Kenya





Malaria Indicator Survey 2020

REPUBLIC OF KENYA

MINISTRY OF HEALTH

Kenya Malaria Indicator Survey 2020

Final Report

Ministry of Health
Division of National Malaria Programme
Nairobi, Kenya

Kenya National Bureau of Statistics
Nairobi, Kenya

The DHS Program
Rockville, Maryland, USA

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NATIONAL MALARIA CONTROL PROGRAM
MINISTRY OF HEALTH, KENYA

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The 2020 Kenya Malaria Indicator Survey (2020 KMIS) was implemented by the Ministry of Health (MOH) Division of National Malaria Programme (DNMP) and the Kenya National Bureau of Statistics (KNBS). Financial support for the survey was provided by the United States Agency for International Development (USAID) through the President's Malaria Initiative (PMI) and by the Government of Kenya with Global Fund support. ICF provided technical assistance through The DHS Program, a USAID-funded project offering support and technical assistance in the implementation of population and health surveys in countries worldwide.

Additional information about the 2020 KMIS may be obtained from the Division of National Malaria Programme of the Ministry of Health, 19982 - 00202, Kenyatta National Hospital, Nairobi, Kenya; e-mail: info@nmcp.or.ke; Website: www.nmcp.or.ke.

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

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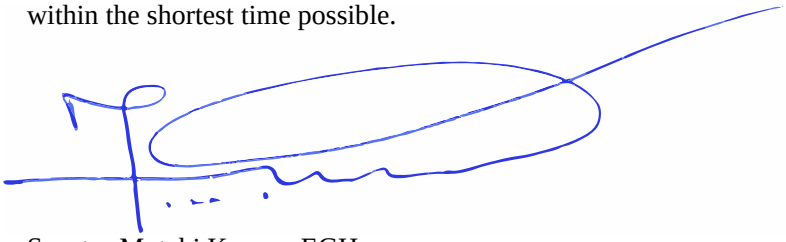
FOREWORD

Malaria is a significant public health problem in Kenya. More than 70% of the population is at constant risk from malaria, including those most vulnerable to the disease, specifically children and pregnant women. In the past 5 years, there has been a concerted effort by the government and malaria partnerships to fight the disease through prevention and treatment interventions such as mass and routine mosquito net distribution programs to attain universal coverage, intermittent preventive treatment for malaria during pregnancy, and parasitological diagnosis and management of malaria cases.

The Kenya Malaria Indicator Survey is one of the key performance monitoring tools periodically used to provide an in-depth assessment of malaria control efforts over time. Kenya has in the past undertaken three Malaria Indicator Surveys, in 2007, 2010, and 2015. The results from these surveys provide information on the performance of the key malaria control interventions as experienced by communities across the country; and are crucial to evaluation of interventions. Moreover, they enable effective planning and malaria control programming and facilitate a good understanding of the factors, dynamics, and impediments that affect control efforts. The reports also provide evidence for comparison with other malaria control programs globally and allow for benchmarking to meet international standards and practices for combating the disease.

In this regard, it is incumbent upon all partners and stakeholders in malaria control and elimination to embrace this report and assess the implications for malaria programming over the next few years.

The report, therefore, has come at an opportune time when we are in the midst of implementing the Kenya Malaria Strategy 2019-2023. The results will form a basis for redirecting efforts and reorienting both technical and operational perspectives to address the challenges and strengthen the successes observed. The Ministry of Health is committed to further reducing the malaria burden in the coming years. Thus, I urge all players in malaria control to rededicate efforts and investments to enable delivery of sound malaria interventions and drive the burden further down towards our ambitious vision of a malaria-free Kenya within the shortest time possible.



Senator Mutahi Kagwe, EGH
Cabinet Secretary
Ministry of Health

ACKNOWLEDGEMENTS

The Ministry of Health would like to sincerely thank the partners in malaria control for their contributions to the successful completion of the 2020 Kenya Malaria Indicator Survey (2020 KMIS) and the resulting report.

We would like to thank the United States President's Malaria Initiative (PMI) and the Global Fund for providing funding for planning, training workshops, data collection, data processing and report writing.

We acknowledge the technical support of the World Health Organization (WHO), the Kenya Medical Research Institute (KEMRI)-Walter Reed Project, AMREF Health Africa, Kenya Medical Training College, PMI Measure Malaria and all of the PMI implementing partners. The survey was conducted in close collaboration with the Kenya National Bureau of Statistics (KNBS) and The Demographic Health Surveys (DHS) Program.

Special thanks go to the data collection teams, county statistical coordinators, county administration, and village guides at the community level for their commitment during the survey period. We thank the staff of the Division of National Malaria Programme (DNMP), the County Directors of Health, members of the Malaria Surveillance, Monitoring and Evaluation Committee of Experts, and the Steering Committee for coordination and oversight of the survey.

We sincerely appreciate all of the survey respondents, without whom the survey would not have been successful. We especially acknowledge the contribution of the caregivers and the children who allowed for the collection of blood samples for assessment and reporting.

Susan Mochache, CBS
Principal Secretary
Ministry of Health

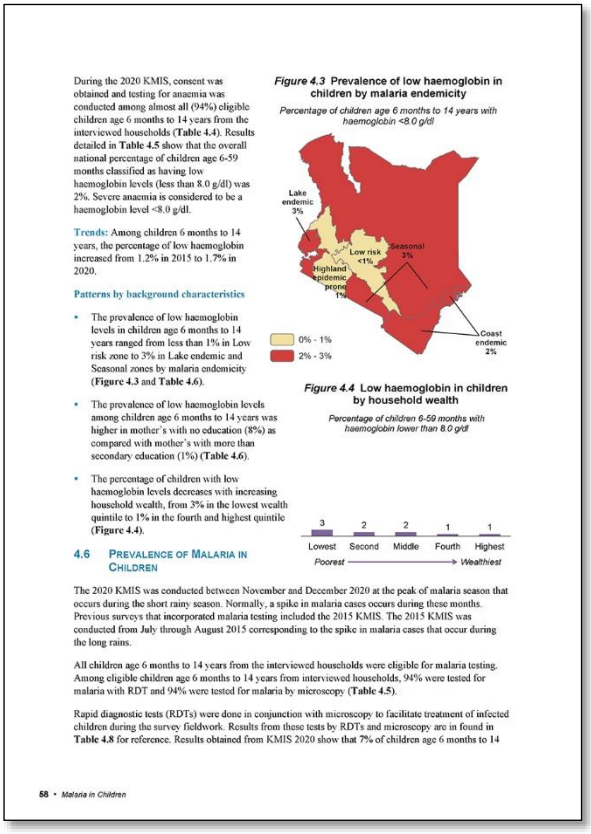
ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	antenatal care
CAPI	computer-assisted personal interviewing
CHV	community health volunteer
CHW	community health worker
CSPro	Census and Survey Processing System
CWC	child welfare clinics
DHAP	dihydroartemisinin plus piperaquine
DHS	Demographic and Health Survey
DNMP	Division of National Malaria Programme
EA	enumeration area
EPSM	equal probability selection method
EQC	external quality control
FBO	faith-based organisation
GTS	Global Technical Strategy
HRP	histidine-rich protein
IPTp	intermittent preventive treatment (of malaria) in pregnancy
IQC	internal quality control
IRS	indoor residual spray
ITN	insecticide-treated net
KDHS	Kenya Demographic and Health Survey
KEMRI	Kenya Medical Research Institute
KHSSP	Kenya Health Sector Strategic and Investment Plan
KMIS	Kenya Malaria Indicator Survey
KMS	Kenya Malaria Strategy
KNBS	Kenya National Bureau of Statistics
LLIN	long-lasting insecticide-treated nets
MIP	malaria in pregnancy
MIS	malaria indicator survey
MOH	Ministry of Health
NASSEP V	Fifth National Sample Survey and Evaluation Program
Pf	Plasmodium falciparum
PHC	Population and Housing Census
Pm	Plasmodium malariae

PMI	President's Malaria Initiative
Po	Plasmodium ovale
RDT	rapid diagnostic test
SBC	social behaviour change
SDG	Sustainable Development Goals
SMS	short message service
SP	sulphadoxine-pyrimethamine
TOT	training of trainers
UHC	universal health coverage
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VIP	ventilated improved pit latrine
WBC	white blood cells
WHO	World Health Organization

READING AND UNDERSTANDING TABLES FROM THE 2020 KENYA MALARIA INDICATOR SURVEY (KMIS)

The 2020 Kenya Malaria Indicator Survey (KMIS) report is very similar in content to the 2015 KMIS but is presented in a new format. The new style features more figures to highlight trends, malaria endemicity zonal patterns, and background characteristics. The text has been simplified to highlight key points in bullets and to clearly identify indicator definitions in boxes.



During the 2020 KMIS, consent was obtained and testing for anaemia was conducted among almost all (94%) eligible children age 6 months to 14 years from the interviewed households (**Table 4.4**). Results detailed in **Table 4.5** show that the overall national percentage of children age 6-59 months classified as having low haemoglobin levels (less than 8.0 g/dl) was 2%. Severe anaemia is considered to be a haemoglobin level <8.0 g/dl.

Trends: Among children 6 months to 14 years, the percentage of low haemoglobin increased from 1.2% in 2015 to 1.7% in 2020.

Patterns by background characteristics

- The prevalence of low haemoglobin levels in children age 6 months to 14 years ranged from less than 1% in Low risk zone to 3% in Lake endemic and Seasonal zones by malaria endemicity (**Figure 4.3** and **Table 4.6**).
- The prevalence of low haemoglobin levels among children age 6 months to 14 years was higher in mother's with no education (8%) as compared with mother's with more than secondary education (1%) (**Table 4.6**).
- The percentage of children with low haemoglobin levels decreases with increasing household wealth, from 3% in the lowest wealth quintile to 1% in the fourth and highest quintile (**Figure 4.4**).

Figure 4.3 Prevalence of low haemoglobin in children by malaria endemicity

Percentage of children age 6 months to 14 years with haemoglobin <8.0 g/dl

Figure 4.4 Low haemoglobin in children by household wealth

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

4.6 PREVALENCE OF MALARIA IN CHILDREN

The 2020 KMIS was conducted between November and December 2020 at the peak of malaria season that occurs during the short rainy season. Normally, a spike in malaria cases occurs during these months. Previous surveys that incorporated malaria testing included the 2015 KMIS. The 2015 KMIS was conducted from July through August 2015 corresponding to the spike in malaria cases that occur during the long rains.

All children age 6 months to 14 years from the interviewed households were eligible for malaria testing. Among eligible children age 6 months to 14 years from interviewed households, 94% were tested for malaria with RDT and 94% were tested for malaria by microscopy (**Table 4.5**).

Rapid diagnostic tests (RDTs) were done in conjunction with microscopy to facilitate treatment of infected children during the survey fieldwork. Results from these tests by RDTs and microscopy are in found in **Table 4.8** for reference. Results obtained from KMIS 2020 show that 7% of children age 6 months to 14

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The tables in this report are located at the end of each chapter instead of being imbedded in the chapter text. This final report is based on approximately 48 tables of data. While the text and figures featured in each chapter highlight some of the most important findings from the tables, not every finding can be discussed or displayed graphically. For this reason, data users should be comfortable reading and interpreting KMIS tables.

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

Example 1: Prevalence of Malaria in Children

A biomarker measure taken from all eligible respondents

Table 4.8 Prevalence of malaria 1

Percentage of children age 6 months to age 14 classified in two tests as having malaria, according to background characteristics, Kenya MIS 2020

3 Background characteristic	Malaria prevalence according to RDT		2 Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
Age				
6-59 months	4.4	3,401	3.0	3,395
6-8 months	2.2	155	0.5	155
9-11 months	2.7	165	2.2	165
12-17 months	2.6	410	1.6	410
18-23 months	3.9	398	2.2	396
24-35 months	3.9	730	2.7	729
36-47 months	5.1	726	4.0	725
48-59 months	6.3	818	4.1	816
5-9 years	7.5	3,612	6.2	3,606
10-14 years	8.3	3,464	7.6	3,457
Sex				
Male	6.7	5,292	5.6	5,278
Female	6.8	5,185	5.6	5,180
Mother's interview status				
Interviewed	4.0	3,226	2.7	3,222
Not interviewed, and not in the household[1]	8.0	7,251	6.9	7,236
Residence				
Urban	2.9	2,927	2.5	2,918
Rural	8.3	7,550	6.8	7,540
Malaria endemicity				
Highland epidemic prone	0.9	2,309	0.7	2,307
Lake endemic	22.8	2,627	18.9	2,625
Coast endemic	4.9	798	4.5	798
Seasonal	2.3	1,491	1.8	1,481
Low risk	0.4	3,252	0.4	3,247
Mother's education[2]				
No education	2.8	376	1.3	373
Primary	6.0	1,357	4.5	1,357
Secondary	3.0	1,084	1.5	1,084
More than secondary	1.2	409	0.9	409
Wealth quintile				
Lowest	9.1	2,470	7.3	2,468
Second	9.7	2,304	8.3	2,302
Middle	7.3	2,137	5.9	2,132
Fourth	3.9	1,978	3.4	1,977
Highest	1.7	1,588	1.6	1,579
Total	4 6.8	10,477	5.6	10,458

RDT = Rapid diagnostic test (Carestart P.f.)
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire.

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Step 1: Read the title and subtitle—highlighted in orange in the table above. They tell you the topic and the specific population group being described. In this case, the table is about children age 6 months to 14 years who were tested for malaria.

Step 2: Scan the column headings—highlighted in green in Example 1. They describe how the information is categorized. In this table, the first column of data shows children who tested positive for malaria according to the rapid diagnostic test or RDT. The second column lists the number of children age 6 months to 14 years who were tested for malaria using RDT in the survey. The third column shows children who tested positive for malaria according to microscopy. The last column lists the number of children age 6 months to 14 years who were tested for malaria using microscopy in the survey.

Step 3: Scan the row headings—the first vertical column highlighted in blue in Example 1. These show the different ways the data are divided into categories based on population characteristics. In this case, the table presents prevalence of malaria by age, sex, mother's interview status, urban-rural residence, malaria endemicity

zone, mother's educational level, and wealth quintile. Most of the tables in the KMIS report will be divided into these same categories.

Step 4: Look at the row at the bottom of the table highlighted in red. These percentages represent the totals of children age 6 months to 14 years who tested positive for malaria according to the different tests. In this case, 6.8%* of children age 6 months to 14 years tested positive for malaria according to RDT, while 5.6% tested positive for malaria according to microscopy.

Step 5: To find out what percentage of children age 6 months to 14 years in rural households tested positive for malaria according to microscopy, draw two imaginary lines, as shown on the table. This shows that 6.8% of rural children age 6 months to 14 years tested positive for malaria according to microscopy.

Step 6: By looking at patterns by background characteristics, we can see how malaria prevalence varies across Kenya. Resources are often limited; knowing how malaria prevalence varies among different groups can help programme planners and policy makers determine how to most effectively use resources.

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

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

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

Answers:

a) Malaria prevalence is the same among girls and boys age 6 months to 14 years – 5.6% each.
b) Malaria prevalence generally increases with age, from 3.0% among children age 6-59 months to 7.6% among children age 10-14 years. Among children age 6-59 months, malaria prevalence ranges from 0.5% among children age 6-8 months to 4.1% among children age 48-59 months.
c) Malaria prevalence ranges from a low of 0.4% in Low risk zone and 0.7% in Highland epidemic prone zone to a high of 18.9% in Lake endemic zone.
d) Malaria prevalence is highest among children whose mothers have primary education (4.5%) and lowest among children whose mothers have more than secondary education (0.9%).
e) Generally, malaria prevalence decreases with household wealth. Malaria prevalence is highest among children from households in the second wealth quintile (8.3%) and lowest among children from households in the highest wealth quintile (1.6%).

Example 2: Use of Mosquito Nets by Pregnant Women

A question asked of a subgroup of survey respondents

Table 3.7 Use of mosquito nets by pregnant women 1

Percentage of pregnant women age 15-49 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey; and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Kenya MIS 2020

Background characteristic 2	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one ITN[1]	
	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of pregnant women	Percentage who slept under an ITN[1] last night	Number of pregnant women
Residence					
Urban	58.1	34.6	136	63.0	75
Rural	48.5	43.6	184	80.6	100
Malaria endemicity					
Highland epidemic prone	54.6	50.5	56	(92.8)	30
Lake endemic	68.2	66.6	69	77.5	59
Coast endemic	(61.1)	(43.1)	30	(81.9)	16
Seasonal	35.5	18.9	36	(75.7)	9
Low risk	(46.1)	(26.0) 4	130	*	60
Education					
No education	24.0	7.2	27	* 4	4
Primary	55.0	51.2	116	73.8	81
Secondary	55.5	34.4	120	67.3	61
More than secondary	54.9	43.5	58	(85.1)	29
Wealth quintile					
Lowest	36.7	29.2	41	(80.2)	15
Second	51.3	49.9	71	72.8	49
Middle	45.6	33.6	48	(77.7)	21
Fourth	71.6	57.1	71	(74.2)	55
Highest	49.5	26.1	89	(65.8)	35
Total	52.6	39.8	321 3	73.0	175

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.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

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

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

Step 3: Find the denominators for each indicator in the table. How many pregnant women age 15-49 in all households were interviewed? It's 321. Now look at the second panel. How many pregnant women age 15-49 in households with at least one ITN were interviewed? It's 175. The second panel is a subset of the first panel.

Step 4: Once these pregnant women are further divided into the background characteristic categories, there may be too few cases for the percentages to be reliable.

- What percentage of pregnant women age 15-49 in all households in Low risk zone slept under an ITN the night before the survey? 26.0%. 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 with no education in households with at least one ITN slept under an ITN the night before the survey? There is no number in this cell—only an asterisk. This is because fewer than 25 pregnant women age 15-49 with no education in households with at least one ITN were interviewed in the survey. Results for this group are not reported. The subgroup is too small, and therefore the data are not reliable.

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

Example 3: Understanding Sampling Weights in KMIS Tables

A sample is a group of people who have been selected for a survey. In the KMIS, the sample is designed to represent the national population age 15-49. In addition to national data, most countries want to collect and report data on smaller geographical or administrative areas. However, doing so requires a minimum sample size per area. For the 2020 KMIS the survey sample is representative at the national level, malaria endemicity zone, and for urban and rural areas.

To generate statistics that are representative of the country as a whole and the five malaria endemicity zones, the number of women surveyed in each malaria endemicity zone should contribute to the size of the total (national) sample in proportion to size of the malaria endemicity zone. However, if some malaria endemicity zones have small populations, then a sample allocated in proportion to each malaria endemicity zone's population may not include sufficient women from each district for analysis. To solve this problem, malaria endemicity zones with small populations are oversampled. For example, let's say that you have enough money to interview 6,771 women and want to produce results that are representative of Kenya as a whole and its malaria endemicity zones (as in Table 2.11). However, the total population of Kenya is not evenly distributed among the malaria endemicity zones: some malaria endemicity zones, such as Low risk zone, are heavily populated while others, such as Coast endemic zone are not. Thus, Coast endemic zone must be oversampled.

A sampling statistician determines how many women should be interviewed in each malaria endemicity zone in order to get reliable statistics. The **blue column (1)** in the table at the right shows the actual number of women interviewed in each malaria endemicity zone. Within the malaria endemicity zones, the number of women interviewed ranges from 781 in Coast endemic zone to 2,369 in Lake endemic zone. The number of interviews is sufficient to get reliable results in each malaria endemicity zone.

Table 2.11 Background characteristics of survey respondents

Percent distribution of women age 15-49 by selected background characteristics, Kenya MIS 2020

Background characteristic	3 Weighted percent	Number of women: 2 Weighted number	Number of women: 1 Unweighted number
Malaria endemicity			
Highland epidemic prone	19.8	1,343	1,264
Lake endemic	19.4	1,312	2,369
Coast endemic	8.0	538	781
Seasonal	12.6	853	1,234
Low risk	40.2	2,724	1,123
Total	100.0	6,771	6,771

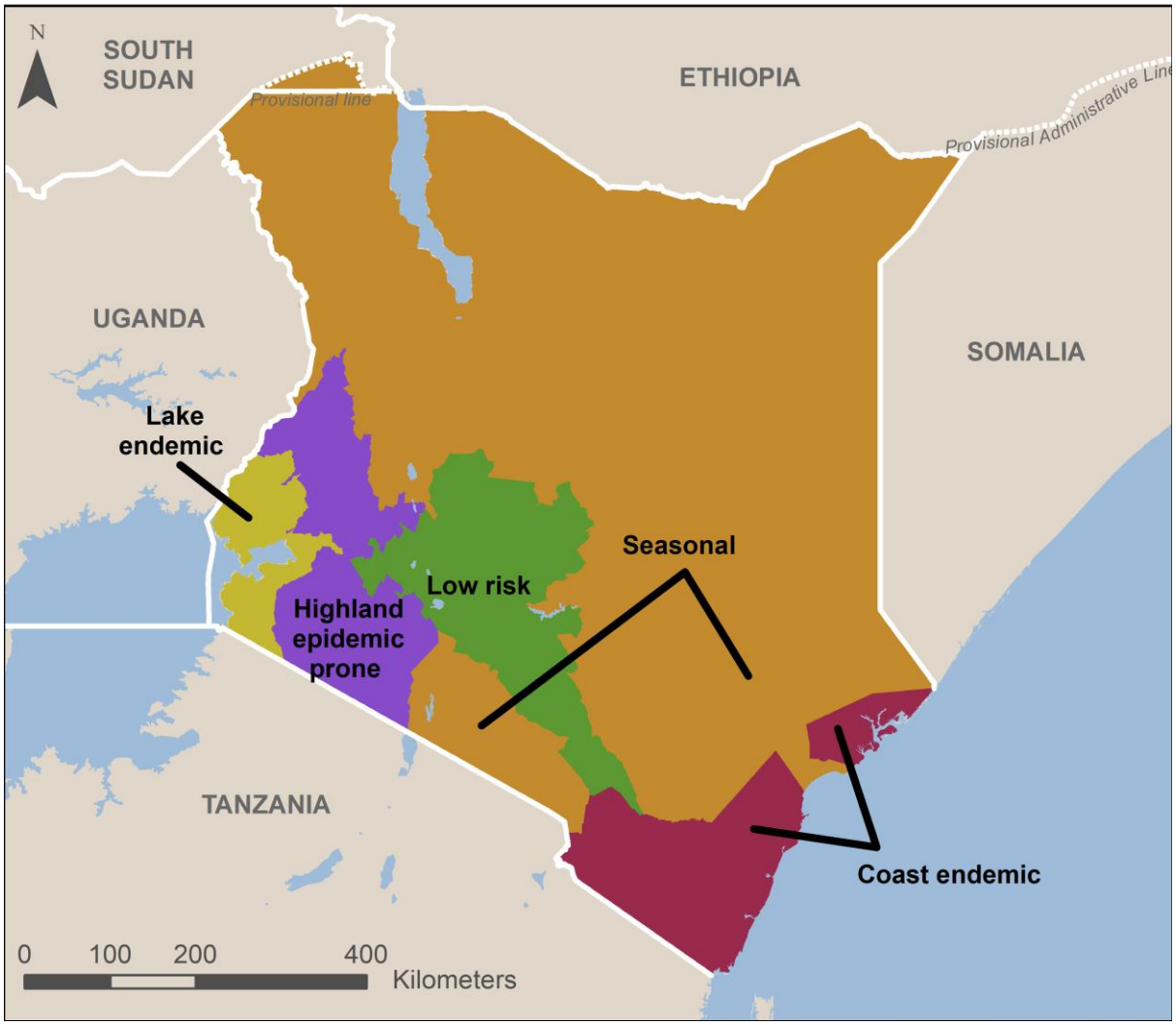
With this distribution of interviews, some malaria endemicity zones are overrepresented and some malaria endemicity zones are underrepresented. For example, the population in Low risk zone is about 40% of the population in Kenya, while Coast endemic zone's population contributes only 8% of the population in Kenya. But as the blue column shows, the number of women interviewed in Low risk zone accounts for only about 17% of the total sample of women interviewed (1,123 / 6,771) and the number of women interviewed in Coast endemic zone accounts for 12% of the total sample of women interviewed (781 / 6,771). This unweighted distribution of women does not accurately represent the population.

In order to get statistics that are representative of Kenya, the distribution of the women in the sample needs to be weighted (or mathematically adjusted) such that it resembles the true distribution in the country. Women from a sparsely populated malaria endemicity zone, like Coast endemic zone, should only contribute a small amount to the national total. Women from a largely populated malaria endemicity zone, like Low risk zone, should contribute much more. Therefore, DHS statisticians mathematically calculate a "weight" which is used to adjust the number of women from each malaria endemicity zone so that each zone's contribution to the total is proportional to the actual population of the malaria endemicity zone. The numbers in the **purple column (2)** represent the "weighted" values. The weighted values can be smaller or larger than the unweighted values at malaria endemicity zone level. The total national sample size of 6,771 women has not changed after weighting, but the distribution of the women in the malaria endemicity zones 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 Kenya, you would see that women in each malaria endemicity zone are contributing to the total sample with the same weight that they contribute to the population of the country. The weighted number of women in the survey now accurately represents the proportion of women who live in Low risk zone and the proportion of women who live in Coast endemic zone.

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

KENYA


N
SOUTH SUDAN
ETHIOPIA
Provisional line
Provisional Administrative Line
UGANDA
SOMALIA
Lake endemic
Seasonal
Low risk
Highland epidemic prone
TANZANIA
Coast endemic
0 100 200 400
Kilometers

INTRODUCTION AND SURVEY METHODOLOGY 1

1.1 HISTORY, GEOGRAPHY, AND ECONOMY

1.1.1 History

The first inhabitants of the territory that is present-day Kenya first inhabited the area four millennia ago and included the Cushites, Nilotes, and Bantus. These groups were followed by Arabs who sailed to Kenya at the end of the first millennia AD and settled on the coast. European explorers and missionaries arrived towards the end of the 15th century. The partitioning of Africa during the Berlin Conference in 1885 gave the British control over the then-called East Africa Protectorate until 1920, when Kenya was declared a British colony. In 1963, Kenya became an independent country.

The last century in Kenya has been marked by economic growth and modernisation, especially in education, agriculture, industry, and infrastructure. In the decades that followed independence, the economy sustained growth as more space nationally and internationally was freed for Kenyan participation in the productive sectors. More schools were constructed, free primary education was provided, and institutions of higher education expanded. Furthermore, the health sector grew with construction of new facilities and establishment of initiatives such as the immunisation program and provision of water and electricity. Improvements in the road network, telecommunication infrastructure, and land reform have been among the notable achievements in Kenya.

Since independence Kenya has remained politically stable. Elections have been held every 5 years, and multi-party politics were re-introduced in 1992. A new constitution was promulgated in 2010, which ushered in a two-level system: the national government and 47 devolved county governments under a unitary state. The functions of the Ministry of Agriculture and the Ministry of Health devolved to the county governments under the 2010 constitution.

1.1.2 Geography and Climate

The geography of Kenya is diverse, varying across all 47 counties. Kenya has a coastline along the Indian Ocean. The country features four topographical regions: the arid and semi-arid north and northeastern regions, the savannah lands of the south, the fertile lowlands along the coast, and the agriculturally rich central highlands around Mount Kenya including the capital, Nairobi, and the western highlands west of the Rift Valley. The western sector of the country is characterised by a moderate lowland around Lake Victoria. Mau Forest, the largest forest complex in East Africa, and the Kakamega Forest in western Kenya are relics of an East African rainforest.

Although Kenya is centred at the equator, it shares the seasons of the southern hemisphere; the warmest months are December through March and the coolest months are June through August, but there are variations by location within the country. Kenya's climate varies considerably in temperature and precipitation due to variations in altitude. The highlands generally have a cool climate with temperatures ranging from 10°C to 26°C. The nation's highest temperatures are found in the northern plains, where temperatures often reach 43°C. Temperatures vary between 14°C and 29°C on the eastern plateau and between 18°C and 34°C in the coastal areas.

Kenya has a bi-modal rainfall pattern, with long rains between March and May and short rains between October and December. Rain is abundant along the coast, normally about 890 to 1,270 mm each year depending on location. Similar amounts fall throughout the highlands, although several of the highland areas and the shores of Lake Victoria receive considerably more. Northern Kenya and the interior areas of

the southeast are generally dry. The north and northeastern regions receive less than 250 mm of rainfall a year. These variations in climate and topography influence the distribution of malaria vectors and, thus, the prevalence of malaria.

1.2 Basic Demographic Indicators

Table 1.1 presents trends in basic demographic indicators for Kenya from 1969 to 2019. There has been a general decline in the annual population growth rate since 1979. The annual growth rate currently stands at 2.2%, down from the 3.8% figure registered in 1979. The population density currently stands at 82 people per square kilometre.

1.3 Health Priorities and Strategies for Malaria Prevention

Kenya's health sector priorities are guided by the Constitution of Kenya, Vision 2030, and the government's Big Four Agenda. These priorities are defined in the Kenya Health Policy 2014-2030, which provides long-term policy directions; the policy's goal is "to attain the highest possible standard of health in a responsive manner."

The Kenya Health Sector Strategic and Investment Plan (KHSSP) 2018-2023 has defined medium-term priorities and objectives towards attaining the aims of the Kenya Health Policy. This strategy has an overarching focus on achieving universal health coverage (UHC). One of the objectives of KHSSP is to eliminate communicable diseases, including malaria, with key health outputs related to improvements in access to and quality of services and demand for services.

The government is committed to implementing universal health coverage. This will ensure that all individuals and communities in Kenya have access to quality essential health services without suffering financial hardship. UHC aspirations for Kenya include availability of essential services, coverage of essential interventions, and financial risk protection. The focus of UHC is the primary health care approach and improvement of health systems.

1.3.1 Kenya Malaria Strategy 2019-2023

The Kenya Malaria Strategy (KMS) 2019-2023 is anchored on the need to secure the gains of the previous period and push towards shrinking the disease map in the country. The strategy provides evidence-based and globally recommended interventions that will serve as a roadmap for the achievement of set targets. A malaria programme review in 2018 provided the strategic direction for the programme that will ultimately reach the vision of a malaria-free Kenya. The goal of the strategy is "to reduce malaria incidence and deaths by seventy-five percent of 2016 levels by 2023."

To achieve this goal, the strategy has six interdependent strategic objectives:

1. To protect 100% of people living in malaria risk areas through access to appropriate malaria preventive interventions by 2023

2. To manage 100% of suspected malaria cases according to the Kenya malaria treatment guidelines by 2023

3. To establish systems for malaria elimination in targeted counties by 2023

4. To increase utilisation of appropriate malaria interventions in Kenya to at least 80% by 2023

5. To strengthen malaria surveillance and use of information to improve decision making for programme performance

6. To provide leadership and management for optimal implementation of malaria interventions at all levels as a means of achieving all strategic objectives by 2023

Implementation of the strategy is guided by the principle of three ones: one country strategy, one coordinating authority, and one monitoring and evaluation framework.

In recognition of a reduced burden, the Kenya Malaria Strategy (KMS) introduced the malaria elimination objective, targeting areas with low malaria transmission over time. The strategy also recognises the need to integrate financial indicators and link programmatic targets to funding and financing to outcomes. The KMS 2019-2023 includes a monitoring and evaluation plan to guide overall performance monitoring across all of the objectives. This plan outlines the key targets over the strategy period, with set targets that can be assessed quarterly, annually, and over the duration of the strategy.

1.3.2 Epidemiology of Malaria in Kenya

Malaria remains a major public health problem in Kenya and accounts for an estimated 13% to 15% of outpatient consultations. Malaria transmission and infection risk in Kenya are mainly determined by altitude, rainfall patterns, and temperature, leading to considerable variation in malaria prevalence by season and across geographic zones. Approximately 70% of the population is at risk for malaria, including 13 million people in endemic areas and another 19 million in highland epidemic prone and seasonal transmission areas.

Kenya is home to all four species of *Plasmodium* parasites that infect humans. The *Plasmodium falciparum* parasite, which causes the most severe form of the disease, accounts for more than 99% of infections. A temperature suitability index (TSI) for malaria transmission shows that the Lake Victoria and coastal regions have ambient temperatures suitable for malaria transmission and have the necessary amounts and seasonality of rainfall to sustain lengthy periods of transmission (Weiss 2014).

The KMS 2019-2023 classifies four epidemiological zones in Kenya with variation in risk of malaria infection. These zones have been determined based on several factors, including malaria prevalence, climate factors (i.e., temperature, rainfall, altitude), and topography.

Highland epidemic prone areas: These areas lie 1,500 metres above sea level. Malaria transmission in the western highlands of Kenya is seasonal, with considerable year-to-year variation. Epidemic malaria events occur when climatic conditions favour sustainability of minimum temperatures above 18°C. This increase in minimum temperatures during periods of long and short rains favours sustained vector breeding and successful sporogony, resulting in an increased intensity of malaria transmission that occasionally reaches epidemic proportions. Epidemics in this zone are generically predictable since they follow the seasonality of the rainfall. The whole population is vulnerable, and case fatality rates due to malaria during an epidemic can rise to 10 times greater than what is experienced in regions where malaria is stable.

Endemic areas (lake and coast): These are areas of stable malaria transmission (with altitudes ranging from 0 to 1,300 m) around Lake Victoria in western Kenya and in the coastal regions. Rainfall, temperature, and humidity are the determinants of perennial transmission of malaria. The vector life cycle is usually short with a high survival rate due to the suitable climatic conditions. Transmission is intense throughout the year, with annual entomological inoculation rates between 30 and 100.

Semi-arid, seasonal malaria transmission areas: This zone, in arid and semi-arid areas of the northern, northeastern, and southeastern parts of the country, experiences short periods of intense malaria transmission during the rainfall seasons. Temperatures are usually high, and water pools created during events of above normal rainfall provide the malaria vectors with numerous breeding habitats. Extreme climatic conditions such as the El Niño southern oscillation may also lead to flooding in these areas and may result in epidemics with high morbidity rates due to the population's low immune status. Epidemics in this zone are less predictable due to the unpredictability of rainfalls.

Low risk malaria areas: This zone covers the central highlands of Kenya, including Nairobi. Temperatures are usually too low to allow completion of the sporogony cycle of the malaria parasite in the vector. However, increasing temperatures and changes in the hydrological cycle associated with climate change are likely to increase the areas suitable for malaria vector breeding and introduce malaria transmission in areas where it did not previously exist.

In view of the different epidemiological settings in Kenya, malaria interventions are not applied uniformly across the entire country, a factor to consider in interpreting the results of this report. The chart below summarises the interventions deployed in the different malaria epidemiological zones.

Epidemiological zone	Long-lasting insecticidal nets (LLINs) (vector control)	Intermittent preventive treatment during pregnancy (IPTp)	Case management	Epidemic preparedness and response	Surveillance	Health education/ behaviour change communication
Highland epidemic prone	✓		✓	✓	✓	✓
Lake endemic	✓	✓	✓		✓	✓
Coast endemic	✓	✓	✓		✓	✓
Seasonal			✓	✓	✓	✓
Low risk			✓		✓	✓

1.4 SURVEY ORGANISATION AND METHODOLOGY

The 2020 Kenya Malaria Indicator Survey (KMIS) is the fourth survey of its kind to be carried out in Kenya. Previous MIS surveys were conducted in 2007, 2010, and 2015. As with the previous KMIS surveys, the 2020 KMIS was designed to follow the Roll Back Malaria Monitoring and Evaluation Working Group guidelines, the Kenya National Malaria Strategy 2019-2023, and the Kenya Malaria Monitoring and Evaluation Plan 2019-2023.

The 2020 KMIS was carried out from 8 November to 23 December 2020, covering a nationally representative sample of 7,952 households. All women age 15-49 in the selected households were eligible for individual interviews. They were asked questions about prevention of malaria during pregnancy and treatment of childhood fever. In addition, the survey included testing for anaemia and malaria among children age 6 months to age 14 using a finger- or heel-prick blood sample. The results of anaemia and malaria rapid diagnostic testing were available immediately and were provided to the children's parents or guardians. Thin and thick blood smears were collected in the field and transported to the National Malaria Reference Laboratory. The Kenya Medical Research Institute (KEMRI) Walter Reed Project Malaria Diagnostics Centre of Excellence Laboratory in Kisumu was responsible for external laboratory quality assurance.

1.4.1 Survey Objectives

The 2020 KMIS was designed to provide information on the implementation of core malaria control interventions and serve as a follow-up to the previous malaria indicator surveys.

The specific objectives of the 2020 KMIS were as follows:

- To measure the extent of ownership of, access to, and use of mosquito nets
- To assess coverage of intermittent preventive treatment of malaria during pregnancy
- To examine fever management among children under age 5
- To measure the prevalence of malaria and anaemia among children age 6 months to age 14
- To assess knowledge, attitudes, and practices regarding malaria control
- To determine the *Plasmodium* species most prevalent in Kenya

The findings from the 2020 KMIS will assist policymakers and programme managers in evaluating and designing programmes and strategies for improving malaria control interventions in Kenya.

1.4.2 Survey Organisation

In line with Kenya's Vision 2030 aspirations, AID Effectiveness principles, and the United States Agency for International Development (USAID) Journey to Self-Reliance mandate, the 2020 Kenya Malaria Indicator Survey was co-designed, co-funded, and co-managed. The Ministry of Health, through the Division of National Malaria Programme (DNMP) and the Kenya National Bureau of Statistics (KNBS), was the implementing agency for the 2020 KMIS and as such had a primary role in planning and conducting fieldwork and analyses while maintaining a high level of data quality and disseminating the survey results. This was done in collaboration with other institutions and partners including the Kenya Medical Research Institute (KEMRI), the World Health Organization (WHO), the United States President's Malaria Initiative (PMI), ICF, and the United Nations Children's Fund (UNICEF).

The survey was advised by the KMIS National Advisory Council, overseen by the Steering Committee and coordinated by a sub-committee composed of members of the Malaria Monitoring and Evaluation Committee of Experts. Field activities were coordinated by DNMP in collaboration with KNBS. The sample design, training of health care workers, data collection, analysis, and report writing were carried out by DNMP and KNBS in collaboration with PMI, WHO, PMI Impact Malaria, PMI Measure Malaria, PMI Tupime Kaunti, ICF, and selected county representatives.

Tablet computers provided by KNBS were used for data collection. ICF assisted in programming the tablet computers as well as in training, fieldwork, report writing, and dissemination of the survey results. ICF provided technical assistance through The DHS Program, a USAID-funded project offering support and technical assistance in the implementation of population and health surveys in countries worldwide. The survey was funded by the Government of Kenya and The Global Fund to Fight AIDS, Tuberculosis and Malaria through a DNMP grant and by USAID through PMI.

1.4.3 Sample Design

The 2020 KMIS followed a two-stage stratified cluster sample design and was intended to provide estimates of key malaria indicators for the country as a whole, for urban and rural areas, and for the five malaria-endemic zones (Highland epidemic prone, Lake endemic, Coast endemic, Seasonal, and Low risk).

The five malaria-endemic zones fully cover the country, and each of the 47 counties in the country falls into one or two of the five zones as follows[1]:

1. **Highland epidemic prone:** Kisii, Nyamira, West Pokot,[1] Trans-Nzoia, Uasin Gishu, Nandi, Narok, Kericho, Bomet, Bungoma,[1] Kakamega,[1] and Elgeyo Marakwet[1]

2. **Lake endemic:** Siaya, Kisumu, Migori, Homa Bay, Kakamega,[1] Vihiga, Bungoma,[1] and Busia

3. **Coast endemic:** Mombasa, Kwale, Kilifi, Lamu, and Taita Taveta

4. **Seasonal:** Tana River, Marsabit, Isiolo, Meru,[1] Tharaka-Nithi,[1] Embu,[1] Kitui, Garissa, Wajir, Mandera, Turkana, Samburu, Baringo, Elgeyo Marakwet,[1] Kajiado, and West Pokot[1]

5. **Low risk:** Nairobi, Nyandarua, Nyeri, Kirinyaga, Murang'a, Kiambu, Machakos, Makueni, Laikipia, Nakuru, Meru,[1] Tharaka-Nithi,[1] and Embu[1]

The survey utilised the fifth National Sample Survey and Evaluation Programme (NASSEP V) household master sample frame, the same frame used for the 2015 KMIS. The frame was used by KNBS from 2012 to 2020 to conduct household-based sample surveys in Kenya. It was based on the 2009 Kenya Population and Housing Census, and the primary sampling units were clusters developed from enumeration areas (EAs). EAs are the smallest geographical areas created for purposes of census enumeration; a cluster can be an EA or part of an EA. The frame had a total of 5,360 clusters and was stratified into urban and rural areas within each of 47 counties, resulting into 92 sampling strata with Nairobi and Mombasa counties being wholly urban.

The survey employed a two-stage stratified cluster sampling design in which, in the first stage of selection, 301 clusters (134 urban and 167 rural) were randomly selected from the NASSEP V master sample frame using an equal probability selection method with independent selection in each sampling stratum. The second stage involved random selection of a fixed number of 30 households per cluster from a roster of households in the sampled clusters using systematic random sampling.

The sampled clusters were allocated based on a power allocation to over-sample the high/moderate risk malaria zones (Lake endemic, Coast endemic and Highland epidemic prone) as a means of aiding in programmatic decision making. To control the sample distribution over all of the counties, the sample was stratified based on counties by residence area, yielding a total of 92 strata.

All of the sampled clusters underwent cluster updating, also known as household listing, to capture changes that might have occurred in the clusters and to update the household information. The updating was done before second stage selection of the secondary sampling units (households). A household listing operation was conducted from 12 October to 31 October 2020 in all of the selected EAs. The list of households was directly recorded on tablet PCs using the computer-assisted personal interviewing (CAPI) system. As part of the listing, the field teams updated the necessary maps and recorded the geographic coordinates of each cluster. During fieldwork, two clusters were not listed because of a lack of security, one cluster was not listed because of pastoralist migration, and eight clusters were not listed because they included less than 30 households. Thus, the number of households decreased from 9,030 to 8,843.

Replacement of nonresponding households was not allowed. Due to the non-proportional allocation of the sample to the different strata and malaria endemicity zones and the possible differences in response rates,

[1] Several counties are of mixed malaria zone classification. These counties are Bungoma (Highland epidemic prone and Lake endemic zones), Kakamega (Highland epidemic prone and Lake endemic zones), West Pokot (Highland epidemic prone and Seasonal zones), Elgeyo Marakwet (Highland epidemic prone and Seasonal zones), Meru (Seasonal and Low risk zones), Embu (Seasonal and Low risk zones) and Tharaka-Nithi (Seasonal and Low risk zones).

sampling weights are required for any analysis that uses the 2020 KMIS data. This ensures the actual representation of the survey results at the national and malaria endemicity zone levels.

Results shown in this report have been weighted to account for the complex sample design. More information on weight calculation is presented in Appendix A.

All women age 15-49 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed. With the parent's or guardian's consent, children age 6 months to age 14 were tested for anaemia and malaria infection.

1.5 QUESTIONNAIRES

Four types of questionnaires were used for the 2020 KMIS: the Household Questionnaire, the Woman's Questionnaire, the Biomarker Questionnaire, and the Fieldworker Questionnaire. The questionnaires were adapted to reflect issues relevant to Kenya. Modifications were determined after a series of meetings with various stakeholders from DNMP and other government ministries and agencies, nongovernmental organisations, and international partners. The Household and Woman's Questionnaires in English and Kiswahili were programmed into Android tablets, which enabled the use of computer-assisted personal interviewing (CAPI) for data collection. The Biomarker Questionnaire, in English and Kiswahili, was filled out on hard copy and then entered into the CAPI system. Fieldworkers were hired from various geographic areas of Kenya. If a respondent did not speak English or Kiswahili, interviewers used the respondent's local language. In addition, discussions were held during interviewer training on translation of local terms.

