REPUBLIC OF KENYA

HARAMBEE

MINISTRY OF HEALTH

Kenya

Malaria Indicator Survey 2015

National Malaria Control Programme,
Ministry of Health

Kenya National Bureau of Statistics

ICF International

Komesha Malaria

Okoa Maisha

REPUBLIC OF KENYA

MINISTRY OF HEALTH

Kenya
Malaria Indicator Survey
2015

National Malaria Control Programme
Ministry of Health
Nairobi, Kenya

Kenya National Bureau of Statistics
Nairobi, Kenya

ICF International
Rockville, Maryland, USA

April 2016

The 2015 Kenya Malaria Indicator Survey (2015 KMIS) was implemented by the National Malaria Control Programme (NMCP) of the Ministry of Health and the Kenya National Bureau of Statistics (KNBS) from July to August 2015. Funding for the KMIS was provided by the Government of Kenya with support from the United States Agency for International Development (USAID), the United States President's Malaria Initiative (PMI), the Global Fund, the World Health Organization (WHO), the United Kingdom Department for International Development (UKAID), and the United Nations Children's Fund (UNICEF). ICF International provided technical assistance for the survey through The DHS Program, a USAID-funded project that helps implement population and health surveys in countries worldwide.

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Recommended citation:

National Malaria Control Programme (NMCP), Kenya National Bureau of Statistics (KNBS), and ICF International. 2016. *Kenya Malaria Indicator Survey 2015*. Nairobi, Kenya, and Rockville, Maryland, USA: NMCP, KNBS, and ICF International.

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FOREWORD

Malaria is a significant public health problem in Kenya. More than 70 percent of the population live in malaria risk areas, including those most vulnerable to the disease: children and pregnant women. In the last 5 years, tremendous efforts have been made to combat malaria with 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 that are periodically used to provide an in-depth assessment of malaria control over time. This is the third survey undertaken; the previous two were in 2007 and in 2010.

This report provides information on the performance of the key malaria control interventions as experienced by communities across the country. The results contained in this report are crucial to the evaluation of interventions, planning for the future, and understanding the dynamics that affectmalaria control programme efforts.

The report shows that with concerted efforts and effective partnerships we can reduce the impact of malaria in the country. A clear indication of this is the overall reduction in malaria prevalence in Kenya as compared with the 2010 survey results. Other key results include the increased uptake in ownership and use of nets as well as improved availability of recommended medicines for the treatment of malaria.The survey results are similar to those for malaria control indicators reported by the 2014 Kenya Demographic Health Survey.

The report has come at an opportune time, and the government urges stakeholders at alllevels to embrace the report, assess its implications on malaria control, and chart the way forward. The report will form the platform for our malaria control strategy in the coming years. It is clear that with continued investments we can make substantial progress toward the objective of eliminating communicable diseases, and thus the Ministry of Health is committed to further reducing the malaria burden in the coming years. A malaria-free Kenya is possible.

Dr.Cleopa K. Mailu, EBS
Cabinet Secretary
Ministry of Health

ACKNOWLEDGEMENTS

The planning, datacollection, analysis, and report writing of the Kenya Malaria Indicator Survey 2015 (2015 KMIS) has been undertakenwith the collaboration of partners and stakeholders. The Ministry of Health would like to sincerely thank the partners in malaria control for their contributions to the successful completion of the 2015 survey and theresulting report.

We would like to thank the United Kingdom International Aid Department (UKAID), the United States President's Malaria Initiative (PMI), theUnited Nations Children's Fund (UNICEF), and the Global Fundfor providing funding for the survey and report writing.

We acknowledge the technical support from the World Health Organization (WHO), Population Services Kenya,MEASUREEvaluation PIMA,and the Kenya Medical Research Institution (KEMRI)/Walter Reed Project. The survey was conducted in close collaboration with the Kenya National Bureau of Statistics (KNBS) and ICF International.

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 National Malaria Control Programme (NMCP), members of the Malaria Monitoring and Evaluation Technical Working Group, and the Steering Committee for coordination and oversight of the survey.

Most important, we appreciate all 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.

Dr.Nicholas Muraguri
Principal Secretary
Ministry of Health

EXECUTIVE SUMMARY

Malaria is a global health problem. The World Health Organization (WHO) estimates that 3.2 billion people are at risk of malaria worldwide. Sub-Saharan Africa is disproportionally affected; in 2015, the region had 88 percent of malaria cases and 90 percent of malaria deaths (WHO 2016). In Kenya, malaria remains a major cause of morbidity and mortality with more than 70 percent of the population at risk of the disease (MOH 2014). The malaria burden in Kenya is not homogenous. The areas around Lake Victoria and on the coast present the highest risk, and children under age 5 and pregnant women are the most vulnerable to infection.

