEFANTRINE ('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 artemether lumefantrine?	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	CHECK 412: OTHER ANTIMALARIAL ('J') GIVEN	CODE 'J' CIRCLED CODE 'J' NOT CIRCLED (SKIP TO 430)	CODE 'I' CIRCLED CODE 'J' NOT CIRCLED (SKIP TO 430)
429	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
430		GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 431.	GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 431.
431	RECORD THE TIME.	HOURS . . . . . MINUTES	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

2016 GHANA MALARIA INDICATOR SURVEY
FIELDWORKER QUESTIONNAIRE

GHANA STATISTICAL SERVICES

LANGUAGE OF QUESTIONNAIRE ENGLISH

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

INSTRUCTIONS

We are collecting information on the 2016 GMIS field staff. Please fill in the information below. The information will be part of the survey data files. Your name will not be in the data files; your information will remain anonymous. If there is any question you do not want to answer you may skip it and go to the next question.

102	In what Region do you live?	WESTERN . . . . . 01 CENTRAL . . . . . 02 GREATER ACCRA . . . . . 03 VOLTA . . . . . 04 EASTERN . . . . . 05 ASHANTI . . . . . 06 BRONG AHAFO . . . . . 07 NOTHERN . . . . . 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	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 SECONDARY . . . . . 4 SSS/SHS . . . . . 5 HIGHER 6	
110	What is the highest GRADE you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE . . . . . [ ][ ]	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	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)	
112	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 . . . . . B EWE . . . . . C ENGLISH . . . . . D OTHER _____ X (SPECIFY)	
114	What is your mother tongue/native language (language spoken at home growing up)?	AKAN . . . . . A GA . . . . . B EWE . . . . . C OTHER _____ X (SPECIFY)	
115	Have you ever worked on a DHS survey prior to this one?	YES . . . . . 1 NO 2	
116	Have you ever worked on any other survey prior to this one (not a DHS)?	YES . . . . . 1 NO 2	
117	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	→ 119
118	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	
119	If you have comments, please write them here.		