The Household Questionnaire was used to list all of the usual members of and visitors to the selected households. Basic information was collected on the characteristics of each person listed in the household, including age, sex, and relationship to the head of the household. The data on age and sex of household members obtained from the questionnaire were used to identify women eligible for individual interviews and children age 6 months to age 14 eligible for anaemia and malaria testing. Additionally, the Household Questionnaire captured information on characteristics of the household's dwelling unit, such as source of water, type of toilet facilities, materials used for the floor, ownership of various durable goods, and ownership and use of mosquito nets.

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

- Background characteristics (age, education, literacy, and religion)
- Reproductive history for the last 5 years
- Preventive malaria treatment during the pregnancy of the most recent live birth
- Prevalence and treatment of fever among children under age 5
- Knowledge about malaria (prevention and types of antimalarial medications)
- Exposure to and source of media messages about malaria in the last 6 months

The Biomarker Questionnaire was used to record the results of the anaemia and malaria testing of children age 6 months to age 14.

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

Consent statements were developed for each tool (the Household, Woman's, and Biomarker Questionnaires). Further consent statements were formulated for malaria testing, anaemia testing, and treatment of children with positive malaria rapid diagnostic tests (RDTs). Signatures were obtained for each consent statement on a separate paper form and were confirmed on the digital form with the interviewer's number at each point of consent.

1.6 Anaemia and Malaria Testing

Blood samples for biomarker testing were collected via finger or heel pricks from children age 6 months to age 14. Each field team included one laboratory technician who carried out anaemia testing and malaria testing by RDT and prepared the blood film. A clinician (nurse, clinical officer, or medical doctor) provided malaria medications for children who tested positive for malaria by RDT, in accordance with the approved treatment guidelines. The child's parent or guardian provided written, informed consent for each test. Additionally, children age 6-12 provided verbal assent, and children age 13-14 provided written assent.

Anaemia testing. A single-use retractable, spring-loaded, sterile lancet was used to make a finger or heel prick. A drop of blood from this site was then collected in a microcuvette. Haemoglobin analysis was carried out on site using a battery-operated portable HemoCue® 201+ analyser, which produces a result in less than 1 minute. Results were given to the child's parent or guardian verbally and in writing. 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 staff at the facility. Results of the anaemia test were recorded in the Biomarker Questionnaire and on a pamphlet left in the household that also contained information on the causes and prevention of anaemia.

Malaria testing with a rapid diagnostic test (RDT). Another drop of blood was used to test children for malaria with the CareStart P.f. rapid diagnostic test (RDT), which produces a result in 20 minutes. The CareStart P.f. RDT tests for one antigen, histidine-rich protein II (HRP-II), specific to *Plasmodium falciparum* (*Pf*), the major cause of malaria in Kenya. The diagnostic test kit includes a disposable sample applicator that comes in a standard package. A tiny volume of blood is collected with the applicator and placed in the sample well of the testing device, and then four drops of buffer are added to the appropriate well. As with anaemia testing, malaria RDT results were recorded in the Biomarker Questionnaire and on a pamphlet that was shared with the child's parent or guardian.

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

Malaria testing by microscopy. In addition to the RDT, thick and thin blood films were prepared in the field. Each blood slide was given a barcode label, with a duplicate affixed to the Biomarker Questionnaire. An additional copy of the barcode label was affixed to a blood sample transmittal form to track blood samples from the field to the National Malaria Reference Laboratory in Nairobi. The thick film slides were dried and stored in slide boxes. The thin film slides were fixed in a dust-free environment and stored in slide boxes. The thick and thin film slides were collected regularly from the field and transported to Nairobi for logging, staining, and microscopic examination.

Upon arrival at the laboratory, the thick and thin films were scanned, assigned unique laboratory numbers, and stained with 3% Giemsa stain. Slides were examined under a microscope to determine the presence or

absence of malaria parasites, speciation, and parasite density. If parasites were present, the microscopist counted both asexual parasites and white blood cells. All stained slides were read by two independent microscopists who were masked from the RDT results. Slides with discordant results between the first and second readers (discordant for either positivity or parasite density) were re-examined by a third WHO-certified Level 1 or 2 microscopist to determine the final result. The microscopy results were quality checked via internal and external quality control processes. Routine internal quality control (IQC) was performed as per the laboratory IQC Standard Operating Procedure. External quality control (EQC) was conducted by the KEMRI Walter Reed Project Malaria Diagnostics Centre of Excellence Laboratory in Kisumu, which independently read 10% of the slides. The external quality control testing yielded 99% agreement between the National Malaria Reference Laboratory and the KEMRI Walter Reed Centre results. More information is provided in Appendix C, Table C.7 and Table C.8.

1.7 THE 2020 KMIS IN THE CONTEXT OF THE COVID-19 PANDEMIC

On 11 February 2020, WHO announced an official name for the disease that caused the 2019 novel coronavirus outbreak (COVID-19). Over the ensuing months COVID-19 spread across the world, leading to a global pandemic. The first case of COVID-19 was confirmed in Kenya on 13 March 2020.

The 2020 KMIS fieldwork was originally planned to take place in June and July 2020, coinciding with peak malaria transmission and comparable with previous KMIS survey (2007, 2010, and 2015) fieldwork dates. However, by June 2020, COVID-19 had prompted a nationwide curfew as well as cessation of movement into and out of certain areas of the country. It became clear that training and fieldwork could not be safely implemented as originally scheduled. The stakeholders agreed on an adjusted plan to conduct fieldwork during October through December 2020, which coincided with the short rains, and to pivot to a virtual technical assistance model for training and survey oversight. Survey logistics were recalibrated to include COVID-19 risk mitigation elements (e.g., procurement of personal protective equipment for fieldworkers, establishment of behavioural protocols during training and fieldwork).

1.8 2020 KMIS TRAINING

1.8.1 Training of Trainers

Due to the COVID-19 pandemic, the ICF team could not travel to Kenya to conduct training of trainers in collaboration with DNMP and KNBS officers. DNMP, KNBS, and ICF worked together on enhanced, virtual training of trainers; thereafter, DNMP and KNBS took the lead in facilitating the in-person pretest and main training, with daily virtual debriefings and support from ICF. During fieldwork, DNMP, KNBS, and ICF held weekly virtual meetings to review field check tables and discuss fieldwork progress.

1.8.2 Pretest

The training for the pretest took place from 5 to 19 October 2020. Overall, 23 officers participated in the training, including two supervisors, three biomarker technicians, four data collectors, and two laboratory scientists. KNBS, DNMP, and ICF staff members led the training and served as the supervisory team for the pretest fieldwork. Participants were trained to administer paper questionnaires, use CAPI, and collect blood samples for anaemia and malaria testing. The pretest training consisted of a survey overview, techniques of interviewing, field procedures, a detailed description of all sections of the Household and Woman's Questionnaires, instruction on the CAPI data collection application, and 3 days of field practice. At the end of fieldwork, a debriefing session was held, and the questionnaires and CAPI applications were modified based on the findings from the field.

1.8.3 Main Training of Field Staff

The training of field staff, which was coordinated by DNMP, KNBS, ICF, and other members of the technical working group, took place from 23 October to 6 November 2020. In collaboration with KNBS,

DNMP recruited 54 interviewers, 25 interviewer-clinicians, 25 supervisors, and 29 biomarker technicians to attend the 2-week interviewer, supervisor, and biomarker training.

The first 4 days of the main training focused on learning about the survey, understanding fieldwork procedures, and reviewing each of the survey questionnaires. The training used a variety of techniques including role plays, practice interviews with peers, and quizzes. Participants in these sessions included supervisors, interviewers, interviewer-clinicians, and biomarker technicians. On the fourth day, biomarker technicians split off from the group for biomarker-specific training.

The supervisors, interviewers, and interviewer-clinicians underwent an additional 7 days of training on CAPI procedures. The additional training included practice in assigning households to interviewers, administering the Household and Woman's Questionnaires, entering completed Biomarker Questionnaires into the CAPI system, handling errors in the field, closing clusters, and transferring data to the central office.

The biomarker technicians completed an additional 5-day training session on the Biomarker Questionnaire and procedures for obtaining consent, setting up stations for blood collection, collecting blood, measuring haemoglobin levels, conducting malaria rapid tests, and preparing thick and thin malaria blood films. Clinician-interviewers briefly joined one of the biomarker training sessions. The biomarker technician training also included 2 days of clinic visits to allow for practice with children.

Following the training, fieldwork teams participated in 2 days of field practice in two counties (Nakuru and Nyandarua). Each fieldwork team was assigned a cluster of 10 selected households to provide the team with experience in conducting interviews with respondents, collecting biomarkers, and working collectively.

1.9 FIELDWORK

Twenty-five teams were formed, with each including a supervisor, three interviewers (one of whom was a clinician), a health technician, and a driver. The team spent an average of 3 days working in a cluster. Information on selected clusters and sampled households was directly uploaded into supervisors' tablets. When eligible respondents were absent from their homes, a maximum of three revisits were made to offer respondents the opportunity to participate in the survey. Field data collection was conducted from 9 November to 19 December 2020 for 20 teams and a slightly longer period (up to 23 December 2020) for five 5 teams that had hard to reach participants or were working in insecure counties.

In addition to the field supervisors, there were national and regional monitors who supervised and monitored field activities and ensured the collection and transfer of blood films to the laboratory. DNMP and KNBS field monitoring staff were responsible for data collection quality control and timely collection and transfer of slides from the field teams to the National Malaria Reference Laboratory. Periodically during fieldwork, a set of field check tables were run from the fieldwork data on the central office computer at KNBS. Problems that appeared from reviews of these tables were discussed with the appropriate teams (during supervisory visits or briefing sessions), and attempts were made to ensure that they did not persist. To facilitate communication and monitoring, each fieldworker was assigned a unique identification number. KNBS data processing staff provided teams with CAPI-related troubleshooting support during data collection.

1.10 DATA PROCESSING

The 2020 KMIS questionnaires were programmed using Census and Survey Processing (CSPro) software. The program was then uploaded into Android-based tablets that were used to collect data via CAPI. The CAPI applications, including the supporting applications and the applications for the Household, Biomarker, and Woman's Questionnaires, were programmed by ICF. The field supervisors transferred data

daily to the CSWeb server, developed by the U.S. Census Bureau and located in Nairobi, for data processing on the central office computer at the KNBS office in Nairobi.

Data received from the field teams were registered and checked for any inconsistencies and outliers on the central office computer at KNBS. 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 the central office computer at KNBS head office. The central office held data files which was used to produce final report tables and final data sets. CSPro software was used for data editing, cleaning, weighting, and tabulation.

1.11 Ethical Considerations

The protocol for the 2020 KMIS was approved by the Kenyatta National Hospital/University of Nairobi Scientific and Ethics Review Committee and the institutional review board at ICF. The risks and benefits of participation in the survey were explained to respondents. Participation in the survey was voluntary, with no compensation provided to participants for their time. Informed consent was provided by eligible respondents before administration of the Household or Woman's Questionnaire. Before collection of blood samples for malaria and anaemia testing, informed consent was requested from parents or guardians of children. All data and other information collected were confidential. Respondents' names and identification numbers were removed from the final data sets before analyses were conducted. Blood samples were stored with barcode identifiers to protect respondents' identity.

1.12 Challenges and Limitations

As a result of poor infrastructure and vast distances between clusters in the sparsely populated regions, more time was spent in data collection in some areas than in others. Other clusters could not be accessed by vehicles; hence, teams working in these clusters were forced to use motorcycles, which had not been included in the budget. Some insecure clusters could not be accessed and were not included in the survey.

There was an excess workload, with only one biomarker technician per team. Therefore, it is recommended that the budgets in future KMIS surveys include two biomarker technicians per team. There is also a need to procure a portable table for each biomarker technician.

Clusters were updated, but the updated maps were not available by the time of data collection, and hence some households could not be found. To avoid losing newly constructed structures, efforts should be made to provide updated cluster maps to the field teams.

Despite the COVID-19 pandemic, the country planned and worked with the "new normal" to implement the survey, which was a success amid the challenges faced. Proper coordination of the survey led to the success of its implementation.

1.13 Response Rates

Table 1.2 presents the results of the household and individual interviews. A total of 8,845 households were selected for the survey, of which 8,185 were occupied at the time of fieldwork. Among the occupied households, 7,952 were successfully interviewed, yielding a response rate of 97%. In the interviewed households, 7,035 eligible women were identified for individual interviews and 6,771 were successfully interviewed, yielding a response rate of 96%.

List of Tables

Table 1.1 Basic demographic indicators

Selected demographic indicators for Kenya, 1969, 1979, 1989, 1999, 2014, and 2019

Indicator	1969	1979	1989	1999	2014	2019
Population (millions)	10.9	16.2	23.2	28.7	43.0[a]	47.6
Density (population/km^2)	19.0	27.0	37.0	49.0	73.9[a]	82.0
Percent urban	9.9	15.1	18.1	19.4	32.3	31.2
Crude birth rate	50.0	54.0	48.0	41.3	30.5[b]	30.5[b]
Crude death rate	17.0	14.0	11.0	11.7	10.4[b]	10.4[b]
Intercensal growth rate	3.3	3.8	3.4	2.9	2.9[b]	2.2
Total fertility rate	7.6	7.8	6.7	5.0	3.9	3.9
Infant mortality rate (per 1,000 births)	119	88	66	77	39	39[b]
Life expectancy at birth	50.0	54.0	60.0	56.6	58.0[b]	58.0[b]

Source: CBS 1970; CBS 1981; CBS 1994; CBS 2002; KNBS & ICF Macro 2010; KNBS 2012; KNBS and ICF International 2015, KNBS 2019.
[a] Projected figures
[b] Assumed to remain constant over the intercensal/survey period

Table 1.2 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Kenya MIS 2020

	Residence		
Result	Urban	Rural	Total
Household interviews			
Households selected	3,986	4,859	8,845
Households occupied	3,580	4,605	8,185
Households interviewed	3,440	4,512	7,952
Household response rate[1]	96.1	98.0	97.2
Interviews with women age 15-49			
Number of eligible women	3,028	4,007	7,035
Number of eligible women interviewed	2,923	3,848	6,771
Eligible women response rate[2]	96.5	96.0	96.2

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

CHARACTERISTICS OF HOUSEHOLDS AND WOMEN

2

Key Findings

- ***Drinking water:*** 92% of urban households have access to an improved source of drinking water, as compared with 56% of rural households.
- ***Sanitation:*** About 2 out of 3 households (66%) use an improved toilet facility, 28% use an unimproved sanitation facility, and 6% do not use a facility.
- ***Household composition:*** The average household size is 3.7 persons; 69% of households are headed by men.
- ***Education:*** 78% of women age 15-49 have completed primary education or higher.
- ***Mobile phone ownership:*** 77% of women own a mobile phone, and 37% own a smart phone. Thus, about half of women who own a mobile phone own a smart phone.

Information on the socioeconomic characteristics of the household population in the 2020 KMIS provides a context to interpret demographic and health indicators and can furnish an approximate indication of the representativeness of the survey. In addition, this information sheds light on the living conditions of the population.

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

2.1 DRINKING WATER SOURCES AND TREATMENT

Improved sources of drinking water

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

Sample: Households

Basic drinking water service

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

Sample: De jure population

Limited drinking water service

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

Sample: De jure population

Improved sources of water protect against outside contamination so that water is more likely to be safe to drink. **Table 2.1** shows that 70% of households use an improved source of drinking water. The most common source of drinking water is water piped into the household's dwelling/yard plot (28%), followed by protected dug wells (8%), rainwater (8%), and public taps/standpipes (7%). Fifty-one percent of households have water on the premises, and 37% take 30 minutes or less (round trip) to obtain drinking water. The percentage of households using improved sources of drinking water is higher in urban areas (92%) than in rural areas (56%).

Trends: Use of improved sources of drinking water decreased 8 percentage points from 78% in 2015 to 70% in 2020.

Urban and rural households rely on different sources of drinking water. Over half (55%) of urban households have water piped into their dwelling/yard/plot or their neighbour's yard, as compared with 16% of rural households (**Figure 2.1**). Rural households are more likely to obtain water from a tube well/borehole/protected dug well or spring (24%) than urban households (7%). Only 2% of urban households have to travel more than 30 minutes to fetch drinking water, compared with 18% of rural households (**Table 2.1**).

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

Percent distribution of households by source of drinking water

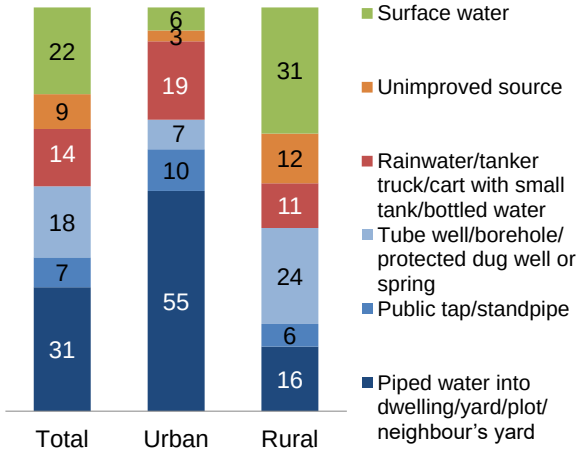


Table 2.2 shows the drinking water service ladder by background characteristics. Overall, 61% of the household population has at least basic drinking water, and 5% has limited service. The percentage of the population with at least basic drinking water service ranges from 37% in the Seasonal zone to 77% in the Low risk zone. Eighty-seven percent of urban residents have at least basic drinking water service, as compared with 48% of rural residents. Use of surface water generally decreases with increasing wealth, from 41% in the lowest wealth quintile to less than 1% in the highest quintile.

2.2 SANITATION

Improved toilet facilities

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

Sample: Households

Nationally, 66% of households use improved toilet facilities, 28% use unimproved sanitation facilities, and 6% engage in open defecation (**Table 2.3** and **Figure 2.2**). More households in urban areas than rural areas use improved sanitation (79% versus 58%). The most commonly used improved toilet facilities in both urban and rural areas are pit latrines with slabs (27% and 41%, respectively). Use of both unimproved sanitation facilities and open defecation is higher in rural households (34% and 8%, respectively) than in urban households (19% and 2%, respectively). Among households with a toilet facility, 29% report that their facility is located inside their dwelling, while 65% report that the facility is located in their own yard/plot.

***Figure 2.2* Household toilet facilities by residence**

Percent distribution of households by type of toilet facilities

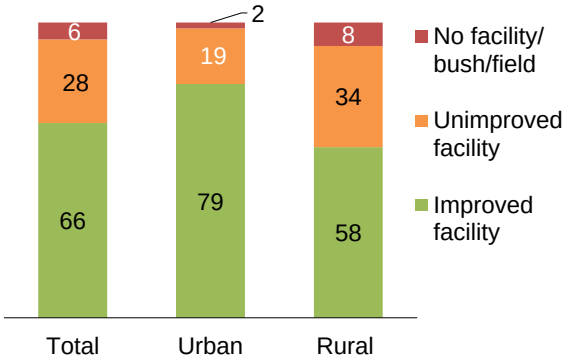


Table 2.4 shows the sanitation service ladder by background characteristics. Overall, 45% of the household population has at least basic service, and 18% has limited service. By malaria endemicity, the household population with at least basic service ranges from 38% in the Coast endemic zone and Highland epidemic prone zone to 54% in the Low risk zone (**Table 2.4**). The percentage of the population using open defecation is highest in the Seasonal endemic zone (27%). As expected, use of unimproved sanitation facilities decreases with increasing wealth.

Trends: Nationally, use of an improved sanitation facility increased from 60% in 2015 to 66% in 2020. Most notably, rural households' use of improved sanitation facilities increased by 13 percentage points from 45% in 2015 to 58% in 2020.

2.3 HOUSING CHARACTERISTICS

The 2020 KMIS collected data on household features such as access to electricity, construction materials, number of sleeping rooms, and types of cooking technology and cooking fuels. These data, along with information on ownership of household durable goods, source of drinking water, and sanitation, contribute to the creation of the household wealth index and provide information that may be relevant for other health indicators.

2.3.1 Construction Materials

Cement is the most common flooring material in Kenya, used by 45% of households. A higher percentage of urban households (61%) than rural households (35%) have cement floors. Earth/sand is the second most common flooring material, used by 34% of households (**Table 2.5**). The majority of households in Kenya (88%) have iron sheet roofing (84% of urban households and 90% of rural households). The most common exterior wall material is stone with lime/cement (21%), followed by dirt (17%).

Trends: Use of iron sheets for roofing material increased slightly from 84% in 2015 to 88% in 2020.

2.3.2 Rooms Used for Sleeping

The number of rooms a household uses for sleeping is an indicator of socioeconomic level and of crowding in the household, which can facilitate the spread of disease. Twenty-three percent of households use three or more rooms for sleeping, 36% use two rooms, and 41% use only one room. There are substantial urban-rural differences in the number of rooms used for sleeping; 56% of urban households use one room for sleeping, as compared with 33% of households in rural areas (**Table 2.5**).

Trends: The percentage of households in Kenya using one room for sleeping decreased from 54% in 2015 to 41% in 2020. Over the same period, there was an increase in the percentage of households using two or more rooms for sleeping (from 46% to 59%).

2.3.3 Electricity, Cooking Technology, and Cooking Fuel

As a target of Sustainable Development Goal (SDG) 7, Kenya is striving to ensure universal access to affordable, reliable, and modern energy services by 2030. The proportion of the population with access to electricity and the proportion with primary reliance on clean fuels and technologies are two indicators used to measure progress towards achieving this target.

Overall, 55% of households in Kenya have access to electricity, including 84% of urban households and 37% of rural households (**Table 2.6**). WHO guidelines for indoor air quality (WHO 2014) highlight the importance of addressing both fuel and technology for protecting public health. The guidelines identify and promote technologies and fuels that are efficient and recommend against the use of technologies that rely on solid fuels such as coal and wood as well as kerosene, a non-solid but highly polluting fuel. Only 32% of households use clean cooking fuels or technologies (64% of households in urban areas and 12% in rural areas). LPG (liquefied petroleum gas) cooking gas stoves are by far the most common clean cooking technology in use in Kenyan households (30%); less than 2% of households use electric stoves or other clean fuels or technologies.

Half of households (50%) rely on a three stone stove/open fire for cooking; another 9% use a traditional solid fuel stove, and 4% use a manufactured solid fuel stove. Overall, 63% of households use solid fuel for cooking. By far the most common solid fuel used for cooking is wood (55% of households), followed by charcoal (8% of households). Use of charcoal is more prevalent in households in urban areas (12%) than rural areas (5%), while wood is more commonly used by rural households (79%) than urban households (15%).

Trends: There has been an increase since 2015 in the percentage of households reporting access to electricity, from 42% to 55%.

2.4 HOUSEHOLD WEALTH

Household Durable Goods

The 2020 KMIS collected information on possession of household goods and means of transportation, ownership of agricultural land, and ownership of farm animals (**Table 2.7**). Ninety percent of households own a mobile phone. Possession of a mobile phone is more common in urban households (96%) than rural households (86%). Approximately 7 in 10 households have a radio (72%), and about 1 in 2 households (49%) have a television. Eleven percent of households have a refrigerator, and 8% have a computer. Fourteen percent of households own a bicycle, 12% own a motorcycle or scooter, and 9% own a car or truck. Overall, 52% of households own agricultural land and 56% own farm animals. As expected, households in rural areas are more likely than households in urban areas to own agricultural land (70% versus 24%) and farm animals (75% versus 26%).

Wealth Index

Wealth index

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

Sample: Households

Table 2.8 shows the distribution of the de jure household population by wealth quintile, according to residence and malaria endemicity zone. A majority of the urban population falls in the upper two wealth quintiles, while a majority of the rural population falls in the bottom two quintiles. Fifty-one percent of urban residents are in the highest wealth quintile, while 6% are in the lowest wealth quintile. In contrast, 5% of rural residents are in the highest wealth quintile and 27% are in the lowest quintile (**Figure 2.3**).

Figure 2.3 **Household wealth by residence**

Percent distribution of de jure population by wealth quintiles

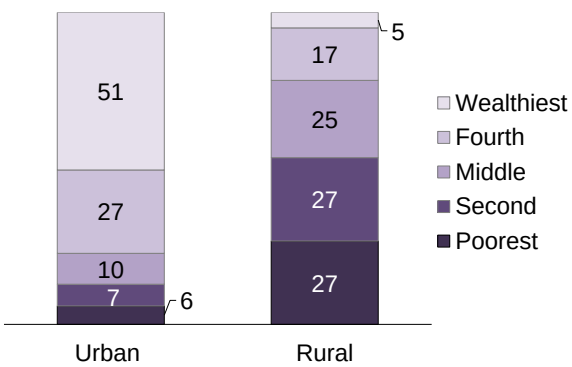


Table 2.8 shows that the concentration of wealth differs markedly by malaria endemicity zone. The percentages of residents in the lowest wealth quintile are highest in the Seasonal and Coast endemic zones (45% and 32%, respectively). The Low risk zone has the highest percentage of residents in the highest wealth quintile (38%) and the lowest in the lowest wealth quintile (5%).

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 otherwise specified.

A total of 29,429 people stayed overnight in the 7,952 interviewed households (**Table 2.9**). The overall sex ratio is 98 males per 100 females, and a majority of the population lives in rural areas (67%).

Age and sex are important demographic variables and are the primary basis of demographic classifications. **Table 2.9** shows the distribution of the de facto household population in the 2020 KMIS by 5-year age groups, according to sex and residence. Nationally, 44% of the population falls into dependency age groups (0-14 and 65 or above). In rural areas, 47% of the population is in these dependency age groups, as compared with 37% of the population in urban areas. Forty-nine percent of the rural population is age 0-17, compared with 40% of the urban population.

The population pyramid in **Figure 2.4** shows the population distribution by sex and 5-year age groups. The broad base of the pyramid indicates that Kenya's population is young, with 39% of the population under age 15.

Figure 2.4 **Population pyramid**

Percent distribution of the household population

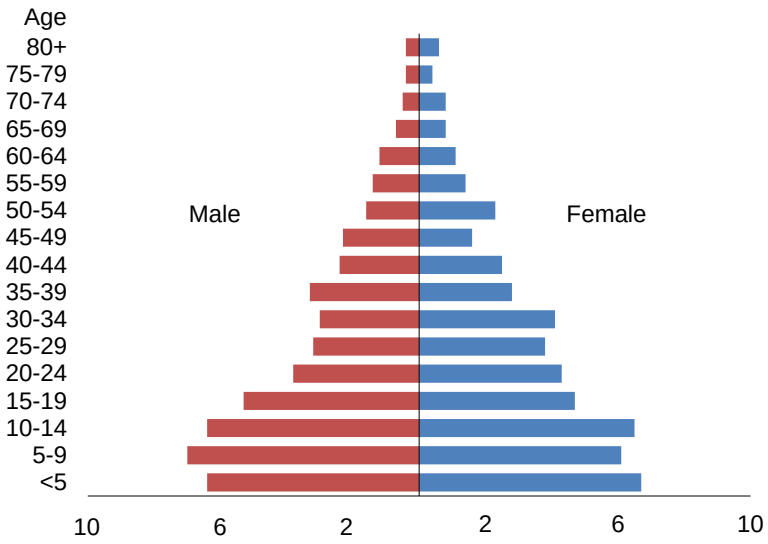


Table 2.10 presents the distribution of households by sex of head of household, household size, and mean size of households, according to residence. Nationally, about 7 out of 10 households are headed by men (69%); 31% are headed by women. Rural households are slightly more likely than urban households to be headed by women (33% versus 27%). Nineteen percent of households have one usual resident. On average, households consist of 3.7 persons.

2.6 BACKGROUND CHARACTERISTICS OF SURVEY RESPONDENTS

A total of 6,771 women age 15-49 were interviewed with the Woman's Questionnaire (**Table 2.11**). More than half (53%) of the women interviewed were under age 30, and close to one-fifth (18%) were age 40-

49. The majority of respondents were Christians: 76% were Protestant or other Christian, and 15% were Roman Catholic. Five percent of women were Muslims. Six out of 10 women (61%) live in rural areas.

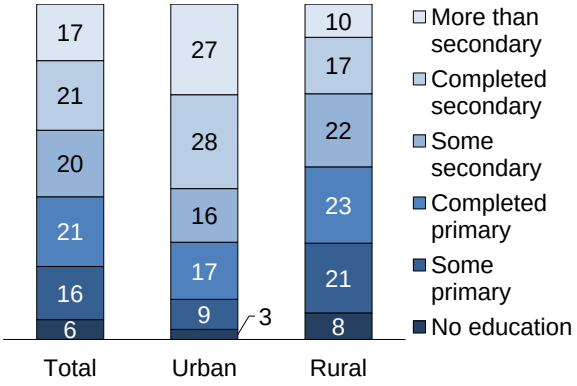
2.7 EDUCATIONAL ATTAINMENT OF WOMEN

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

Table 2.12 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. Overall, 6% of women have no education, 16% have some primary education, and 21% attended or completed primary education and went no further. Twenty-one percent of women completed secondary education, and an additional 17% have attended or completed more than secondary education (**Figure 2.5**). Nationally, women have completed a median of 9.4 years of education.

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

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



Patterns by background characteristics

- Twenty-three percent of women in rural areas have completed primary education and gone no further, as compared with 17% of women in urban areas (**Table 2.12**).
- By malaria endemicity, the percentage of women with no education is highest in the Seasonal zone (26%) and lowest in the Lake endemic and Low risk zones (2% each).
- Women in the highest wealth quintile have completed a median of 11.6 years of schooling, compared with 6.5 years among women in the lowest wealth quintile.

2.8 LITERACY OF WOMEN

Literacy

All respondents were given a sentence to read out loud, and they were considered to be literate if they could read all or part of the sentence.

Sample: Women age 15-49

Knowing the level and distribution of literacy among the population is an important factor in the design and delivery of health messages and interventions. **Table 2.13** shows that, overall, 89% of women age 15-49 in Kenya are literate.

Patterns by background characteristics

- Literacy varies by place of residence; 85% of women in rural areas are literate, as compared with 95% of women in urban areas.
- By malaria endemicity, literacy among women ranges from 68% in the Seasonal zone to 95% in the Low risk zone.
- The percentage of literate women increases with increasing wealth, from 66% in the lowest wealth quintile to 98% in the highest wealth quintile.

2.9 EXPOSURE TO MASS MEDIA

Exposure to mass media

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

Sample: Women age 15-49

All women were asked how often they listen to a radio or watch television, and women who were literate were asked how often they read a newspaper or magazine. Sixty-six percent of women listen to the radio at least once a week, 54% watch television at least once a week, and 12% read a newspaper at least once a week. Seven percent of women are exposed to all three media at least once a week; 18% access none of the three media at least once a week (**Table 2.14**).

Patterns by background characteristics

- Seventy-three percent of women in urban areas watch television at least once a week, as compared with 42% of women in rural areas.
- Exposure to all three media sources varies by education, with less than 1% of women with no education and 19% of women with more than a secondary education accessing all three media at least once a week.

2.10 MOBILE PHONE OWNERSHIP AND INTERNET USAGE

Use of the Internet

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

Sample: Women age 15-49

A mobile phone is an empowering tool, allowing easier communication, while Internet access is a gateway to critical information, services, and opportunities. Seventy-seven percent of women own any mobile phone, and 37% of women own a smart phone. Thus, about half of women who own a mobile phone own a smart phone.

One in 3 women (34%) have used the Internet in the last 12 months. Among women who have used the Internet in the last 12 months, 2 in 3 (66%) used the Internet almost every day during the last month (**Table 2.15**).

Patterns by background characteristics

- Eighty-nine percent of women in urban areas own a mobile phone, as compared with 69% of women in rural areas. Women in urban areas are more than twice as likely as women in rural areas to own a smart phone (57% versus 25%).
- Ownership of a smart phone varies widely by malaria endemicity; 22% of women in the Lake endemic zone own a smart phone, compared with 53% of women in the Low risk zone.
- The percentage of women who have used the Internet in the last 12 months increases with increasing education, from 8% among women with no education to 83% among those with more than a secondary education.

2.11 CONCLUSIONS

- There have been improvements in household living conditions since the 2015 KMIS. Despite a decrease in the proportion of households using improved sources of drinking water, there has been an increase in the proportion of households using improved construction materials for their dwelling units and using improved toilet facilities.

- Between 2015 and 2020, the percentage of households using one room for sleeping decreased, while the percentage using two or more rooms for sleeping increased. The percentage of households using solid fuels for cooking is still high relative to the percentage using clean fuels and technologies.

- Nationally, about 7 of 10 households are headed by men. Nineteen percent of households have one household member. On average, households in Kenya consist of 3.7 persons.

- Eighty-five percent of women in rural areas are literate, as compared with 95% of women in urban areas. Seventy-seven percent of women own any mobile phone, and 37% own a smart phone. Around 1 in 3 women used the Internet in the 12 months preceding the survey.

2.12 RECOMMENDATIONS

- Increase advocacy with relevant government agencies for women to achieve higher literacy levels.

LIST OF TABLES

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

- **Table 2.1 Household drinking water**
- **Table 2.2 Drinking water service ladder**
- **Table 2.3 Household sanitation facilities**
- **Table 2.4 Sanitation service ladder**
- **Table 2.5 Household characteristics: Construction materials and rooms used for sleeping**
- **Table 2.6 Household characteristics: Electricity, cooking technology, and cooking fuel**
- **Table 2.7 Household possessions**
- **Table 2.8 Wealth quintiles**
- **Table 2.9 Household population by age, sex, and residence**
- **Table 2.10 Household composition**
- **Table 2.11 Background characteristics of survey respondents**
- **Table 2.12 Educational attainment**
- **Table 2.13 Literacy**
- **Table 2.14 Exposure to mass media**
- **Table 2.15 Mobile phone ownership and Internet usage**

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, Kenya MIS 2020

	Households			Population		
Characteristic	Urban	Rural	Total	Urban	Rural	Total
Source of drinking water						
Improved source	**91.5**	**56.4**	**69.8**	**89.2**	**54.0**	**65.5**
Piped into dwelling/yard/plot	49.3	14.0	27.5	47.4	11.4	23.1
Piped to neighbour	5.2	2.0	3.2	4.9	1.8	2.8
Public tap/standpipe	10.3	5.6	7.4	9.2	5.8	6.9
Tube well/borehole	2.4	7.7	5.7	2.8	7.7	6.1
Protected dug well	3.2	10.6	7.8	3.8	11.0	8.6
Protected spring	1.7	5.5	4.1	1.9	6.2	4.8
Rainwater	3.9	9.8	7.5	4.6	8.8	7.5
Tanker truck/cart with small tank	9.1	1.0	4.1	8.7	1.0	3.6
Bottled water	6.4	0.3	2.6	5.9	0.2	2.1
Unimproved source	**2.7**	**12.3**	**8.6**	**3.3**	**13.0**	**9.8**
Unprotected dug well	1.6	4.4	3.3	2.0	4.3	3.5
Unprotected spring	1.2	7.9	5.3	1.2	8.7	6.3
Surface water	**5.7**	**31.3**	**21.5**	**7.6**	**33.0**	**24.7**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Time to obtain drinking water (round trip)						
Water on premises[1]	73.4	36.5	50.6	71.9	32.6	45.4
30 minutes or less	24.3	45.3	37.2	24.7	48.1	40.5
More than 30 minutes	1.9	18.1	11.9	2.6	19.2	13.8
Don't know	0.5	0.0	0.2	0.8	0.0	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	3,044	4,908	7,952	9,691	20,084	29,775

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

Table 2.2 Drinking water service ladder

Percent distribution of de jure population by drinking water service ladder, according to background characteristics, Kenya MIS 2020

Background characteristic	At least basic service[1]	Limited service[2]	Unimproved[3]	Surface water	Total	Number of persons
Residence						
Urban	87.0	2.2	3.3	7.6	100.0	9,691
Rural	48.1	5.9	13.0	33.0	100.0	20,084
Malaria endemicity						
Highland epidemic prone	46.3	2.9	24.0	26.8	100.0	6,399
Lake endemic	58.6	6.3	8.9	26.2	100.0	6,370
Coast endemic	74.5	7.2	2.5	15.8	100.0	2,363
Seasonal	36.8	12.1	8.9	42.3	100.0	3,920
Low risk	76.5	1.5	3.9	18.1	100.0	10,722
Wealth quintile						
Lowest	28.4	10.0	20.8	40.9	100.0	5,955
Second	38.5	4.8	14.4	42.3	100.0	5,958
Middle	54.8	5.0	11.3	28.9	100.0	5,955
Fourth	84.6	2.0	2.5	10.9	100.0	5,952
Highest	97.7	1.6	0.2	0.6	100.0	5,955
Total	60.8	4.7	9.8	24.7	100.0	29,775

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

Table 2.3 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities and percent distribution of households and de jure population with a toilet/latrine facility by location of the facility, according to residence, Kenya MIS 2020

Type and location of toilet/latrine facility	Households			Population		
	Urban	Rural	Total	Urban	Rural	Total
Improved sanitation facility	**79.2**	**57.8**	**66.0**	**80.2**	**55.1**	**63.3**
Flush/pour flush to piped sewer system	21.4	1.6	9.2	23.9	1.0	8.5
Flush/pour flush to septic tank	15.0	2.3	7.1	13.8	1.9	5.7
Flush/pour flush to pit latrine	6.9	5.6	6.1	6.5	5.5	5.8
Flush/pour flush, don't know where	0.4	0.1	0.2	0.4	0.1	0.2
Ventilated improved pit (VIP) latrine	6.7	7.1	7.0	6.5	7.0	6.9
Pit latrine with slab	26.7	40.5	35.2	27.5	38.9	35.2
Composting toilet	2.2	0.5	1.2	1.6	0.7	1.0
Unimproved sanitation facility	**18.8**	**34.3**	**28.4**	**18.0**	**35.7**	**30.0**
Flush/pour flush not to sewer/ septic tank/pit latrine	4.4	0.2	1.8	3.8	0.1	1.3
Pit latrine without slab/open pit	13.5	33.7	26.0	13.2	35.2	28.0
Bucket	0.9	0.1	0.4	1.0	0.1	0.4
Hanging toilet/hanging latrine	0.0	0.3	0.2	0.0	0.3	0.2
Other	0.0	0.0	0.0	0.0	0.0	0.0
Open defecation (no facility/bush/field)	**2.0**	**7.9**	**5.7**	**1.8**	**9.2**	**6.8**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	3,044	4,908	7,952	9,691	20,084	29,775
Location of toilet facility						
In own dwelling	39.6	21.7	28.8	41.6	21.9	28.7
In own yard/plot	53.7	73.0	65.3	52.6	72.9	65.9
Elsewhere	6.7	5.3	5.9	5.8	5.2	5.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population with a toilet/latrine facility	2,984	4,518	7,502	9,519	18,244	27,762

Table 2.4 Sanitation service ladder

Percent distribution of de jure population by sanitation service, according to background characteristics, Kenya MIS 2020

Background characteristic	At least basic service[1]	Limited service[2]	Unimproved[3]	Open defecation	Total	Number of persons
Residence						
Urban	50.1	30.0	18.0	1.8	100.0	9,691
Rural	42.6	12.5	35.7	9.2	100.0	20,084
Malaria endemicity						
Highland epidemic prone	38.3	14.2	46.3	1.2	100.0	6,399
Lake endemic	43.4	16.6	34.4	5.6	100.0	6,370
Coast endemic	38.0	19.3	25.2	17.5	100.0	2,363
Seasonal	39.8	18.0	15.2	27.0	100.0	3,920
Low risk	53.6	21.5	24.0	1.0	100.0	10,722
Wealth quintile						
Lowest	15.2	10.2	45.1	29.4	100.0	5,955
Second	41.1	12.2	44.6	2.2	100.0	5,958
Middle	50.1	17.4	32.0	0.6	100.0	5,955
Fourth	46.8	34.8	17.1	1.2	100.0	5,952
Highest	72.1	16.6	10.9	0.4	100.0	5,955
Total	45.1	18.2	30.0	6.8	100.0	29,775

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

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

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

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

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

Percent distribution of households and de jure population by housing construction materials and rooms used for sleeping, according to residence, Kenya MIS 2020

	Households			Population		
Housing characteristic	Urban	Rural	Total	Urban	Rural	Total
Flooring material						
Earth/sand	9.7	49.1	34.0	11.7	51.2	38.4
Dung	1.4	9.8	6.6	1.6	11.2	8.1
Wood planks	0.0	0.2	0.1	0.1	0.1	0.1
Parquet or polished wood	0.0	0.1	0.1	0.0	0.1	0.1
Vinyl or asphalt strips	0.1	0.0	0.1	0.1	0.0	0.0
Ceramic tiles	20.0	5.2	10.9	20.3	4.7	9.8
Cement	61.3	34.5	44.8	59.1	31.8	40.7
Carpet	7.3	1.0	3.4	7.1	0.8	2.9
Other	0.0	0.1	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Roof material						
No roof	0.2	0.5	0.4	0.3	0.3	0.3
Thatch/palm leaf	0.5	5.4	3.5	0.6	6.0	4.3
Sod	0.0	0.0	0.0	0.0	0.0	0.0
Rustic mat	0.0	0.2	0.1	0.0	0.1	0.1
Palm/bamboo	0.0	0.1	0.1	0.0	0.3	0.2
Wood planks	0.0	0.5	0.3	0.0	0.4	0.3
Cardboard	0.4	0.4	0.4	0.4	0.3	0.3
Iron sheets	84.0	90.1	87.7	83.3	90.1	87.9
Wood	0.2	0.2	0.2	0.2	0.3	0.3
Calamine/cement fibre	0.4	0.1	0.2	0.6	0.1	0.2
Brick/clay tiles	1.9	0.3	0.9	1.8	0.3	0.8
Cement	12.3	1.3	5.5	12.7	0.9	4.8
Roofing shingles	0.1	0.3	0.2	0.1	0.3	0.2
Other	0.1	0.6	0.4	0.1	0.5	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Exterior wall material						
No walls	4.4	0.4	1.9	3.4	0.3	1.3
Cane/palm/trunks	0.6	3.3	2.2	0.8	3.6	2.7
Dirt	4.5	24.2	16.6	5.9	26.3	19.6
Bamboo with mud	2.5	8.7	6.3	2.4	9.9	7.4
Stone with mud	2.0	6.4	4.7	2.6	7.2	5.7
Uncovered adobe	0.1	1.5	0.9	0.2	1.8	1.3
Plywood	0.5	1.4	1.0	0.6	1.5	1.2
Cardboard	0.0	0.8	0.5	0.0	0.7	0.5
Reused wood	0.9	4.5	3.1	0.8	4.0	2.9
Cement	17.1	11.0	13.3	16.9	9.9	12.2
Stone with lime/cement	34.8	12.8	21.2	34.8	11.4	19.0
Bricks	2.6	6.3	4.9	3.1	6.3	5.3
Cement blocks	19.9	3.4	9.7	19.5	2.7	8.2
Covered adobe	0.7	3.1	2.2	0.9	2.8	2.2
Wood planks/shingles	1.8	6.4	4.6	1.5	6.2	4.6
Other	7.6	5.9	6.5	6.7	5.5	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Rooms used for sleeping						
One	55.5	32.7	41.4	40.9	25.1	30.2
Two	27.7	40.6	35.7	35.6	42.1	40.0
Three or more	16.8	26.7	22.9	23.6	32.8	29.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/ population	3,044	4,908	7,952	9,691	20,084	29,775

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

Percent distribution of households and de jure population by access to electricity and cooking fuels and technologies, according to residence, Kenya MIS 2020