In Kenya and around the world, major efforts have been made to reduce and eliminate malaria. The objectives of combatting the disease are intrinsically linked to most of the United Nations' Sustainable Development Goals, as they were to nearly all of the Millennium Development Goals, and are in line with Kenya's Vision 2030. The Ministry of Health, through the National Malaria Control Programme (NMCP), has implemented sound policies and evidence-based strategies in the fight against malaria. Key interventions include the provision of long-lasting insecticidal nets, intermittent preventive treatment for pregnant women, and prompt diagnosis and effective treatment of all malaria cases. Interventions also include improving the capacity of health providers and strengthening the supply chain to deliver diagnostic tests and quality-assured medicines at all levels of the health system. These interventions are supported by a robust advocacy and communication platform focused on enhancing demand and uptake by communities.

NMCP also engages in routine monitoring and periodic evaluations as these are important components in forming malaria policy and programs. Routine monitoring through the surveillance and health information system provides regular status updates on malaria prevalence. The information generated serves to assess performance against targets and guides immediate actions. Periodic evaluations through facility and community surveys provide a long-term view of trends and progress against targets. The 2015 Kenya Malaria Indicator Survey (KMIS) is one such periodic evaluation undertaken at the community level. This is the third such survey in Kenya; the first was undertaken in 2007 followed by a second in 2010.

The main objective of the 2015 KMIS was to measure progress achieved in key malaria indicators since the 2010 KMIS. The specific objectives were:

1. To determine the progress of key malaria interventions as stated in the Kenya Malaria Strategy 2009-2018 (revised 2014)
2. To assess malaria parasite prevalence among children age 6 months to 14 years
3. To determine anaemia prevalence among children age 6 months to 14 years

The survey was based on a nationally representative sample drawn from the four epidemiological zones in the country. Twenty-five field teams successfully interviewed individuals in 6,481 households. In each household, women age 15-49 were eligible for interview, and children age 6 months to 14 years were eligible for anaemia and malaria testing. The results of the interviews and testing are presented in this report.

VECTOR CONTROL

The 2015 KMIS results indicate that a majority of households own a net and that there is an overall improvement in household ownership. Furthermore, almost all the nets

currently owned by households in Kenya are long-lasting insecticidal nets (LLINs). A majority of households (63 percent) own at least one LLIN, although only 40 percent own at least one LLIN for every two persons who stayed in the household the night before the survey (universal coverage). Sixty-three percent of households owned an LLIN in 2015, compared with 44 percent in the 2010 KMIS.

Net use is a key preventive component. Net use has increased since 2010 among the household population, and among those most vulnerable: children under age 5 and pregnant women. Nearly one-half of the household population (48 percent) slept under an LLIN the night before the survey. Seven in 10 (71 percent) members of households with at least one LLIN slept under an LLIN the night before the survey; therefore, access to LLINs is a key determinant of net use. Fifty-six percent of children under age 5 slept under an LLIN the night before the survey; this is an increase from 39 percent in the 2010 KMIS. Fifty-eight percent of pregnant women age 15-49 slept under an LLIN the night before the survey, an increase from 36 percent reported in the 2010 KMIS. Improvements in net use are especially notable in the lake and coast endemic zones and the highland epidemic zone.

It is recommended that efforts be made to achieve universal coverage in all malaria risk areas. Advocacy, communication, and social mobilisation efforts should also be increased to bridge the gap between ownership and utilisation.

Malaria in Pregnancy

Malaria in pregnancy is an important public health problem in Kenya and is associated with considerable morbidity and mortality for pregnant women and infants. The Kenya National Malaria Strategy recommends provision of intermittent preventive treatment for malaria in pregnancy (IPTp) during antenatal care (ANC) for women residing in malaria-endemic areas. Sulfadoxine-pyrimethamine (SP)/Fansidar is the only drug currently recommended for IPTp in Kenya.

Utilisation of ANC services is widespread in Kenya: 94 percent of women received ANC services from a skilled provider. In the malaria endemic zones, more than three-quarters of women who gave birth in the 2 years prior to the survey received at least one dose of SP/Fansidar, 56 percent received two or more doses, and 37 percent received the currently recommended three doses or more. Women were somewhat more likely to have received at least one dose of SP/Fansidar in the coast endemic zone than in the lake endemic zone. Although there is a steady upward trend in IPTp coverage from 2007 to 2015, there is need to increase IPTp coverage, particularly for three or more doses.