	Households			Population		
Housing characteristic	Urban	Rural	Total	Urban	Rural	Total
Electricity						
Yes	83.9	37.1	55.0	83.6	33.3	49.6
No	16.1	62.9	45.0	16.4	66.7	50.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Main cooking technology						
Clean fuels and technologies						
Electric stove	1.0	0.4	0.6	1.1	0.3	0.6
Solar cooker	0.0	0.0	0.0	0.0	0.0	0.0
LPG/cooking gas stove	61.5	10.9	30.2	56.5	8.2	23.9
Piped natural gas stove	0.2	0.1	0.1	0.1	0.1	0.1
Biogas stove	0.7	0.7	0.7	0.8	0.5	0.6
Liquid fuel stove using alcohol/ethanol	0.0	0.0	0.0	0.0	0.0	0.0
Other fuels and technologies						
Liquid fuel stove not using alcohol/ethanol	7.9	1.3	3.9	5.5	0.7	2.3
Manufactured solid fuel stove	6.5	2.2	3.9	7.9	2.3	4.1
Traditional solid fuel stove	7.1	10.8	9.4	8.2	11.5	10.4
Three stone stove/open fire	14.0	72.8	50.3	19.4	76.2	57.7
No food cooked in household	1.0	0.8	0.9	0.4	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Cooking fuel						
Clean fuels and technologies[1]	63.5	12.1	31.8	58.6	9.1	25.2
Solid fuels for cooking	27.3	85.8	63.4	35.5	89.9	72.2
Coal/lignite	0.0	0.1	0.0	0.0	0.1	0.0
Charcoal	12.2	5.3	7.9	15.0	4.6	8.0
Wood	15.1	79.0	54.5	20.5	83.9	63.2
Straw/shrubs/grass	0.0	0.3	0.2	0.0	0.3	0.2
Agricultural crop	0.0	1.0	0.6	0.0	1.0	0.7
Animal dung/waste	0.0	0.1	0.1	0.0	0.1	0.0
Processed biomass (pellets) or woodchips	0.0	0.0	0.0	0.0	0.0	0.0
Garbage/plastic	0.0	0.0	0.0	0.0	0.0	0.0
Sawdust	0.0	0.0	0.0	0.0	0.0	0.0
Other fuels						
Gasoline/diesel	0.1	0.0	0.0	0.0	0.0	0.0
Kerosene/paraffin	8.1	1.4	4.0	5.5	0.7	2.3
No food cooked in household	1.0	0.8	0.9	0.4	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of households/population	3,044	4,908	7,952	9,691	20,084	29,775

LPG = Liquefied petroleum gas

[1] Includes stove/cookers using electricity, LPG/natural gas/biogas, solar, and alcohol/ethanol

Table 2.7 Household possessions

Percentage of households possessing various household effects, means of transportation, agricultural land, and livestock/farm animals, according to residence, Kenya MIS 2020

Possession	Residence		Total
	Urban	Rural	
Household effects			
Radio	77.2	68.4	71.8
Television	67.1	37.6	48.9
Mobile phone	95.8	86.3	90.0
Fixed line telephone	1.5	0.7	1.0
Computer	15.8	3.8	8.4
Refrigerator	23.7	3.6	11.3
Solar panel	10.5	35.1	25.7
Table	90.7	86.5	88.1
Chair	90.7	90.5	90.6
Sofa	73.6	58.0	64.0
Bed	95.2	92.3	93.4
Cupboard	59.3	46.9	51.7
Clock	35.6	15.1	23.0
Microwave oven	13.0	2.2	6.3
DVD player	25.6	10.3	16.2
CD player	21.3	8.1	13.1
Means of transportation			
Bicycle	13.1	15.0	14.3
Animal-drawn cart	1.2	2.8	2.1
Motorcycle/scooter	9.4	13.0	11.6
Car/truck	15.4	5.3	9.2
Boat with a motor	0.9	1.0	1.0
Ownership of agricultural land	23.5	69.9	52.1
Ownership of farm animals[1]	25.6	75.2	56.2
Number	3,044	4,908	7,952

[1] Local cattle (indigenous), exotic/grade cattle, horses, donkeys, mules, goats, sheep, chickens or other poultry, pigs

Table 2.8 Wealth quintiles

Percent distribution of the de jure population by wealth quintiles, and the Gini coefficient, according to residence and malaria endemicity, Kenya MIS 2020

Residence/malaria endemicity	Wealth quintile					Total	Number of persons	Gini coefficient
	Lowest	Second	Middle	Fourth	Highest			
Residence								
Urban	5.5	6.5	10.3	26.9	50.9	100.0	9,691	0.17
Rural	27.0	26.5	24.7	16.7	5.1	100.0	20,084	0.21
Malaria endemicity								
Highland epidemic prone	23.6	27.8	24.9	18.3	5.5	100.0	6,399	0.23
Lake endemic	22.1	29.0	23.6	17.0	8.2	100.0	6,370	0.29
Coast endemic	32.0	11.7	10.0	21.8	24.5	100.0	2,363	0.32
Seasonal	44.5	16.5	17.0	10.4	11.6	100.0	3,920	0.36
Low risk	5.0	13.1	18.2	25.9	37.7	100.0	10,722	0.25
Total	20.0	20.0	20.0	20.0	20.0	100.0	29,775	0.27

Table 2.9 Household population by age, sex, and residence

Percent distribution of the de facto household population by age groups and percentage of the de facto household population age 10-19, according to sex and residence, Kenya MIS 2020

	Urban			Rural			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	12.0	13.0	12.5	13.3	13.3	13.3	12.9	13.2	13.0
5-9	13.2	9.7	11.5	14.6	13.3	13.9	14.1	12.1	13.1
10-14	11.3	10.1	10.7	13.9	14.2	14.1	13.0	12.9	12.9
15-19	8.4	8.3	8.4	12.0	9.7	10.8	10.8	9.3	10.0
20-24	9.0	12.6	10.8	7.2	6.6	6.9	7.8	8.6	8.2
25-29	8.6	10.1	9.4	5.5	6.4	5.9	6.5	7.6	7.1
30-34	7.9	11.0	9.5	5.0	6.6	5.8	6.0	8.0	7.0
35-39	9.0	6.1	7.5	5.4	5.2	5.3	6.6	5.5	6.0
40-44	5.2	5.0	5.1	4.5	5.0	4.8	4.8	5.0	4.9
45-49	4.1	3.0	3.6	5.0	3.3	4.2	4.7	3.2	4.0
50-54	3.2	3.9	3.5	3.1	4.9	4.0	3.2	4.5	3.9
55-59	3.0	2.9	2.9	2.8	2.7	2.7	2.8	2.7	2.8
60-64	2.4	1.4	1.9	2.4	2.5	2.4	2.4	2.1	2.2
65-69	0.9	0.9	0.9	1.8	1.9	1.8	1.5	1.6	1.5
70-74	0.6	0.7	0.7	1.3	1.9	1.6	1.1	1.5	1.3
75-79	0.5	0.3	0.4	0.9	0.9	0.9	0.7	0.7	0.7
80+	0.4	0.5	0.5	1.1	1.7	1.4	0.9	1.3	1.1
Don't know	0.2	0.3	0.3	0.2	0.2	0.2	0.2	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	36.5	32.8	34.6	41.8	40.8	41.3	40.0	38.2	39.1
15-64	60.9	64.5	62.7	52.9	52.7	52.8	55.5	56.6	56.1
65+	2.4	2.4	2.4	5.1	6.3	5.7	4.2	5.0	4.6
Don't know	0.2	0.3	0.3	0.2	0.2	0.2	0.2	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	42.2	37.8	40.0	50.3	47.8	49.1	47.6	44.6	46.1
18+	57.6	61.9	59.7	49.5	52.0	50.8	52.2	55.2	53.7
Don't know	0.2	0.3	0.3	0.2	0.2	0.2	0.2	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	19.7	18.5	19.1	25.9	23.9	24.9	23.8	22.2	23.0
Number of persons	4,814	4,861	9,675	9,744	10,010	19,753	14,558	14,871	29,429

Table 2.10 Household composition

Percent distribution of households by sex of head of household and by household size, and mean size of households, according to residence, Kenya MIS 2020

Characteristic	Residence		Total
	Urban	Rural	
Household headship			
Male	72.8	66.6	69.0
Female	27.2	33.4	31.0
Total	100.0	100.0	100.0
Number of usual members			
0	0.0	0.1	0.1
1	25.8	15.4	19.4
2	16.3	12.9	14.2
3	15.8	14.8	15.2
4	19.7	16.9	18.0
5	11.4	14.8	13.5
6	5.8	10.4	8.7
7	2.5	6.8	5.1
8	0.9	3.5	2.5
9+	1.7	4.5	3.4
Total	100.0	100.0	100.0
Mean size of households	3.2	4.1	3.7
Number of households	3,044	4,908	7,952

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

Table 2.11 Background characteristics of survey respondents

Percent distribution of women age 15-49 by selected background characteristics, Kenya MIS 2020

Background characteristic	Weighted percent	Weighted number	Unweighted number
Age			
15-19	19.3	1,308	1,432
20-24	18.4	1,243	1,243
25-29	15.6	1,057	1,091
30-34	17.2	1,166	1,072
35-39	12.0	812	814
40-44	10.4	703	627
45-49	7.1	483	492
Religion			
Roman Catholic	15.4	1,046	1,067
Protestant/other Christian	76.3	5,169	4,889
Muslim	5.3	360	695
No religion	2.7	183	109
Other	0.2	13	11
Residence			
Urban	39.0	2,641	2,923
Rural	61.0	4,130	3,848
Malaria endemicity			
Highland epidemic prone	19.8	1,343	1,264
Lake endemic	19.4	1,312	2,369
Coast endemic	8.0	538	781
Seasonal	12.6	853	1,234
Low risk	40.2	2,724	1,123
Education			
No education	6.0	403	563
Primary	36.6	2,478	2,775
Secondary	40.9	2,772	2,551
More than secondary	16.5	1,118	882
Wealth quintile			
Lowest	16.3	1,104	1,422
Second	18.4	1,245	1,345
Middle	18.9	1,279	1,323
Fourth	21.1	1,430	1,518
Highest	25.3	1,714	1,163
Total	100.0	6,771	6,771

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

Table 2.12 Educational attainment

Percent distribution of women age 15-49 by highest level of schooling attended or completed, and median years completed, according to background characteristics, Kenya MIS 2020

Background characteristic	Highest level of schooling						Total	Median years completed	Number of women
	No education	Some primary	Completed primary[1]	Some secondary	Completed secondary[2]	More than secondary			
Age									
15-24	2.4	10.9	14.7	36.1	24.1	11.8	100.0	9.9	2,550
15-19	2.2	13.0	13.3	57.0	13.4	1.0	100.0	9.2	1,308
20-24	2.6	8.8	16.1	14.1	35.3	23.1	100.0	11.2	1,243
25-29	5.4	14.3	21.5	9.7	25.5	23.6	100.0	10.8	1,057
30-34	10.5	17.4	22.8	9.1	19.6	20.6	100.0	8.0	1,166
35-39	9.2	19.9	22.6	11.3	18.2	18.8	100.0	7.9	812
40-44	7.7	23.1	31.0	10.0	13.3	15.0	100.0	7.6	703
45-49	6.8	27.5	24.8	8.7	17.8	14.4	100.0	7.6	483
Residence									
Urban	2.9	9.0	17.2	16.1	28.1	26.7	100.0	11.2	2,641
Rural	7.9	20.7	22.6	22.0	16.9	10.0	100.0	7.9	4,130
Malaria endemicity									
Highland epidemic prone	3.3	22.2	19.3	22.0	19.8	13.3	100.0	8.9	1,343
Lake endemic	2.2	26.1	22.8	24.9	13.5	10.4	100.0	7.9	1,312
Coast endemic	10.6	20.8	23.4	14.4	17.6	13.2	100.0	7.8	538
Seasonal	25.5	13.7	18.8	15.6	14.2	12.2	100.0	7.6	853
Low risk	2.0	8.1	19.9	18.3	28.6	23.0	100.0	11.1	2,724
Wealth quintile									
Lowest	25.0	32.3	18.0	17.3	5.7	1.7	100.0	6.5	1,104
Second	4.0	25.0	28.2	22.4	15.3	5.2	100.0	7.7	1,245
Middle	2.4	19.6	27.5	23.0	18.4	9.1	100.0	8.0	1,279
Fourth	1.3	8.8	19.6	23.1	30.3	16.9	100.0	10.7	1,430
Highest	1.6	2.7	12.1	13.9	30.2	39.5	100.0	11.6	1,714
Total	6.0	16.1	20.5	19.7	21.3	16.5	100.0	9.4	6,771

[1] Completed grade 8 at the primary level
[2] Completed grade 4 at the secondary level

Table 2.13 Literacy

Percent distribution of women age 15-49 by level of literacy, and percentage literate, according to background characteristics, Kenya MIS 2020

Background characteristic	Can read a whole sentence	Can read part of a sentence	Cannot read at all	No card with required language	Blind/visually impaired	Total	Percentage literate[1]	Number of women
Age								
15-24	86.3	8.8	4.8	0.0	0.2	100.0	95.1	2,550
15-19	88.9	7.6	3.5	0.0	0.0	100.0	96.5	1,308
20-24	83.4	10.2	6.1	0.0	0.3	100.0	93.6	1,243
25-29	77.4	13.7	8.9	0.0	0.0	100.0	91.1	1,057
30-34	66.9	15.1	17.9	0.0	0.0	100.0	82.0	1,166
35-39	64.8	21.3	13.8	0.0	0.0	100.0	86.1	812
40-44	66.6	17.9	14.6	0.0	0.8	100.0	84.5	703
45-49	60.7	20.6	17.3	0.0	1.4	100.0	81.3	483
Residence								
Urban	85.4	9.4	5.1	0.0	0.1	100.0	94.8	2,641
Rural	68.5	16.9	14.2	0.0	0.4	100.0	85.4	4,130
Malaria endemicity								
Highland epidemic prone	78.4	12.0	9.3	0.0	0.3	100.0	90.4	1,343
Lake endemic	70.7	19.7	9.1	0.0	0.5	100.0	90.4	1,312
Coast endemic	71.6	16.0	12.1	0.0	0.3	100.0	87.6	538
Seasonal	54.7	13.7	31.6	0.0	0.0	100.0	68.4	853
Low risk	82.6	11.8	5.3	0.0	0.2	100.0	94.5	2,724
Wealth quintile								
Lowest	46.4	19.5	34.0	0.0	0.1	100.0	65.9	1,104
Second	65.2	21.6	12.7	0.0	0.4	100.0	86.9	1,245
Middle	75.8	16.1	7.5	0.0	0.6	100.0	91.8	1,279
Fourth	83.9	12.0	3.8	0.0	0.2	100.0	95.9	1,430
Highest	92.9	4.8	2.2	0.0	0.0	100.0	97.8	1,714
Total	75.1	13.9	10.7	0.0	0.3	100.0	89.1	6,771

[1] Refers to women who can read a whole sentence or part of a sentence

Table 2.14 Exposure to mass media

Percentage of women age 15-49 who are exposed to specific media on a weekly basis, according to background characteristics, Kenya MIS 2020

Background characteristic	Reads a newspaper at least once a week	Watches television at least once a week	Listens to the radio at least once a week	Accesses all three media at least once a week	Accesses none of the three media at least once a week	Number of women
Age						
15-19	11.6	49.7	61.4	7.3	22.0	1,308
20-24	9.4	57.0	66.0	5.5	15.9	1,243
25-29	11.0	61.7	66.6	7.3	15.2	1,057
30-34	9.7	54.7	64.6	5.5	19.5	1,166
35-39	14.2	58.0	70.2	11.9	16.7	812
40-44	11.4	46.0	69.1	4.4	16.9	703
45-49	18.3	46.4	73.2	11.7	19.1	483
Residence						
Urban	16.2	72.8	61.6	9.8	10.7	2,641
Rural	8.6	42.2	69.3	5.6	22.7	4,130
Malaria endemicity						
Highland epidemic prone	8.9	44.8	75.7	5.7	15.1	1,343
Lake endemic	10.6	45.3	75.1	6.2	16.5	1,312
Coast endemic	9.8	50.3	47.3	6.4	33.5	538
Seasonal	9.0	32.7	51.8	6.0	37.4	853
Low risk	14.5	70.5	65.7	9.0	11.1	2,724
Education						
No education	0.0	15.5	22.9	0.0	68.6	403
Primary	5.0	40.4	67.6	2.3	21.8	2,478
Secondary	11.3	62.2	69.6	7.9	12.1	2,772
More than secondary	30.9	78.6	70.8	19.2	6.1	1,118
Wealth quintile						
Lowest	4.1	8.5	43.9	2.3	54.0	1,104
Second	7.6	24.0	71.0	2.3	22.3	1,245
Middle	5.4	49.8	74.2	2.6	13.2	1,279
Fourth	11.8	73.1	71.0	8.5	9.9	1,430
Highest	23.6	92.9	67.5	16.3	2.1	1,714
Total	11.6	54.2	66.3	7.2	18.0	6,771

Table 2.15 Mobile phone ownership and Internet usage

Percentage of women age 15-49 who own any mobile phone, who own a smart phone, who have ever used the Internet, and who have used the Internet in the last 12 months, and among women who have used the Internet in the last 12 months, percent distribution by frequency of Internet use in the last month, according to background characteristics, Kenya MIS 2020

Background characteristic	Owns any mobile phone	Owns a smart phone	Ever used the Internet	Used the Internet in the last 12 months	Number of women	Among respondents who have used the Internet in the past 12 months, percentage who, in the last month, used the Internet: Almost every day	At least once a week	Less than once a week	Not at all	Total	Number
Age											
15-19	32.0	15.6	20.2	18.7	1,308	51.8	34.6	9.6	4.0	100.0	244
20-24	81.5	47.2	49.9	47.7	1,243	66.9	27.8	2.9	2.5	100.0	593
25-29	88.5	46.0	44.4	43.0	1,057	65.9	24.7	8.8	0.6	100.0	454
30-34	88.4	45.6	42.6	41.2	1,166	61.6	25.6	11.7	1.2	100.0	480
35-39	89.5	40.4	34.7	33.1	812	76.3	16.9	5.8	1.0	100.0	269
40-44	90.9	31.9	24.3	23.3	703	77.2	17.0	3.7	2.0	100.0	164
45-49	87.4	31.9	28.4	26.2	483	67.7	21.8	10.1	0.3	100.0	127
Residence											
Urban	88.5	56.8	55.8	54.0	2,641	71.9	22.4	4.5	1.2	100.0	1,425
Rural	68.9	24.5	23.3	21.9	4,130	56.5	29.3	11.7	2.5	100.0	906
Malaria endemicity											
Highland epidemic prone	70.1	25.5	27.1	26.2	1,343	55.4	33.8	6.7	4.1	100.0	351
Lake endemic	67.1	22.0	20.4	18.9	1,312	58.1	30.0	7.8	4.1	100.0	248
Coast endemic	75.5	39.2	36.6	34.5	538	77.6	17.4	4.4	0.7	100.0	186
Seasonal	72.0	26.7	25.4	24.4	853	68.1	23.0	5.6	3.3	100.0	209
Low risk	86.0	53.1	51.1	49.1	2,724	68.1	23.3	8.1	0.5	100.0	1,337
Education											
No education	63.2	11.8	8.0	7.8	403	(27.4)	(70.4)	(2.2)	(0.0)	(100.0)	31
Primary	72.3	16.0	11.3	9.6	2,478	46.2	30.5	19.5	3.8	100.0	239
Secondary	73.7	39.5	42.8	40.7	2,772	56.4	31.7	10.0	1.9	100.0	1,129
More than secondary	98.0	87.1	84.2	83.4	1,118	83.6	14.3	1.1	1.0	100.0	932
Wealth quintile											
Lowest	51.0	5.5	4.2	4.1	1,104	27.7	37.5	29.1	5.7	100.0	45
Second	66.5	12.6	14.4	11.6	1,245	46.1	41.7	9.6	2.5	100.0	144
Middle	75.0	24.3	21.9	20.1	1,279	51.4	32.0	11.5	5.1	100.0	257
Fourth	85.3	50.1	48.7	46.3	1,430	55.3	30.4	12.4	1.9	100.0	662
Highest	94.3	74.1	72.2	71.3	1,714	78.4	18.4	2.6	0.6	100.0	1,223
Total	76.6	37.1	36.0	34.4	6,771	65.9	25.1	7.3	1.7	100.0	2,331

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

MALARIA PREVENTION 3

Key Findings

- ***Ownership of insecticide-treated nets (ITNs):*** Around 1 in 2 households (49%) in Kenya own at least one ITN, and 29% of households have at least one ITN for every two people.
- ***Sources of ITNs:*** 53% of ITNs owned by households were obtained from a mass distribution campaign.
- ***Access to an ITN:*** 4 in 10 people (40%) have access to an ITN. This means that 40% of the country's population could sleep under an ITN if each ITN in a household were used by two people.
- ***Use of ITNs:*** 35% of the household population, 42% of children under age 5, and 40% of pregnant women slept under an ITN the night before the survey.
- ***Antenatal care (ANC):*** 93% of women age 15-49 who had a live birth in the 2 years preceding the survey received ANC from a skilled provider.
- ***Intermittent preventive treatment (IPTp):*** 49% of women in the Lake endemic zone and 46% of women in the Coast endemic zone received three or more doses of sulfadoxine pyrimethamine (SP)/Fansidar.

This chapter describes population coverage rates of some key malaria control interventions in Kenya, including ownership and use of mosquito nets and intermittent preventive treatment during pregnancy (IPTp) using sulfadoxine pyrimethamine (SP). Objective 1 of the Kenya Malaria Strategy 2019-2023 focuses on scaling up these malaria preventive interventions to protect 100% of people living in malaria risk areas through access to appropriate preventive interventions by 2023 (MOH 2019).

Another malaria control intervention in Kenya is indoor residual spraying (IRS). IRS is currently implemented in two counties (Migori and Homa Bay) in the Lake endemic zone (MOH 2019). Due to the focalised nature of IRS campaigns, this intervention was not captured in the 2020 KMIS.

It is important to note that the 2020 KMIS was conducted during the COVID-19 pandemic. The pandemic could have affected the uptake of services provided in health facilities, including routine distribution of nets and malaria in pregnancy (MIP) services.

3.1 OWNERSHIP OF INSECTICIDE-TREATED NETS

Ownership of insecticide-treated nets
Households that have at least one insecticide-treated net (ITN). An ITN is defined as a factory-treated net that does not require any further treatment.
Sample: Households

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

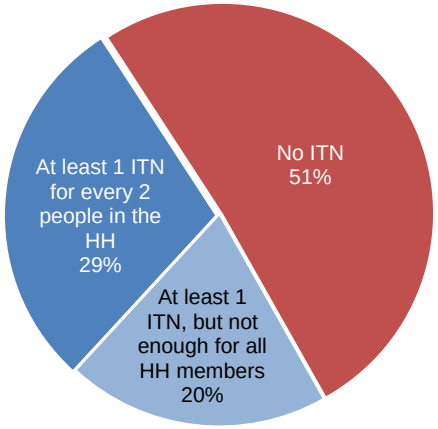
ITNs provide protection against mosquito bites and thus reduce the transmission of malaria parasites. Additionally, ITNs repel and kill mosquitoes. By reducing the vector population, ITNs help to decrease malaria risk at the individual level as well as the community level when high coverage is achieved. The distribution and use of ITNs is one of the core interventions for preventing malaria infection in Kenya. In surveys conducted prior to 2020, the definition of an ITN included nets that had been soaked or retreated with insecticides within the past 12 months. In the 2020 KMIS, questions on retreatment of nets were eliminated, since nets that require annual retreatment and the products used in this process are no longer distributed. As a result, the distinction between ITNs and long-lasting insecticide-treated nets (LLIN) is no longer meaningful.

To help achieve Objective 1 of the Kenya Malaria Strategy 2019-2023, DNMP distributes ITNs through appropriate channels to aim at achieving and sustaining universal coverage in malaria risk areas. This indicator is operationalised as one ITN for every two household members. To achieve universal coverage of ITNs for all age groups in malaria-endemic and epidemic prone counties, ITNs are distributed through regular rolling mass distribution campaigns carried out every three years in the 27 malaria-endemic, epidemic prone, and irrigation counties. With the support of the President's Malaria Initiative (PMI), routine distribution of ITNs is conducted in 36 counties through antenatal care clinics (ANC) for pregnant women and child welfare clinics (CWCs) (where immunisations and other services are given) for children under age 1 (USAID 2019). It is important to note that the most recent ITN mass distribution campaign occurred from June 2017 through March 2018, between 40 and 55 months before the start of fieldwork for the 2020 KMIS. The 2020 ITN mass distribution campaign was scheduled to occur in March 2020; however, there was a delay in implementation of the campaign due to the COVID-19 pandemic. This delay could have contributed to the results observed during the survey.

The 2020 KMIS revealed that 49% of households in Kenya own at least one ITN. Only 29% of households have one net for every two people who stayed in the household the night prior to the survey. Thus, to meet strategic goals, the scope of distribution needs to expand to reach the 51% of households that do not own any ITNs (**Figure 3.1**). In addition, the quantity of ITNs distributed needs to increase to provide sufficient ITNs for the 20% of households that own at least one ITN but have an insufficient supply for the number of household residents.

Figure 3.1 **Household coverage of ITNs**

Percent distribution of households



Trends: The percentage of households that own at least one ITN increased from 48% in 2010 to 63% in 2015 before decreasing to 49% in 2020 (**Figure 3.2**).

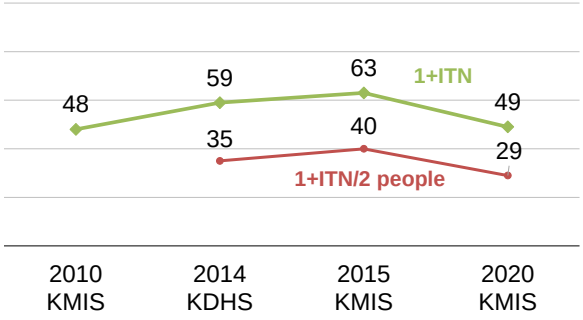
The percentage of households with at least one net for every two persons who stayed in the household last night decreased from 40% in 2015 to 29% in 2020 (**Figure 3.2**). In 2015, the difference between ownership of any net and ownership of an ITN was 2 percentage points (65% versus 63%). However, in 2020, there is a 10-percentage-point difference between ownership of any net and an ITN (59% versus 49%).

Patterns by background characteristics

- Household ownership of ITNs is higher in rural areas (52%) than urban areas (44%) (**Table 3.1**).
- The percentage of households with at least one ITN generally decreases with increasing household wealth, from 57% in the second wealth quintile to 43% in the highest wealth quintile (**Figure 3.3**).
- By endemicity, the percentage of households with at least one ITN is highest in the Lake endemic zone (78%) and lowest in the Low risk zone (31%) (**Figure 3.4**). ITNs are not distributed in low risk malaria areas; rather, they are distributed only in the endemic and highland areas, where both rolling mass ITN distribution campaigns and routine ITN distribution occur.

Figure 3.2 Trends in ITN ownership

Percentage of households owning at least one insecticide-treated net (ITN) and percentage of households with at least one net for every two persons



Note: The definition of an ITN in surveys conducted prior to the 2020 KMIS included nets that had been soaked with insecticides within the past 12 months.

Figure 3.3 ITN ownership by household wealth

Percentage of households with at least one ITN

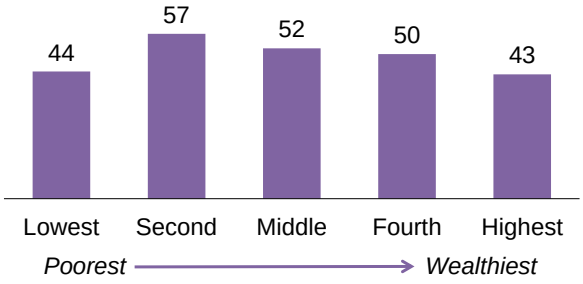
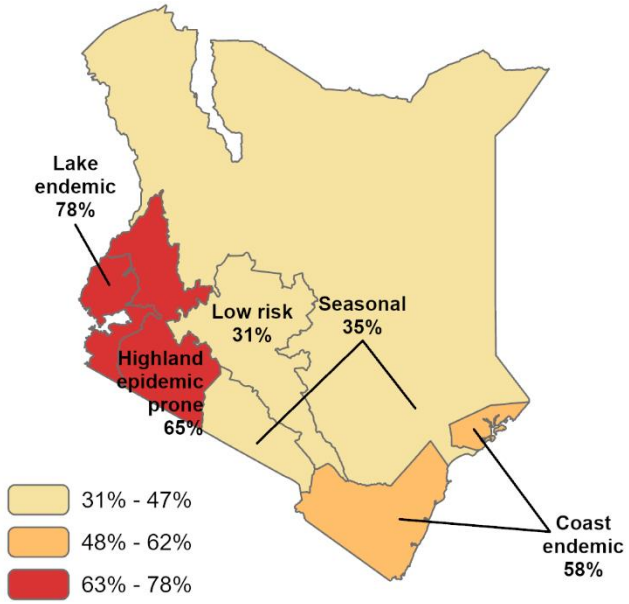


Figure 3.4 ITN ownership by malaria endemicity

Percentage of households with at least one ITN

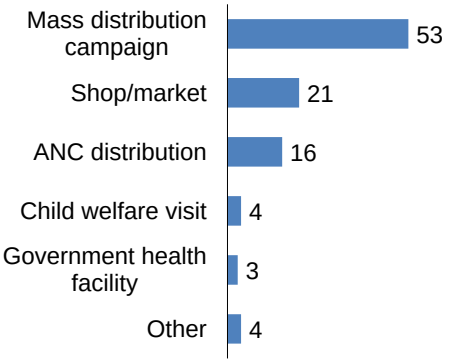


Source of Nets

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

Figure 3.5 Source of ITNs

Percent distribution of ITNs in interviewed households



National distribution campaigns were the main source of ITNs in Kenya (53% of households) (**Table 3.2**). Twenty-one percent of ITNs were obtained in shops/markets. Sixteen percent of households obtained their ITNs through ANC visits, 4% via CWC visits, and 3% via government health facilities.

Trends: In 2015, the main sources of ITNs were government/faith-based organisations/clinics/hospitals (35%) and mass ITN distribution campaigns (22%). In 2020, the majority of ITNs were obtained during mass distribution campaigns.

3.2 Household Access to and Use of ITNs

Access to an ITN

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

Sample: De facto household population

Use of ITNs

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

Sample: De facto household population

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

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

Forty percent of household residents in Kenya have access to an ITN, and 35% slept under an ITN the night before the survey (**Table 3.3**, **Table 3.4**, and **Figure 3.6**). In households with at least one ITN, 66% of the household population slept under an ITN the previous night (**Table 3.4**). The gap between access to and use of ITNs is 5 percentage points in rural areas (40% versus 35%) and 4 percentage points in urban areas (39% versus 35%) (**Table 3.3** and **Table 3.4**). Overall, 80% of all existing ITNs were used the night before the survey (**Table 3.5**). This means that 8 out of every 10 ITNs were used the night before the survey.

Trends: The percentage of the household population with access to an ITN increased from 48% in 2014 to 53% in 2015 before decreasing to 40% in 2020. Similarly, the percentage of the household population who slept under an ITN the night before the survey increased from 43% in 2014 to 48% in 2015 and then decreased to 35% in 2020. The gap between ITN access and ITN use remained unchanged from 2015 to 2020 (5 percentage points) (**Figure 3.7**). In households with at least one ITN, the percentage of the population who slept under an ITN increased from 61% in 2010 to 71% in 2015 before decreasing to 66% in 2020 (**Figure 3.8**).

Figure 3.6 Access to and use of ITNs

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

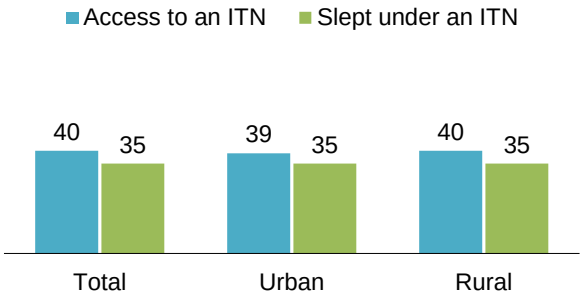
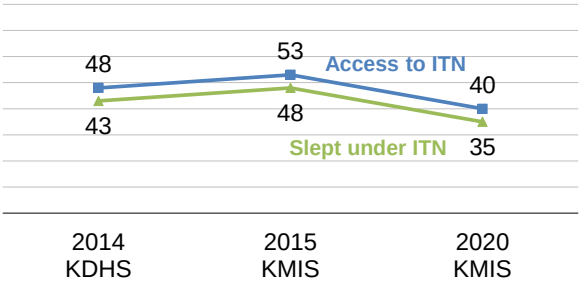


Figure 3.7 Trends in ITN access and use

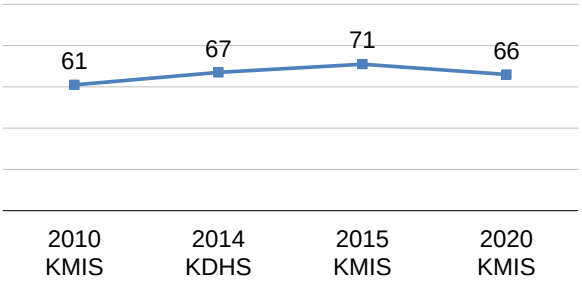
Percentage of the household population with access to an ITN and percentage who slept under an ITN the night before the survey



Note: The definition of an ITN in surveys conducted prior to the 2020 KMIS included nets that had been soaked with insecticides within the past 12 months.

Figure 3.8 Trends in use of ITNs by persons in the household

Among the household population in households with at least one ITN, percentage who slept under an ITN the night before the survey



Note: The definition of an ITN in surveys conducted prior to the 2020 KMIS included nets that had been soaked with insecticides within the past 12 months.

Patterns by background characteristics

- By endemicity, ITN access ranges from 23% in the Seasonal zone to 56% in the Lake endemic zone (**Figure 3.9**).
- ITN use by the household population ranges from 21% in the Low risk zone to 53% in the Lake endemic zone (**Figure 3.10**).
- The difference between ITN access and ITN use is largest in the Highland epidemic prone zone (8 percentage points each) and smallest in the Seasonal zone (2 percentage point).
- Among households with at least one ITN, the percentage of the population who slept under an ITN last night increases from 58% in the lowest wealth quintile to 70% in the highest quintile (**Table 3.4**).
- In households with at least one ITN, children age 5 to 14 are least likely to have slept under an ITN last night (58%) (**Table 3.4**).

Figure 3.9 ITN access by malaria endemicity

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

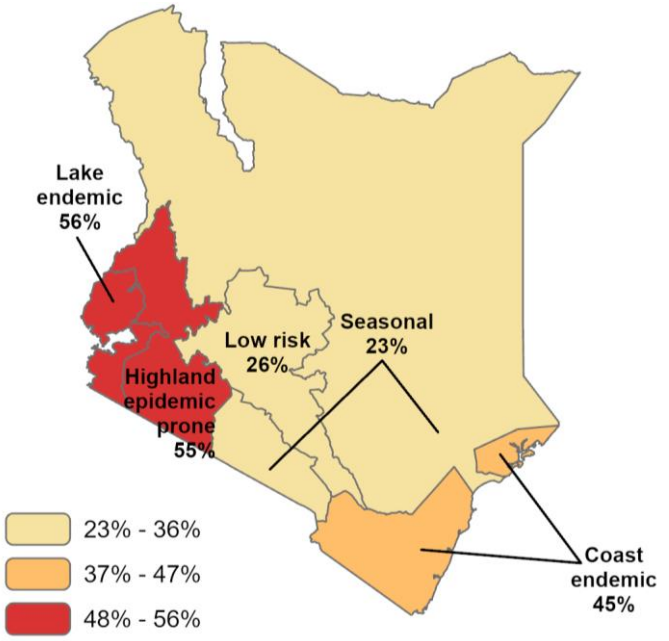
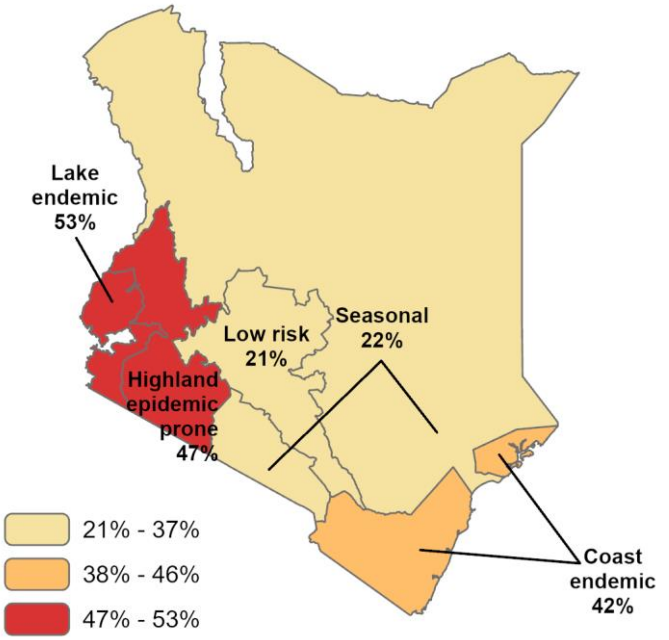


Figure 3.10 ITN use in the household population by malaria endemicity

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



3.3 USE OF ITNS BY CHILDREN

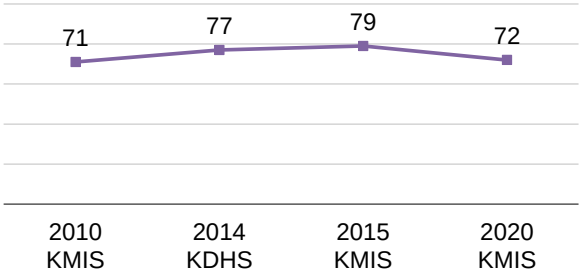
Malaria is endemic in Kenya; transmission occurs year-round with seasonal variations. Partial immunity to the disease is acquired over time among those living in high malaria transmission areas (Doolan et al. 2009). Children under age 5 are prone to severe malaria manifestations because they lack acquired 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 on the level of exposure to malarial infection. In high malaria-endemic areas, children are thought to attain a high level of immunity by their fifth birthday. These children may experience episodes of malaria illness but usually do not suffer from severe, life-threatening conditions (Shulman and Dorman 2003).

Forty-two percent of children under age 5 slept under an ITN the night before the survey, and 72% of children in households with at least one ITN slept under an ITN the night before the survey (**Table 3.6**).

Trends: ITN use among children under age 5 in households with at least one ITN increased from 71% in 2010 to 79% in 2015 and then decreased to 72% in 2020 (**Figure 3.11**). By malaria endemicity, there was a decrease in ITN usage among children under age 5 in households with at least one ITN across all zones. The largest decrease (13 percentage points) was in the Lake endemic zone (82% in 2015 and 69% in 2020).

Figure 3.11 **Among households with at least one ITN, ITN use by children**

Among children under age 5 in households with at least one ITN, percentage who slept under an ITN the night before the survey



Note: The definition of an ITN in surveys conducted prior to the 2020 KMIS included nets that had been soaked with insecticides within the past 12 months.

Patterns by background characteristics

- ITN use by children under age 5 ranges from 25% in the Seasonal zone to 58% in the Lake endemic zone.
- The percentage of children under age 5 who slept under an ITN the previous night ranges from 32% in the lowest wealth quintile to 53% in the fourth wealth quintile.
- ITN use among children decreases with increasing age, from 48% among those less than age 12 months to 34% among those age 48-59 months.
- Sixty-three percent of children in urban areas slept under any mosquito net, while 47% slept under an ITN (**Table 3.6**).

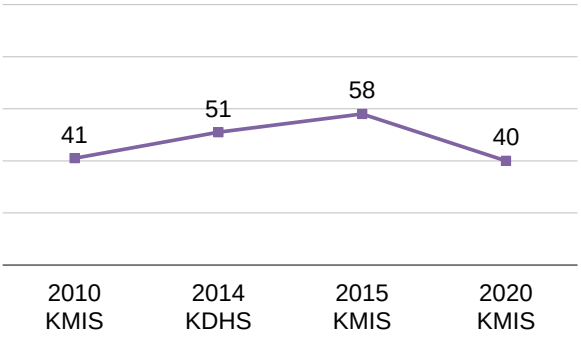
3.4 USE OF ITNS BY PREGNANT WOMEN

Adults usually acquire some degree of immunity. However, since pregnancy suppresses immunity, pregnant women (especially women pregnant for the first time) 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).

Overall, 40% of pregnant women age 15-49 slept under an ITN the night before the survey, and 73% of pregnant women living in households with at least one ITN slept under an ITN the night before the survey (**Table 3.7**).

Figure 3.12 **ITN use by pregnant women**

Percentage of pregnant women using an ITN the night before the survey



Note: The definition of an ITN in surveys conducted prior to the 2020 KMIS included nets that had been soaked with insecticides within the past 12 months.

Trends: The percentage of pregnant women who slept under an ITN the night before the survey increased from 41% in 2010 to 58% in 2015 before decreasing to 40% in 2020 (**Figure 3.12**).

Patterns by background characteristics

- ITN use by pregnant women is higher in rural areas (44%) than in urban areas (35%).
- Eighty-one percent of pregnant women in rural households with at least one ITN slept under an ITN, as compared with 63% of pregnant women in urban areas.
- Pregnant women with no formal education (7%) were less likely to have slept under an ITN than pregnant women with a primary (51%), secondary (34%), or more than a secondary (44%) education (**Table 3.7**).

3.5 Reasons Mosquito Nets Were Not Used

In Kenya, the MOH advocates for ownership and proper use of mosquito nets to protect against malaria. **Table 3.8** presents reasons why mosquito nets were not used the night before the survey. This information is important to the DNMP for identifying barriers to net usage. Overall, 19% of ITNs in households were not used the night before the survey. Thirty-five percent of respondents reported that the net was an extra net or that they were saving it for later, 22% said that the usual user did not sleep in the household last night, and 11% stated that there were no mosquitoes or malaria. Enhancing social and behaviour change communication activities to advocate for consistent and proper mosquito net use, especially in malaria prone regions, is recommended.

Patterns by background characteristics

- By malaria endemicity, the proportion of nets that were not used ranged from 16% in the Lake endemic zone to 23% in the Low risk zone (**Table 3.8**).
- Twenty-six percent of the population in the Coast endemic zone cited “too hot” as the reason for not using an ITN on the night before the survey, as compared with 5% or less of the population in other malaria endemicity zones.
- The percentage of households not using a net the night before the survey was higher in rural areas than in urban areas (20% versus 17%).
- A higher percentage of rural households than urban households reported not using a mosquito net because there were no mosquitos or malaria (14% versus 6%).
- By malaria endemicity, the proportion of households that reported not using a mosquito net because there were no mosquitos or malaria ranged from 2% in the Lake endemic zone to 23% in the Low risk zone.
- A higher percentage of households in the highest wealth quintile (38%) than the lowest wealth quintile (26%) reported that they did not use a net the night before the survey because it was an extra net or they were saving the net for later (**Table 3.8**).
- The percentage of households that reported not using a net the night before the survey because it was an extra net or they were saving the net for later ranged from 20% in the Seasonal zone to 50% in the Lake endemic zone.

3.6 Use of Mosquito Repellent Spray or Other Methods

As part of the 2020 KMIS Household Questionnaire, respondents were asked if in the past year their household had used mosquito repellent spray (e.g., Doom), ointments, vaporisers, coils, herbs, or plants to protect against mosquitoes and malaria. Overall, 28% of households reported using sprays or other

methods to protect against mosquitoes/malaria. Use of spatial repellents and other methods complements malaria interventions and should be encouraged (Wirth 2017).

Patterns by background characteristics

- The percentage of households using sprays or other methods to protect against mosquitoes is higher in urban areas (35%) than in rural areas (23%).
- By malaria endemicity, use of sprays or other methods ranges from a high of 45% in the Coast endemic zone to a low of 20% in the Highland epidemic prone zone (**Table 3.9**).
- Use of sprays or other methods to protect against mosquitoes and malaria increases from 16% among households in the lowest wealth quintile to 43% among households in the highest wealth quintile (**Table 3.9**).

3.7 MALARIA IN PREGNANCY

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

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

The 2020 KMIS assessed use of antenatal care services for the last birth in the 2 years preceding the survey and IPTp usage during the pregnancy for the last birth in the 2 years preceding the survey among women age 15-49.

3.7.1 Antenatal Care (ANC)

Overall, 93% of pregnant women received antenatal care from a skilled provider for their last birth in the past 2 years (**Table 3.10**). Ninety-three percent received care from a doctor, nurse/midwife, or health personnel and 3% received care from a community health worker (CHW), also commonly referred to as a community health volunteer (CHV). Less than 1% of pregnant women received care from a traditional birth attendant, and 4% did not attend antenatal care. Four percent of pregnant women had eight or more ANC visits, with the majority of women attending ANC between four and seven times (55%). Twenty-eight percent of pregnant women had their first ANC visit during the first trimester of pregnancy. Among those who received ANC, the median number of months pregnant at the first visit was 4.8 (**Table 3.11**).

Trends: The percentage of pregnant women receiving ANC from a skilled provider remained relatively unchanged from 2015 to 2020 (95% versus 93%). Over the same period, the percentage of pregnant women receiving ANC services from a CHW increased from less than 1% to 3%. By malaria endemicity, the percentage of pregnant women in the Low risk zone receiving ANC from a CHW increased from less than 1% in 2015 to 7% in 2020. The percentage of pregnant women attending four or more ANC visits increased from 58% in 2014 to 63% in 2015 before decreasing to 59% in 2020. The percentage of women who were less than 4 months pregnant at the time of their first ANC visit increased from 20% in 2014 to 28% in 2020.

Patterns by background characteristics

- Eighty-seven percent of pregnant women less than age 20 sought ANC services from a skilled provider, as compared with 94% of women age 20-34 and 95% of women age 35-49.
- Nine percent of pregnant women less than age 20 sought ANC services from a CHW, compared with 2% of women age 20-34 and less than 1% of women age 35-49.
- Women in the Low risk zone were more likely to report seeking ANC services from a CHW (7%) than women in the other zones (1% or less).
- Seventeen percent of pregnant women in the Seasonal zone did not seek ANC services.
- Women with no education and those in the lowest wealth quintile were most likely to report not seeking ANC services (21% and 12%, respectively).

3.7.2 ANC Decision Making

As part of the Woman's Questionnaire, respondents were asked who usually made the final decision about whether they went for antenatal care during their pregnancy (the respondent, the respondent's spouse, the respondent and spouse jointly, or someone else). The majority of women (57%) stated that they made the decision to seek ANC; 35% reported that it was a joint decision with their spouse. Five percent of women said it was their spouse's decision, and 2% said it was someone else's decision (**Table 3.12**).

Patterns by background characteristics

- Women in the Coast endemic zone were most likely (20%) to report that their spouse made the final decision about whether they went for antenatal care.

3.7.3 IPTp

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

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

Kenya first adopted a policy of providing IPTp in 1998. Following the WHO recommendation at that time, the initial IPTp policy called for at least two doses of SP to be administered to all pregnant women in the second and third trimesters of pregnancy. In 2009, based on a change in the WHO guidance, the Kenya National Malaria Strategy was revised to limit IPTp to women residing in malaria-endemic areas. The malaria strategy currently calls for women living in malaria-endemic areas in 14 endemic counties and fringe portions of Highland epidemic prone areas (specifically Kericho, Nandi, Kisii, and Nyamira counties) to receive (starting at 13 weeks of pregnancy) at least three doses of SP during pregnancy (MOH 2016). The 14 endemic counties are in the Lake endemic and Coast endemic zones. Within the Lake endemic zone, community health workers assigned to community units are trained to provide malaria in pregnancy services. As of 2020, 32% of the community units were implementing interventions for the prevention of malaria in pregnancy (MOH unpublished data, 2020).

The 2020 KMIS measured coverage of this intervention among women age 15-49 with a live birth in the 2 years before the survey. Thirty-eight percent of women with a live birth in the 2 years before the survey reported receiving one or more doses of IPTp during the pregnancy of their most recent live birth, while 30% received two or more doses. Nationally, 22% of women received three or more doses of IPTp (**Table 3.13**). Among women living in IPTp targeted malaria-endemic areas, 49% of those in the Lake endemic zone and 46% of those in the Coast endemic zone received three or more doses of IPTp (**Table 3.14**).

Among women with a live birth in the 2 years preceding the survey who took IPTp only once or twice during pregnancy, the most commonly cited reasons for not taking IPTp more than one or two times were that they were not given the medicine (41%) and that they were not aware they had to take more (35%) (**Table 3.15**). The lack of awareness among women that they had to take more doses shows the likelihood of a gap in provider-client communication, especially with respect to the importance of receiving subsequent doses.

Trends: In the targeted endemic areas, uptake of three or more doses of IPTp increased from 35% in 2015 to 49% in 2020 in the Lake endemic zone and from 43% in 2015 to 46% in 2020 in the Coast endemic zone. In the Low risk zone, uptake of three or more doses of IPTp decreased from 13% in 2015 to 8% in 2020. The Low risk zone is not targeted for IPTp.

3.8 CONCLUSIONS

- Household ownership of ITNs has decreased since 2015, from 63% to 49%. There has also been a decrease in the percentage of households with at least one net for every two persons who stayed in the household the night before the survey (from 40% to 29%).

- There is still a gap between access to ITNs (40%) and use of ITNs (35%) among the household population. The gap between access and use is slightly larger in rural (40% versus 35%) than urban (39% versus 35%) households.

- By malaria endemicity, there has been a decrease across all zones in ITN usage among children under age 5 in households with at least one ITN. The largest decrease (13 percentage points) was in the Lake endemic zone, from 82% in 2015 to 69% in 2020. In households with at least one ITN, 73% of pregnant women slept under an ITN the night before the survey. In households with at least one ITN, children age 5 to 14 were least likely to have slept under an ITN the night before the survey.

- In both 2015 and 2020, more than 90% of pregnant women sought ANC services from a skilled provider. The percentage of pregnant women receiving ANC services from CHWs increased from less than 1% in 2015 to 3% in 2020. Women from the Low risk zone (7%) and those less than age 20 (9%) were most likely to receive ANC services from CHWs.

- Among women who received ANC, the median number of months pregnant at the first visit was 4.8. Thirty-five percent of women reported that their spouse was involved in ANC decision making.

- In the targeted endemic areas, uptake of three or more doses of IPTp increased from 35% in 2015 to 49% in 2020 in the Lake endemic zone and from 43% in 2015 to 46% in 2020 in the Coast endemic zone.

- In the Low risk zone, uptake of three or more doses of IPTp decreased from 13% in 2015 to 8% in 2020. The Low risk regions are not target areas for IPTp; therefore, adherence to policy guidelines to prevent misuse of commodities was implemented as recommended in the 2015 KMIS.

- Among women with a live birth in the 2 years preceding the survey who took IPTp only one or two times during pregnancy, the most commonly cited reasons for not taking IPTp more than once or twice were that they were not given the medicine (41%) and they were not aware that they had to take more (35%).

3.9 RECOMMENDATIONS

- Strengthen existing channels for ITN distribution to improve ITN ownership and achieve universal ITN coverage.

- Sustain health education and appropriate/targeted social and behaviour change messaging on the continuous use of ITNs among rural and vulnerable populations such as children under age 5 and pregnant women. Increase health communication among school-aged children on the importance of using an ITN.

- Strengthen efforts towards achieving the 80% target of all pregnant women living in endemic zones receiving at least three doses of IPTp and sustain adherence to policy guidance in non-endemic areas.

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- **Table 3.1 Household possession of mosquito nets**
- **Table 3.2 Source of mosquito nets**
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- **Table 3.15 Reasons for not receiving SP/Fansidar**

Table 3.1 Household possession of mosquito nets

Percentage of households with at least one mosquito net (treated or untreated) and insecticide-treated net (ITN), average number of nets and ITNs per household, and percentage of households with at least one net and ITN per two persons who stayed in the household last night, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage of households with at least one mosquito net		Average number of nets per household		Number of households	Percentage of households with at least one net for every two persons who stayed in the household last night[1]		Number of households with at least one person who stayed in the household last night
	Any mosquito net	Insecticide-treated mosquito net (ITN)[2]	Any mosquito net	Insecticide-treated mosquito net (ITN)[2]		Any mosquito net	Insecticide-treated mosquito net (ITN)[2]	
Residence								
Urban	63.7	44.4	1.3	0.8	3,044	45.1	28.4	3,035
Rural	55.8	51.9	1.1	1.0	4,908	31.5	28.8	4,907
Malaria endemicity								
Highland epidemic prone	67.3	64.8	1.5	1.4	1,609	45.1	42.5	1,603
Lake endemic	81.0	77.9	1.6	1.5	1,492	45.2	41.9	1,489
Coast endemic	67.4	57.9	1.3	1.0	612	42.9	32.8	611
Seasonal	47.0	35.0	0.9	0.6	948	25.0	18.2	948
Low risk	46.4	30.6	0.9	0.5	3,292	31.0	18.1	3,291
Wealth quintile								
Lowest	47.4	44.1	0.8	0.7	1,441	20.5	19.0	1,441
Second	58.2	57.1	1.2	1.1	1,398	31.6	30.7	1,398
Middle	56.8	52.4	1.2	1.1	1,469	34.1	30.6	1,466
Fourth	61.5	50.2	1.1	0.9	1,836	40.0	30.6	1,832
Highest	67.1	42.8	1.5	0.9	1,808	52.4	31.3	1,805
Total	58.8	49.0	1.2	0.9	7,952	36.7	28.7	7,941

[1] De facto household members
[2] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.2 Source of mosquito nets

Percent distribution of insecticide-treated nets (ITNs), non-ITNs, and all mosquito nets by source of net, according to background characteristics, Kenya MIS 2020

Background characteristic	Mass distribution campaign	ANC visit	Child welfare visit	Government health facility	Private health facility	Pharmacy	Shop/ market	Community health worker	Religious institution	School	Other	Don't know/ missing	Total	Number of mosquito nets
						ITNs[1]								
Residence														
Urban	32.9	14.3	3.9	2.2	0.9	0.7	42.6	0.0	0.1	0.0	1.7	0.6	100.0	2,476
Rural	63.4	16.6	3.3	2.8	0.2	0.7	10.6	0.1	0.1	0.3	1.4	0.4	100.0	5,067
Malaria endemicity														
Highland epidemic prone	77.4	10.1	2.1	4.0	0.2	0.4	3.6	0.2	0.1	0.6	0.8	0.4	100.0	2,328
Lake endemic	66.5	17.2	3.1	2.5	0.5	1.2	7.6	0.1	0.0	0.0	1.1	0.2	100.0	2,224
Coast endemic	50.6	25.5	6.5	1.0	0.0	0.1	11.5	0.0	0.1	0.0	3.2	1.6	100.0	636
Seasonal	28.2	18.1	7.5	5.7	2.2	0.4	33.6	0.0	0.6	0.3	2.4	1.0	100.0	546
Low risk	15.0	17.5	3.6	0.6	0.1	0.9	59.7	0.0	0.0	0.0	2.1	0.5	100.0	1,809
Wealth quintile														
Lowest	64.6	16.6	5.6	2.9	0.0	0.1	7.9	0.1	0.2	0.0	1.5	0.3	100.0	994
Second	66.0	19.9	3.0	3.5	0.2	0.2	5.5	0.0	0.0	0.8	0.4	0.4	100.0	1,591
Middle	66.4	15.6	2.4	1.9	0.1	0.8	10.4	0.0	0.1	0.0	1.9	0.4	100.0	1,590
Fourth	53.3	16.2	3.8	3.0	0.1	1.4	18.3	0.3	0.1	0.1	2.8	0.7	100.0	1,734
Highest	22.0	11.4	3.5	1.7	1.5	0.9	57.6	0.0	0.0	0.0	0.8	0.6	100.0	1,633
Total	53.4	15.9	3.5	2.6	0.4	0.7	21.1	0.1	0.1	0.2	1.5	0.5	100.0	7,543
						NON-ITNs								
Total	na	na	na	0.0	0.0	0.8	92.4	0.0	0.2	0.0	5.3	1.2	100.0	1,798
						ALL MOSQUITO NETS								
Total	43.1	12.8	2.8	2.1	0.3	0.7	34.8	0.1	0.1	0.2	2.2	0.6	100.0	9,342

ANC = Antenatal care
na = Not applicable
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.3 Access to an ITN

Percentage of the de facto population with access to an ITN in the household, by background characteristics, Kenya MIS 2020

Background characteristic	Percentage of the de facto population with access to an ITN[1,2]	Number of persons
Residence		
Urban	38.8	9,675
Rural	40.1	19,753
Malaria endemicity		
Highland epidemic prone	54.8	6,251
Lake endemic	56.1	6,305
Coast endemic	45.2	2,255
Seasonal	23.4	3,816
Low risk	25.9	10,802
Wealth quintile		
Lowest	30.2	5,761
Second	42.5	5,885
Middle	41.4	5,871
Fourth	44.8	5,900
Highest	39.1	6,012
Total	39.6	29,429

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).
[2] Percentage of the de facto household population who could sleep under an ITN if each ITN in the household were used by up to two people

Table 3.4 Use of mosquito nets by persons in the household

Percentage of the de facto household population who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey; among the de facto household population in households with at least one ITN, percentage who slept under an ITN the night before the survey; and among the de facto household population in households with at least one ITN for every two people, percentage who slept under an ITN the night before the survey, according to background characteristics, Kenya MIS 2020

	Household population			Household population in households with at least one ITN[1]		Household population in households with at least one ITN[1] for every two people	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of persons	Percentage who slept under an ITN[1] last night	Number of persons	Percentage who slept under an ITN[1] last night	Number of persons
Age							
<5	49.6	42.0	3,896	71.9	2,277	86.3	706
5-14	39.2	31.4	7,609	57.5	4,156	82.8	1,447
15-34	40.0	32.8	9,510	62.8	4,963	79.7	2,285
35-49	47.2	37.2	4,373	73.4	2,215	84.5	1,080
50+	43.2	37.1	3,976	75.1	1,968	84.3	1,280
Don't know	51.7	29.7	64	(70.7)	27	(89.9)	17
Sex							
Male	39.7	32.6	14,558	62.3	7,607	80.2	3,365
Female	45.4	37.1	14,871	69.0	8,000	85.1	3,449
Residence							
Urban	52.0	34.5	9,675	70.6	4,732	81.8	2,379
Rural	38.0	35.0	19,753	63.7	10,875	83.2	4,436
Malaria endemicity							
Highland epidemic prone	47.9	46.6	6,251	68.8	4,227	83.6	2,258
Lake endemic	55.6	52.6	6,305	65.8	5,045	86.4	1,849
Coast endemic	50.1	41.5	2,255	66.7	1,405	81.0	546
Seasonal	32.8	21.9	3,816	64.3	1,301	83.2	433
Low risk	33.8	20.9	10,802	62.4	3,628	77.9	1,727
Wealth quintile							
Lowest	30.1	27.2	5,761	57.9	2,710	79.7	686
Second	38.3	37.3	5,885	61.9	3,550	84.3	1,364
Middle	40.7	37.5	5,871	67.9	3,244	84.9	1,397
Fourth	47.5	40.4	5,900	70.6	3,383	85.3	1,615
Highest	55.7	31.8	6,012	70.2	2,720	78.3	1,753
Total	42.6	34.9	29,429	65.8	15,606	82.7	6,815

Note: Figures in parentheses are based on 25-49 unweighted cases.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.5 Use of existing ITNs

Percentage of insecticide-treated nets (ITNs) that were used by anyone the night before the survey, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage of existing ITNs[1] used last night	Number of ITNs[1]
Residence		
Urban	80.7	2,476
Rural	79.9	5,067
Malaria endemicity		
Highland epidemic prone	79.6	2,328
Lake endemic	84.3	2,224
Coast endemic	79.4	636
Seasonal	83.3	546
Low risk	75.1	1,809
Wealth quintile		
Lowest	83.0	994
Second	80.3	1,591
Middle	82.4	1,590
Fourth	80.7	1,734
Highest	75.5	1,633
Total	80.2	7,543

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.6 Use of mosquito nets by children

Percentage of children under age 5 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, and among children under age 5 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Kenya MIS 2020

	Children under age 5 in all households			Children under age 5 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of children	Percentage who slept under an ITN[1] last night	Number of children
Age in months					
<12	57.5	47.7	671	75.0	428
12-23	54.6	46.8	830	78.9	493
24-35	52.8	45.5	761	76.1	455
36-47	44.7	37.6	778	66.2	442
48-59	40.3	33.8	855	63.1	458
Sex					
Male	49.0	43.5	1,907	72.1	1,151
Female	50.2	40.6	1,989	71.8	1,126
Residence					
Urban	63.2	46.8	1,228	83.0	693
Rural	43.4	39.8	2,668	67.1	1,584
Malaria endemicity					
Highland epidemic prone	50.3	49.5	693	70.5	487
Lake endemic	60.3	58.1	897	68.8	757
Coast endemic	61.2	54.5	308	76.6	219
Seasonal	38.9	24.9	596	72.5	205
Low risk	44.5	32.6	1,401	75.1	608
Wealth quintile					
Lowest	36.3	31.6	889	64.8	433
Second	43.3	42.5	778	65.8	502
Middle	42.6	39.4	744	69.2	424
Fourth	60.1	52.9	803	78.4	543
Highest	69.8	45.3	681	82.3	375
Total	49.6	42.0	3,896	71.9	2,277

Note: Table is based on children who stayed in the household the night before the interview.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.7 Use of mosquito nets by pregnant women

Percentage of pregnant women age 15-49 who slept under a mosquito net (treated or untreated) and under an insecticide-treated net (ITN) the night before the survey, and among pregnant women age 15-49 in households with at least one ITN, percentage who slept under an ITN the night before the survey, according to background characteristics, Kenya MIS 2020

	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an ITN[1] last night	Number of pregnant women	Percentage who slept under an ITN[1] last night	Number of pregnant women
Residence					
Urban	58.1	34.6	136	63.0	75
Rural	48.5	43.6	184	80.6	100
Malaria endemicity					
Highland epidemic prone	54.6	50.5	56	(92.8)	30
Lake endemic	68.2	66.6	69	77.5	59
Coast endemic	(61.1)	(43.1)	30	(81.9)	16
Seasonal	35.5	18.9	36	(75.7)	9
Low risk	(46.1)	(26.0)	130	*	60
Education					
No education	24.0	7.2	27	*	4
Primary	55.0	51.2	116	73.8	81
Secondary	55.5	34.4	120	67.3	61
More than secondary	54.9	43.5	58	(85.1)	29
Wealth quintile					
Lowest	36.7	29.2	41	(80.2)	15
Second	51.3	49.9	71	72.8	49
Middle	45.6	33.6	48	(77.7)	21
Fourth	71.6	57.1	71	(74.2)	55
Highest	49.5	26.1	89	(65.8)	35
Total	52.6	39.8	321	73.0	175

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

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

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

Among ITNs, non-ITNs, and all mosquito nets, percentage that were not used by anyone the night before the survey, and among mosquito nets that were not used by anyone the night before the survey, percent distribution by the main reason each net was not used, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage of nets not used the night before the survey	Total number of mosquito nets	Main reason each net was not used the night before the survey											Number of mosquito nets not used the night before the survey
			Too hot	Don't like net shape, colour, and/or size	Don't like smell	Unable to hang net	Slept outdoors	Usual user didn't sleep in household last night	No mosquitoes/ no malaria	Extra net/ saving for later	Net too short/ small	Net brought bedbugs	Other	Total	
							ITNs[1]								
Residence															
Urban	17.4	2,462	6.8	0.0	0.6	10.2	0.5	25.9	6.1	34.6	0.7	0.3	4.7	90.4	429
Rural	19.9	5,037	2.5	0.4	1.0	4.6	2.3	20.0	13.5	34.9	0.0	0.9	5.5	85.8	1,002
Malaria endemicity															
Highland epidemic prone	19.8	2,321	0.5	0.5	0.9	4.6	1.9	29.9	8.2	34.1	0.0	0.0	5.6	86.3	459
Lake endemic	15.5	2,220	1.5	0.4	1.3	4.5	2.4	14.0	1.6	49.7	0.3	2.3	6.8	84.8	345
Coast endemic	20.5	636	26.3	0.0	1.2	1.6	1.0	20.9	7.8	28.6	1.8	0.7	5.8	95.6	130
Seasonal	17.0	524	4.7	0.0	0.0	13.1	0.0	32.5	16.5	20.2	0.0	2.0	1.8	90.6	89
Low risk	22.7	1,798	2.1	0.0	0.6	9.7	1.6	17.0	23.1	28.2	0.0	0.0	4.2	86.6	409
Wealth quintile															
Lowest	17.0	988	3.0	0.3	2.6	3.1	0.0	15.1	8.1	26.2	0.1	5.2	3.9	67.5	168
Second	19.6	1,585	1.4	0.4	1.0	4.0	0.2	21.4	9.9	36.4	0.2	0.4	8.0	83.2	310
Middle	17.0	1,579	4.4	0.8	0.6	5.1	4.5	22.9	12.7	36.2	0.0	0.1	4.2	91.3	268
Fourth	19.3	1,721	3.3	0.0	0.5	11.2	2.7	20.3	15.2	33.2	0.7	0.2	4.7	92.2	331
Highest	21.8	1,626	6.4	0.0	0.6	6.0	0.8	25.7	9.4	38.0	0.2	0.0	4.8	92.0	354
Total	19.1	7,499	3.8	0.3	0.9	6.3	1.7	21.8	11.3	34.8	0.2	0.8	5.3	87.2	1,431
							NON-ITNs								
Total	20.7	1,842	4.1	0.0	0.0	9.2	0.1	4.9	17.3	48.7	0.6	0.1	7.0	91.9	381
							ALL MOSQUITO NETS								
Total	19.4	9,342	3.9	0.2	0.7	6.9	1.4	18.2	12.6	37.8	0.3	0.6	5.6	88.2	1,812

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment. In KDHS and KMIS surveys conducted prior to 2020, this was known as a long-lasting insecticidal net (LLIN).

Table 3.9 Use of spray and other methods to protect against mosquitoes/malaria

Percentage of households in which mosquito repellent spray or other methods have been used in the past year to protect against mosquitoes/malaria, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage using spray or other methods to protect against mosquitoes/ malaria	Number of households
Residence		
Urban	35.3	3,044
Rural	22.6	4,908
Malaria endemicity		
Highland epidemic prone	20.4	1,609
Lake endemic	33.4	1,492
Coast endemic	44.8	612
Seasonal	29.5	948
Low risk	24.6	3,292
Wealth quintile		
Lowest	16.1	1,441
Second	19.1	1,398
Middle	27.5	1,469
Fourth	27.2	1,836
Highest	43.4	1,808
Total	27.5	7,952

Note: Other methods include ointments, vaporisers, coils, herbs, or plants.

Table 3.10 Antenatal care

Percent distribution of women age 15-49 who had a live birth in the 2 years preceding the survey by antenatal care (ANC) provider during the pregnancy for the most recent birth and percentage receiving antenatal care from a skilled provider for the most recent birth, according to background characteristics, Kenya MIS 2020

Background characteristic	Antenatal care provider			No ANC	Total	Percentage receiving antenatal care from a skilled provider[1]	Number of women
	Doctor, nurse/midwife, or health personnel	Community health worker	Traditional birth attendant				
Age at birth							
<20	86.7	8.9	0.0	4.4	100.0	86.7	196
20-34	93.7	1.9	0.1	4.3	100.0	93.7	1,036
35-49	94.7	0.0	0.1	5.2	100.0	94.7	131
Birth order							
1	90.6	6.5	0.0	2.9	100.0	90.6	426
2-3	96.3	1.5	0.0	2.2	100.0	96.3	474
4-5	91.9	0.8	0.3	7.0	100.0	91.9	305
6+	90.1	0.0	0.1	9.8	100.0	90.1	158
Residence							
Urban	93.2	5.9	0.0	1.0	100.0	93.2	440
Rural	92.6	1.2	0.1	6.0	100.0	92.6	923
Malaria endemicity							
Highland epidemic prone	97.9	0.0	0.0	2.1	100.0	97.9	206
Lake endemic	97.5	0.5	0.0	2.0	100.0	97.5	305
Coast endemic	96.7	0.0	0.0	3.3	100.0	96.7	113
Seasonal	81.4	0.6	0.6	17.4	100.0	81.4	202
Low risk	91.6	6.5	0.0	1.9	100.0	91.6	537
Education							
No education	78.3	0.0	0.7	21.0	100.0	78.3	138
Primary	95.7	0.7	0.0	3.5	100.0	95.7	534
Secondary	91.3	6.6	0.0	2.1	100.0	91.3	508
More than secondary	99.5	0.0	0.0	0.5	100.0	99.5	182
Wealth quintile							
Lowest	86.7	0.8	0.4	12.1	100.0	86.7	294
Second	95.3	0.0	0.0	4.7	100.0	95.3	267
Middle	96.9	0.6	0.0	2.5	100.0	96.9	266
Fourth	94.4	4.2	0.0	1.5	100.0	94.4	297
Highest	91.0	8.8	0.0	0.2	100.0	91.0	238
Total	92.8	2.7	0.1	4.4	100.0	92.8	1,363

Note: If more than one source of ANC was mentioned, only the provider with the highest qualifications is considered in this tabulation.
[1] Skilled provider includes doctor, nurse/midwife, or health personnel.

Table 3.11 Number of antenatal care visits and timing of first visit

Percent distribution of women age 15-49 who had a live birth in the 2 years preceding the survey by number of antenatal care (ANC) visits for the most recent live birth and by the timing of the first visit, and among women with ANC, median months pregnant at first visit, according to background characteristics, Kenya MIS 2020

Background characteristic	Number of ANC visits								Number of months pregnant at time of first ANC visit						Number of women	Median months pregnant at first visit (for those with ANC)	Number of women with ANC
	None	1	2	3	4-7	8+	Don't know	Total	No ante-natal care	<4	4-6	7+	Don't know	Total			
Age at birth																	
<20	4.4	2.1	4.2	31.0	55.0	2.8	0.5	100.0	4.4	25.6	64.7	5.0	0.3	100.0	196	4.9	188
20-34	4.3	1.7	7.5	26.9	54.0	3.9	1.8	100.0	4.3	29.6	54.1	7.8	4.2	100.0	1,036	4.7	992
35-49	5.2	0.8	8.5	20.3	62.0	2.9	0.3	100.0	5.2	19.7	65.1	9.7	0.3	100.0	131	4.9	124
Birth order																	
1	2.9	1.3	7.1	23.6	57.8	6.1	1.1	100.0	2.9	30.8	58.2	5.3	2.8	100.0	426	4.7	414
2-3	2.2	1.8	5.5	29.1	55.3	3.5	2.5	100.0	2.2	27.9	59.2	5.0	5.8	100.0	474	4.7	464
4-5	7.0	1.8	6.5	27.7	54.5	2.1	0.5	100.0	7.0	29.2	51.5	12.0	0.3	100.0	305	5.1	283
6+	9.8	1.7	13.2	27.2	46.4	0.3	1.4	100.0	9.8	19.0	55.5	13.1	2.6	100.0	158	4.9	143
Residence																	
Urban	1.0	1.7	4.8	28.4	54.2	8.4	1.5	100.0	1.0	26.6	63.5	5.3	3.6	100.0	440	4.8	436
Rural	6.0	1.6	8.2	26.1	55.2	1.4	1.5	100.0	6.0	28.8	53.5	8.6	3.1	100.0	923	4.8	868
Malaria endemicity																	
Highland epidemic prone	2.1	2.4	7.9	22.7	62.5	1.7	0.6	100.0	2.1	29.2	59.7	7.8	1.1	100.0	206	4.8	201
Lake endemic	2.0	1.8	4.5	19.1	67.6	3.4	1.6	100.0	2.0	37.6	53.8	5.4	1.3	100.0	305	4.5	299
Coast endemic	3.3	0.0	11.3	18.7	64.3	1.9	0.5	100.0	3.3	28.2	61.7	6.3	0.5	100.0	113	4.9	109
Seasonal	17.4	2.8	6.4	15.9	53.8	1.6	2.0	100.0	17.4	22.4	51.5	6.8	2.0	100.0	202	4.7	167
Low risk	1.9	1.1	7.7	38.7	43.2	5.7	1.8	100.0	1.9	24.4	58.2	9.3	6.3	100.0	537	5.0	527
Education																	
No education	21.0	3.4	9.6	13.5	50.8	1.0	0.6	100.0	21.0	22.0	46.7	9.7	0.6	100.0	138	5.0	109
Primary	3.5	1.6	7.8	28.0	55.8	1.6	1.8	100.0	3.5	30.2	53.1	8.6	4.6	100.0	534	4.7	516
Secondary	2.1	1.8	7.3	29.2	54.1	4.4	1.2	100.0	2.1	24.5	63.5	6.9	3.0	100.0	508	4.9	497
More than secondary	0.5	0.0	2.8	27.2	57.8	9.5	2.2	100.0	0.5	36.4	56.3	4.6	2.2	100.0	182	4.5	182
Wealth quintile																	
Lowest	12.1	3.2	8.0	19.4	55.3	1.3	0.6	100.0	12.1	24.6	55.4	7.6	0.3	100.0	294	4.8	258
Second	4.7	1.0	8.7	27.1	55.3	0.8	2.4	100.0	4.7	31.8	52.8	7.7	3.1	100.0	267	4.7	255
Middle	2.5	1.6	5.3	30.3	57.1	2.4	0.7	100.0	2.5	26.2	57.2	10.6	3.5	100.0	266	5.1	260
Fourth	1.5	2.0	8.8	23.9	56.4	7.0	0.4	100.0	1.5	27.9	60.7	7.7	2.3	100.0	297	4.7	293
Highest	0.2	0.0	4.0	35.6	49.5	6.9	3.8	100.0	0.2	30.6	57.4	3.9	7.9	100.0	238	4.6	238
Total	4.4	1.6	7.1	26.9	54.9	3.6	1.5	100.0	4.4	28.1	56.7	7.6	3.3	100.0	1,363	4.8	1,304

Table 3.12 ANC decision making

Percent distribution of women age 15-49 receiving antenatal care (ANC) for their most recent live birth in the 2 years preceding the survey by who usually made the final decision about seeking ANC, according to background characteristics, Kenya MIS 2020

Background characteristic	Person who usually made the final decision about seeking ANC					Total	Number of women with ANC
	Respondent	Spouse	Joint decision with spouse	Someone else	Don't know		
Residence							
Urban	56.3	6.1	36.5	0.8	0.4	100.0	436
Rural	56.7	4.8	34.1	2.7	1.7	100.0	868
Malaria endemicity							
Highland epidemic prone	60.4	1.4	35.4	2.3	0.4	100.0	201
Lake endemic	53.2	6.0	37.3	2.4	1.2	100.0	299
Coast endemic	51.8	19.9	25.2	2.0	1.1	100.0	109
Seasonal	55.1	1.2	38.5	2.0	3.2	100.0	167
Low risk	58.5	4.4	34.3	1.8	1.0	100.0	527
Wealth quintile							
Lowest	62.9	6.9	28.3	1.7	0.2	100.0	258
Second	61.1	3.2	29.2	3.7	2.7	100.0	255
Middle	57.6	4.6	35.3	1.3	1.3	100.0	260
Fourth	48.5	7.9	40.9	2.4	0.2	100.0	293
Highest	53.8	2.8	40.4	0.9	2.1	100.0	238
Total	56.6	5.2	34.9	2.0	1.3	100.0	1,304

Table 3.13 Use of intermittent preventive treatment (IPTp) by women during pregnancy

Percentage of women age 15-49 with a live birth in the 2 years preceding the survey who, during the pregnancy that resulted in the last live birth, received one or more doses of SP/Fansidar, received two or more doses of SP/Fansidar, and received three or more doses of SP/Fansidar, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage who received one or more doses of SP/Fansidar	Percentage who received two or more doses of SP/Fansidar	Percentage who received three or more doses of SP/Fansidar	Number of women with a live birth in the 2 years preceding the survey
Birth order				
1	30.3	25.1	20.0	426
2-3	40.0	30.0	22.5	474
4-5	41.7	34.1	22.7	305
6+	43.6	34.5	24.7	158
Residence				
Urban	35.2	29.5	21.4	440
Rural	39.0	30.1	22.3	923
Malaria endemicity				
Highland epidemic prone	34.3	22.1	16.1	206
Lake endemic	82.2	68.1	48.6	305
Coast endemic	73.6	56.5	46.0	113
Seasonal	21.6	16.8	12.2	202
Low risk	12.4	10.5	7.8	537
Education				
No education	26.6	20.7	14.1	138
Primary	49.1	37.1	26.3	534
Secondary	32.9	28.3	22.0	508
More than secondary	26.7	20.3	15.5	182
Wealth quintile				
Lowest	43.5	33.6	22.5	294
Second	45.3	34.9	24.2	267
Middle	36.4	28.3	22.5	266
Fourth	37.2	30.5	22.7	297
Highest	24.7	20.9	17.7	238
Total	37.8	29.9	22.0	1,363

Table 3.14 Use of intermittent preventive treatment (IPTp) by women during pregnancy in the Lake endemic and Coast endemic zones

Percentage of women age 15-49 in the Lake endemic and Coast endemic zones with a live birth in the 2 years preceding the survey who, during the pregnancy that resulted in the last live birth, received one or more doses of SP/Fansidar, received two or more doses of SP/Fansidar, and received three or more doses of SP/Fansidar, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage who received one or more doses of SP/Fansidar	Percentage who received two or more doses of SP/Fansidar	Percentage who received three or more doses of SP/Fansidar	Number of women with a live birth in the 2 years preceding the survey
Birth order				
1	76.7	63.1	45.3	107
2-3	78.6	61.6	45.7	150
4-5	83.3	70.1	51.9	101
6+	83.1	68.3	51.2	61
Residence				
Urban	76.0	61.9	44.0	121
Rural	81.5	66.2	49.5	298
Malaria endemicity				
Lake endemic	82.2	68.1	48.6	305
Coast endemic	73.6	56.5	46.0	113
Education				
No education	(71.7)	(56.1)	(42.6)	21
Primary	79.0	62.6	46.9	226
Secondary	81.3	70.6	50.0	119
More than secondary	84.0	66.0	49.4	52
Wealth quintile				
Lowest	76.1	63.1	43.4	105
Second	83.5	69.3	50.1	106
Middle	78.4	61.2	45.4	84
Fourth	85.0	65.4	52.8	80
Highest	73.9	65.3	48.9	45
Total	79.9	65.0	47.9	419

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

Table 3.15 Reasons for not receiving SP/Fansidar

Among women age 15-49 with a live birth in the 2 years preceding the survey who, during the pregnancy that resulted in the last live birth, received one or two doses of SP/Fansidar, reasons for taking SP/Fansidar only once or twice, according to background characteristics, Kenya MIS 2020

Background characteristic	Facility too far away	Had no money	Side effects	Not aware had to take more	Did not want to take	Not given	Not available	Other	Don't know	Number of women
Residence										
Urban	0.4	1.2	2.3	23.7	0.1	27.6	1.9	4.4	43.8	95
Rural	2.5	0.2	2.2	41.3	2.0	47.4	5.4	1.9	15.2	181
Malaria endemicity										
Highland epidemic prone	(1.3)	(0.5)	(0.0)	(34.6)	(4.8)	(24.0)	(10.2)	(5.1)	(23.5)	31
Lake endemic	0.8	0.8	1.7	43.0	1.7	47.7	2.9	2.6	15.6	126
Coast endemic	0.0	0.0	5.0	22.0	0.0	44.8	11.9	6.4	21.7	39
Seasonal	(15.3)	(1.9)	(3.1)	(42.1)	(0.0)	(58.0)	(0.0)	(0.8)	(5.6)	23
Low risk	(0.0)	(0.0)	(2.2)	(24.6)	(0.0)	(24.1)	(0.0)	(0.0)	(57.1)	57
Wealth quintile										
Lowest	6.8	0.6	2.2	38.9	1.0	53.2	4.2	2.8	12.5	66
Second	0.0	0.2	1.1	45.4	2.2	44.0	8.1	0.3	16.6	68
Middle	0.0	2.1	3.6	42.4	1.2	37.8	0.2	2.9	20.3	47
Fourth	0.6	0.0	2.5	20.9	1.2	32.5	4.7	3.3	42.3	65
Highest	(0.0)	(0.0)	(1.9)	(24.1)	(0.5)	(27.2)	(0.0)	(6.8)	(42.5)	30
Total	1.8	0.6	2.2	35.2	1.3	40.6	4.2	2.8	25.1	276

Note: More than one reason may have been cited. Figures in parentheses are based on 25-49 unweighted cases.

MALARIA IN CHILDREN 4

Key Findings

- ***Fever prevalence:*** 17% of children under age 5 had a fever in the 2 weeks before the survey.
- ***Care seeking for fever:*** Advice or treatment was sought for 64% of children with a fever in the 2 weeks before the survey.
- ***Testing:*** Around 1 in 3 children (36%) with a recent fever had blood taken from a finger or heel for testing.
- ***Type of antimalarial drug used:*** Among children under age 5 with a recent fever who received an antimalarial, 91% received artemisinin-based combination therapy (ACT).
- ***ACT:*** Among children under age 5 with a fever in the 2 weeks preceding the survey who took an antimalarial, 82% took artemether-lumefantrine (AL), the recommended first-line ACT.
- ***Low haemoglobin:*** 2% of children age 6 months to age 14 had a haemoglobin level below 8.0 g/dl.
- ***Malaria:*** 6% of children age 6 months to age 14 tested positive for malaria by microscopy.
- ***Malaria species:*** 3 out of 4 malaria-positive children (76%) age 6 months to age 14 had a *Plasmodium falciparum* infection.

This chapter presents data useful for assessing how well fever management strategies are being implemented. Specific topics include care seeking for febrile children, diagnostic testing of children with fever, and therapeutic use of antimalarial drugs. The prevalence of malaria and low haemoglobin among children age 6 months to age 14 is also discussed.

4.1 CHILDREN WITH FEVER

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

Trends: The reported prevalence of fever decreased from 36% in 2015 to 17% in 2020.

Patterns by background characteristics

- By malaria endemicity, the percentage of children under age 5 with a recent fever ranged from 10% in the Low risk zone to 29% in the Lake endemic zone (**Table 4.1**).
- The percentage of children with a recent fever generally decreases with increasing household wealth, from 21% in the lowest wealth quintile to 14% in the highest wealth quintile (**Table 4.1**).

4.2 CARE SEEKING FOR FEVER IN CHILDREN

Care seeking for children under age 5 with a fever

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

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

The National Guidelines for the Diagnosis, Treatment, and Prevention of Malaria require timely care seeking within 24 hours of illness. Advice or treatment was sought for 64% of children with fever. Thirty-six percent of children with a recent fever received timely care (the same or next day) following fever onset (**Table 4.1**). Among children with a recent fever for whom advice or treatment was sought, 68% received advice or treatment from the public health sector and 32% received advice or treatment from the private health sector. Two percent received advice from "other" private sector sources. Among children receiving care from public health facilities, the most common sources of advice or treatment were government health dispensaries (28%), government hospitals (25%), and government health centres (17%) (**Table 4.2**).

Trends: The percentage of children with a recent fever receiving advice or treatment decreased from 72% in 2015 to 64% in 2020. In the Lake endemic zone, the percentage of children with a recent fever who were taken to a health provider for advice or treatment decreased from 66% in 2015 to 57% in 2020.

Patterns by background characteristics

- The percentage of children for whom advice or treatment was sought is higher among those age 24 months or older than among those age 23 months or younger (**Table 4.1**).
- By malaria endemicity, the percentage of children for whom advice or treatment was sought ranges from a high of 74% in the Highland epidemic prone zone to a low of 57% in the Lake endemic zone (**Table 4.1**).
- Advice or treatment for children with a recent fever was sought more often in rural areas than in urban areas (65% versus 60%) (**Table 4.1**).

4.3 DIAGNOSTIC TESTING OF CHILDREN WITH FEVER

Diagnosis of malaria in children under age 5 with a fever

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

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

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

In the 2020 KMIS, 36% of children with a fever in the 2 weeks before the survey had blood taken from a finger or heel, presumably for malaria testing (**Table 4.1**).

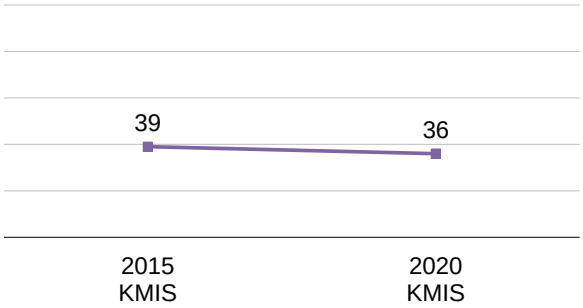
Trends: The percentage of children with a fever in the 2 weeks preceding the survey who had blood taken from a finger or heel for testing decreased from 39% in 2015 to 36% in 2020 (**Figure 4.1**).

Patterns by background characteristics

- The percentage of children under age 5 with a recent fever who had blood taken from a finger or heel for testing is higher in rural areas (39%) than urban areas (29%) (**Table 4.1**).

Figure 4.1 **Trends in diagnostic testing of children with fever**

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



4.4 USE OF RECOMMENDED ANTIMALARIALS

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

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

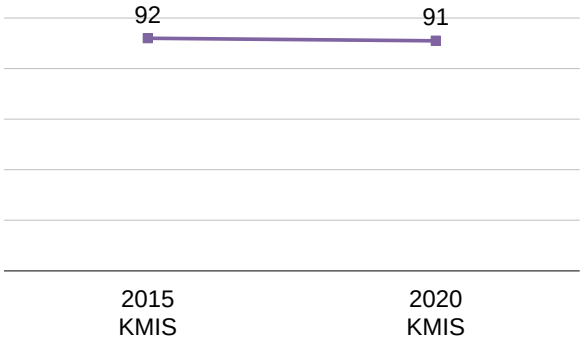
Sample: Children under age 5 with a fever in the 2 weeks before the survey

Kenya adopted artemisinin-based combination therapy (ACT) as the first-line treatment for malaria in 2004 (MOH 2016). The current recommended first-line ACT is artemether plus lumefantrine (AL). The second-line ACT is dihydroartemisinin plus piperaquine (DHAP). The 2020 KMIS results showed that among children under age 5 with a fever in the 2 weeks preceding the survey who took an antimalarial medication, 91% received ACT. Most children (82%) received AL, the recommended first-line treatment in Kenya (**Table 4.4**).

Trends: The percentage of children under age 5 with a recent fever who received ACT remained high between 2015 and 2020 (92% and 91%, respectively) (**Figure 4.2**).

Figure 4.2 **Trends in ACT use by children under age 5**

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



4.5 PREVALENCE OF ANAEMIA IN CHILDREN

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

During the 2020 KMIS, consent was obtained and testing for anaemia was conducted among almost all (94%) eligible children age 6 months to age 14 from the interviewed households (**Table 4.5**). Results detailed in **Table 4.6** show that the overall national percentage of children age 6 months to age 14 classified as having low haemoglobin levels (less than 8.0 g/dl) is 2%. Appendix D includes severe anaemia (haemoglobin level <8.0 g/dl) results restricted to children age 6-59 months.

Trends: The percentage of low haemoglobin among children age 6 months to age 14 increased from 1% in 2015 to 2% in 2020.

Patterns by background characteristics

- By malaria endemicity, the prevalence of low haemoglobin levels in children age 6 months to age 14 ranges from less than 1% in the Low risk zone to 3% in the Lake endemic and Seasonal zones (**Figure 4.3** and **Table 4.6**).
- The prevalence of low haemoglobin levels is higher among children whose mothers have no education (8%) than among children whose mothers have more than a secondary education (1%) (**Table 4.6**).
- The percentage of children with low haemoglobin levels decreases with increasing household wealth, from 3% in the lowest wealth quintile to 1% in the fourth and highest quintiles (**Figure 4.4**).