Case Management

Malaria case management, including prompt parasitological diagnosis and treatment within 24 hours of onset of symptoms with appropriate and effective medicines, is one of the cornerstones of the Kenya National Malaria Strategy. In the 2015 KMIS, mothers of children under age 5 were asked whether their children had fever (the most common symptom of malaria) in the 2 weeks preceding the survey and, if so, whether any treatment was sought.

Thirty-six percent of children under age 5 had fever in the 2 weeks prior to the survey. More than 7 in 10 children with fever were taken to a health provider for advice or treatment (72 percent), and 39 percent had blood taken for testing (considered a proxy for malaria testing). Twenty-seven percent of children with fever were treated with antimalarials; 25 percent were treated with the recommended artemisinin-based combination therapy. Among children with fever for whom treatment or advice was sought, 70 percent received care at government health facilities.

Efforts in social behaviour change communication should encourage caregivers to seek treatment for fevers promptly. Given

that the majority of febrile children received care from public facilities, there is need to continue capacity-building among government health workers on diagnosis and treatment of malaria.

Parasitaemia and Anaemia

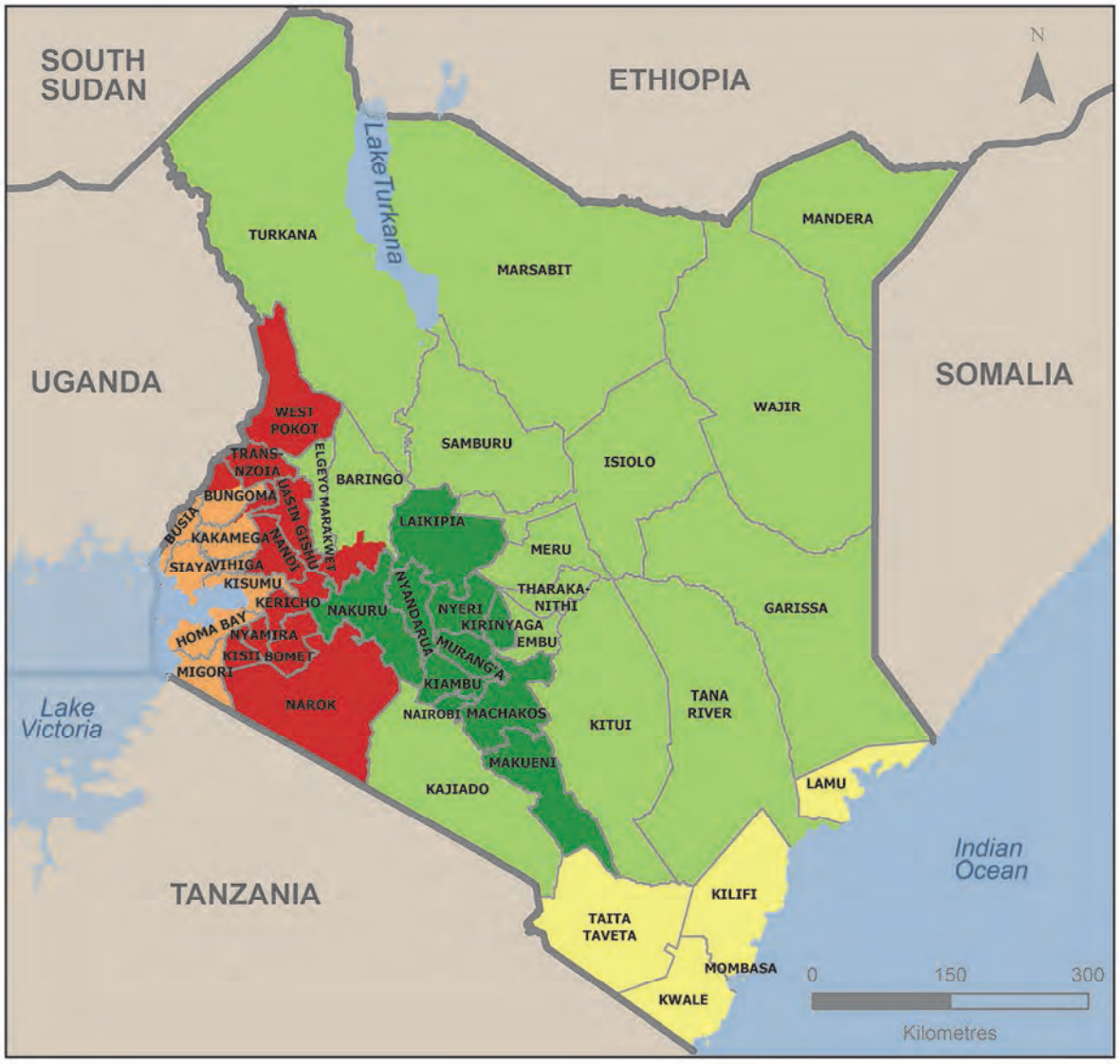
A major objective of the 2015 KMIS was to assess the prevalence of malaria among children age 6 months to 14 years. Nationally, the prevalence of malaria among children was 8 percent (by microscopy), a decline from 11 percent at the time of the 2010 KMIS. Malaria prevalence was highest among children age 10-14 years (11 percent), followed closely by children age 5-9 years (10 percent). Among children age 6-59 months, who are considered especially vulnerable, malaria prevalence decreased from 8 percent in 2010 to 5 percent.