Figure 4.3 **Prevalence of low haemoglobin in children by malaria endemicity**

Percentage of children age 6 months to age 14 with haemoglobin <8.0 g/dl

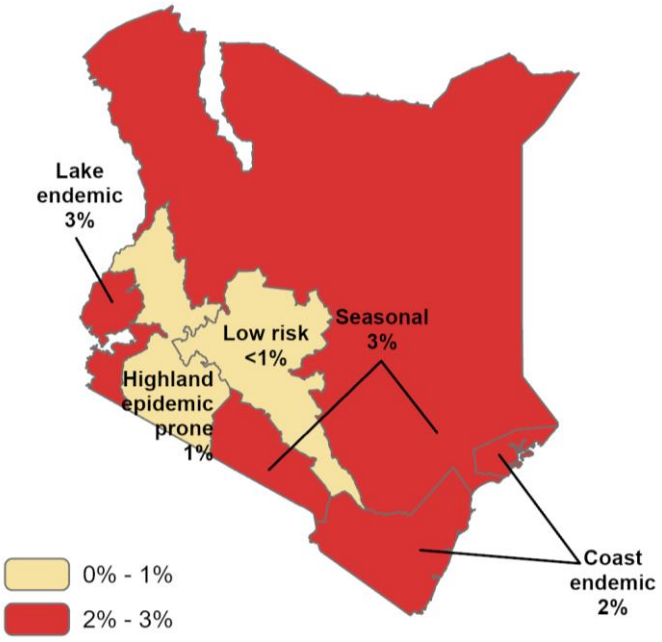
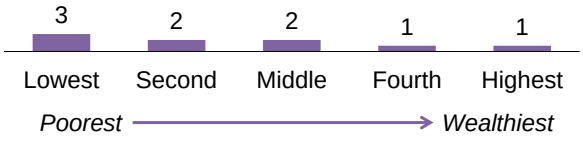


Figure 4.4 **Low haemoglobin in children by household wealth**

Percentage of children age 6 months to age 14 with haemoglobin lower than 8.0 g/dl



4.6 Prevalence of Malaria in Children

The 2020 KMIS was conducted in November and December 2020 at the peak of malaria season, which occurs during the short rainy season. Normally, a spike in malaria cases occurs during these months. Previous surveys that incorporated malaria testing included the 2015 KMIS. The 2015 KMIS was conducted from July through August 2015 corresponding to the spike in malaria cases that occurs during the long rains.

All children age 6 months to age 14 from the interviewed households were eligible for malaria testing. Among eligible children age 6 months to age 14 from interviewed households, 94% were tested for malaria with RDT and 94% were tested by microscopy (**Table 4.5**).

Rapid diagnostic tests were done in conjunction with microscopy to facilitate treatment of infected children during the survey. RDT and microscopy results are shown in **Table 4.8** for reference. The 2020

KMIS results showed that 7% of children age 6 months to age 14 tested positive for *Plasmodium falciparum* antigens according to RDTs, while 6% tested positive for malaria parasites according to microscopy (**Table 4.8**). The higher prevalence observed in the RDT results than the microscopy results is expected since RDTs detect the presence of circulating antigens up to several weeks after malaria parasites have been cleared from the body. In contrast, microscopy detects the actual parasite. Appendix D includes malaria prevalence results restricted to children age 6-59 months.

Trends: The percentage of children age 6 months to age 14 testing positive for malaria according to microscopy decreased from 8% in 2015 to 6% in 2020 (**Figure 4.5**).

Patterns by background characteristics

- Malaria prevalence according to microscopy generally increases with age, from 3% among children age 6-59 months to 8% among those age 10-14 (**Table 4.8**).
- The percentage of children with malaria according to microscopy is over two times as high in rural areas (7%) as in urban areas (3%) (**Table 4.8**).
- The prevalence of malaria according to microscopy generally decreases with increasing wealth, from 8% in the second wealth quintile to 2% in the highest quintile (**Figure 4.6**).
- By malaria endemicity, the percentage of children with malaria according to microscopy is highest in the Lake endemic zone (19%) and lowest in the Low risk zone (less than 1%) (**Figure 4.7**).

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

Percentage of children age 6 months to age 14 who tested positive for malaria by microscopy

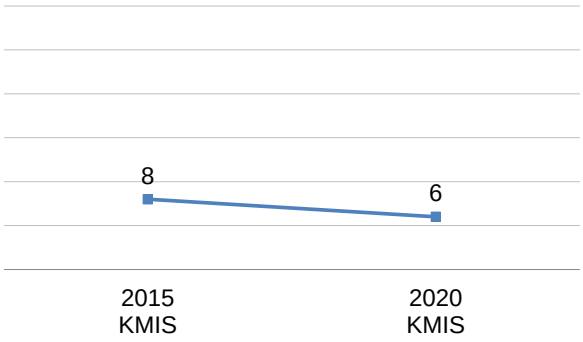


Figure 4.6 **Prevalence of malaria in children by household wealth**

Percentage of children age 6 months to age 14 who tested positive for malaria by microscopy

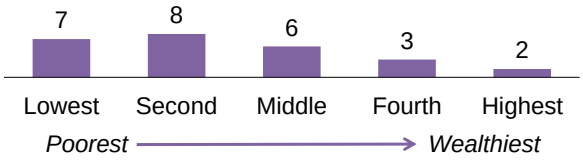
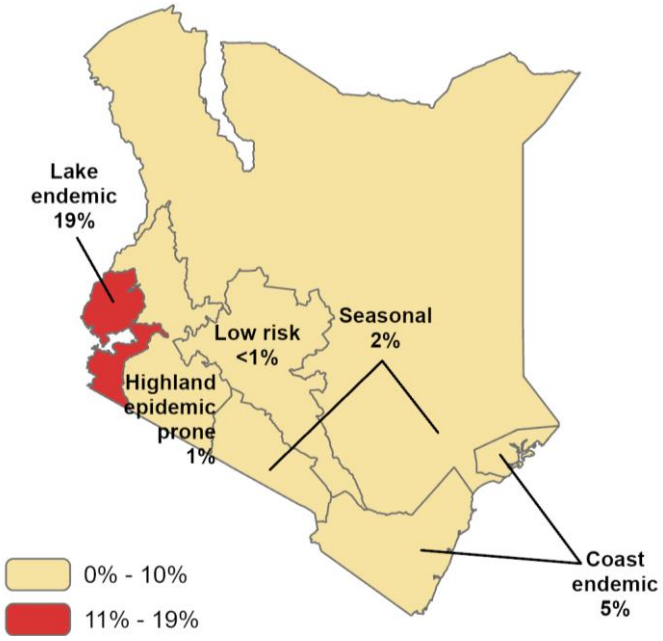


Figure 4.7 **Prevalence of malaria in children by malaria endemicity**

Percentage of children age 6 months to age 14 who tested positive for malaria by microscopy



4.7 MALARIA SPECIES

Several species of malaria parasites exist; *P. falciparum* malaria is the predominant species in Kenya, causing the majority of illnesses among patients. It also causes the most severe form of the disease among children and leads to poor pregnancy outcomes in pregnant women. There are other important species including *P. malariae*, *P. ovale*, and *P. vivax*. The delineation of malaria species is important as it guides a country's malaria diagnostic strategy.

The 2020 KMIS obtained results for malaria species in the population sampled. Among children who tested positive for malaria, 76% had a *P. falciparum* infection, 4% had a *P. malariae* infection, and 1% had a *P. ovale* infection (**Table 4.9**).

Trends: The prevalence of *P. falciparum* parasites among children with malaria decreased from 81% in 2015 to 76% in 2020. Conversely, mixed *P. falciparum* and *P. malariae* (*Pf+Pm*) infections increased from 10% to 19%.

4.8 MALARIA AND ANAEMIA IN CHILDREN

Table 4.10 shows malaria and anaemia test results among the 10,458 children age 6 months to age 14 for whom outcomes of both malaria (microscopy) and anaemia tests conducted in the 2020 KMIS were available. As expected, children with malaria were slightly more likely to have a positive anaemia test result (3%) than to have a negative result (2%). Among malaria-negative children, more children (65%) were not anaemic than anaemic (30%). Although malaria increases the chances of anaemia, a large percentage of children without malaria had anaemia, thus reflecting the diverse causes of anaemia in the country.

Trends: The percentage of malaria-positive children with anaemia decreased from 4% in 2015 to 3% in 2020.

4.9 CONCLUSIONS

- Care seeking among caregivers of children under age 5 with a fever has decreased since 2015.
- Nine in 10 children (91%) less than age 5 with a recent fever who took an antimalarial received ACT.
- The majority (82%) of children with a fever who took an antimalarial drug received artemether-lumefantrine, the recommended first-line ACT.
- The national prevalence of malaria according to microscopy decreased from 8% in 2015 to 6% in 2020. Malaria prevalence also declined in all of the malaria endemicity zones.
- The prevalence of mixed infections (*P. falciparum* and *P. malariae)* has increased over the last 5 years.

4.10 RECOMMENDATIONS

- Explore innovative strategies to strengthen social and behaviour change communication messaging regarding prompt care seeking for febrile children under age 5.
- Maintain and further strengthen the use of ACT (specifically AL) for malaria-positive children.
- Review the malaria diagnostic strategy in view of increasing mixed infections.

LIST OF TABLES

For more information on malaria in children, see the following tables:

- **Table 4.1 Prevalence, diagnosis, and prompt treatment of children with fever**
- **Table 4.2 Source of advice or treatment for children with fever**
- **Table 4.3 Source of advice or treatment for children with fever by background characteristics**
- **Table 4.4 Type of antimalarial drugs used**
- **Table 4.5 Coverage of testing for anaemia and malaria in children**
- **Table 4.6 Haemoglobin <8.0 g/dl in children**
- **Table 4.7 Prevalence of anaemia**
- **Table 4.8 Prevalence of malaria**
- **Table 4.9 Malaria species**
- **Table 4.10 Comparison of malaria and anaemia prevalence**

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

Percentage of children under age 5 with a fever in the 2 weeks preceding the survey, and among children under age 5 with a fever, percentage for whom advice or treatment was sought, percentage for whom advice or treatment was sought the same or next day following the onset of fever, percentage who had blood taken from a finger or heel for testing, percentage who were told that their test results were positive for malaria by a health care provider, percentage who took any ACT, and percentage who took any ACT the same or next day, according to background characteristics, Kenya MIS 2020

	Children under age 5		Children under age 5 with fever							Children under age 5 with fever who took any ACT:	
Background characteristic	Percentage with a fever in the 2 weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought[1]	Percentage for whom advice or treatment was sought the same or next day	Percentage who had blood taken from a finger or heel for testing	Percentage who were told that their test results were positive for malaria by a health care provider	Percentage who took any ACT	Percentage who took any ACT same or next day	Number of children	Percentage who took any ACT same or next day	Number of children
Age in months											
<12	22.0	619	55.9	36.2	24.9	11.5	9.4	7.5	137	*	13
12-23	19.0	770	59.3	35.2	38.3	18.4	11.0	9.8	146	(89.8)	16
24-35	16.6	686	70.4	34.6	43.0	38.4	30.6	26.2	114	(85.8)	35
36-47	13.9	591	67.9	37.0	31.5	30.5	26.8	21.3	82	(79.4)	22
48-59	12.7	657	70.2	35.5	41.6	21.0	20.9	18.0	84	(85.8)	17
Sex											
Male	16.5	1,627	61.3	35.1	38.5	26.2	21.7	18.6	268	86.0	58
Female	17.4	1,696	65.7	36.1	32.7	20.0	15.4	12.6	294	82.2	45
Residence											
Urban	16.7	1,159	60.3	36.7	28.9	13.2	9.9	7.1	193	(71.5)	19
Rural	17.1	2,165	65.3	35.1	39.0	28.0	22.8	19.9	369	87.2	84
Malaria endemicity											
Highland epidemic prone	16.4	564	74.0	32.2	42.7	31.2	21.7	19.2	93	*	20
Lake endemic	29.0	704	56.7	31.2	48.0	37.6	33.7	28.6	204	84.9	69
Coast endemic	23.0	274	64.0	32.3	40.1	15.8	6.7	5.7	63	*	4
Seasonal	15.3	534	68.8	41.4	31.8	15.8	12.2	8.9	82	*	10
Low risk	9.7	1,248	(63.6)	(43.6)	(9.0)	(0.4)	(0.2)	(0.1)	121	*	0
Mother's education											
No education	17.6	379	77.0	45.1	40.6	31.6	27.8	23.6	67	*	19
Primary	21.8	1,342	59.8	30.5	40.5	24.9	20.0	17.0	293	84.8	59
Secondary	12.5	1,151	68.6	45.5	28.5	17.2	15.1	12.4	144	(82.1)	22
More than secondary	13.0	451	55.0	26.1	21.7	17.5	7.6	6.6	59	*	4
Wealth quintile											
Lowest	20.5	719	69.8	40.2	37.9	25.0	23.7	19.2	148	(81.0)	35
Second	15.0	611	60.0	27.1	39.5	31.5	29.6	24.6	92	83.1	27
Middle	17.9	619	57.3	26.3	44.6	29.5	20.8	18.6	111	(89.3)	23
Fourth	16.7	736	63.2	37.3	29.9	15.4	8.3	6.6	123	*	10
Highest	13.9	637	65.4	46.2	23.6	12.8	8.6	8.2	88	*	8
Total	16.9	3,323	63.6	35.6	35.5	22.9	18.4	15.5	562	84.3	103

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
[1] Includes advice or treatment from the following sources: public sector, private medical sector, NGO medical sector, shop, market, and itinerant drug seller. Excludes advice or treatment from a traditional practitioner.

Table 4.2 Source of advice or treatment for children with fever

Among children under age 5 with a fever in the 2 weeks preceding the survey for whom advice or treatment was sought, percentage for whom advice or treatment was sought from specific sources, Kenya MIS 2020

Source	Among children with fever for whom advice or treatment was sought, percentage for whom advice or treatment was sought from each source
Public sector	**68.1**
Government hospital	24.6
Government health centre	17.3
Government health dispensary	27.7
Mobile clinic	0.2
Fieldworker/CHW	0.1
Private medical sector	**31.9**
Private hospital/clinic	13.9
Pharmacy	17.8
Private doctor	0.7
Mobile clinic	5.5
Other private medical sector	0.1
Other private sector	**1.6**
Shop	1.2
Traditional practitioner	0.4
Other	0.0
Number of children	359

Note: Advice or treatment for children with fever may have been sought from more than one source.
CHW = Community health worker

Table 4.3 Source of advice or treatment for children with fever by background characteristics

Among children under age 5 with a fever in the 2 weeks preceding the survey for whom advice or treatment was sought, percentage for whom advice or treatment was sought from specific sources, according to background characteristics, Kenya MIS 2020

Background characteristic	Source of advice or treatment for fever			Number of children with fever for whom advice or treatment was sought
	Public sector[1]	Private sector[2]	Other private sector[3]	
Age in months				
<12	68.5	35.8	0.0	32
12-23	79.1	20.5	0.4	66
24-35	72.7	27.1	1.7	77
36-47	56.8	42.0	1.9	73
48-59	65.6	34.2	2.4	110
Sex				
Male	70.3	29.8	1.2	156
Female	66.4	33.5	1.9	203
Residence				
Urban	54.5	46.6	0.8	116
Rural	74.6	24.8	2.0	243
Malaria endemicity				
Highland epidemic prone	74.5	25.4	0.0	68
Lake endemic	77.7	22.7	1.1	116
Coast endemic	59.7	39.7	3.9	40
Seasonal	67.6	32.0	4.9	58
Low risk	(52.8)	47.2	0.0	77
Mother's education				
No education	74.1	27.9	2.7	51
Primary	78.7	20.4	2.2	177
Secondary	52.5	47.7	0.3	99
More than secondary	(48.2)	52.6	0.0	32
Wealth quintile				
Lowest	83.9	15.1	3.1	105
Second	74.7	24.4	2.1	55
Middle	72.2	29.2	0.5	64
Fourth	70.2	30.2	1.1	78
Highest	25.8	74.6	0.0	58
Total	68.1	31.9	1.6	359

Note: Advice or treatment for children with fever may have been sought from more than one source. Figures in parentheses are based on 25-49 unweighted cases.
[1] Public sector includes government hospital, government health centre, government health dispensary, mobile clinic, and fieldworker/CHW.
[2] Private medical sector includes private hospital/clinic, pharmacy, private doctor, mobile clinic, and other private medical sector.
[3] Other private sector includes shop and traditional practitioner.

Table 4.4 Type of antimalarial drugs used

Among children under age 5 with a fever in the 2 weeks preceding the survey who took any antimalarial medication, percentage who took specific antimalarial drugs, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage of children who took:												Number of children with fever who took anti-malarial drug
	Any ACT	Specific ACT			SP/ Fansidar	Chloro-quine	Amodia-quine	Quinine pills	Quinine injection	Artesu-nate rectal	Artesu-nate injection	Other anti-malarial	
		AL	DHAP	Other									
Age in months													
<6	*	*	*	*	*	*	*	*	*	*	*	*	4
6-11	*	*	*	*	*	*	*	*	*	*	*	*	12
12-23	(86.3)	(80.0)	(0.0)	(6.3)	(2.8)	(1.4)	(0.0)	(0.0)	(4.7)	(1.2)	(9.8)	(0.0)	19
24-35	90.8	89.3	0.0	1.5	0.0	6.2	1.8	1.9	0.0	0.0	1.5	0.0	38
36-47	(96.3)	(85.2)	(1.9)	(11.0)	(0.0)	(9.2)	(0.0)	(0.0)	(0.0)	(0.4)	(0.6)	(2.8)	23
48-59	(98.5)	(69.3)	(0.0)	(29.2)	(0.0)	(1.5)	(1.4)	(0.0)	(3.7)	(0.0)	(2.3)	(0.0)	18
Sex													
Male	88.5	76.5	0.6	12.0	0.4	6.9	1.0	2.3	1.4	0.4	4.1	0.0	66
Female	94.5	90.3	0.0	4.2	0.6	1.1	1.4	1.0	3.2	0.0	2.3	2.2	48
Residence													
Urban	86.3	74.5	0.0	11.8	1.2	3.5	2.3	4.1	4.0	1.3	4.7	0.0	22
Rural	92.2	84.2	0.5	7.9	0.3	4.6	0.9	1.1	1.7	0.0	3.1	1.2	91
Malaria endemicity													
Highland epidemic prone	*	*	*	*	*	*	*	*	*	*	*	*	20
Lake endemic	94.8	89.7	0.0	5.1	0.0	1.4	0.9	2.5	2.1	0.0	2.1	0.0	72
Coast endemic	*	*	*	*	*	*	*	*	*	*	*	*	6
Seasonal	*	*	*	*	*	*	*	*	*	*	*	*	14
Low risk	*	*	*	*	*	*	*	*	*	*	*	*	0
Mother's education													
No education	(88.1)	(76.3)	(2.0)	(11.8)	(1.2)	(0.0)	(3.3)	(0.0)	(0.0)	(0.0)	(6.7)	(2.0)	21
Primary	93.3	87.2	0.0	6.1	0.0	3.4	0.0	0.8	2.5	0.1	1.4	1.0	63
Secondary	(91.8)	(89.3)	(0.0)	(2.6)	(0.0)	(0.0)	(0.0)	(5.5)	(3.7)	(0.9)	(5.9)	(0.0)	24
More than secondary	*	*	*	*	*	*	*	*	*	*	*	*	6
Wealth quintile													
Lowest	87.8	81.0	1.1	6.8	0.0	3.5	1.1	3.0	0.0	0.0	3.5	1.1	40
Second	97.9	90.8	0.0	7.1	0.0	0.0	0.9	2.1	2.4	0.0	0.0	0.0	28
Middle	(93.4)	(81.4)	(0.0)	(12.1)	(1.0)	(11.5)	(1.7)	(0.0)	(3.5)	(0.9)	(2.3)	(0.0)	25
Fourth	(82.4)	(82.4)	(0.0)	(0.0)	(0.0)	(2.0)	(2.0)	(0.0)	(7.2)	(0.0)	(13.7)	(5.1)	12
Highest	*	*	*	*	*	*	*	*	*	*	*	*	9
Total	91.0	82.3	0.4	8.7	0.5	4.4	1.2	1.7	2.1	0.3	3.4	0.9	113

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
AL= Artemether-lumefantrine
DHAP = Dihydroartemisinin-piperaquine
SP = Sulfadoxine pyrimethamine

Table 4.5 Coverage of testing for anaemia and malaria in children

Percentage of eligible children age 6 months to age 14 who were tested for anaemia and for malaria, according to background characteristics (unweighted), Kenya MIS 2020

Background characteristic	Percentage tested for: Anaemia	Malaria with RDT	Malaria by microscopy	Number of children
Age				
6-59 months	96.1	96.1	95.8	3,888
6-8 months	92.9	92.9	92.9	198
9-11 months	95.7	95.7	95.7	209
12-17 months	97.9	97.9	97.4	431
18-23 months	96.6	96.6	95.8	409
24-35 months	96.1	96.1	95.9	850
36-47 months	96.2	96.2	96.1	862
48-59 months	95.7	95.7	95.4	929
5-9 years	94.9	94.9	94.5	4,242
10-14 years	91.4	91.4	91.1	4,123
Sex				
Male	94.0	94.0	93.5	6,061
Female	94.2	94.2	94.0	6,192
Mother's interview status				
Interviewed	96.5	96.5	96.2	3,608
Not interviewed and not in the household[1]	93.1	93.1	92.8	8,645
Residence				
Urban	93.0	93.0	92.5	4,201
Rural	94.6	94.6	94.4	8,052
Malaria endemicity				
Highland epidemic prone	94.3	94.3	93.6	2,254
Lake endemic	95.2	95.2	95.1	4,912
Coast endemic	93.2	93.2	93.2	1,296
Seasonal	92.4	92.4	91.8	2,400
Low risk	93.6	93.6	93.5	1,391
Mother's education[2]				
No education	94.3	94.3	93.6	582
Primary	98.2	98.2	97.9	1,644
Secondary	96.3	96.3	96.3	999
More than secondary	93.0	93.0	92.7	383
Wealth quintile				
Lowest	93.0	93.0	92.6	3,467
Second	95.0	95.0	94.9	2,804
Middle	96.1	96.1	95.8	2,467
Fourth	95.2	95.2	94.8	2,206
Highest	89.3	89.3	88.8	1,309
Total	94.1	94.1	93.8	12,253

RDT = Rapid diagnostic test (Carestart P.f.)
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table 4.6 Haemoglobin <8.0 g/dl in children

Percentage of children age 6 months to age 14 with haemoglobin lower than 8.0 g/dl, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage of children with haemoglobin <8.0 g/dl	Number of children
Age		
6-59 months	3.5	3,401
6-8 months	4.3	155
9-11 months	7.8	165
12-17 months	4.5	410
18-23 months	3.6	398
24-35 months	4.3	730
36-47 months	3.2	726
48-59 months	1.6	818
5-9 years	1.1	3,612
10-14 years	0.5	3,464
Sex		
Male	1.9	5,292
Female	1.5	5,185
Mother's interview status		
Interviewed	3.5	3,226
Not interviewed and not in the household[1]	0.9	7,251
Residence		
Urban	1.2	2,927
Rural	1.9	7,550
Malaria endemicity		
Highland epidemic prone	1.3	2,309
Lake endemic	3.1	2,627
Coast endemic	1.6	798
Seasonal	3.1	1,491
Low risk	0.3	3,252
Mother's education[2]		
No education	7.5	376
Primary	3.9	1,357
Secondary	2.5	1,084
More than secondary	1.4	409
Wealth quintile		
Lowest	3.1	2,470
Second	1.8	2,304
Middle	1.6	2,137
Fourth	0.9	1,978
Highest	0.5	1,588
Total	1.7	10,477

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia is based on haemoglobin levels and is adjusted for altitude using CDC formulas (CDC 1998). Haemoglobin is measured in grams per decilitre (g/dl).

[1] Includes children whose mothers are deceased

[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table 4.7 Prevalence of anaemia

Percent distribution of de facto children age 6 months to age 14 with anaemia, by background characteristics, Kenya MIS 2020

Background characteristic	Severe anaemia	Moderate anaemia	Mild anaemia	No anaemia	Total	Number of children
Age						
6-59 months	3.5	17.7	24.3	54.5	100.0	3,401
6-8 months	4.3	29.6	35.5	30.6	100.0	155
9-11 months	7.8	25.7	31.5	35.0	100.0	165
12-17 months	4.5	24.5	39.6	31.5	100.0	410
18-23 months	3.6	32.1	26.4	37.9	100.0	398
24-35 months	4.3	19.2	21.6	54.9	100.0	730
36-47 months	3.2	11.1	23.6	62.2	100.0	726
48-59 months	1.6	8.0	15.1	75.3	100.0	818
5-9 years	1.1	5.1	23.6	70.2	100.0	3,612
10-14 years	0.5	2.7	21.0	75.7	100.0	3,464
Sex						
Male	1.9	8.5	21.3	68.4	100.0	5,292
Female	1.5	8.3	24.7	65.4	100.0	5,185
Mother's interview status						
Interviewed	3.5	16.6	26.0	53.9	100.0	3,226
Not interviewed and not in the household[1]	0.9	4.8	21.6	72.7	100.0	7,251
Residence						
Urban	1.2	6.6	19.9	72.3	100.0	2,927
Rural	1.9	9.1	24.2	64.8	100.0	7,550
Malaria endemicity						
Highland epidemic prone	1.3	4.6	21.7	72.4	100.0	2,309
Lake endemic	3.1	13.4	26.0	57.6	100.0	2,627
Coast endemic	1.6	12.9	34.0	51.4	100.0	798
Seasonal	3.1	10.9	22.9	63.1	100.0	1,491
Low risk	0.3	4.8	18.8	76.1	100.0	3,252
Mother's education[2]						
No education	7.5	25.7	24.5	42.3	100.0	376
Primary	3.9	19.6	27.0	49.5	100.0	1,357
Secondary	2.5	11.6	24.3	61.7	100.0	1,084
More than secondary	1.4	11.4	28.3	58.9	100.0	409
Wealth quintile						
Lowest	3.1	11.6	27.2	58.1	100.0	2,470
Second	1.8	9.6	23.3	65.3	100.0	2,304
Middle	1.6	7.6	24.7	66.1	100.0	2,137
Fourth	0.9	7.7	20.9	70.5	100.0	1,978
Highest	0.5	3.7	16.3	79.6	100.0	1,588
Total	1.7	8.4	23.0	66.9	100.0	10,477

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia is based on haemoglobin levels and is adjusted for altitude using CDC formulas (CDC 1998). Haemoglobin is measured in grams per decilitre (g/dl). Severe anaemia is considered to be a haemoglobin level <8.0 g/dl and moderate anaemia is 8.0-9.9 g/dl. Other anaemia classifications vary by age group as follows: children 6-59 months - mild anaemia 10.0-10.9 g/dl, no anaemia >11.0 g/dl; children 5-11 years - mild anaemia 10.0-11.4 g/dl, no anaemia >11.5 g/dl; children 12-14 years - mild anaemia 10.0-11.9 g/dl, no anaemia >12.0 g/dl (Kraemer and Zimmerman 2007).

[1] Includes children whose mothers are deceased

[2] Excludes children whose mothers were not interviewed

Table 4.8 Prevalence of malaria

Percentage of children age 6 months to age 14 classified in two tests as having malaria, according to background characteristics, Kenya MIS 2020

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
Age				
6-59 months	4.4	3,401	3.0	3,395
6-8 months	2.2	155	0.5	155
9-11 months	2.7	165	2.2	165
12-17 months	2.6	410	1.6	410
18-23 months	3.9	398	2.2	396
24-35 months	3.9	730	2.7	729
36-47 months	5.1	726	4.0	725
48-59 months	6.3	818	4.1	816
5-9 years	7.5	3,612	6.2	3,606
10-14 years	8.3	3,464	7.6	3,457
Sex				
Male	6.7	5,292	5.6	5,278
Female	6.8	5,185	5.6	5,180
Mother's interview status				
Interviewed	4.0	3,226	2.7	3,222
Not interviewed and not in the household[1]	8.0	7,251	6.9	7,236
Residence				
Urban	2.9	2,927	2.5	2,918
Rural	8.3	7,550	6.8	7,540
Malaria endemicity				
Highland epidemic prone	0.9	2,309	0.7	2,307
Lake endemic	22.8	2,627	18.9	2,625
Coast endemic	4.9	798	4.5	798
Seasonal	2.3	1,491	1.8	1,481
Low risk	0.4	3,252	0.4	3,247
Mother's education[2]				
No education	2.8	376	1.3	373
Primary	6.0	1,357	4.5	1,357
Secondary	3.0	1,084	1.5	1,084
More than secondary	1.2	409	0.9	409
Wealth quintile				
Lowest	9.1	2,470	7.3	2,468
Second	9.7	2,304	8.3	2,302
Middle	7.3	2,137	5.9	2,132
Fourth	3.9	1,978	3.4	1,977
Highest	1.7	1,588	1.6	1,579
Total	6.8	10,477	5.6	10,458

RDT = Rapid diagnostic test (Carestart P.f.)
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table 4.9 Malaria species

Among children age 6 months to age 14 with malaria parasites, percentage infected with specific species of *Plasmodium* and combination of species identified by microscopy, according to background characteristics, Kenya MIS 2020

Background characteristic	Positive for *Pf*	Positive for *Pm*	Positive for *Po*	Positive for *Pf+Po*	Positive for *Pf+Pm*	Number of children with malaria
Age						
6-59 months	72.1	5.4	2.0	0.9	19.6	101
6-8 months	*	*	*	*	*	1
9-11 months	*	*	*	*	*	4
12-17 months	*	*	*	*	*	6
18-23 months	*	*	*	*	*	9
24-35 months	(74.6)	(0.0)	(2.8)	(2.8)	(19.7)	19
36-47 months	(76.3)	(6.1)	(5.1)	(0.0)	(12.5)	29
48-59 months	68.6	2.9	0.0	1.1	27.5	33
5-9 years	75.2	3.7	0.8	0.4	19.9	225
10-14 years	77.9	3.1	0.2	0.0	18.7	262
Sex						
Male	75.8	3.9	0.7	0.2	19.4	295
Female	75.9	3.6	0.8	0.4	19.3	293
Mother's interview status						
Interviewed	71.2	7.0	1.4	1.0	19.3	86
Not interviewed and not in the household[1]	76.7	3.2	0.6	0.2	19.3	502
Residence						
Urban	61.1	5.2	1.4	0.0	32.2	74
Rural	78.0	3.5	0.7	0.4	17.5	514
Malaria endemicity						
Highland epidemic prone	(77.8)	(0.0)	(0.0)	(0.0)	(22.2)	15
Lake endemic	76.3	3.6	0.9	0.4	18.8	496
Coast endemic	84.8	7.7	0.0	0.0	7.5	36
Seasonal	(95.1)	(4.9)	(0.0)	(0.0)	(0.0)	27
Low risk	*	*	*	*	*	14
Mother's education[2]						
No education	*	*	*	*	*	5
Primary	70.0	6.7	1.1	0.9	21.2	61
Secondary	(65.4)	(10.0)	(3.3)	(2.1)	(19.2)	17
More than secondary	*	*	*	*	*	4
Wealth quintile						
Lowest	80.4	3.8	0.3	0.0	15.5	180
Second	74.9	2.6	0.0	0.6	21.9	191
Middle	76.6	5.9	1.7	0.0	15.8	125
Fourth	80.3	3.9	1.6	0.5	13.7	67
Highest	*	*	*	*	*	25
Total	75.9	3.7	0.7	0.3	19.3	588

Note: No cases of *Plasmodium vivax* were found. 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.
Pf = Plasmodium falciparum
Pm = Plasmodium malariae
Po = Plasmodium ovale
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table 4.10 Comparison of malaria and anaemia prevalence

Percent distribution of children age 6 months to age 14 who had a result from both malaria (microscopy) and anaemia tests by the outcome of the tests, Kenya MIS 2020

Outcome of anaemia and malaria tests	Percent	Number
Malaria positive	**5.6**	**588**
Anaemic	3.2	337
Not anaemic	2.4	251
Malaria negative	**94.4**	**9,870**
Anaemic	29.9	3,122
Not anaemic	64.5	6,748
Total	100.0	10,458

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia is based on haemoglobin levels and is adjusted for altitude using CDC formulas (CDC 1998). Haemoglobin is measured in grams per decilitre (g/dl). Severe anaemia is considered to be a haemoglobin level <8.0 g/dl and moderate anaemia is 8.0-9.9 g/dl. Other anaemia classifications vary by age group as follows: children 6-59 months - mild anaemia 10.0-10.9 g/dl, no anaemia >11.0 g/dl; children 5-11 years - mild anaemia 10.0-11.4 g/dl, no anaemia >11.5 g/dl; children 12-14 years - mild anaemia 10.0-11.9 g/dl, no anaemia >12.0 g/dl (Kraemer and Zimmerman 2007). Undetermined slide microscopy results were excluded.

MALARIA BELIEFS AND EXPOSURE TO MALARIA MESSAGES

5

Key Findings

Exposure to malaria messages:

- Approximately 1 out of 3 women (34%) reported having seen or heard a malaria message in the past 6 months.
- Among women who have seen or heard a malaria message, radio (55%), television (40%), and health care providers (6%) are the most common sources of information.
- 49% of women who have been exposed to malaria messages have heard the message "Sleep under an insecticide-treated mosquito net."

Knowledge of ways to avoid malaria:

- 85% of women stated that there are ways to avoid getting malaria. Among women who said there are ways to avoid malaria, 94% cited sleeping under a mosquito net or insecticide-treated net (ITN).

Net hanging:

- Most women (86%) stated that they were confident in their ability to hang a mosquito net in their household.

Community norms:

- 62% of women believe that the majority of people in their community currently practise specific malaria-related behaviours.

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 treatment and prevention of malaria as well as malaria susceptibility, severity, and self-efficacy.

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

Social behaviour change (SBC) is the cornerstone of uptake of malaria control interventions. The Kenya Malaria Strategy (KMS) 2019-2023 envisions increases in utilisation of interventions through strengthened programme communication. The strategy prioritises strengthening of health care provider behaviour change communication for attainment of national targets through incorporation of provider-based SBC modules in malaria intervention policy guidelines and engagement of specific stakeholders. The KMS

2019-2023 also prioritises the strengthening of community-based SBC activities for all malaria interventions. The community strategy mechanism allows households and communities to strengthen their role in their own health by increasing their knowledge, skills, and participation. Exposure to information is the critical first step in increasing knowledge of practises and services that may influence an individual to adopt or change a behaviour. The target population's ability to recall messages about malaria is an indicator of the success of communication activities.

To assess coverage of malaria communication programmes, women age 15-49 were asked if they had seen or heard any messages about malaria prevention in the 6 months preceding the survey. Women who had heard or seen messages were further asked about the source of the messages.

Regardless of the source, 34% of women had heard or seen a malaria message in the 6 months preceding the survey. This is below the national target of 80% as outlined in the Kenya Malaria Strategy 2019-2023. Among those who had seen or heard a malaria message, radio was the most commonly cited source of information, with over one half of women (55%) reporting that they had heard a malaria message on the radio. Another commonly cited source for malaria messages was television (40%). Other sources included health care providers (6%) and community health workers (CHWs) (5%) and social media (5%) (**Table 5.1**). Despite high mobile phone (77%) and smart phone (37%) ownership among women age 15-49 (see Chapter 2, **Table 2.15**), only a small percentage of women cited social media (5%) as a source of malaria messages. This represents a missed opportunity to reach the larger population with malaria messages, especially with respect to use of SMS (short message service) to target women in rural areas.

Women who had seen or heard a malaria message in the past 6 months were asked whether they had seen or heard a specific message. Forty-nine percent of women reported seeing or hearing the message "Sleep under an insecticide-treated mosquito net." Other commonly cited messages included "If you have symptoms of malaria, go to a health facility" (34%) and "Malaria kills" (26%) (**Table 5.2**). In contrast, only 4% of women had seen or heard the message "Treat malaria with ACT," and only 2% had seen or heard the message "SP protects pregnant women and unborn babies from getting malaria." The stark difference between messages regarding exposure to insecticide-treated nets (ITNs) and messages regarding the importance of pregnant women taking sulfadoxine pyrimethamine (SP) could be attributed to the reach of these messages. Messages regarding SP usage are limited to the Lake and Coast endemic zones, while ITN use is promoted in all high burden malaria areas. It is worth noting that the mass media messages delivered in the 6 months before the survey focused on care seeking and promotion of ITN use.

It is important to note that questions regarding women's exposure to malaria messaging were limited to 6 months prior to the survey. This timeframe overlaps with the onset of the COVID-19 pandemic. The COVID-19 situation brought about fear and stigma. For example, fear of being infected at a health facility and the stigma of being tested for COVID-19 infection affected facility attendance. Due to such fears, women may have had less exposure to communication messages from health care workers. COVID-19-related restrictions might have also reduced visits to households by CHWs. During this time, there was a greater focus on COVID-19 messaging and less focus on malaria messaging.

Patterns by background characteristics

- Forty-two percent of women with more than a secondary education have been exposed to malaria messages from any source, as compared with 12% of women with no education (**Figure 5.1**).
- The percentage of women who have seen or heard a malaria message in the past 6 months ranges from 23% in the Seasonal zone to 53% in the Lake endemic zone (**Figure 5.2**).
- Among women who have seen or heard a malaria message in the past 6 months, 54% of those in rural areas and 40% of those in urban areas have heard the message "Sleep under an insecticide-treated mosquito net" (**Table 5.2**).
- Three percent of women in the Lake endemic zone have seen or heard the message "SP protects pregnant women and unborn babies from getting malaria," compared with 6% of women in the Coast endemic zone (**Table 5.2**).

Figure 5.1 Reach of behaviour change communication messages by education

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

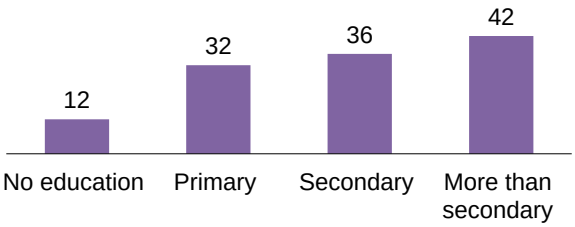
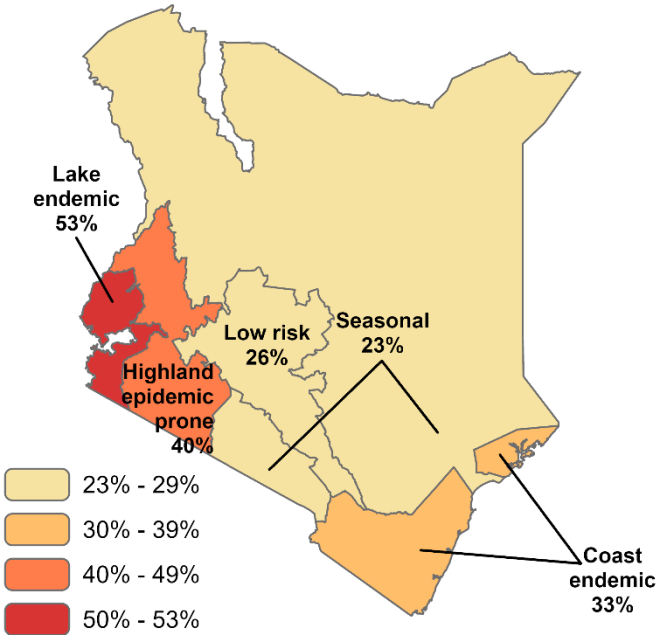


Figure 5.2 Reach of behaviour change communication messages by malaria endemicity

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



5.2 Knowledge of Ways to Avoid Malaria and of Recommended Treatment

Better knowledge of ways to avoid and prevent malaria, such as increasing use of ITNs, is a foundational step toward changing behaviour. Women age 15-49 were asked if there are ways to avoid getting malaria. Women who said that there are ways to avoid getting malaria were further asked to report specific ways to avoid malaria. Eighty-five percent of women stated that there are ways to avoid getting malaria. Among those who said there are ways to avoid getting malaria, 94% cited sleeping under a mosquito net or ITN. Other commonly cited measures included keeping one's surroundings clean (26%) and filling in stagnant waters (puddles) (21%). Only 1% of women reported that pregnant women taking SP/Fansidar is a preventive measure (**Table 5.3**).

Women who said there are ways to avoid malaria were asked whether they knew the recommended treatment for malaria. Twenty-nine percent cited artemisinin-based combination therapy (ACT)/artemether-lumefantrine (AL) as the recommended treatment, 7% cited SP/Fansidar, and 7% cited other medicines. However, the majority of women stated that they do not know the recommended treatment for malaria (58%) (**Table 5.4**).

Women's knowledge with respect to how to avoid malaria is primarily in the area of ITN use as opposed to other malaria prevention interventions such as indoor residual spraying (IRS) and intermittent preventive treatment during pregnancy (IPTp). This could be due to past efforts promoting net use during mass net distribution campaigns and routine net distribution in health facilities.

Patterns by background characteristics

- A higher percentage of women in urban areas (90%) than rural areas (82%) state that there are ways to avoid getting malaria.
- Ninety-six percent of women with more than a secondary education state that there are ways to avoid getting malaria, as compared with 59% of women with no education.
- The percentage of women who cite ACT/AL as a recommended treatment ranges from 8% in the Low risk zone to 74% in the Lake endemic region.
- The percentage of women who cited pregnant women taking SP/Fansidar as a way to avoid getting malaria was highest in the Lake endemic zone (3%).

5.3 Net Hanging and Repurposing

People are more likely to practise a desired behaviour (e.g., sleeping under an ITN) when they feel that they are both at risk and able to take action. Being confident in one's ability to hang an ITN is a first step in taking action to use the net. The majority of women (86%) stated that they were confident in their ability to hang a mosquito net in their household. This high confidence level in net hanging can be attributed to the various campaigns (e.g., mass net distribution campaigns) promoting net hanging and use of nets as a method of malaria prevention.

Nine percent of women stated that a net in their household has been used for any reason other than sleeping. Among women who stated that their household has a net used for a reason other than sleeping, the majority of nets were being used for covering/protecting the garden or chickens (82%) (**Table 5.4**).

Trends: The percentage of women age 15-49 who are confident in their ability to hang a net (86%) is similar to the percentages found in past surveys (85% of household respondents in 2010 and 91% in 2015). It is important to note that the population asked this question in 2010 and 2015 (household respondents) was different than the population asked the question in 2020 (women age 15-49).

5.4 Perceived Susceptibility, Severity, and Self-efficacy

Risk involves the following components: the likelihood of a specific event occurring (perceived susceptibility) multiplied by the magnitude of consequences associated with that event (perceived severity) (Douglas 1986). Self-efficacy refers to people's confidence in their ability to perform a specific behaviour.

During the survey, a series of statements were read to capture respondents' perceptions of malaria susceptibility, their beliefs regarding the severity of the consequences of malaria, and their perceived self-efficacy to perform specific malaria-related behaviours. Seventy-six percent of women perceive that their families and communities are at risk for malaria. Similarly, 77% of women believe that the consequences of malaria are serious. Thirty-six percent of women disagree that getting malaria is not a problem because it can be easily treated, and 70% disagree that only weak children can die from malaria (**Table 5.5**).

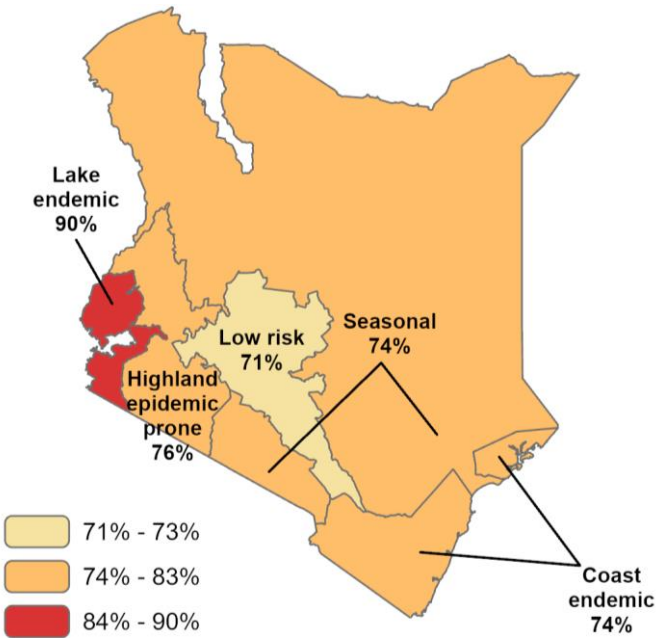
Eighty-seven percent of women say that they are confident in their ability to perform specific malaria-related behaviours. This includes women who agree that they can sleep under a mosquito net for the entire night when there are lots of mosquitoes or agree that they can sleep under a mosquito net for the entire night when there are few mosquitoes (**Table 5.5**).

Patterns by background characteristics

- The percentage of women who perceive that their families and communities are at risk from malaria ranges from 71% in the Low risk zone to 90% in the Lake endemic zone (**Figure 5.3**).
- A higher percentage of women in urban areas (81%) than rural areas (75%) feel that the consequences of malaria are serious.
- The percentage of women who feel that the consequences of malaria are serious ranges from 68% in the Coast endemic zone to 82% in the Low risk zone.
- The percentage of women who feel that the consequences of malaria are serious generally increases with increasing household wealth, from 69% in the lowest wealth quintile to 82% in the highest wealth quintile.

Figure 5.3 Malaria susceptibility by malaria endemicity

Percentage of women age 15-49 who perceive that their families and communities are at risk from malaria



- Eighty-six percent of women with more than a secondary education feel that the consequences of malaria are serious, as compared with 67% of women with no education.
- The percentage of women who are confident in their ability to perform specific malaria-related behaviours ranges from 81% in the Seasonal zone to 93% in the Highland epidemic prone zone (**Table 5.5**).

5.5 Attitudes toward Malaria-related Behaviours and Malaria Norms

People who view a behaviour favourably or positively are more likely to adopt the behaviour. Those with favourable attitudes toward a behaviour anticipate beneficial outcomes (e.g., prompt care seeking ensures peace of mind) or feel that the behaviour has positive attributes (e.g., sleeping under a net feels safe).

Women were asked whether they do not like sleeping under a mosquito net when the weather is too warm and whether it is best to start giving a child with a fever any medicine they have at home. If they disagreed with either statement, they were considered to have a favourable attitude towards specific malaria-related behaviours. Overall, 82% of women had a favourable attitude towards specific malaria behaviours (**Table 5.6**).

Beliefs about what others do and what others think we should do often guide our actions. These types of beliefs are called norms. Malaria programs can influence behaviours if they portray certain behaviours as socially unacceptable or socially desirable. Sixty-two percent of women believe that the majority of people in their community currently practise specific malaria-related behaviours (**Table 5.6**). This includes women who agree that people in their community usually take their children to a health care provider on the same day or the day after they develop a fever or agree that people in the community who have a mosquito net usually sleep under a mosquito net every night.

Patterns by background characteristics

- The percentage of women with a favourable attitude toward specific malaria-related behaviours ranges from 71% among those with no education to 89% among those with more than a secondary education.
- The percentage of women with a favourable attitude toward specific malaria-related behaviours increases with increasing household wealth, from 75% in the lowest wealth quintile to 87% in the highest wealth quintile.
- The percentage of women who believe that the majority of people in their community currently practise specific malaria-related behaviours ranges from 52% among those in the Low risk zone to 79% among those in the Highland epidemic prone zone (**Table 5.6**).

5.6 CONCLUSIONS

- Thirty-four percent of women had heard or seen a malaria message in the 6 months preceding the survey. This is below the national target of 80% as outlined in the Kenya Malaria Strategy 2019-2023.
- Radio (55%) was the most commonly cited source of malaria messages. Other sources included health care providers (6%) and community health workers (5%).
- Knowledge regarding how to avoid malaria was high (85%); however, most women cited sleeping under a mosquito net or ITN as opposed to other malaria prevention interventions such as IRS and IPTp.
- Knowledge of IPTp as a preventive strategy was low in the targeted IPTp intervention areas, with 3% of women in the Lake endemic zone and 2% of women in the Coast endemic zone citing pregnant women taking SP/Fansidar as a preventive measure.
- The majority of women (71%) did not know that ACT/AL is the recommended treatment for malaria.
- Close to 9 in 10 women (86%) stated that they were confident in their ability to hang a mosquito net in their household.

5.7 RECOMMENDATIONS

- Scale up regular exposure to simplified malaria messages that are translated in local dialects through various communication channels, with an emphasis on the recommended treatment for malaria (ACT) and use of SP for malaria prevention among pregnant women in the targeted counties.
- Create a comprehensive media plan with targeted messages for specific audiences and age groups including vulnerable populations.
- Conduct regular omnibus surveys to assess the reach and impact of SBC messages to guide the design and dissemination of future messaging.
- Strategise on how to improve interpersonal communication among health care workers and CHWs to reach vulnerable populations, with efforts made to reach those who are unable to access mass media.

- Scale up the use of SMS, digital platforms, and other media outlets as channels for sharing key messages.

- Promote the benefits of engaging in the recommended malaria prevention and treatment practises.

LIST OF TABLES

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

- **Table 5.1 Media exposure to malaria messages**
- **Table 5.2 Content of malaria messages**
- **Table 5.3 Knowledge of ways to avoid malaria**
- **Table 5.4 Malaria treatment knowledge, net hanging, and net use for other purposes**
- **Table 5.5 Malaria susceptibility, severity, and self-efficacy**
- **Table 5.6 Attitudes toward malaria-related behaviours and malaria norms**

Table 5.1 Media exposure to malaria messages

Percentage of women age 15-49 who have seen or heard a malaria message in the past 6 months, and among those who have seen or heard a malaria message in the past 6 months, percentage who cite specific sources for malaria messages, according to background characteristics, Kenya MIS 2020

Background characteristic	Percentage who have seen or heard a malaria message in the past 6 months	Number of women	Source of exposure to malaria messages in the past 6 months: Radio	Television	Poster/ billboard	News-paper/ magazine	Leaflet/ brochure	Health care provider	Community health worker	Social media	Relative/ friend	Community dialogue/ baraza	Community leader/ elder	Community event/ roadshow	School pupils	Other	Don't remember	Number of women who have seen or heard a message
Age																		
15-19	30.0	1,308	52.9	36.0	2.3	1.2	2.4	6.3	2.2	3.5	5.4	2.8	3.0	1.5	12.8	1.8	0.2	393
20-24	30.2	1,243	56.8	35.7	5.5	1.7	0.5	5.9	5.1	7.9	4.0	1.4	4.0	1.7	1.3	0.3	0.2	376
25-29	36.2	1,057	52.0	43.5	6.8	1.9	0.5	8.3	7.6	6.6	4.1	1.9	3.8	4.1	0.7	0.3	2.5	383
30-34	33.4	1,166	56.4	36.8	2.3	1.0	0.4	4.2	5.9	8.1	6.9	2.3	3.5	0.9	0.7	0.4	0.2	389
35-39	42.2	812	49.5	56.3	2.4	0.9	0.3	4.4	3.4	1.8	2.1	2.7	3.7	0.9	0.1	0.1	0.1	342
40-44	33.9	703	62.1	36.3	3.8	0.1	1.1	8.3	2.4	1.0	3.7	2.3	4.7	1.4	0.3	1.6	0.0	238
45-49	39.4	483	65.2	25.8	12.0	1.0	0.7	5.0	12.7	0.6	4.1	4.5	5.1	1.4	1.1	0.0	1.2	190
Residence																		
Urban	34.5	2,641	43.6	52.1	6.5	1.0	0.6	5.2	3.3	8.1	3.6	1.3	2.8	1.0	2.0	0.8	0.9	912
Rural	33.9	4,130	63.2	31.4	3.2	1.3	1.0	6.5	6.6	2.6	5.0	3.1	4.5	2.2	3.3	0.6	0.4	1,399
Malaria endemicity																		
Highland epidemic prone	40.2	1,343	69.5	29.8	3.1	3.2	0.1	2.9	4.4	5.2	5.5	1.7	1.9	2.2	1.1	0.0	0.7	540
Lake endemic	52.5	1,312	68.9	35.2	4.9	1.0	2.0	10.0	6.6	2.6	5.0	4.7	8.9	3.6	2.0	0.7	0.3	689
Coast endemic	32.5	538	41.9	40.9	4.8	0.7	1.3	10.7	13.0	3.3	4.2	1.5	1.0	1.6	3.2	0.3	1.3	175
Seasonal	23.2	853	53.1	37.3	1.3	0.6	0.8	12.1	10.8	1.6	4.2	5.0	6.6	0.3	4.8	0.4	0.0	198
Low risk	26.1	2,724	35.7	51.4	6.2	0.1	0.3	1.7	1.2	7.8	3.3	0.3	0.3	0.1	4.2	1.2	0.9	710
Education																		
No education	12.4	403	56.5	15.4	2.8	0.0	0.0	7.4	13.0	0.0	8.6	11.7	4.4	0.8	2.0	1.8	1.7	50
Primary	31.9	2,478	62.1	27.1	2.6	0.1	0.6	9.3	7.1	1.1	4.5	2.4	5.7	1.8	1.9	1.5	1.5	791
Secondary	36.0	2,772	53.7	43.6	4.8	1.3	1.1	4.1	3.8	5.1	3.8	2.4	2.7	2.2	4.0	0.1	0.1	997
More than secondary	42.4	1,118	47.8	54.3	7.4	2.8	0.9	4.3	4.3	10.6	5.2	1.6	3.1	0.8	1.6	0.2	0.2	474
Wealth quintile																		
Lowest	19.7	1,104	60.1	5.2	4.5	1.1	1.3	11.3	12.5	1.0	6.5	3.7	4.6	2.0	5.1	0.4	0.6	218
Second	33.0	1,245	70.9	11.9	2.1	0.4	1.3	8.0	5.8	1.4	5.3	2.0	3.8	4.0	3.9	1.0	0.7	411
Middle	37.9	1,279	69.2	25.6	2.7	1.1	0.8	6.6	6.5	2.9	4.7	3.4	2.5	1.6	4.6	0.7	0.5	485
Fourth	43.6	1,430	51.4	53.9	6.1	1.4	0.3	4.3	4.2	6.2	3.2	3.3	5.0	1.6	1.1	0.1	0.2	623
Highest	33.6	1,714	35.4	68.4	6.1	1.6	1.0	3.9	2.3	8.6	4.2	0.4	3.4	0.2	1.4	1.1	1.2	575
Total	34.1	6,771	55.4	39.5	4.5	1.2	0.8	6.0	5.3	4.8	4.4	2.4	3.8	1.7	2.8	0.7	0.6	2,312

Note: More than one source may have been cited.

Table 5.2 Content of malaria messages

Among women age 15-49 who have seen or heard a malaria message in the past 6 months, percentage who saw or heard specific messages, according to background characteristics, Kenya MIS 2020

Background characteristic	Content of malaria messages seen or heard in the past 6 months: If you have symptoms of malaria, go to a health facility	Sleep under an insecticide-treated mosquito net	Pregnant women should take medicine to prevent malaria	SP protects pregnant women and unborn babies from getting malaria	Always test before treating malaria	Treat malaria with ACT	Malaria kills	Other	Don't remember	Number of women who have seen or heard a message
Age										
15-19	31.2	55.7	3.8	2.8	6.2	2.8	25.0	7.3	8.9	393
20-24	31.3	41.8	10.6	2.3	5.3	3.8	31.0	4.2	12.9	376
25-29	35.5	46.5	9.5	2.6	8.1	5.5	30.8	7.8	8.6	383
30-34	35.1	47.4	8.7	2.6	4.5	3.0	21.3	15.7	7.1	389
35-39	38.3	51.1	7.8	3.2	3.0	2.8	17.2	9.0	11.2	342
40-44	30.7	52.1	8.2	2.1	6.3	8.4	27.3	7.8	3.5	238
45-49	36.7	46.8	5.1	0.4	6.7	3.5	28.5	5.4	5.8	190
Residence										
Urban	34.7	40.3	6.0	2.9	5.5	3.7	24.7	9.7	12.2	912
Rural	33.6	54.3	9.0	2.2	5.8	4.3	26.3	7.6	6.5	1,399
Malaria endemicity										
Highland epidemic prone	40.5	40.6	17.4	3.7	4.1	2.6	11.9	6.4	10.1	540
Lake endemic	34.3	61.4	6.9	3.4	8.9	8.6	34.4	8.3	6.4	689
Coast endemic	17.0	63.1	2.8	5.5	7.5	2.4	19.8	5.3	6.1	175
Seasonal	53.3	61.3	12.2	1.2	11.1	1.2	16.7	5.9	5.2	198
Low risk	27.7	35.6	1.5	0.1	1.8	1.9	31.6	11.6	11.6	710
Education										
No education	36.4	54.9	15.0	0.0	0.9	2.1	15.1	0.7	8.4	50
Primary	34.4	49.1	8.3	2.1	5.3	5.3	26.6	7.7	9.4	791
Secondary	28.6	48.4	7.3	2.1	5.6	3.6	29.0	7.7	10.4	997
More than secondary	44.6	48.1	7.4	4.0	6.9	3.2	18.4	12.0	4.2	474
Wealth quintile										
Lowest	31.9	54.5	9.8	1.4	5.9	1.9	21.0	7.7	7.1	218
Second	26.1	52.0	4.6	2.5	3.5	5.8	20.9	5.5	10.9	411
Middle	41.0	54.4	10.1	2.1	6.5	3.6	25.1	8.7	6.1	485
Fourth	31.1	52.2	7.8	1.7	6.1	3.7	36.6	8.3	4.1	623
Highest	37.9	35.7	7.5	3.8	5.9	4.4	19.6	10.7	15.1	575
Total	34.0	48.7	7.8	2.4	5.7	4.1	25.7	8.4	8.7	2,312

Note: More than one source may have been cited.
SP = Sulfadoxine pyrimethamine
ACT = Artemisinin-based combination therapy

Table 5.3 Knowledge of ways to avoid malaria

Percentage of women age 15-49 who state there are ways to avoid getting malaria, and among women who state there are ways to avoid getting malaria, percentage reporting specific ways of avoiding malaria, by background characteristics, Kenya MIS 2020

Background characteristic	Percentage who state there are ways to avoid getting malaria	Number of women	Ways to avoid getting malaria										Number of women who state there are ways to avoid getting malaria
			Sleep under mosquito net or ITN	Use mosquito repellent	Take preventative medications	Spray house with insecticide	Fill in stagnant waters (puddles)	Keep surroundings clean	Put mosquito screen on windows	Pregnant women take SP/ Fansidar	Other	Don't know	
Age													
15-19	84.4	1,308	93.7	8.7	2.5	4.8	27.9	29.3	1.1	0.9	1.9	1.2	1,103
20-24	85.7	1,243	93.3	15.7	5.8	7.6	19.4	23.5	0.6	1.6	1.0	0.8	1,064
25-29	83.3	1,057	95.7	12.1	3.9	5.2	20.1	25.4	1.1	1.9	3.3	0.1	881
30-34	85.5	1,166	95.1	7.2	7.7	5.6	17.0	23.1	0.5	1.7	4.1	0.8	997
35-39	87.3	812	94.9	10.0	3.4	4.8	23.8	29.2	1.0	1.6	0.8	0.9	709
40-44	86.4	703	92.9	10.2	3.9	5.7	15.6	25.4	0.4	0.6	3.1	0.8	607
45-49	82.4	483	95.4	9.9	7.6	13.3	25.6	25.9	1.2	1.1	6.6	0.3	398
Residence													
Urban	90.2	2,641	94.5	15.5	6.9	8.5	23.9	24.3	0.7	1.0	3.3	0.8	2,383
Rural	81.8	4,130	94.2	7.2	3.4	4.6	19.5	27.0	0.9	1.7	2.2	0.7	3,377
Malaria endemicity													
Highland epidemic prone	87.4	1,343	97.8	6.2	3.0	5.9	18.5	21.7	0.5	1.6	1.0	0.6	1,174
Lake endemic	89.0	1,312	96.7	8.3	6.3	6.5	23.8	33.4	2.7	3.1	2.9	0.3	1,168
Coast endemic	82.7	538	95.1	15.9	2.5	5.5	18.8	34.3	1.0	1.6	1.7	0.6	445
Seasonal	78.2	853	96.1	12.0	2.7	4.0	10.1	18.7	0.5	2.4	2.7	1.4	667
Low risk	84.6	2,724	90.8	12.7	6.1	7.0	25.1	24.6	0.2	0.1	3.5	0.9	2,306
Education													
No education	58.7	403	91.8	0.9	5.0	1.0	2.8	9.9	0.7	0.9	4.9	0.4	237
Primary	78.5	2,478	94.9	6.0	3.5	2.6	12.3	21.2	0.8	1.7	3.1	1.2	1,945
Secondary	90.5	2,772	94.4	11.3	4.9	6.6	25.4	27.4	0.8	1.2	2.3	0.8	2,508
More than secondary	95.7	1,118	93.7	19.6	7.0	12.9	32.2	34.4	1.1	1.4	2.3	0.0	1,070
Wealth quintile													
Lowest	70.4	1,104	92.3	3.6	3.5	3.2	12.9	20.2	0.6	2.1	3.6	1.6	777
Second	82.5	1,245	95.8	5.8	3.2	2.8	15.5	25.1	0.5	1.7	1.7	0.7	1,027
Middle	84.4	1,279	96.6	6.7	3.5	3.4	17.4	24.9	0.6	2.0	2.0	0.6	1,079
Fourth	89.7	1,430	93.6	12.5	4.7	7.4	24.5	26.6	1.3	1.1	3.2	0.1	1,283
Highest	93.0	1,714	93.5	18.4	7.5	10.8	29.2	29.3	1.0	0.6	2.9	1.0	1,594
Total	85.1	6,771	94.3	10.7	4.8	6.2	21.3	25.9	0.8	1.4	2.7	0.8	5,760

Note: More than one source may have been cited.
ITN = insecticide-treated net
SP = Sulfadoxine pyrimethamine

Table 5.4 Malaria treatment knowledge, net hanging, and net use for other purposes

Among women age 15-49 who state that there are ways to avoid getting malaria, percentage who know specific treatments for malaria; among women age 15-49, percentage who are confident in their ability to hang a mosquito net in their own household and percentage whose household has any net that has been used for a reason other than sleeping; and among women age 15-49 whose household has any net that has been used for a reason other than sleeping, percentage of uses to which nets have been put, according to background characteristics, Kenya MIS 2020

Background characteristic	Recommended treatment for malaria						Number of women who state there are ways to avoid getting malaria	Confident in ability to hang a mosquito net in own household	Net in household has been used for any reason other than sleeping	Number of women	How mosquito net was used						Number of women whose household has a net that has been used for a reason other than sleeping
	ACT/AL	SP/ Fansidar	Chloro-quine	Amodia-quine	Other	Don't know					Cover/ protect the garden or chickens	Fishing activities	Window screen	Clothing/ wedding veil	Other	Don't know	
Age																	
15-19	22.7	4.4	3.6	0.8	5.4	66.4	1,103	82.0	10.3	1,308	86.2	3.8	4.5	1.8	8.6	1.2	135
20-24	25.1	6.6	3.9	0.5	4.9	63.6	1,064	83.5	6.2	1,243	81.9	7.4	2.8	0.9	12.0	1.0	77
25-29	31.6	9.3	7.6	1.1	4.5	54.6	881	88.9	6.6	1,057	63.9	5.1	9.7	0.4	25.7	0.0	69
30-34	28.4	5.9	7.1	1.5	8.8	53.9	997	86.4	6.9	1,166	82.5	3.5	4.8	5.1	8.7	1.7	80
35-39	37.0	8.1	5.2	1.2	5.9	52.8	709	86.6	11.3	812	92.2	4.1	2.7	0.0	6.2	1.7	92
40-44	30.9	8.7	5.5	1.1	10.0	51.5	607	86.6	8.0	703	84.4	3.9	2.7	1.1	9.7	0.8	56
45-49	27.6	11.5	5.5	0.8	8.4	54.2	398	89.9	16.4	483	77.3	4.2	9.3	0.8	3.9	6.7	79
Residence																	
Urban	21.2	4.9	5.3	1.0	7.9	64.7	2,383	85.2	3.2	2,641	74.8	8.5	10.8	1.3	11.2	1.0	84
Rural	33.6	8.9	5.5	1.0	5.5	53.0	3,377	86.0	12.2	4,130	83.3	3.8	4.1	1.5	10.0	2.0	504
Malaria endemicity																	
Highland epidemic prone	29.9	14.9	7.8	0.5	2.5	54.0	1,174	92.5	14.2	1,343	81.9	0.8	2.8	2.5	12.8	0.0	191
Lake endemic	74.1	7.5	2.4	1.4	10.4	18.1	1,168	90.1	13.1	1,312	88.0	5.9	1.1	1.5	9.7	0.7	172
Coast endemic	27.7	7.1	4.4	4.4	4.5	54.8	445	89.4	10.8	538	67.6	5.7	27.8	2.1	10.0	5.4	58
Seasonal	17.0	6.7	4.4	1.0	3.3	71.9	667	83.2	8.2	853	66.4	15.7	4.0	0.4	14.8	7.3	70
Low risk	8.0	3.4	6.2	0.4	7.9	76.4	2,306	80.2	3.6	2,724	91.6	0.6	4.0	0.0	2.7	1.6	98
Education																	
No education	21.0	3.9	3.2	3.4	9.2	64.4	237	79.5	8.1	403	75.3	6.0	9.1	0.7	12.3	0.0	33
Primary	32.9	8.9	3.7	1.0	5.9	54.7	1,945	85.7	9.7	2,478	78.9	5.6	7.2	2.0	11.3	0.7	241
Secondary	26.9	5.4	5.0	0.6	5.9	60.9	2,508	85.9	9.1	2,772	84.8	3.5	3.6	1.1	9.6	2.2	253
More than secondary	25.6	9.1	9.8	1.4	8.4	54.7	1,070	87.2	5.5	1,118	86.7	3.4	1.1	1.2	6.8	5.8	61
Wealth quintile																	
Lowest	28.8	8.0	2.8	1.7	5.0	59.1	777	82.2	12.8	1,104	74.6	8.3	6.1	3.5	11.9	1.0	142
Second	37.8	10.0	5.8	0.7	5.3	49.0	1,027	87.6	10.9	1,245	86.5	4.3	5.1	0.1	5.2	2.7	136
Middle	29.7	7.8	3.4	0.7	5.3	58.9	1,079	85.9	10.2	1,279	79.9	2.0	2.3	0.1	18.7	0.6	130
Fourth	32.2	7.0	5.6	1.2	7.0	54.3	1,283	87.2	9.1	1,430	84.5	2.4	4.5	1.9	6.0	2.7	130
Highest	18.4	4.9	7.6	1.0	8.5	65.0	1,594	85.2	2.9	1,714	90.2	6.2	11.3	2.1	7.1	3.2	50
Total	28.5	7.2	5.4	1.0	6.5	57.8	5,760	85.7	8.7	6,771	82.1	4.5	5.1	1.5	10.2	1.9	588

Note: More than one way to prevent malaria and more than one recommended treatment may have been cited.
ACT = Artemisinin-based combination therapy
AL= Artemether-lumefantrine
SP = Sulfadoxine pyrimethamine

Table 5.5 Malaria susceptibility, severity, and self-efficacy

Percentage of women age 15-49 who express specific perceptions about malaria risk, and percentage who perceive that their families and communities are at risk from malaria; percentage of women who express specific perceptions about the severity of malaria, and percentage who feel that the consequences of malaria are serious; and percentage of women who express specific perceptions regarding their confidence in their ability to perform specific malaria-related behaviours (self-efficacy), according to background characteristics, Kenya MIS 2020

	Perceived susceptibility			Perceived severity			Perceived self-efficacy			
	Percentage of women who:			Percentage of women who:			Percentage of women who:			
Background characteristic	Disagree that people in the community get malaria only during the rainy season	Agree that when a child has a fever, they almost always worry it might be malaria	Perceive that their families and communities are at risk from malaria[1]	Disagree that getting malaria is not a problem because it can be easily treated	Disagree that only weak children can die from malaria	Feel that the consequences of malaria are serious[2]	Agree that they can sleep under a mosquito net for the entire night when there are lots of mosquitoes	Agree that they can sleep under a mosquito net for the entire night when there are few mosquitoes	Are confident in their ability to perform specific malaria-related behaviours[3]	Number of women
Age										
15-19	41.0	46.8	70.5	37.1	73.0	79.2	81.1	71.5	86.9	1,308
20-24	43.9	55.7	78.5	33.1	67.7	76.4	76.1	71.2	81.9	1,243
25-29	43.9	49.2	73.4	41.4	70.7	79.1	82.7	72.4	86.9	1,057
30-34	45.9	57.1	79.8	34.2	73.8	79.9	81.1	77.9	87.4	1,166
35-39	40.0	53.7	74.9	34.3	67.4	75.7	81.1	74.6	88.1	812
40-44	48.2	57.0	81.4	36.1	66.0	75.2	83.1	73.4	86.9	703
45-49	40.6	58.1	77.0	28.8	62.3	70.8	85.0	81.2	93.6	483
Living children under age 5										
One or more	44.2	56.0	79.2	36.7	68.8	76.4	82.6	77.8	89.0	2,927
None	42.8	51.2	73.9	34.6	70.3	78.0	79.7	71.0	84.9	3,844
Residence										
Urban	49.0	47.6	75.7	33.7	75.1	81.0	77.5	72.1	84.1	2,641
Rural	39.9	56.9	76.4	36.7	66.1	75.0	83.1	75.2	88.4	4,130
Malaria endemicity										
Highland epidemic prone	37.8	62.5	75.7	37.4	62.0	71.4	87.9	78.9	92.5	1,343
Lake endemic	52.7	70.9	90.1	46.5	72.3	80.4	85.6	80.4	91.5	1,312
Coast endemic	33.0	58.7	73.6	36.0	58.4	67.7	79.5	70.5	84.3	538
Seasonal	26.2	60.0	73.5	36.2	62.7	73.8	76.3	71.5	81.2	853
Low risk	49.2	37.1	71.0	28.9	76.5	81.8	76.9	69.8	83.7	2,724
Education										
No education	27.6	66.1	79.3	37.3	53.1	66.5	75.2	65.6	79.6	403
Primary	39.6	59.1	78.1	36.7	63.3	72.4	83.8	76.4	88.8	2,478
Secondary	45.6	50.4	74.0	35.6	73.3	80.1	80.6	72.9	86.4	2,772
More than secondary	52.2	42.8	76.2	32.0	80.8	85.5	77.2	74.3	85.1	1,118
Wealth quintile										
Lowest	35.2	58.0	73.1	35.6	60.1	69.4	82.4	71.6	86.5	1,104
Second	36.9	59.8	76.7	35.8	67.6	76.6	85.2	73.9	89.8	1,245
Middle	42.3	60.1	80.4	37.8	64.7	75.2	83.2	77.5	90.4	1,279
Fourth	48.5	55.9	82.3	37.3	71.5	79.9	82.5	76.2	86.4	1,430
Highest	50.1	38.2	69.4	32.1	79.4	82.4	73.8	70.9	82.0	1,714
Total	43.4	53.3	76.2	35.5	69.6	77.3	80.9	73.9	86.7	6,771

[1] Includes women who disagree that people in the community get malaria only during the rainy season or agree that when a child has a fever they almost always worry it might be malaria
[2] Includes women who disagree that getting malaria is not a problem because it can be easily treated or disagree that only weak children can die from malaria
[3] Includes women who agree that they can sleep under a mosquito net for the entire night when there are lots of mosquitoes or agree that they can sleep under a mosquito net for the entire night when there are few mosquitoes

Table 5.6 Attitudes toward malaria-related behaviours and malaria norms

Percentage of women age 15-49 who express specific perceptions regarding malaria-related behaviours, percentage with favourable attitudes toward specific malaria-related behaviours, percentage who express specific perceptions regarding community norms, and percentage who believe the majority of people in their community currently practise specific malaria-related behaviours, according to background characteristics, Kenya MIS 2020

	Attitudes towards malaria-related behaviours			Community norms			
	Percentage of women who:			Percentage of women who:			
Background characteristic	Disagree that they do not like sleeping under a mosquito net when the weather is too warm	Disagree that when a child has a fever it is best to start giving the child any medicine that you have at home	Have a favourable attitude toward specific malaria-behaviours[1]	Agree that people in the community usually take their children to a health care provider on the same day or the day after they develop a fever	Agree that people in the community who have a mosquito net usually sleep under a mosquito net every night	Believe the majority of people in their community currently practise specific malaria-related behaviours[2]	Number of women
Age							
15-19	54.1	63.2	78.5	47.3	41.4	59.6	1,308
20-24	54.8	69.4	83.3	46.9	34.7	57.0	1,243
25-29	53.9	73.1	82.3	50.1	39.8	60.7	1,057
30-34	52.3	68.4	83.1	51.9	38.8	61.9	1,166
35-39	49.5	70.8	82.3	60.0	38.1	68.2	812
40-44	46.8	66.8	79.8	56.8	41.4	67.3	703
45-49	45.4	63.4	80.6	57.0	47.5	71.2	483
Living children under age 5							
One or more	52.9	68.7	82.6	51.1	38.7	62.3	2,927
None	51.3	67.6	80.7	52.1	40.1	62.4	3,844
Residence							
Urban	56.7	73.8	86.4	46.3	34.7	55.0	2,641
Rural	48.9	64.4	78.4	55.0	42.6	67.0	4,130
Malaria endemicity							
Highland epidemic prone	52.4	70.3	82.1	67.4	49.1	79.1	1,343
Lake endemic	51.9	61.1	78.0	55.2	47.2	66.7	1,312
Coast endemic	45.5	57.7	77.8	52.2	49.3	68.3	538
Seasonal	49.3	60.3	75.5	43.2	40.0	60.3	853
Low risk	53.8	74.9	85.5	44.7	29.0	51.5	2,724
Education							
No education	40.6	53.1	71.2	43.9	41.6	62.0	403
Primary	46.1	63.4	77.7	54.0	43.4	66.3	2,478
Secondary	57.7	70.1	83.6	51.4	36.9	60.4	2,772
More than secondary	54.9	78.9	88.7	50.0	36.6	58.5	1,118
Wealth quintile							
Lowest	46.5	59.8	75.0	53.1	38.9	65.1	1,104
Second	48.9	62.7	75.7	59.9	45.1	70.9	1,245
Middle	50.0	67.3	81.8	57.9	45.7	71.4	1,279
Fourth	55.3	71.8	84.5	49.9	39.9	60.7	1,430
Highest	56.3	74.9	87.3	41.5	30.9	48.9	1,714
Total	52.0	68.1	81.5	51.7	39.5	62.3	6,771

[1] Includes women who disagree that they do not like sleeping under a mosquito net when the weather is too warm or disagree that when a child has a fever, it is best to start by giving the child any medicine they have at home

[2] Includes women who agree that people in the community usually take their children to a health care provider on the same day or day after they develop a fever or agree that people in the community who have a mosquito net usually sleep under a mosquito net every night

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SAMPLE DESIGN

Appendix A

A.1 INTRODUCTION

The 2020 Kenya Malaria Indicator Survey (2020 KMIS) was a cross-sectional household-based survey with a nationally representative sample of conventional households. The survey targeted women age 15-49 and children age 6 months to age 14 living within conventional households in Kenya. All women age 15-49 who were usual members of the selected households or who spent the night before the survey in the selected households were eligible for individual interviews. In all sampled households, children age 6 months to age 14 were tested for anaemia and malaria.

The sample for the 2020 KMIS was designed to produce reliable estimates for key malaria indicators at the national level, for urban and rural areas separately, and for each of the five malaria endemic zones. The five malaria endemic zones fully cover the country, and each of the 47 counties in the country falls into one or two of the five zones as follows[1]:

1. **Highland epidemic prone:** Kisii, Nyamira, West Pokot,[1] Trans-Nzoia, Uasin Gishu, Nandi, Narok, Kericho, Bomet, Bungoma,[1] Kakamega,[1] and Elgeyo Marakwet[1]
2. **Lake endemic:** Siaya, Kisumu, Migori, Homa Bay, Kakamega,[1] Vihiga, Bungoma,[1] and Busia
3. **Coast endemic:** Mombasa, Kwale, Kilifi, Lamu, and Taita Taveta
4. **Seasonal:** Tana River, Marsabit, Isiolo, Meru,[1] Tharaka-Nithi,[1] Embu,[1] Kitui, Garissa, Wajir, Mandera, Turkana, Samburu, Baringo, Elgeyo Marakwet,[1] Kajiado, and West Pokot[1]
5. **Low risk:** Nairobi, Nyandarua, Nyeri, Kirinyaga, Murang'a, Kiambu, Machakos, Makueni, Laikipia, Nakuru, Meru,[1] Tharaka-Nithi,[1] and Embu[1]

A.2 SAMPLE FRAME

The survey utilized the fifth National Sample Survey and Evaluation Programme (NASSEP V) household master sample frame, the same frame used for the 2015 KMIS. The frame was employed by the Kenya National Bureau of Statistics (KNBS) from 2012 to 2020 to conduct household-based sample surveys in Kenya. It was based on the 2009 Kenya Population and Housing Census, and the primary sampling units were clusters developed from enumeration areas (EAs). EAs are the smallest geographical areas created for purposes of census enumeration; a cluster can be an EA or part of an EA. The frame had a total of 5,360 clusters and was stratified into urban and rural areas within each of 47 counties, resulting into 92 sampling strata with Nairobi and Mombasa counties being wholly urban. For the purposes of the 2020 KMIS, the frame was explicitly stratified into malaria endemic zones as the first level of stratification and then into rural and urban areas.

Table A.1 shows the distribution of households across malaria endemic zones based on the 2009 census frame, by type of residence (urban/rural). The percentage of households in each malaria endemic zone varied greatly, from 8% in the Coast endemic zone to 34% in the Low risk zone. The urbanization of the

[1] Several counties are of mixed malaria zone classification: Bungoma (Highland epidemic prone and Lake endemic zones), Kakamega (Highland epidemic prone and Lake endemic zones), West Pokot (Highland epidemic prone and Seasonal zones), Elgeyo Marakwet (Highland epidemic prone and Seasonal zones), Meru (Seasonal and Low risk zones), Embu (Seasonal and Low risk zones) and Tharaka-Nithi (Seasonal and Low risk zones).

zones also varied greatly; only 20% of households in the Seasonal zone are in urban areas, as compared with 61% of households in the Low risk zone. **Table A.2** presents the distribution of enumeration areas and their average size (number of households) in the census frame by malaria endemicity zone and residence. There were a total of 96,252 EAs, 36,844 in urban areas and 59,408 in rural areas. The average EA size was 91 households.

Table A.1 Households

Distribution of residential households in the census frame, percentage that each malaria endemicity zone contributes to the total number of households, and percentage of each malaria endemicity zone that is urban, Kenya MIS 2020

	Number of residential households in census frame			Percentage of total households	Percentage urban
Malaria endemicity	Urban	Rural	Total		
Highland epidemic prone	34,5137	1,233,553	1,578,690	18.0	21.9
Lake endemic	409,788	1,306,333	1,716,121	19.6	23.9
Coast endemic	388,432	295,353	683,785	7.8	56.8
Seasonal	363,512	1,438,465	1,801,977	20.6	20.2
Low risk	1,831,849	1,155,359	2,987,208	34.1	61.3
Kenya	**3,338,718**	**5,429,063**	**8,767,781**	**100.0**	**38.1**

Source: The 2009 Kenya Population and Housing Census conducted by KNBS.

Table A.2 Enumeration areas and households

Number of enumeration areas (EAs) and average number of households per EA in the census frame, by malaria endemicity and type of residence, Kenya MIS 2020

	Number of enumeration areas in census frame			Average number of residential households in enumeration area		
Malaria endemicity	Urban	Rural	Total	Urban	Rural	Total
Highland epidemic prone	3,808	14,316	18,124	91	86	87
Lake endemic	4,465	13,454	17,919	92	97	96
Coast endemic	4,493	3,430	7,923	86	86	86
Seasonal	4,467	16,572	21,039	81	87	86
Low risk	19,611	11,636	31,247	93	99	96
Kenya	**36,844**	**59,408**	**96,252**	**91**	**91**	**91**

Source: The 2009 Kenya Population and Housing Census conducted by KNBS.

A.3 SAMPLE DESIGN AND IMPLEMENTATION

The sample for the 2020 KMIS was a stratified sample selected in two stages. In the first stage, 301 EAs were selected with a stratified equal probability selection method from the NASSEP V master sample frame; this was because the EAs had been selected into the master sample frame using probability proportional to size selection and further standardized through segmentation to form clusters of almost equal size. Stratification was achieved by separating every county into urban and rural areas. Therefore, the 47 counties were stratified into 92 sampling strata: 45 rural strata and 47 urban strata, with Nairobi and Mombasa counties purely urban. The frame was further stratified into malaria endemicity zones. Samples were selected independently in each stratum, with a predetermined number of EAs selected. Implicit stratification was achieved at each of the lower administrative unit levels by sorting the sampling frame according to administrative units within each sampling stratum.

After the selection of the clusters and before the main survey, a cluster updating operation was carried out in all selected clusters to capture changes that might have occurred in the clusters in terms of household listing and number of households. The resulting lists of households served as the sampling frame for the selection of households in the second stage. In the second stage of selection, a fixed number of 30 households were selected in every sampled cluster via equal probability systematic sampling. The survey interviewers were asked to interview only the pre-selected households. To prevent bias, replacements and changes of the pre-selected households were not allowed. **Table A.3** shows the distribution of sample EAs

by urban and rural residence for each county and for each of the five malaria endemic zones. **Table A.4** presents the distribution of the expected number of completed interviews with women age 15-49 by urban and rural residence for each of the malaria endemic zones.

Table A.3 Sample allocation of clusters and households

Number of clusters and households allocated by county and malaria endemicity, according to residence, Kenya MIS 2020

	Number of clusters allocated			Number of households allocated		
	Urban	Rural	Total	Urban	Rural	Total
County						
Nairobi	5	0	5	150	0	150
Nyandarua	2	2	4	60	60	120
Nyeri	2	2	4	60	60	120
Kirinyaga	2	2	4	60	60	120
Murang'a	2	3	5	60	90	150
Kiambu	2	2	4	60	60	120
Mombasa	8	0	8	240	0	240
Kwale	3	5	8	90	150	240
Kilifi	3	5	8	90	150	240
Tana River	2	2	4	60	60	120
Lamu	2	3	5	60	90	150
Taita Taveta	2	4	6	60	120	180
Marsabit	2	2	4	60	60	120
Isiolo	2	2	4	60	60	120
Meru	4	5	9	120	150	270
Tharaka	4	4	8	120	120	240
Embu	4	4	8	120	120	240
Kitui	2	2	4	60	60	120
Machakos	2	2	4	60	60	120
Makueni	2	2	4	60	60	120
Garissa	2	2	4	60	60	120
Wajir	2	2	4	60	60	120
Mandera	2	2	4	60	60	120
Siaya	3	9	12	90	270	360
Kisumu	7	6	13	210	180	390
Migori	5	7	12	150	210	360
Homa Bay	4	9	13	120	270	390
Kisii	2	2	4	60	60	120
Nyamira	2	3	5	60	90	150
Turkana	2	2	4	60	60	120
West Pokot	2	6	8	60	180	240
Samburu	2	2	4	60	60	120
Trans-Nzoia	2	2	4	60	60	120
Baringo	2	2	4	60	60	120
Uasin Gishu	2	2	4	60	60	120
Elgeyo Marakwet	4	4	8	120	120	240
Nandi	2	3	5	60	90	150
Laikipia	2	2	4	60	60	120
Nakuru	2	2	4	60	60	120
Narok	2	2	4	60	60	120
Kajiado	2	2	4	60	60	120
Kericho	2	2	4	60	60	120
Bomet	2	3	5	60	90	150
Kakamega	6	11	17	180	330	510
Vihiga	4	7	11	120	210	330
Bungoma	5	10	15	150	300	450
Busia	3	8	11	90	240	330
Malaria endemicity						
Highland epidemic prone	24	27	51	720	810	1,530
Lake endemic	33	63	96	990	1,890	2,880
Coast endemic	18	17	35	540	510	1,050
Seasonal	30	34	64	900	1,020	1,920
Low risk	29	26	55	870	780	1,650
Kenya	**134**	**167**	**301**	**4,020**	**5,010**	**9,030**

Table A.4 Sample allocation of completed interviews with women

Sample allocation of expected number of completed interviews with women by malaria endemicity, according to residence, Kenya MIS 2020

	Women age 15-49		
Malaria endemicity	Urban	Rural	Total
Highland epidemic prone	518	610	1,128
Lake endemic	712	1,424	2,136
Coast endemic	389	385	774
Seasonal	647	770	1,417
Low risk	626	588	1,214
Kenya	**2,892**	**3,777**	**6,669**

The calculations in **Table A.4** are based on parameters from the 2015 KMIS, where there were an average of 0.86 women age 15-49 per household, the response rate among women was 97%, and household completion rates were 87% and 90% in urban and rural areas, respectively.

A.4 SAMPLE PROBABILITIES AND SAMPLING WEIGHTS

Due to the non-proportional allocation of the sample to the different counties and the possible differences in response rates, sampling weights are required for any analysis using the 2020 KMIS data to ensure the actual representative of the survey results at the national level as well as the domain level. Since the 2020 KMIS sample was a two-stage stratified cluster sample selected from a master sample, sampling weights were calculated based on sampling probabilities separately for each sampling stage, including master sample selection probabilities, and for each cluster. The following notations were used:

P_{0hi}: sampling probability of the i^{th} EA in stratum h in the selection of the master sample from the 2009 census frame

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

P_{2hi}: second-stage sampling probability of households within the i^{th} EA

The NASSEP V master sample was selected with a stratified probability proportional to size procedure. Let a_h be the number of EAs selected in stratum h, M_{hi} the measure of size (number of households) according to the 2009 census frame in the i^{th} EA, and $\sum M_{hi}$ the total measure of size (total number of households) in stratum h. The probability of selecting the i^{th} EA in the NASSEP V master sample is calculated as follows:

$$P_{0hi} = \frac{a_h M_{hi}}{\sum M_{hi}}$$

Let b_h be the number of EAs selected in stratum h of the NASSEP V master sample for the 2020 KMIS. Then the probability of selecting EA i in the sample is:

$$P_{1hi} = \frac{b_h}{a_h}$$

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 2020 KMIS is therefore the product of the selection probabilities:

$$P_{hi} = P_{0hi} \times P_{1hi} \times P_{2hi} = \frac{b_h M_{hi}}{\sum M_{hi}} \times \frac{g_{hi}}{L_{hi}}$$

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

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

The design weight was adjusted for household nonresponse and nonresponse among women to obtain the sampling weights for households and for women, respectively. Nonresponse was adjusted at the sampling stratum level. For the household sampling weight, the household design weight was multiplied by the inverse of the household response rate, by stratum. For the women's individual sampling weight, the household sampling weight was multiplied by the inverse of women's individual response rate, by stratum. After adjusting for nonresponse, the sampling weights were normalized to obtain the final standard weights that appear in the data files. The normalization process is done to obtain a total number of unweighted cases equal to the total number of weighted cases at the national level, for the total number of households and women. Normalization is done by multiplying the sampling weight by the estimated sampling fraction obtained from the survey for the household weight and the individual woman's weight. The normalized weights are relative weights that are valid for estimating means, proportions, ratios, and rates but are not valid for estimating population totals or for pooled data.

A.5 SURVEY IMPLEMENTATION

An examination of response rates for the 2020 KMIS indicates that the survey was successfully implemented. **Table A.5** presents interview completion rates for households and individual women in the 2020 KMIS by residence and malaria endemicity.

Table A.5 Sample implementation: Women

Percent distribution of households and eligible women age 15-49 by results of the household and individual interviews, and household, eligible women, and overall women response rates, according to residence and malaria endemicity (unweighted), Kenya MIS 2020

	Residence		Malaria endemicity					
Result	Urban	Rural	Highland epidemic prone	Lake endemic	Coast endemic	Seasonal	Low risk	Total
Selected households								
Completed (C)	86.3	92.9	88.5	93.2	90.0	88.1	87.1	89.9
Household present but no competent respondent at home (HP)	1.6	1.1	1.0	1.2	2.2	1.4	1.3	1.3
Postponed (P)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Refused (R)	1.2	0.4	1.0	0.4	0.8	0.6	1.5	0.8
Dwelling not found (DNF)	0.7	0.3	0.9	0.2	0.3	0.9	0.3	0.5
Household absent (HA)	6.0	3.4	5.1	3.1	3.0	6.4	6.0	4.6
Dwelling vacant/address not a dwelling (DV)	3.8	1.4	2.9	1.6	3.4	2.2	3.4	2.5
Dwelling destroyed (DD)	0.3	0.3	0.6	0.2	0.3	0.3	0.2	0.3
Other (O)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	3,986	4,859	1,650	2,924	1,005	1,619	1,647	8,845
Household response rate (HRR)[1]	96.1	98.0	96.9	98.1	96.5	96.9	96.4	97.2
Eligible women								
Completed (EWC)	96.5	96.0	97.9	95.5	95.0	96.2	96.9	96.2
Not at home (EWNH)	2.4	2.9	1.2	3.4	3.3	2.4	2.6	2.7
Refused (EWR)	0.9	0.4	0.6	0.4	0.9	0.9	0.3	0.6
Incapacitated (EWI)	0.2	0.7	0.2	0.6	0.9	0.5	0.2	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	3,028	4,007	1,294	2,477	819	1,302	1,143	7,035
Eligible women response rate (EWRR)[2]	96.5	96.0	97.9	95.5	95.0	96.2	96.9	96.2
Overall women response rate (OWRR)[3]	92.8	94.1	94.9	93.7	91.7	93.2	93.3	93.5

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

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

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

$$OWRR = HRR * EWRR/100$$

ESTIMATES OF SAMPLING ERRORS

Appendix B

The estimates from a sample survey are affected by two types of errors: non-sampling errors and sampling errors. Non-sampling errors are the results of mistakes made in implementing data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts were made during the implementation of the 2020 Kenya Malaria Indicator Survey (KMIS) to minimise this type of error, non-sampling errors are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in the 2020 KMIS is only one of many samples that could have been selected from the same population, using the same design and expected size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability between all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results.

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

If the sample of respondents had been selected as a simple random sample, it would have been possible to use straightforward formulas for calculating sampling errors. However, the 2020 KMIS sample is the result of a multi-stage stratified design, and, consequently, it was necessary to use more complex formulas. Sampling errors are computed in SAS, using programs developed by ICF. These programs use the Taylor linearisation method of variance estimation for survey estimates that are means, proportions, or ratios.

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

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

in which

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

where h represents the stratum, which varies from 1 to H;
m_h is the total number of clusters selected in the h^{th} stratum;
y_{hi} is the sum of the weighted values of variable y in the i^{th} cluster in the h^{th} stratum;
x_{hi} is the sum of the weighted number of cases in the i^{th} cluster in the h^{th} stratum; and
f is the overall sampling fraction, which is so small that it is ignored.

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

Sampling errors for the 2020 KMIS are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for the whole country, for urban and rural areas, and for each of the malaria endemic zones. For each variable, the type of statistic (mean, proportion, or rate) and the base population are given in **Table B.1**. **Tables B.2** through **B.9** present the value of the statistic (R), its standard error (SE), the number of unweighted (N) and weighted (WN) cases, the design effect (DEFT), the relative standard error (SE/R), and the 95% confidence limits (R±2SE) for each variable. The DEFT is considered undefined when the standard error considering a simple random sample is zero (when the estimate is close to 0 or 1).

The confidence interval (e.g., as calculated for *child had fever in last 2 weeks*) can be interpreted as follows: the overall average from the national sample is 0.169, and its standard error is 0.008. Therefore, to obtain the 95% confidence limits, one adds and subtracts twice the standard error to the sample estimate, that is, $0.169 \pm 2 \times 0.008$. There is a high probability (95%) that the true proportion of children with a fever in the last 2 weeks is between 0.153 and 0.185.

For the total sample, the value of the DEFT, averaged over all variables, is 1.98. This means that, due to multi-stage clustering of the sample, the average standard error is increased by a factor of 1.98 over that in an equivalent simple random sample.

Table B.1 List of selected variables for sampling errors, Kenya MIS 2020

Variable	Estimate	Base population
HOUSEHOLDS		
Ownership of at least one mosquito net	Proportion	Households
Average number of mosquito nets per household	Mean	Households
Ownership of at least one ITN	Proportion	Households
Average number of ITNs per household	Mean	Households
Ownership of at least one ITN for every two persons	Proportion	Households
WOMEN		
No education	Proportion	All women 15-49
Secondary education or higher	Proportion	All women 15-49
Literacy	Proportion	All women 15-49
CHILDREN		
Child slept under any mosquito net last night	Proportion	Children under 5
Child slept under an ITN last night	Proportion	Children under 5
Child slept under an ITN last night in households with at least one ITN	Proportion	Children under 5 in households with at least one ITN
Child had fever in last 2 weeks	Proportion	Child under 5 in women's birth history
Child sought care/treatment from a health facility	Proportion	Child under 5 with fever in last 2 weeks
Child took ACT	Proportion	Child under 5 with fever in last 2 weeks who received any antimalarial drugs
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	Proportion	Child 6-59 months tested for anaemia
Child (age 6-59 months) has malaria (based on rapid test)	Proportion	Children 6-59 months tested (rapid test) for malaria
Child (age 6-59 months) has malaria (based on microscopy test)	Proportion	Children 6-59 months tested (microscopy) for malaria
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	Proportion	Child 6 months to 14 years tested for anaemia
Child (age 6 months to age 14) has malaria (based on rapid test)	Proportion	Children 6 months to 14 years tested (rapid test) for malaria
Child (age 6 months to age 14) has malaria (based on microscopy test)	Proportion	Children 6 months to 14 years tested (microscopy) for malaria
PREGNANT WOMEN		
Slept under any mosquito net last night	Proportion	All pregnant women 15-49
Slept under an ITN last night	Proportion	All pregnant women 15-49
Slept under an ITN last night in households with at least one ITN	Proportion	Pregnant women 15-49 in households with at least one ITN
Received 1+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years
Received 2+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years
Received 3+ doses of SP/Fansidar	Proportion	Last birth of women 15-49 with live births in last 2 years

Table B.2 Sampling errors: Total sample, Kenya MIS 2020

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	0.588	0.017	7,952	7,952	3.015	0.028	0.555	0.621
Average number of mosquito nets per household	1.175	0.057	7,952	7,952	3.936	0.049	1.060	1.290
Ownership of at least one ITN	0.490	0.019	7,952	7,952	3.377	0.039	0.452	0.528
Average number of ITNs per household	0.949	0.050	7,952	7,952	3.633	0.053	0.848	1.049
Ownership of at least one ITN for two persons	0.287	0.014	7,933	7,941	2.833	0.050	0.258	0.315
WOMEN								
No education	0.060	0.006	6,771	6,771	2.239	0.108	0.047	0.072
Secondary education or higher	0.574	0.022	6,771	6,771	3.655	0.038	0.531	0.618
Literacy	0.891	0.007	6,771	6,771	1.947	0.008	0.876	0.905
CHILDREN								
Child slept under any mosquito net last night	0.496	0.018	4,271	3,896	1.910	0.037	0.460	0.533
Child slept under an ITN last night	0.420	0.017	4,271	3,896	1.831	0.041	0.386	0.455
Child slept under an ITN last night in households with at least one ITN	0.719	0.016	2,827	2,277	1.500	0.023	0.687	0.752
Child had fever in last 2 weeks	0.169	0.008	3,581	3,323	1.175	0.047	0.153	0.185
Child sought care/treatment from a health facility	0.636	0.030	745	562	1.422	0.047	0.577	0.695
Child took ACT	0.910	0.027	189	113	1.014	0.030	0.856	0.965
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.035	0.004	3,736	3,401	1.091	0.103	0.028	0.042
Child (age 6-59 months) has malaria (based on rapid test)	0.044	0.005	3,736	3,401	1.246	0.112	0.034	0.054
Child (age 6-59 months) has malaria (based on microscopy test)	0.030	0.004	3,725	3,395	1.260	0.135	0.022	0.038
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.017	0.002	11,528	10,477	1.189	0.095	0.014	0.020
Child (age 6 months to age 14) has malaria (based on rapid test)	0.068	0.006	11,528	10,477	1.690	0.088	0.056	0.080
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.056	0.005	11,491	10,458	1.624	0.092	0.046	0.067
PREGNANT WOMEN								
Slept under any mosquito net last night	0.526	0.053	333	321	1.904	0.102	0.419	0.632
Slept under an ITN last night	0.398	0.044	333	321	1.618	0.111	0.309	0.487
Slept under an ITN last night in households with at least one ITN	0.730	0.055	198	175	1.651	0.076	0.620	0.841
Received 1+ doses of SP/Fansidar	0.378	0.021	1,481	1,363	1.611	0.056	0.336	0.420
Received 2+ doses of SP/Fansidar	0.299	0.019	1,481	1,363	1.567	0.065	0.260	0.338
Received 3+ doses of SP/Fansidar	0.220	0.016	1,481	1,363	1.450	0.074	0.188	0.253

Table B.3 Sampling errors: Urban sample, Kenya MIS 2020

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	0.637	0.026	3,440	3,044	3.126	0.040	0.585	0.688
Average number of mosquito nets per household	1.251	0.113	3,440	3,044	5.153	0.090	1.025	1.477
Ownership of at least one ITN	0.444	0.036	3,440	3,044	4.223	0.081	0.372	0.515
Average number of ITNs per household	0.814	0.093	3,440	3,044	4.757	0.114	0.627	1.000
Ownership of at least one ITN for two persons	0.284	0.028	3,424	3,035	3.686	0.100	0.227	0.341
WOMEN								
No education	0.029	0.007	2,923	2,641	2.383	0.256	0.014	0.044
Secondary education or higher	0.709	0.042	2,923	2,641	5.017	0.060	0.624	0.794
Literacy	0.948	0.008	2,923	2,641	2.064	0.009	0.931	0.965
CHILDREN								
Child slept under any mosquito net last night	0.632	0.029	1,509	1,228	1.934	0.046	0.575	0.690
Child slept under an ITN last night	0.468	0.036	1,509	1,228	2.283	0.076	0.397	0.540
Child slept under an ITN last night in households with at least one ITN	0.830	0.027	1,032	693	1.847	0.032	0.777	0.884
Child had fever in last 2 weeks	0.167	0.016	1,354	1,159	1.538	0.094	0.135	0.198
Child sought care/treatment from a health facility	0.603	0.044	262	193	1.311	0.073	0.515	0.690
Child took ACT	0.863	0.055	55	22	0.782	0.063	0.754	0.973
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.026	0.006	1,275	1,019	1.322	0.241	0.014	0.039
Child (age 6-59 months) has malaria (based on rapid test)	0.014	0.004	1,275	1,019	1.016	0.278	0.006	0.021
Child (age 6-59 months) has malaria (based on microscopy test)	0.010	0.003	1,270	1,018	0.990	0.313	0.004	0.016
Child (age 6 months to age 14) has anaemia (Haemoglobin <8.0 g/dl)	0.012	0.003	3,907	2,927	1.485	0.241	0.006	0.018
Child (age 6 months to age 14) has malaria (based on rapid test)	0.029	0.006	3,907	2,927	1.802	0.225	0.016	0.042
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.025	0.006	3,887	2,918	1.817	0.246	0.013	0.038
PREGNANT WOMEN								
Slept under any mosquito net last night	0.581	0.096	132	136	2.413	0.165	0.389	0.773
Slept under an ITN last night	0.346	0.083	132	136	2.169	0.241	0.179	0.512
Slept under an ITN last night in households with at least one ITN	0.630	0.098	77	75	1.867	0.156	0.434	0.826
Received 1+ doses of SP/Fansidar	0.352	0.046	564	440	2.113	0.130	0.261	0.444
Received 2+ doses of SP/Fansidar	0.295	0.044	564	440	2.130	0.149	0.207	0.384
Received 3+ doses of SP/Fansidar	0.214	0.036	564	440	1.938	0.169	0.142	0.286

Table B.4 Sampling errors: Rural sample, Kenya MIS 2020

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	0.558	0.022	4,512	4,908	2.924	0.039	0.515	0.601
Average number of mosquito nets per household	1.128	0.060	4,512	4,908	3.070	0.053	1.008	1.247
Ownership of at least one ITN	0.519	0.021	4,512	4,908	2.778	0.040	0.478	0.561
Average number of ITNs per household	1.032	0.058	4,512	4,908	3.018	0.056	0.917	1.148
Ownership of at least one ITN for two persons	0.288	0.015	4,509	4,907	2.263	0.053	0.257	0.318
WOMEN								
No education	0.079	0.009	3,848	4,130	2.120	0.117	0.061	0.098
Secondary education or higher	0.488	0.012	3,848	4,130	1.438	0.024	0.465	0.512
Literacy	0.854	0.009	3,848	4,130	1.595	0.011	0.836	0.872
CHILDREN								
Child slept under any mosquito net last night	0.434	0.022	2,762	2,668	1.809	0.050	0.390	0.477
Child slept under an ITN last night	0.398	0.020	2,762	2,668	1.662	0.049	0.359	0.437
Child slept under an ITN last night in households with at least one ITN	0.671	0.020	1,795	1,584	1.422	0.030	0.630	0.711
Child had fever in last 2 weeks	0.171	0.009	2,227	2,165	0.974	0.051	0.153	0.188
Child sought care/treatment from a health facility	0.653	0.039	483	369	1.457	0.060	0.575	0.731
Child took ACT	0.922	0.031	134	91	1.068	0.034	0.859	0.984
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.039	0.004	2,461	2,382	1.004	0.113	0.030	0.048
Child (age 6-59 months) has malaria (based on rapid test)	0.058	0.007	2,461	2,382	1.234	0.121	0.044	0.071
Child (age 6-59 months) has malaria (based on microscopy test)	0.038	0.006	2,455	2,377	1.246	0.147	0.027	0.049
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.019	0.002	7,621	7,550	1.090	0.102	0.015	0.023
Child (age 6 months to age 14) has malaria (based on rapid test)	0.083	0.008	7,621	7,550	1.671	0.098	0.067	0.099
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.068	0.007	7,604	7,540	1.604	0.102	0.054	0.082
PREGNANT WOMEN								
Slept under any mosquito net last night	0.485	0.063	201	184	1.617	0.129	0.359	0.610
Slept under an ITN last night	0.436	0.049	201	184	1.282	0.113	0.338	0.535
Slept under an ITN last night in households with at least one ITN	0.806	0.048	121	100	1.162	0.060	0.710	0.902
Received 1+ doses of SP/Fansidar	0.390	0.022	917	923	1.345	0.057	0.346	0.435
Received 2+ doses of SP/Fansidar	0.301	0.020	917	923	1.252	0.065	0.262	0.340
Received 3+ doses of SP/Fansidar	0.223	0.017	917	923	1.185	0.075	0.190	0.257

Table B.5 Sampling errors: Highland epidemic sample, Kenya MIS 2020

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	0.673	0.040	1,461	1,609	3.224	0.059	0.594	0.753
Average number of mosquito nets per household	1.507	0.133	1,461	1,609	3.471	0.088	1.240	1.773
Ownership of at least one ITN	0.648	0.038	1,461	1,609	3.022	0.058	0.573	0.724
Average number of ITNs per household	1.447	0.124	1,461	1,609	3.245	0.086	1.199	1.696
Ownership of at least one ITN for two persons	0.425	0.022	1,457	1,603	1.668	0.051	0.382	0.468
WOMEN								
No education	0.033	0.008	1,264	1,343	1.650	0.250	0.017	0.050
Secondary education or higher	0.551	0.021	1,264	1,343	1.473	0.037	0.510	0.592
Literacy	0.904	0.014	1,264	1,343	1.636	0.015	0.877	0.931
CHILDREN								
Child slept under any mosquito net last night	0.503	0.056	726	693	2.403	0.110	0.392	0.614
Child slept under an ITN last night	0.495	0.056	726	693	2.441	0.114	0.382	0.607
Child slept under an ITN last night in households with at least one ITN	0.705	0.037	467	487	1.488	0.053	0.630	0.780
Child had fever in last 2 weeks	0.164	0.021	611	564	1.210	0.126	0.123	0.206
Child sought care/treatment from a health facility	0.740	0.091	102	93	1.836	0.123	0.558	0.921
Child took ACT	0.989	0.012	19	20	0.497	0.012	0.966	1.013
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.031	0.008	631	617	1.153	0.271	0.014	0.048
Child (age 6-59 months) has malaria (based on rapid test)	0.011	0.004	631	617	1.006	0.397	0.002	0.020
Child (age 6-59 months) has malaria (based on microscopy test)	0.003	0.002	627	616	0.765	0.548	0.000	0.007
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.013	0.002	2,126	2,309	0.772	0.146	0.009	0.017
Child (age 6 months to age 14) has malaria (based on rapid test)	0.009	0.003	2,126	2,309	1.339	0.364	0.002	0.016
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.007	0.002	2,109	2,307	1.186	0.377	0.002	0.011
PREGNANT WOMEN								
Slept under any mosquito net last night	0.546	0.111	53	56	1.578	0.203	0.325	0.767
Slept under an ITN last night	0.505	0.115	53	56	1.627	0.227	0.276	0.734
Slept under an ITN last night in households with at least one ITN	0.928	0.061	28	30	1.244	0.066	0.805	1.051
Received 1+ doses of SP/Fansidar	0.343	0.033	217	206	0.971	0.097	0.277	0.409
Received 2+ doses of SP/Fansidar	0.221	0.023	217	206	0.760	0.102	0.176	0.267
Received 3+ doses of SP/Fansidar	0.161	0.029	217	206	1.116	0.184	0.102	0.220

Table B.6 Sampling errors: Lake endemic sample, Kenya MIS 2020

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	0.810	0.008	2,725	1,492	1.127	0.010	0.793	0.827
Average number of mosquito nets per household	1.588	0.035	2,725	1,492	1.459	0.022	1.518	1.658
Ownership of at least one ITN	0.779	0.009	2,725	1,492	1.117	0.011	0.762	0.797
Average number of ITNs per household	1.491	0.033	2,725	1,492	1.385	0.022	1.425	1.557
Ownership of at least one ITN for two persons	0.419	0.014	2,718	1,489	1.478	0.033	0.391	0.447
WOMEN								
No education	0.022	0.004	2,369	1,312	1.265	0.173	0.014	0.030
Secondary education or higher	0.489	0.016	2,369	1,312	1.565	0.033	0.457	0.521
Literacy	0.904	0.009	2,369	1,312	1.432	0.010	0.886	0.921
CHILDREN								
Child slept under any mosquito net last night	0.603	0.022	1,606	897	1.549	0.037	0.558	0.648
Child slept under an ITN last night	0.581	0.022	1,606	897	1.519	0.038	0.537	0.625
Child slept under an ITN last night in households with at least one ITN	0.688	0.021	1,361	757	1.428	0.031	0.646	0.730
Child had fever in last 2 weeks	0.290	0.016	1,263	704	1.154	0.054	0.259	0.321
Child sought care/treatment from a health facility	0.567	0.032	364	204	1.201	0.057	0.503	0.631
Child took ACT	0.948	0.019	133	72	0.964	0.020	0.911	0.986
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.065	0.007	1,440	809	1.060	0.111	0.051	0.080
Child (age 6-59 months) has malaria (based on rapid test)	0.162	0.017	1,440	809	1.606	0.107	0.127	0.196
Child (age 6-59 months) has malaria (based on microscopy test)	0.105	0.013	1,440	809	1.533	0.128	0.078	0.132
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.031	0.003	4,674	2,627	1.131	0.099	0.025	0.037
Child (age 6 months to age 14) has malaria (based on rapid test)	0.228	0.019	4,674	2,627	2.297	0.084	0.190	0.267
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.189	0.017	4,669	2,625	2.201	0.090	0.155	0.223
PREGNANT WOMEN								
Slept under any mosquito net last night	0.682	0.050	118	69	1.175	0.074	0.582	0.783
Slept under an ITN last night	0.666	0.050	118	69	1.166	0.076	0.565	0.767
Slept under an ITN last night in households with at least one ITN	0.775	0.048	102	59	1.191	0.062	0.680	0.871
Received 1+ doses of SP/Fansidar	0.822	0.016	558	305	0.974	0.019	0.791	0.854
Received 2+ doses of SP/Fansidar	0.681	0.022	558	305	1.129	0.033	0.636	0.726
Received 3+ doses of SP/Fansidar	0.486	0.027	558	305	1.269	0.056	0.432	0.540

Table B.7 Sampling errors: Coast endemic sample, Kenya MIS 2020

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	0.674	0.027	905	612	1.757	0.041	0.619	0.729
Average number of mosquito nets per household	1.292	0.069	905	612	1.601	0.054	1.154	1.431
Ownership of at least one ITN	0.579	0.030	905	612	1.843	0.052	0.519	0.640
Average number of ITNs per household	1.040	0.045	905	612	1.151	0.043	0.949	1.130
Ownership of at least one ITN for two persons	0.328	0.034	902	611	2.197	0.105	0.260	0.397
WOMEN								
No education	0.106	0.019	781	538	1.733	0.181	0.067	0.144
Secondary education or higher	0.452	0.042	781	538	2.365	0.094	0.368	0.537
Literacy	0.876	0.019	781	538	1.596	0.022	0.838	0.914
CHILDREN								
Child slept under any mosquito net last night	0.612	0.035	447	308	1.238	0.057	0.543	0.681
Child slept under an ITN last night	0.545	0.036	447	308	1.276	0.066	0.473	0.616
Child slept under an ITN last night in households with at least one ITN	0.766	0.031	318	219	1.156	0.041	0.704	0.829
Child had fever in last 2 weeks	0.230	0.021	394	274	0.974	0.093	0.187	0.272
Child sought care/treatment from a health facility	0.640	0.057	94	63	1.097	0.088	0.527	0.753
Child took ACT	0.657	0.156	11	6	1.001	0.237	0.345	0.969
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.032	0.011	394	274	1.288	0.351	0.010	0.055
Child (age 6-59 months) has malaria (based on rapid test)	0.032	0.013	394	274	1.381	0.402	0.006	0.057
Child (age 6-59 months) has malaria (based on microscopy test)	0.028	0.013	394	274	1.573	0.464	0.002	0.053
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.016	0.006	1,208	798	1.617	0.376	0.004	0.029
Child (age 6 months to age 14) has malaria (based on rapid test)	0.049	0.022	1,208	798	2.290	0.439	0.006	0.092
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.045	0.021	1,208	798	2.334	0.475	0.002	0.088
PREGNANT WOMEN								
Slept under any mosquito net last night	0.611	0.069	44	30	0.932	0.114	0.472	0.750
Slept under an ITN last night	0.431	0.075	44	30	1.001	0.175	0.280	0.581
Slept under an ITN last night in households with at least one ITN	0.819	0.081	25	16	1.008	0.098	0.658	0.980
Received 1+ doses of SP/Fansidar	0.736	0.040	160	113	1.166	0.055	0.656	0.816
Received 2+ doses of SP/Fansidar	0.565	0.051	160	113	1.309	0.090	0.463	0.666
Received 3+ doses of SP/Fansidar	0.460	0.047	160	113	1.209	0.102	0.366	0.554

Table B.8 Sampling errors: Seasonal sample, Kenya MIS 2020

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	0.470	0.021	1,426	948	1.567	0.044	0.428	0.511
Average number of mosquito nets per household	0.856	0.052	1,426	948	1.691	0.061	0.751	0.960
Ownership of at least one ITN	0.350	0.015	1,426	948	1.178	0.043	0.320	0.380
Average number of ITNs per household	0.576	0.036	1,426	948	1.385	0.062	0.505	0.647
Ownership of at least one ITN for two persons	0.182	0.024	1,423	948	2.362	0.133	0.134	0.231
WOMEN								
No education	0.255	0.035	1,234	853	2.793	0.136	0.185	0.324
Secondary education or higher	0.420	0.028	1,234	853	1.994	0.067	0.364	0.476
Literacy	0.684	0.032	1,234	853	2.446	0.047	0.619	0.749
CHILDREN								
Child slept under any mosquito net last night	0.389	0.035	927	596	1.769	0.090	0.319	0.459
Child slept under an ITN last night	0.249	0.020	927	596	1.157	0.081	0.209	0.290
Child slept under an ITN last night in households with at least one ITN	0.725	0.049	418	205	1.768	0.068	0.627	0.824
Child had fever in last 2 weeks	0.153	0.015	812	534	1.103	0.096	0.124	0.183
Child sought care/treatment from a health facility	0.688	0.088	142	82	1.994	0.129	0.511	0.865
Child took ACT	0.722	0.109	23	14	1.089	0.151	0.505	0.940
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.063	0.014	787	511	1.517	0.223	0.035	0.090
Child (age 6-59 months) has malaria (based on rapid test)	0.008	0.006	787	511	1.777	0.747	0.000	0.021
Child (age 6-59 months) has malaria (based on microscopy test)	0.013	0.011	780	506	2.736	0.882	0.000	0.035
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.031	0.007	2,218	1,491	1.782	0.240	0.016	0.045
Child (age 6 months to age 14) has malaria (based on rapid test)	0.023	0.009	2,218	1,491	2.163	0.403	0.005	0.042
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.018	0.009	2,204	1,481	2.529	0.517	0.000	0.037
PREGNANT WOMEN								
Slept under any mosquito net last night	0.355	0.079	75	36	1.207	0.222	0.198	0.513
Slept under an ITN last night	0.189	0.062	75	36	1.156	0.327	0.065	0.312
Slept under an ITN last night in households with at least one ITN	0.757	0.114	25	9	0.974	0.151	0.529	0.985
Received 1+ doses of SP/Fansidar	0.216	0.034	326	202	1.395	0.156	0.149	0.283
Received 2+ doses of SP/Fansidar	0.168	0.024	326	202	1.083	0.141	0.120	0.215
Received 3+ doses of SP/Fansidar	0.122	0.015	326	202	0.788	0.124	0.092	0.152

Table B.9 Sampling errors: Low risk sample, Kenya MIS 2020

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	0.464	0.034	1,435	3,292	2.589	0.074	0.396	0.532
Average number of mosquito nets per household	0.895	0.122	1,435	3,292	3.890	0.136	0.652	1.139
Ownership of at least one ITN	0.306	0.037	1,435	3,292	3.066	0.122	0.231	0.381
Average number of ITNs per household	0.550	0.097	1,435	3,292	3.721	0.176	0.356	0.744
Ownership of at least one ITN for two persons	0.181	0.030	1,433	3,291	2.962	0.167	0.121	0.242
WOMEN								
No education	0.020	0.010	1,123	2,724	2.394	0.498	0.000	0.040
Secondary education or higher	0.700	0.041	1,123	2,724	3.002	0.059	0.617	0.782
Literacy	0.945	0.008	1,123	2,724	1.176	0.008	0.929	0.961
CHILDREN								
Child slept under any mosquito net last night	0.445	0.036	565	1,401	1.494	0.080	0.373	0.517
Child slept under an ITN last night	0.326	0.028	565	1,401	1.235	0.085	0.271	0.382
Child slept under an ITN last night in households with at least one ITN	0.751	0.043	263	608	1.467	0.058	0.665	0.838
Child had fever in last 2 weeks	0.097	0.010	501	1,248	0.804	0.108	0.076	0.118
Child sought care/treatment from a health facility	0.636	0.078	43	121	1.125	0.122	0.481	0.791
Child took ACT	0.568	0.347	3	0	0.276	0.611	0.000	1.262
Child (age 6-59 months) has anaemia (haemoglobin <8.0 g/dl)	0.006	0.004	484	1,190	1.092	0.613	0.000	0.014
Child (age 6-59 months) has malaria (based on rapid test)	0.000	0.000	484	1,190	na	na	0.000	0.000
Child (age 6-59 months) has malaria (based on microscopy test)	0.000	0.000	484	1,190	na	na	0.000	0.000
Child (age 6 months to age 14) has anaemia (haemoglobin <8.0 g/dl)	0.003	0.002	1,302	3,252	1.420	0.703	0.000	0.007
Child (age 6 months to age 14) has malaria (based on rapid test)	0.004	0.004	1,302	3,252	2.381	0.951	0.000	0.013
Child (age 6 months to age 14) has malaria (based on microscopy test)	0.004	0.004	1,301	3,247	2.380	0.950	0.000	0.013
PREGNANT WOMEN								
Slept under any mosquito net last night	0.461	0.113	43	130	1.707	0.245	0.235	0.687
Slept under an ITN last night	0.260	0.098	43	130	1.675	0.376	0.065	0.455
Slept under an ITN last night in households with at least one ITN	0.561	0.127	18	60	1.312	0.227	0.307	0.815
Received 1+ doses of SP/Fansidar	0.124	0.035	220	537	1.572	0.281	0.054	0.194
Received 2+ doses of SP/Fansidar	0.105	0.036	220	537	1.723	0.339	0.034	0.176
Received 3+ doses of SP/Fansidar	0.078	0.029	220	537	1.597	0.368	0.021	0.136

na = Not applicable

DATA QUALITY TABLES

Appendix C

Table C.1 Household age distribution

Single-year age distribution of the de facto household population by sex (weighted), Kenya MIS 2020

	Female		Male			Female		Male	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
0	356	2.4	312	2.1	37	116	0.8	154	1.1
1	397	2.7	407	2.8	38	196	1.3	221	1.5
2	396	2.7	356	2.4	39	82	0.6	99	0.7
3	385	2.6	378	2.6	40	245	1.6	260	1.8
4	429	2.9	424	2.9	41	97	0.7	65	0.4
5	378	2.5	445	3.1	42	155	1.0	172	1.2
6	402	2.7	446	3.1	43	120	0.8	113	0.8
7	374	2.5	375	2.6	44	123	0.8	84	0.6
8	350	2.4	444	3.1	45	160	1.1	216	1.5
9	296	2.0	348	2.4	46	88	0.6	129	0.9
10	442	3.0	400	2.7	47	90	0.6	112	0.8
11	339	2.3	384	2.6	48	77	0.5	143	1.0
12	449	3.0	411	2.8	49	68	0.5	86	0.6
13	359	2.4	383	2.6	50	278	1.9	167	1.1
14	329	2.2	317	2.2	51	89	0.6	43	0.3
15	332	2.2	432	3.0	52	168	1.1	101	0.7
16	344	2.3	403	2.8	53	62	0.4	57	0.4
17	270	1.8	268	1.8	54	78	0.5	92	0.6
18	260	1.7	299	2.1	55	79	0.5	119	0.8
19	172	1.2	171	1.2	56	97	0.7	112	0.8
20	297	2.0	291	2.0	57	82	0.6	63	0.4
21	267	1.8	183	1.3	58	100	0.7	76	0.5
22	223	1.5	231	1.6	59	49	0.3	45	0.3
23	238	1.6	238	1.6	60	141	0.9	178	1.2
24	254	1.7	189	1.3	61	47	0.3	31	0.2
25	283	1.9	200	1.4	62	64	0.4	71	0.5
26	235	1.6	157	1.1	63	28	0.2	31	0.2
27	185	1.2	188	1.3	64	32	0.2	36	0.2
28	280	1.9	255	1.8	65	53	0.4	70	0.5
29	148	1.0	151	1.0	66	25	0.2	30	0.2
30	368	2.5	277	1.9	67	43	0.3	51	0.4
31	187	1.3	119	0.8	68	85	0.6	48	0.3
32	273	1.8	166	1.1	69	25	0.2	19	0.1
33	174	1.2	144	1.0	70+	515	3.5	396	2.7
34	191	1.3	162	1.1	Don't know	33	0.2	32	0.2
35	244	1.6	329	2.3					
36	174	1.2	154	1.1	Total	14,871	100.0	14,558	100.0

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

Table C.2 Age distribution of eligible and interviewed women

De facto household population of women age 10-54, number and percent distribution of interviewed women age 15-49, and percentage of eligible women who were interviewed (weighted), by 5-year age groups, Kenya MIS 2020

	Household population of women	Interviewed women age 15-49		Percentage of eligible women
Age group	age 10-54	Number	Percentage	interviewed
10-14	1,916	na	na	-
15-19	1,378	1,279	19.1	92.8
20-24	1,279	1,232	18.4	96.3
25-29	1,132	1,069	15.9	94.5
30-34	1,193	1,143	17.0	95.9
35-39	812	792	11.8	97.4
40-44	741	726	10.8	98.0
45-49	482	467	7.0	96.8
50-54	675	-	-	-
15-49	7,017	6,708	100.0	95.6

Note: The de facto population includes all residents and nonresidents who stayed in the household the night before the interview. Weights for both the household population of women and interviewed women are household weights. Age is based on the Household Questionnaire.

Table C.3 Completeness of reporting

Percentage of observations missing information for selected demographic and health questions (weighted), Kenya MIS 2020

Subject	Percentage with information missing	Number of cases
Day only (births in the 15 years preceding the survey)	1.08	3,915
Month only (births in the 15 years preceding the survey)	0.29	3,915
Month and year (births in the 15 years preceding the survey)	0.08	3,915
Respondent's education (all women age 15-49)	0.00	6,771
Anaemia: living children age 6-59 months (from the Biomarker Questionnaire)	5.61	3,579
Malaria: living children age 6-59 months (from the Biomarker Questionnaire)	5.76	3,579
Anaemia: living children age 6 months to age 14 (from the Biomarker Questionnaire)	6.59	11,214
Malaria: living children age 6 months to age 14 (from the Biomarker Questionnaire)	6.24	11,214

Table C.4 Births by calendar years

Number of births, percentage with complete birth date, sex ratio at birth, and calendar year ratio by calendar year, according to living, dead, and total children (weighted), Kenya MIS 2020

	Number of births			Percentage with year and month of birth given			Sex ratio at birth[1]			Calendar year ratio[2]		
Calendar year	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total	Living	Dead	Total
2020	552	4	556	100.0	100.0	100.0	85.6	102.7	85.7	na	na	na
2019	766	9	775	99.7	98.8	99.7	104.6	1,149.0	106.7	na	na	na
2018	710	15	725	99.7	100.0	99.7	93.4	368.0	95.8	103.7	314.2	105.1
2017	604	0	604	99.6	100.0	99.6	95.0	0.0	94.9	88.5	2.8	86.9
2016	655	11	667	99.3	100.0	99.3	99.2	103.9	99.3	110.4	405.0	111.8
2015	582	5	588	99.4	100.0	99.5	110.1	236.9	110.9	29.5	20.5	29.4
2016-2020	3,287	40	3,327	99.7	99.7	99.7	96.0	239.5	97.0	147.7	158.2	147.8
All	3,869	45	3,915	99.6	99.7	99.6	98.0	239.2	98.9	na	na	na

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

Table C.5 Number of enumeration areas completed, by month and malaria endemicity

During the period of fieldwork, number of enumeration areas (EAs) completed by month, according to malaria endemicity, and percent distribution of EAs completed by month, Kenya MIS 2020

Malaria endemicity	Month		Number of EAs
	November	December	
Highland epidemic prone	27	28	55
Lake endemic	59	39	98
Coast endemic	17	17	34
Seasonal	34	22	56
Low risk	36	19	55
Percentage	58.1	41.9	100.0
Total	173	125	298

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

Table C.6 Positive rapid diagnostic test (RDT) results, by month and malaria endemicity

Among children age 6 months to age 14 tested for malaria by RDT, percentage who tested positive by month of fieldwork, according to malaria endemicity, Kenya MIS 2020

	Percentage of children classified as having malaria by month of fieldwork		
Malaria endemicity	November	December	Total
Highland epidemic prone	1.2	0.8	0.9
Lake endemic	22.2	22.8	22.4
Coast endemic	0.7	7.8	5.0
Seasonal	3.3	0.2	2.3
Low risk	0.7	0.2	0.5
Total	7.1	6.3	6.8

Table C.7 Concordance and discordance between RDT and microscopy results

Among children age 6 months to age 14 tested for malaria, percent distribution of results according to concordance and discordance between rapid diagnostic test (RDT) and microscopy test results, Kenya MIS 2020

	Concordance		Discordance			
	RDT+/ microscopy+	RDT-/ microscopy-	RDT+/ microscopy-	Other[1]	Total	Number of children
Total	6.7	89.3	3.7	0.3	100.0	11,329

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

Table C.8 Concordance and discordance between national and external quality control laboratories

Among microscope slides of thick films examined by both the national laboratory and the external quality control (EQC) laboratory, percent distribution of concordant and discordant results, Kenya MIS 2020

	National lab and EQC lab results are				
	Concordant	Discordant	Other[1]	Total	Number of microscope slides
Total	98.7	1.2	0.1	100.0	1,118

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

SUPPLEMENTARY TABLES OF SURVEY RESULTS

Appendix D

Table D.1 Coverage of testing for anaemia and malaria in children age 6-59 months

Percentage of eligible children age 6-59 months who were tested for anaemia and for malaria, according to background characteristics (unweighted), Kenya MIS 2020

Background characteristic	Percentage tested for: Anaemia	Malaria with RDT	Malaria by microscopy	Number of children
Age in months				
6-8	92.9	92.9	92.9	198
9-11	95.7	95.7	95.7	209
12-17	97.9	97.9	97.4	431
18-23	96.6	96.6	95.8	409
24-35	96.1	96.1	95.9	850
36-47	96.2	96.2	96.1	862
48-59	95.7	95.7	95.4	929
Sex				
Male	96.1	96.1	95.9	1,934
Female	96.1	96.1	95.8	1,954
Mother's interview status				
Interviewed	96.5	96.5	96.2	3,050
Not interviewed and not in the household[1]	94.6	94.6	94.4	838
Residence				
Urban	94.3	94.3	93.9	1,352
Rural	97.0	97.0	96.8	2,536
Malaria endemicity				
Highland epidemic prone	95.9	95.9	95.3	658
Lake endemic	97.1	97.1	97.1	1,483
Coast endemic	95.4	95.4	95.4	413
Seasonal	95.2	95.2	94.3	827
Low risk	95.5	95.5	95.5	507
Mother's education[2]				
No education	94.5	94.5	93.7	473
Primary	98.2	98.2	98.0	1,371
Secondary	96.0	96.0	96.0	869
More than secondary	93.5	93.5	93.2	337
Wealth quintile				
Lowest	96.7	96.7	96.4	1,136
Second	97.1	97.1	97.0	831
Middle	97.7	97.7	97.5	729
Fourth	96.0	96.0	95.5	731
Highest	90.5	90.5	90.0	461
Total	96.1	96.1	95.8	3,888

RDT = Rapid diagnostic test (Carestart P.f.)
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table D.2 Prevalence of malaria in children age 6-59 months

Percentage of children age 6-59 months classified in two tests as having malaria, according to background characteristics, Kenya MIS 2020

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	2.2	155	0.5	155
9-11	2.7	165	2.2	165
12-17	2.6	410	1.6	410
18-23	3.9	398	2.2	396
24-35	3.9	730	2.7	729
36-47	5.1	726	4.0	725
48-59	6.3	818	4.1	816
Sex				
Male	4.4	1,676	2.8	1,674
Female	4.5	1,725	3.2	1,722
Mother's interview status				
Interviewed	3.5	2,734	2.2	2,730
Not interviewed and not in the household[1]	8.3	667	6.1	665
Residence				
Urban	1.4	1,019	1.0	1,018
Rural	5.8	2,382	3.8	2,377
Malaria endemicity				
Highland epidemic prone	1.1	617	0.3	616
Lake endemic	16.2	809	10.5	809
Coast endemic	3.2	274	2.8	274
Seasonal	0.8	511	1.3	506
Low risk	0.0	1,190	0.0	1,190
Mother's education[2]				
No education	2.5	305	1.2	302
Primary	4.9	1,151	3.5	1,151
Secondary	2.9	928	1.4	928
More than secondary	1.2	349	1.0	349
Wealth quintile				
Lowest	6.9	787	4.2	786
Second	5.8	696	4.8	694
Middle	6.0	655	3.5	654
Fourth	1.9	730	1.1	729
Highest	0.7	533	0.7	532
Total	4.4	3,401	3.0	3,395

RDT = Rapid diagnostic test (Carestart P.f.)
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table D.3 Malaria species in children age 6-59 months

Among children age 6-59 months with malaria parasites, percentage infected with specific species of *Plasmodium* and combinations of species identified by microscopy, according to background characteristics, Kenya MIS 2020

Background characteristic	Positive for *Pf*	Positive for *Pm*	Positive for *Po*	Positive for *Pf+Po*	Positive for *Pf+Pm*	Number of children with malaria
Age in months						
6-8	*	*	*	*	*	1
9-11	*	*	*	*	*	4
12-17	*	*	*	*	*	6
18-23	*	*	*	*	*	9
24-35	(74.6)	(0.0)	(2.8)	(2.8)	(19.7)	19
36-47	(76.3)	(6.1)	(5.1)	(0.0)	(12.5)	29
48-59	68.6	2.9	0.0	1.1	27.5	33
Sex						
Male	62.5	5.8	1.4	0.8	29.6	46
Female	80.3	5.0	2.6	1.0	11.1	54
Mother's interview status						
Interviewed	70.4	8.1	0.9	1.5	19.1	60
Not interviewed and not in the household[1]	74.6	1.4	3.7	0.0	20.3	40
Residence						
Urban	*	*	*	*	*	10
Rural	73.0	5.0	1.5	1.0	19.5	91
Malaria endemicity						
Highland epidemic prone	*	*	*	*	*	2
Lake endemic	69.3	6.4	2.4	1.1	20.9	85
Coast endemic	*	*	*	*	*	8
Seasonal	*	*	*	*	*	6
Mother's education[2]						
No education	*	*	*	*	*	4
Primary	67.8	7.9	0.0	1.3	23.0	40
Secondary	*	*	*	*	*	13
More than secondary	*	*	*	*	*	3
Wealth quintile						
Lowest	75.7	4.0	1.6	0.0	18.7	33
Second	72.1	7.1	0.0	1.6	19.2	33
Middle	(65.0)	(3.7)	(3.7)	(0.0)	(27.7)	23
Fourth	*	*	*	*	*	8
Highest	*	*	*	*	*	3
Total	72.1	5.4	2.0	0.9	19.6	101

Note: No cases of *Plasmodium vivax* were found. 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.
Pf = Plasmodium falciparum
Pm = Plasmodium malariae
Po = Plasmodium ovale
[1] Includes children whose mothers are deceased
[2] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Table D.4 Prevalence of anaemia in children age 6-59 months

Percent distribution of anaemia among de facto children age 6-59 months, by background characteristics, Kenya MIS 2020

Background characteristic	Severe anaemia	Moderate anaemia	Mild anaemia	No anaemia	Total	Number of children
Age in months						
6-8	4.3	29.6	35.5	30.6	100.0	155
9-11	7.8	25.7	31.5	35.0	100.0	165
12-17	4.5	24.5	39.6	31.5	100.0	410
18-23	3.6	32.1	26.4	37.9	100.0	398
24-35	4.3	19.2	21.6	54.9	100.0	730
36-47	3.2	11.1	23.6	62.2	100.0	726
48-59	1.6	8.0	15.1	75.3	100.0	818
Sex						
Male	4.1	17.8	21.7	56.4	100.0	1,676
Female	2.9	17.7	26.8	52.6	100.0	1,725
Mother's interview status						
Interviewed	3.8	18.5	24.7	53.0	100.0	2,734
Not interviewed and not in the household[1]	2.4	14.6	22.6	60.4	100.0	667
Residence						
Urban	2.6	14.1	20.0	63.3	100.0	1,019
Rural	3.9	19.2	26.2	50.7	100.0	2,382
Malaria endemicity						
Highland epidemic prone	3.1	10.7	27.4	58.9	100.0	617
Lake endemic	6.5	27.1	24.6	41.8	100.0	809
Coast endemic	3.2	26.3	25.7	44.8	100.0	274
Seasonal	6.3	24.1	24.2	45.4	100.0	511
Low risk	0.6	10.3	22.2	66.9	100.0	1,190
Mother's education[2]						
No education	8.1	29.1	22.6	40.2	100.0	305
Primary	4.1	21.9	25.2	48.8	100.0	1,151
Secondary	2.9	12.9	23.8	60.3	100.0	928
More than secondary	1.6	12.4	27.2	58.7	100.0	349
Wealth quintile						
Lowest	6.9	24.7	25.9	42.4	100.0	787
Second	3.7	19.5	25.3	51.6	100.0	696
Middle	3.6	17.3	29.4	49.7	100.0	655
Fourth	1.4	15.1	22.1	61.4	100.0	730
Highest	1.2	9.1	17.3	72.4	100.0	533
Total	3.5	17.7	24.3	54.5	100.0	3,401

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia is based on haemoglobin levels and is adjusted for altitude using CDC formulas (CDC 1998). Haemoglobin is measured in grams per decilitre (g/dl). Severe anaemia is considered to be a haemoglobin level <8.0 g/dl, moderate anaemia is 8.0-9.9 g/dl, mild anaemia is 10.0-10.9 g/dl, and no anaemia is >11.0 g/dl (Kraemer and Zimmerman 2007).

[1] Includes children whose mothers are deceased

[2] Excludes children whose mothers were not interviewed

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QUESTIONNAIRES

Appendix F

FORMATTING DATE: 13 Oct 2020
ENGLISH LANGUAGE: 13 Oct 2020

KENYA MALARIA INDICATOR SURVEY
HOUSEHOLD QUESTIONNAIRE

Division of National Malaria Programme
Kenya National Bureau of Statistics

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

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

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

INTERVIEWER VISITS

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

*RESULT CODES:

1 COMPLETED
2 NO HOUSEHOLD MEMBER AT HOME OR NO COMPETENT RESPONDENT AT HOME AT TIME OF VISIT
3 ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME
4 POSTPONED
5 REFUSED
6 DWELLING VACANT OR ADDRESS NOT A DWELLING
7 DWELLING DESTROYED
8 DWELLING NOT FOUND
9 OTHER _____ (SPECIFY)

TOTAL PERSONS IN HOUSEHOLD | |

TOTAL ELIGIBLE WOMEN | |

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE | |

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

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:

01 ENGLISH	06 KAMBA	11 LUO	16 SOMALI
02 KISWAHILI	07 KIKUYU	12 MAASAI	17 TURKANA
03 BORANA	08 KISII	13 MERU	96 OTHER _____ SPECIFY
04 EMBU	09 LUHYA	14 MIJIKENDA	
05 KALENJIN	10 MARAGOLI	15 POKOT	

SUPERVISOR

_____ NAME

				NUMBER

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INTRODUCTION AND CONSENT

RESPONDENT AGREES TO BE INTERVIEWED . . 1

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

100	RECORD THE TIME.	HOURS . . . . . ☐☐ MINUTES . . . . . ☐☐

HOUSEHOLD SCHEDULE

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBILITY	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household. AFTER ASKING QUESTIONS 2-7 FOR EACH PERSON ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD '95'.	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	CIRCLE LINE NUMBER OF ALL CHILDREN AGE 0-14
			M F	Y N	Y N	IN YEARS		
01			1 2	1 2	1 2		01	01
02			1 2	1 2	1 2		02	02
03			1 2	1 2	1 2		03	03
04			1 2	1 2	1 2		04	04
05			1 2	1 2	1 2		05	05
06			1 2	1 2	1 2		06	06
07			1 2	1 2	1 2		07	07
08			1 2	1 2	1 2		08	08
09			1 2	1 2	1 2		09	09
10			1 2	1 2	1 2		10	10

2A)	Just to make sure that I have a complete listing: are there any other people such as small children or infants that we have not listed?	YES ☐ →	ADD TO TABLE	NO ☐
2B)	Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends who usually live here?	YES ☐ →	ADD TO TABLE	NO ☐
2C)	Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?	YES ☐ →	ADD TO TABLE	NO ☐

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

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

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 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)	→ 109
106	Do you share this toilet facility with other households?	YES . . . . . 1 NO 2	→ 108
107	Including your own household, how many households use this toilet facility?	NO. OF HOUSEHOLDS IF LESS THAN 10 . . . . . 0 _ 10 OR MORE HOUSEHOLDS . . . . . 95 DON'T KNOW 98	
108	Where is this toilet facility located?	IN OWN DWELLING . . . . . 1 IN OWN YARD/PLOT . . . . . 2 ELSEWHERE 3	
109	In your household, what type of cooking device (cookstove) is mainly used for cooking?	ELECTRIC STOVE . . . . . 01 SOLAR COOKER . . . . . 02 LIQUEFIED PETROLEUM GAS (LPG)/ COOKING GAS STOVE . . . . . 03 PIPED NATURAL GAS STOVE . . . . . 04 BIOGAS STOVE . . . . . 05 LIQUID FUEL STOVE . . . . . 06 MANUFACTURED SOLID FUEL STOVE . . . . . 07 TRADITIONAL SOLID FUEL STOVE . . . . . 08 THREE STONE STOVE/OPEN FIRE . . . . . 09 NO FOOD COOKED IN HOUSEHOLD . . . . . 95 OTHER _____ 96 (SPECIFY)	→ 111 → 111
110	What type of fuel or energy source is used in this cookstove?	ALCOHOL/ETHANOL . . . . . 01 GASOLINE/DIESEL . . . . . 02 KEROSENE/PARAFFIN . . . . . 03 COAL/LIGNITE . . . . . 04 CHARCOAL . . . . . 05 WOOD . . . . . 06 STRAW/SHRUBS/GRASS . . . . . 07 AGRICULTURAL CROP . . . . . 08 ANIMAL DUNG/WASTE . . . . . 09 PROCESSED BIOMASS (PELLETS) OR WOODCHIPS . . . . . 10 GARBAGE/PLASTIC . . . . . 11 SAWDUST . . . . . 12 OTHER _____ 96 (SPECIFY)	
111	How many rooms in this household are used for sleeping?	ROOMS . . . . . _ _	
112	Does this household own any livestock, herds, other farm animals, or poultry?	YES . . . . . 1 NO 2	→ 114

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
113	How many of the following (animals) livestock does this household own? IF NONE, RECORD '00'. IF 95 OR MORE, RECORD '95'. IF UNKNOWN, RECORD '98'.		
	a) Local cattle (indigenous)?	a) LOCAL CATTLE	
	b) Exotic/grade cattle?	b) EXOTIC/GRADE CATTLE	
	c) Horses?	c) HORSES	
	d) Donkeys?	d) DONKEYS	
	e) Mules?	e) MULES	
	f) Goats?	f) GOATS	
	g) Sheep?	g) SHEEP	
	h) Chickens or other poultry?	h) CHICKENS/POULTRY	
	i) Pigs?	i) PIGS	
114	Does any member of this household own any agricultural land?	YES . . . . . 1 NO 2	→ 116
115	How many acres or hectares of agricultural land do members of this household own? ACRES/HECTARES: IF 995 OR MORE, RECORD '995.0' IN APPROPRIATE BOX. PLOT SIZE (SQ FT): IF 999995 OR MORE, RECORD '999995.0' IN APPROPRIATE BOX	ACRES . . . . . 1 ___.___ HECTARES . . . . . 2 ___.___ PLOT SIZE (SQ FT) 3 ___.___ DON'T KNOW 998	
116	Does your household have:	YES NO	
	a) Electricity?	a) ELECTRICITY 1 2	
	b) A radio?	b) RADIO 1 2	
	c) A television?	c) TELEVISION 1 2	
	d) A fixed line telephone?	d) FIXED LINE TELEPHONE 1 2	
	e) A computer?	e) COMPUTER 1 2	
	f) A refrigerator?	f) REFRIGERATOR 1 2	
	g) A solar panel?	g) SOLAR PANEL 1 2	
	h) A table?	h) TABLE 1 2	
	i) A chair?	i) CHAIR 1 2	
	j) A sofa?	j) SOFA 1 2	
	k) A bed?	k) BED 1 2	
	l) A cupboard?	l) CUPBOARD 1 2	
	m) A clock?	m) CLOCK 1 2	
	n) A microwave oven?	n) MICROWAVE OVEN 1 2	
	o) A DVD player?	o) DVD PLAYER 1 2	
	p) A CD player?	p) CD PLAYER 1 2	

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
117	Does any member of this household own: a) A watch? b) A mobile phone? c) A bicycle? d) A motorcycle or motor scooter? e) An animal-drawn cart? f) A car or truck? g) A boat with a motor?	YES NO a) WATCH . . . . . 1 2 b) MOBILE PHONE . . . . . 1 2 c) BICYCLE . . . . . 1 2 d) MOTORCYCLE/SCOOTER . . . . . 1 2 e) ANIMAL-DRAWN CART . . . . . 1 2 f) CAR/TRUCK . . . . . 1 2 g) BOAT WITH MOTOR 1 2	
118	Does any member of this household have an account in a bank or other financial institution?	YES . . . . . 1 NO 2	
119	Does any member of this household use a mobile phone to make financial transactions such as sending or receiving money, paying bills, purchasing goods or services, or receiving wages?	YES . . . . . 1 NO 2	
119A	In the past year has this household ever used mosquito repellent spray (e.g. Doom), ointments, vaporizers coils, herbs, or plants to protect against mosquitoes / malaria?	YES . . . . . 1 NO 2	
120	Does your household have any mosquito nets?	YES . . . . . 1 NO 2	→ 132
121	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS . . . . . ☐	

MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD. OBSERVE AND ANSWER THE QUESTIONS FOR EACH NET, ONE BY ONE.		
122	ASSIGN EACH NET A SEQUENTIAL NUMBER AND RECORD THE NUMBER HERE.	NET NUMBER . . . . . [ ][ ]	
123	WAS THIS NET OBSERVED?	OBSERVED . . . . . 1 NOT OBSERVED 2	
124	How many months ago did your household get the mosquito net? IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS AGO . . . . . [ ][ ] MORE THAN 36 MONTHS AGO . . . . . 95 NOT SURE 98	
125	OBSERVE OR ASK BRAND/TYPE OF MOSQUITO NET. IF BRAND IS UNKNOWN AND YOU CANNOT OBSERVE THE NET, SHOW PICTURES OF TYPICAL NET TYPES/BRANDS TO RESPONDENT.	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET (SUPANET EXTRA) . . . . . 11 PERMANET (SUPANET EXTRA) . . . . . 12 NETPROTECT . . . . . 13 YORKOOL . . . . . 14 DAWA PLUS . . . . . 15 OTHER/DON'T KNOW BRAND (LLIN) . . . . . 16 OTHER TYPE (NOT LLIN) . . . . . 96 DON'T KNOW TYPE 98	
126	Did you get the net through a distribution campaign, during an antenatal care visit, or during a child welfare visit?	YES, MASS DISTRIBUTION CAMPAIGN . . . . . 1 YES, ANC . . . . . 2 YES, CHILD WELFARE VISIT . . . . . 3 NO 4	→ 128
127	Where did you get the net?	GOVERNMENT HEALTH FACILITY . . . . . 01 PRIVATE HEALTH FACILITY . . . . . 02 PHARMACY . . . . . 03 SHOP/MARKET . . . . . 04 CHW . . . . . 05 RELIGIOUS INSTITUTION . . . . . 06 SCHOOL . . . . . 07 OTHER . . . . . 96 DON'T KNOW 98	
128	Did anyone sleep under this mosquito net last night?	YES . . . . . 1 NO . . . . . 2 NOT SURE 8	→ 130 → 131

MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
129	Who slept under this mosquito net last night? RECORD THE PERSON'S NAME AND LINE NUMBER FROM HOUSEHOLD SCHEDULE.	NAME _____ LINE NUMBER . . . . . |_|_| NAME _____ LINE NUMBER . . . . . |_|_| NAME _____ LINE NUMBER . . . . . |_|_| NAME _____ LINE NUMBER . . . . . |_|_|	→ 131
130	What was the main reason this net was not used last night?	TOO HOT . . . . . 01 DON'T LIKE NET SHAPE/COLOR/SIZE . . . . . 02 DON'T LIKE SMELL . . . . . 03 UNABLE TO HANG NET . . . . . 04 SLEPT OUTDOORS . . . . . 05 USUAL USER DIDN'T SLEEP HERE LAST NIGHT . . . . . 06 NO MOSQUITOES/NO MALARIA . . . . . 07 EXTRA NET/SAVING FOR LATER . . . . . 08 NET TOO SMALL/SHORT . . . . . 09 NET BROUGHT BEDBUGS . . . . . 10 OTHER _____ 96 (SPECIFY)	
131	GO BACK TO 122 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 132.		

ADDITIONAL HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
132	OBSERVE MAIN MATERIAL OF THE FLOOR OF THE DWELLING. RECORD OBSERVATION.	**NATURAL FLOOR** EARTH/SAND . . . . . 11 DUNG . . . . . 12 **RUDIMENTARY FLOOR** WOOD PLANKS . . . . . 21 PALM/BAMBOO . . . . . 22 **FINISHED FLOOR** PARQUET OR POLISHED WOOD . . . . . 31 VINYL OR ASPHALT STRIPS . . . . . 32 CERAMIC TILES . . . . . 33 CEMENT . . . . . 34 CARPET . . . . . 35 OTHER _____ 96 (SPECIFY)	
133	OBSERVE MAIN MATERIAL OF THE ROOF OF THE DWELLING. RECORD OBSERVATION.	**NATURAL ROOFING** NO ROOF . . . . . 11 THATCH/PALM LEAF . . . . . 12 SOD . . . . . 13 **RUDIMENTARY ROOFING** RUSTIC MAT . . . . . 21 PALM/BAMBOO . . . . . 22 WOOD PLANKS . . . . . 23 CARDBOARD . . . . . 24 **FINISHED ROOFING** IRON SHEETS . . . . . 31 WOOD . . . . . 32 CALAMINE/CEMENT FIBER . . . . . 33 BRICK/CLAY TILES . . . . . 34 CEMENT . . . . . 35 ROOFING SHINGLES . . . . . 36 OTHER _____ 96 (SPECIFY)	
134	OBSERVE MAIN MATERIAL OF THE EXTERIOR WALLS OF THE DWELLING. RECORD OBSERVATION.	**NATURAL WALLS** NO WALLS . . . . . 11 CANE/PALM/TRUNKS . . . . . 12 DIRT . . . . . 13 **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)	
135	RECORD THE TIME.	HOURS . . . . . ☐☐ MINUTES . . . . . ☐☐	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

FORMATTING DATE: 15 Oct 2020
ENGLISH LANGUAGE: 15 Oct 2020

KENYA MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

Division of National Malaria Programme
Kenya National Bureau of Statistics

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

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

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

NAME AND LINE NUMBER OF WOMAN _____ | | |

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY
				MONTH
				YEAR
INTERVIEWER'S NAME				INT. NO.
RESULT*				RESULT*
NEXT VISIT: DATE				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	06 KAMBA	11 LUO	16 SOMALI
02 KISWAHILI	07 KIKUYU	12 MAASAI	17 TURKANA
03 BORANA	08 KISII	13 MERU	96 OTHER _____ SPECIFY
04 EMBU	09 LUHYA	14 MIJIKENDA	
05 KALENJIN	10 MARAGOLI	15 POKOT	

SUPERVISOR

_____ NAME | | | | | NUMBER

INTRODUCTION AND CONSENT

RESPONDENT AGREES TO BE INTERVIEWED . . 1 → SECTION 1. RESPONDENT'S BACKGROUND

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

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	
102	In what month and year were you born?	MONTH . . . . . [ ][ ] 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, post-primary/vocational, secondary/'A' Level, College, or University	PRIMARY . . . . . 1 POST-PRIMARY/VOCATIONAL . . . . . 2 SECONDARY/'A' LEVEL . . . . . 3 COLLEGE (MIDDLE LEVEL) . . . . . 4 UNIVERSITY 5	
106	What is the highest (standard/form/year) you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	STANDARD/FORM/YEAR . . . . . [ ][ ]	
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	CHECK 108: CODE '2', '3' OR '4' CIRCLED ☐ CODE '1' OR '5' CIRCLED ☐ → 111		
110	Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . . 1 AT LEAST ONCE A WEEK . . . . . 2 LESS THAN ONCE A WEEK . . . . . 3 NOT AT ALL 4	

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . . 1 AT LEAST ONCE A WEEK . . . . . 2 LESS THAN ONCE A WEEK . . . . . 3 NOT AT ALL 4	
112	Do you watch television almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY . . . . . 1 AT LEAST ONCE A WEEK . . . . . 2 LESS THAN ONCE A WEEK . . . . . 3 NOT AT ALL 4	
113	Do you own a mobile phone?	YES . . . . . 1 NO 2	→ 115
114	Is your mobile phone a smart phone?	YES . . . . . 1 NO 2	
115	Have you ever used the internet from any location on any device?	YES . . . . . 1 NO 2	→ 118
116	In the last 12 months, have you used the internet? IF NECESSARY, PROBE FOR USE FROM ANY LOCATION, WITH ANY DEVICE.	YES . . . . . 1 NO 2	→ 118
117	During the last one month, how often did you use the internet: almost every day, at least once a week, less than once a week, or not at all?	ALMOST EVERY DAY . . . . . 1 AT LEAST ONCE A WEEK . . . . . 2 LESS THAN ONCE A WEEK . . . . . 3 NOT AT ALL 4	
118	What is your religion?	ROMAN CATHOLIC . . . . . 1 PROTESTANT/OTHER CHRISTIAN . . . . . 2 MUSLIM . . . . . 3 NO RELIGION . . . . . 4 OTHER _____ 96 (SPECIFY)	

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	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 LIVE 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 →		→ 224
211	Now I'd like to ask you about your more recent births. How many births have you had in 2015-2020? RECORD NUMBER OF LIVE BIRTHS IN 2015-2020	TOTAL IN 2015-2020 . . . . . [ ][ ] NONE 00	→ 224

SECTION 2. REPRODUCTION

212 Now I would like to record the names of all your births in 2015-2020, whether still alive or not, starting with the most recent one you had.
RECORD IN 213 THE NAMES OF ALL THE BIRTHS BORN IN 2015-2020. 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 Was that a single or multiple pregnancy?	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 THE SAME ☐ ↓ NUMBERS ARE DIFFERENT ☐ → (PROBE AND RECONCILE)		
224	Are you pregnant now?	YES . . . . . 1 NO . . . . . 2 UNSURE 8	→ 301
225	How many weeks or months pregnant are you? RECORD NUMBER OF COMPLETED WEEKS OR MONTHS.	WEEKS . . . . . 1 ☐☐ MONTHS . . . . . 2 ☐☐	

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	CHECK 216: ONE OR MORE BIRTHS 0-35 MONTHS BEFORE THE SURVEY ☐ ↓ NO BIRTHS 0-35 MONTHS BEFORE THE SURVEY ☐ →		401
302	RECORD THE NAME OF THE MOST RECENT BIRTH FROM 213, LINE 01:	MOST RECENT BIRTH NAME _____	
303	Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. While you were pregnant with (NAME), did you see anyone for antenatal care for this pregnancy?	YES . . . . . 1 NO 2	→ 308
304	Whom did you see? Anyone else? PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.	**HEALTH PERSONNEL** DOCTOR, NURSE/MIDWIFE, OR ANY OTHER HEALTH PERSONNEL . . . . . A **OTHER PERSON** TRADITIONAL BIRTH ATTENDANT . . . . . C COMMUNITY HEALTH WORKER . . . . . D OTHER _____ X (SPECIFY)	
305	Where did you receive antenatal care for this pregnancy? Anywhere else? PROBE TO IDENTIFY THE TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC, PRIVATE, OR NGO SECTOR, RECORD 'X' AND WRITE THE NAME OF THE PLACE(S).	**HOME** HER HOME . . . . . A OTHER HOME . . . . . B **PUBLIC SECTOR** GOVERNMENT HOSPITAL . . . . . C GOVERNMENT HEALTH CENTER . . . . . D GOVERNMENT DISPENSARY . . . . . E OTHER PUBLIC SECTOR _____ F (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL . . . . . G PRIVATE CLINIC . . . . . H FAITH-BASED, CHURCH, HOSPITAL/CLINIC . . . . . I OTHER PRIVATE MEDICAL SECTOR _____ J (SPECIFY) OTHER _____ X (SPECIFY)	

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	NAME OF CHILD _____	BIRTH HISTORY NUMBER	
306	How many weeks or months pregnant were you when you first received antenatal care for this pregnancy?	WEEKS . . . . . 1 MONTHS . . . . . 2 DON'T KNOW 998	
307	How many times did you receive antenatal care during this pregnancy?	NUMBER OF TIMES . . . . . DON'T KNOW 98	
307A	During this pregnancy who usually made the final decision about whether you went for antenatal care – you, your spouse, you and your spouse, or someone else?	RESPONDENT . . . . . 1 SPOUSE . . . . . 2 JOINT DECISION WITH SPOUSE . . . . . 3 SOMEONE ELSE . . . . . 4 DON'T KNOW 8	
308	During this pregnancy, did you take SP/Fansidar to keep you from getting malaria?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 401
309	How many times did you take SP/Fansidar during this pregnancy?	TIMES . . . . . DON'T KNOW 98	
309A	CHECK 309: TOOK SP ONLY 1 OR 2 TIMES DURING THIS PREGNANCY	CODE '01' OR '02' TIMES ENTERED ☐ OTHER ☐	→ 310
309B	Why did you take SP/Fansidar only one or two times during this pregnancy? RECORD ALL MENTIONED	FACILITY TOO FAR . . . . . A HAD NO MONEY . . . . . B SIDE EFFECTS . . . . . C NOT AWARE HAD TO TAKE MORE . . . . . D DID NOT WANT TO TAKE . . . . . E NOT GIVEN . . . . . F NOT AVAILABLE . . . . . G OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
310	Did you get the SP/Fansidar during any antenatal care visit, during another visit to a health facility or from another source? IF MORE THAN ONE SOURCE, RECORD THE HIGHEST SOURCE ON THE LIST.	ANTENATAL VISIT . . . . . 1 ANOTHER FACILITY VISIT . . . . . 2 OTHER SOURCE 6	

SECTION 4. FEVER IN CHILDREN

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
401	CHECK 216 AND 217 IN THE BIRTH HISTORY: ANY SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY? ONE OR MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ NO SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ → 501		
402	Now I would like to ask some questions about the health of your children born in the last 5 years. (We will talk about each separately, starting with the youngest.)		
403	RECORD THE NAME AND BIRTH HISTORY NUMBER FROM 213 OF THE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY, STARTING WITH THE LAST ONE. NAME OF CHILD _____	BIRTH HISTORY NUMBER . . . . . ☐☐	
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 416
405	At any time during the illness, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
406	Were you told by a healthcare provider that (NAME) had malaria?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
407	Did you seek advice or treatment for the illness from any source?	YES . . . . . 1 NO 2	→ 412
408	Where did you seek advice or treatment? Anywhere else? PROBE TO IDENTIFY THE TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC, PRIVATE, OR NGO SECTOR, RECORD 'X' AND WRITE THE NAME OF THE PLACE(S).	**PUBLIC SECTOR** GOVERNMENT HOSPITAL . . . . . A GOVERNMENT HEALTH CENTER . . . . . B GOVERNMENT DISPENSARY . . . . . C MOBILE CLINIC . . . . . D COMMUNITY HEALTH WORKER/ FIELDWORKER . . . . . E OTHER PUBLIC SECTOR _____ F (SPECIFY) **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL . . . . . G PRIVATE CLINIC . . . . . H PHARMACY . . . . . I PRIVATE DOCTOR . . . . . J MOBILE CLINIC . . . . . K COMMUNITY HEALTH WORKER . . . . . L OTHER PRIVATE MEDICAL SECTOR _____ M (SPECIFY) **OTHER SOURCE** SHOP . . . . . Q TRADITIONAL PRACTITIONER . . . . . R MARKET . . . . . S ITINERANT DRUG SELLER . . . . . T OTHER _____ X (SPECIFY)	

SECTION 4. FEVER IN CHILDREN

NO.	NAME OF CHILD _____ BIRTH HISTORY NUMBER	
409	CHECK 408: TWO OR MORE CODES CIRCLED ☐ ↓ ONLY ONE CODE CIRCLED ☐ → 411	
410	Where did you first seek advice or treatment? USE LETTER CODE FROM 408.	FIRST PLACE . . . . . ☐
411	How many days after the illness began did you first seek advice or treatment for (NAME)? IF THE SAME DAY RECORD '00'.	DAYS . . . . . ☐☐
412	At any time during the illness, did (NAME) take any medicine for the illness?	YES . . . . . 1 NO . . . . . 2 → 416 DON'T KNOW 8
413	What medicine did (NAME) take? Any other medicine? RECORD ALL MENTIONED. IF MEDICINE NOT KNOWN, ASK TO SEE THE PACKAGE OR PRESCRIPTION.	**ACT ANTIMALARIAL MEDICINE** AL . . . . . A DHAP . . . . . B OTHER ACT (NOT AL OR DHAP) . . . . . C **NON-ACT ANTIMALARIAL** SP/FANSIDAR . . . . . D CHLOROQUINE . . . . . E AMODIAQUINE . . . . . F QUININE PILLS . . . . . G INJECTION/IV . . . . . H ARTESUNATE RECTAL . . . . . I INJECTION/IV . . . . . J OTHER ANTIMALARIAL _____ K (SPECIFY) **ANTIBIOTIC MEDICINE** AMOXICILLIN . . . . . L COTRIMOXAZOLE . . . . . M OTHER PILL/SYRUP . . . . . N OTHER INJECTION/IV . . . . . O **OTHER MEDICINE** ASPIRIN . . . . . P PARACETAMOL/PANADOL/ ACETAMINOPHEN . . . . . Q IBUPROFEN . . . . . R OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z
414	CHECK 413: ARTEMISININ-BASED COMBINATION THERAPY ('A', 'B', OR 'C') GIVEN CODE 'A', 'B', OR 'C' CIRCLED ☐ ↓ CODE 'A', 'B', AND/OR 'C' NOT CIRCLED ☐ → 416	
415	How long after the fever started did (NAME) first take an artemisinin-based combination therapy?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . . . . 3 DON'T KNOW 8
416	CHECK 216 AND 217 IN BIRTH HISTORY: ANY MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY? NO MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ ↓ SKIP TO 501 MORE SURVIVING CHILDREN BORN 0-59 MONTHS BEFORE THE SURVEY ☐ → 403	

SECTION 5. KNOWLEDGE AND BELIEFS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	In the past six months, have you seen or heard any messages about malaria?	YES . . . . . 1 NO 2	→ 503
502	Where did you see or hear these messages? Anywhere else? RECORD ALL MENTIONED	RADIO . . . . . A TELEVISION . . . . . B POSTER/BILLBOARD . . . . . C NEWSPAPER/MAGAZINE . . . . . D LEAFLET/BROCHURE . . . . . E HEALTHCARE PROVIDER . . . . . F COMMUNITY HEALTH WORKER . . . . . G SOCIAL MEDIA . . . . . H RELATIVE/FRIEND . . . . . I COMMUNITY DIALOGUE / BARAZA . . . . . J COMMUNITY LEADER / ELDER . . . . . K COMMUNITY EVENT / ROADSHOW . . . . . L SCHOOL PUPILS . . . . . M ANYWHERE ELSE _____ X (SPECIFY) DON'T REMEMBER Z	
502A	What messages about malaria have you seen or heard in the past 6 months? Anything else? RECORD ALL MENTIONED	IF YOU HAVE SYMPTOMS OF MALARIA GO TO HEALTH FACILITY . . . . . A SLEEP UNDER AN INSECTICIDE-TREATED MOSQUITO NET . . . . . B PREGNANT WOMEN SHOULD TAKE MEDICINE 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	
503	Are there ways to avoid getting malaria?	YES . . . . . 1 NO 2	→ 505
504	What are the things that people can do to prevent themselves from getting malaria? RECORD ALL MENTIONED	SLEEP UNDER A MOSQUITO NET . . . . . A SLEEP UNDER AN INSECTICIDE-TREATED MOSQUITO NET . . . . . B USE MOSQUITO REPELLENT . . . . . C TAKE PREVENTATIVE MEDICATIONS . . . . . D SPRAY HOUSE WITH INSECTICIDE . . . . . E FILL IN STAGNANT WATERS (PUDDLES . . . . . F KEEP SURROUNDINGS CLEAN . . . . . G PUT MOSQUITO SCREEN ON WINDOWS . . . . . H PREGNANT WOMEN TAKE SP/FANSIDAR . . . . . I OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
504A	What is the recommended treatment for malaria?	ACT/AL . . . . . A SP/FANSIDAR . . . . . B CHLOROQUINE . . . . . C AMODIAQUINE . . . . . D OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
505	Now I am going to read some statements and I would like you to tell me whether you agree or disagree with it. If you don't know, say, don't know. People in this community only get malaria during the rainy season. Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
506	When a child has a fever, you almost always worry it might be malaria. Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	

SECTION 5. KNOWLEDGE AND BELIEFS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
507	Getting malaria is not a problem because it can be easily treated. Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
508	Only weak children can die from malaria Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
509	You can sleep under a mosquito net for the entire night when there are lots of mosquitoes Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
510	You can sleep under a mosquito net for the entire night when there are few mosquitoes Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
511	You do not like sleeping under a mosquito net when the weather is too warm. Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
511A	I am confident in my ability to hang a mosquito net in my household Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
512	When a child has a fever, it is best to start by giving them any medicine you have at home. Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
513	People in your community usually take their children to a health care provider on the same day or day after they develop a fever Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
514	People in your community who have a mosquito net usually sleep under a mosquito net every night Do you agree or disagree?	AGREE . . . . . 1 DISAGREE . . . . . 2 DON'T KNOW/UNCERTAIN 8	
514A	Now I will ask you a specific question about your household. Has any mosquito net in this house been used for any reason other than sleeping?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 515
514B	What was it used for? Anything else? RECORD ALL MENTIONED.	COVER/PROTECT THE GARDEN OR CHICK . . . . . A FISHING ACTIVITIES . . . . . B WINDOW SCREEN . . . . . C CLOTHING/WEDDING VEIL . . . . . D OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
515	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: 18 July 2020
ENGLISH LANGUAGE: 9 Jan 2020

KENYA MALARIA INDICATOR SURVEY
BIOMARKER QUESTIONNAIRE

Division of National Malaria Programme
Kenya National Bureau of Statistics

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

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

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

HEALTH TECH VISITS

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

NOTES:

TOTAL ELIGIBLE CHILDREN

LANGUAGE OF QUESTIONNAIRE** 0 1

LANGUAGE OF INTERVIEW**

NATIVE LANGUAGE OF RESPONDENT**

TRANSLATOR (YES = 1, NO = 2)

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:

01 ENGLISH	06 KAMBA	11 LUO	16 SOMALI
02 KISWAHILI	07 KIKUYU	12 MAASAI	17 TURKANA
03 BORANA	08 KISII	13 MERU	96 OTHER
04 EMBU	09 LUHYA	14 MIJIKENDA	
05 KALENJIN	10 MARAGOLI	15 POKOT	SPECIFY

SUPERVISOR		HOUSEHOLD INTERVIEWER	
NAME	NUMBER	NAME	NUMBER

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS" [COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE]. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 1		SKIP
102	CHECK CAPI OUTPUT AND RECORD LINE NUMBER AND NAME OF CHILD. [RECORD LINE NUMBER FROM COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE; RECORD NAME FROM COLUMN 2 IN HOUSEHOLD QUESTIONNAIRE.]	LINE NUMBER . . . . . ☐☐ NAME _____	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
105	CHECK 104: CHILD AGE 0-14 YEARS? YES ☐	NO ☐ →	129
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐	AGE 0-5 MONTHS ☐ →	129
107	NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____	
108	CONSENT		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER . . . . . 3 →	112
110	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

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

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

	CHILD 1		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	TELL THE PARENT/OTHER ADULT: If your child has a fever for two days after the last dose of ACTs, you should take the child to the nearest health facility for further examination. If [NAME] has a high fever, fast or difficult breathing, is not able to drink or breastfeed, gets sicker or does not get better in two days, you should take him/her to a health professional for treatment right away. IF CHILD WEIGHS LESS THAN 5 KGS., DO NOT LEAVE DRUGS. TELL PARENT TO TAKE CHILD TO HEALTH FACILITY. First day starts by taking first dose followed by the second dose 8 hours later. On subsequent days, the recommendation is simply "morning" and "evening" (around 12 hours apart). Take the medicine (crushed for small children) with high fat foods or drinks like milk. Make sure the full 3 days treatment is taken at the recommended times, otherwise the infection may return. If your child vomits within an hour of taking the medicine, you will need to get additional tablets and repeat the dose.		→ 128
126	CHECK 113: HAEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA . . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANAEMIA REFERRAL** The anaemia test shows that (NAME OF CHILD) has severe anaemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 103 ON THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.		

DOSING SCHEDULE WITH ARTEMETHER-LUMEFANTRINE (AL)

WEIGHT IN KG	AGE IN YEARS	NUMBER OF TABLETS PER DOSE					
		DAY 1		DAY 2		DAY 3	
		1st dose	8 hours	24 hours	36 hours	48 hours	60 hours
5-14	5mos-<3yrs	1	1	1	1	1	1
15-24	3-7yrs	2	2	2	2	2	2
25-34	8-11yrs	3	3	3	3	3	3
35 and above	≥12yrs	4	4	4	4	4	4

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS" [COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE]. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 2		SKIP
102	CHECK CAPI OUTPUT AND RECORD LINE NUMBER AND NAME OF CHILD. [RECORD LINE NUMBER FROM COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE; RECORD NAME FROM COLUMN 2 IN HOUSEHOLD QUESTIONNAIRE.]	LINE NUMBER . . . . . ☐☐ NAME _____	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
105	CHECK 104: CHILD AGE 0-14 YEARS? YES ☐	NO ☐	→ 129
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐	AGE 0-5 MONTHS ☐	→ 129
107	NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____	
108	CONSENT		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER 3	→ 112
110	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

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

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

	CHILD 2		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	TELL THE PARENT/OTHER ADULT: If your child has a fever for two days after the last dose of ACTs, you should take the child to the nearest health facility for further examination. If [NAME] has a high fever, fast or difficult breathing, is not able to drink or breastfeed, gets sicker or does not get better in two days, you should take him/her to a health professional for treatment right away. IF CHILD WEIGHS LESS THAN 5 KGS., DO NOT LEAVE DRUGS. TELL PARENT TO TAKE CHILD TO HEALTH FACILITY. First day starts by taking first dose followed by the second dose 8 hours later. On subsequent days, the recommendation is simply "morning" and "evening" (around 12 hours apart). Take the medicine (crushed for small children) with high fat foods or drinks like milk. Make sure the full 3 days treatment is taken at the recommended times, otherwise the infection may return. If your child vomits within an hour of taking the medicine, you will need to get additional tablets and repeat the dose.		→ 128
126	CHECK 113: HAEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA . . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANAEMIA REFERRAL** The anaemia test shows that (NAME OF CHILD) has severe anaemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 103 ON THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.		

DOSING SCHEDULE WITH ARTEMETHER-LUMEFANTRINE (AL)

WEIGHT IN KG	AGE IN YEARS	NUMBER OF TABLETS PER DOSE					
		DAY 1		DAY 2		DAY 3	
		1st dose	8 hours	24 hours	36 hours	48 hours	60 hours
5-14	5mos-<3yrs	1	1	1	1	1	1
15-24	3-7yrs	2	2	2	2	2	2
25-34	8-11yrs	3	3	3	3	3	3
35 and above	>12yrs	4	4	4	4	4	4

101	CHECK CAPI OUTPUT FOR "LIST ELIGIBLE INDIVIDUALS/BIOMARKERS" [COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE]. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102 ON THIS PAGE AND SUBSEQUENT PAGES STARTING WITH THE FIRST ONE LISTED. IF MORE THAN THREE CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).		
	CHILD 3		SKIP
102	CHECK CAPI OUTPUT AND RECORD LINE NUMBER AND NAME OF CHILD. [RECORD LINE NUMBER FROM COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE; RECORD NAME FROM COLUMN 2 IN HOUSEHOLD QUESTIONNAIRE.]	LINE NUMBER . . . . . ☐☐ NAME _____	
103	IF MOTHER INTERVIEWED: COPY CHILD'S DATE OF BIRTH (DAY, MONTH, AND YEAR) FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: What is (NAME)'s date of birth?	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
104	IF MOTHER INTERVIEWED: COPY CHILD'S AGE FROM BIRTH HISTORY. IF MOTHER NOT INTERVIEWED ASK: How old was (NAME) at (NAME)'s last birthday? COMPARE AND CORRECT 103 AND/OR 104 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
105	CHECK 104: CHILD AGE 0-14 YEARS? YES ☐	NO ☐	→ 129
106	CHECK 103: IS THE CHILD AGE 0-5 MONTHS OR IS THE CHILD OLDER? OLDER ☐	AGE 0-5 MONTHS ☐	→ 129
107	NAME OF PARENT/RESPONSIBLE ADULT FOR THE CHILD.	NAME _____	
108	CONSENT		
109	CIRCLE THE CODE.	GRANTED . . . . . 1 REFUSED . . . . . 2 NOT PRESENT/OTHER 3	→ 112
110	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

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

HAEMOGLOBIN MEASUREMENT AND MALARIA TESTING FOR CHILDREN AGE 0-14 YEARS

	CHILD 3		SKIP
121	ASK CONSENT FOR MALARIA TREATMENT FROM PARENT/RESPONSIBLE ADULT: The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called 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.		
122	CIRCLE THE APPROPRIATE CODE.	ACCEPTED MEDICINE . . . . . 1 REFUSED MEDICINE . . . . . 2 OTHER 6	→ 128
123	SIGN NAME AND ENTER HEALTH TECH NUMBER.	_____ (SIGN) ☐☐☐☐ HEALTH TECH NUMBER	
124	CHECK 122: ACCEPTED MEDICINE? YES ☐ NO ☐		→ 128
125	TELL THE PARENT/OTHER ADULT: If your child has a fever for two days after the last dose of ACTs, you should take the child to the nearest health facility for further examination. If [NAME] has a high fever, fast or difficult breathing, is not able to drink or breastfeed, gets sicker or does not get better in two days, you should take him/her to a health professional for treatment right away. IF CHILD WEIGHS LESS THAN 5 KGS., DO NOT LEAVE DRUGS. TELL PARENT TO TAKE CHILD TO HEALTH FACILITY. First day starts by taking first dose followed by the second dose 8 hours later. On subsequent days, the recommendation is simply "morning" and "evening" (around 12 hours apart). Take the medicine (crushed for small children) with high fat foods or drinks like milk. Make sure the full 3 days treatment is taken at the recommended times, otherwise the infection may return. If your child vomits within an hour of taking the medicine, you will need to get additional tablets and repeat the dose.		→ 128
126	CHECK 113: HAEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA . . . . . 1 8.0 G/DL OR ABOVE . . . . . 2 OTHER 6	→ 128
127	**SEVERE ANAEMIA REFERRAL** The anaemia test shows that (NAME OF CHILD) has severe anaemia. Your child is very ill and must be taken to a health facility immediately. RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.		
128	TODAY'S DATE:	DAY . . . . . ☐☐ MONTH . . . . . ☐☐ YEAR . . . . . ☐☐☐☐	
129	IF ANOTHER CHILD, GO TO 103 IN ADDITIONAL QUESTIONNAIRE; IF NO MORE CHILDREN, END INTERVIEW.		

DOSING SCHEDULE WITH ARTEMETHER-LUMEFANTRINE (AL)

WEIGHT IN KG	AGE IN YEARS	NUMBER OF TABLETS PER DOSE					
		DAY 1		DAY 2		DAY 3	
		1st dose	8 hours	24 hours	36 hours	48 hours	60 hours
5-14	5mos-<3yrs	1	1	1	1	1	1
15-24	3-7yrs	2	2	2	2	2	2
25-34	8-11yrs	3	3	3	3	3	3
35 and above	≥12yrs	4	4	4	4	4	4

HEALTH TECH'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING BIOMARKERS

SUPERVISOR'S OBSERVATIONS

KENYA MALARIA INDICATOR SURVEY
FIELDWORKER QUESTIONNAIRE

Division of National Malaria Programme
Kenya National Bureau of Statistics

LANGUAGE OF QUESTIONNAIRE ENGLISH

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

INSTRUCTIONS

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

102	In what region do you live?	COAST . . . . . 01 NORTH EASTERN . . . . . 02 EASTERN . . . . . 03 CENTRAL . . . . . 04 RIFT VALLEY . . . . . 05 WESTERN . . . . . 06 NYANZA . . . . . 07 NAIROBI 08	
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, post-primary/vocational, secondary/'A' Level, College, or University	PRIMARY . . . . . 1 POST-PRIMARY . . . . . 2 SECONDARY/'A' LEVEL . . . . . 3 COLLEGE (MIDDLE LEVEL) . . . . . 4 UNIVERSITY 5	
110	What is the highest (standard/form/year) you completed at that level? IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	STANDARD/FORM/YEAR . . . . . [ ][ ]	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	What is your religion?	ROMAN CATHOLIC . . . . . 1 PROTESTANT/OTHER CHRISTIAN . . . . . 2 MUSLIM . . . . . 3 NO RELIGION . . . . . 4 OTHER _____ 96 (SPECIFY)	
112	What languages can you speak? RECORD ALL LANGUAGES YOU CAN SPEAK.	EMBU . . . . . A KALENJIN . . . . . B KAMBA . . . . . C KIKUYU . . . . . D KISII . . . . . E LUHYA . . . . . F LUO . . . . . G MAASAI . . . . . H MERU . . . . . I MIJIKENDA/ SWAHILI . . . . . J SOMALI . . . . . K TAITA/ TAVETA . . . . . L OTHER _____ X (SPECIFY)	
113	What is your mother tongue/native language (language spoken at home growing up)?	EMBU . . . . . 01 KALENJIN . . . . . 02 KAMBA . . . . . 03 KIKUYU . . . . . 04 KISII . . . . . 05 LUHYA . . . . . 06 LUO . . . . . 07 MAASAI . . . . . 08 MERU . . . . . 09 MIJIKENDA/ SWAHILI . . . . . 10 SOMALI . . . . . 11 TAITA/ TAVETA . . . . . 12 OTHER _____ 96 (SPECIFY)	
114	Have you ever worked on: a) a DHS prior to this survey? b) an MIS prior to this survey? c) any other survey prior to this survey?	YES NO a) DHS . . . . . 1 2 b) MIS . . . . . 1 2 c) OTHER SURVEY 1 2	
115	Were you already working for DNMP or KNBS at the time you were employed to work on this MIS?	YES, DNMP . . . . . 1 YES, KNBS . . . . . 2 NO 3	→ 117
116	Are you a permanent or temporary employee of DNMP or KNBS?	PERMANENT . . . . . 1 TEMPORARY 2	
117	If you have comments, please write them here.		

ADDITIONAL DHS PROGRAM RESOURCES

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