Malaria prevalence continues to be much higher in the lake endemic zone than in other zones, but the rate among children age 6 months to 14 years was markedly lower in 2015 (27 percent) than in 2010 (38 percent). On the other hand, in the coast endemic area, the malaria rate among children age 6 months to 14 years has increased from 4 percent in 2010 to 8 percent. The anaemia rate was almost twice as high in the lake endemic region (38 percent) as in the low risk transmission areas (20 percent).

The decline in malaria prevalence in the lake endemic zone is promising. There is need to continue to fully scale up malaria control interventions in the lake endemic region and to continue focused intervention efforts in the coastal region to stem the slight increase in prevalence observed there. Older children appear to have the highest prevalence, and therefore there is need to target school-age children with preventive measures.

The 2015 KMIS results indicate that much progress has been made in malaria control in Kenya. To sustain the gains, investment levels need to be maintained, especially in the high burden areas around Lake Victoria and in the coastal region. In other regions, investment in surveillance and preventive measures will be key to ensuring that there is no resurgence of the disease in those areas.

KENYA



Malaria Endemicity Zone

- Low Risk
- Semi-Arid, Seasonal
- Coast Endemic
- Lake Endemic
- Highland Epidemic

Counties with mixed transmission
Baringo: Highland Epidemic & Semi-arid, Seasonal
Bungoma: Lake Endemic & Highland Epidemic
Kakamega: Lake Endemic & Highland Epidemic

- 1 -

Introduction

1 INTRODUCTION

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 was marked by economic growth and modernisation, especially in education, agriculture, industry, and infrastructure. In the decades since independence, the economy sustained growth as more space was freed for Kenyan participation in the productive sectors. More schools were constructed, primary education was provided, and institutions of higher education expanded. Further, the health sector grew with new facilities and initiatives such as the immunisation of children and the 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. 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

Kenya covers sits astride the equator. It shares borders with Ethiopia in the North, Somalia in the Northeast, South Sudan in the Northwest, Uganda in the West, and Tanzania in the South. To the east lies the Indian Ocean. The country is divided into four regions: the arid deserts of the North; the savannah lands of the South; the fertile lowlands along the coast; and the highlands in the West, where the capital Nairobi is situated.

Throughout the country, the hottest months are December through March. The coastal areas are tropical, with particularly high humidity in April and May but tempered by monsoon winds. The lowlands are hot but mainly dry, while the highlands are more temperate with four seasons. Nairobi has a very pleasant climate throughout the year due to its altitude. Near Lake Victoria, the temperatures are much higher and rainfall can be heavy. Although Kenya lies on the equator, its climate varies considerably in temperature and precipitation due to variations in altitude. The highlands generally have a cool, bracing climate with temperature ranging from 26°C to 10°C. Nairobi, at an elevation of 1,670 m, has a mean annual temperature of 19°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.

Rain is abundant along the coast; normally about 890 to 1,270 mm fall each year depending on location. Similar amounts fall throughout the highlands, although several of the higher areas and the shores of Lake Victoria receive considerably more. Northern Kenya and the interior areas of the East are quite dry. Parts of the North receive less than 250 mm a year.

1.1.3 Economy

Agriculture and tourism are the main drivers of Kenya's economy. In 2014, the agricultural sector recorded mixed performance, mainly attributable to erratic rains with some regions experiencing depressed rainfall. The low levels of rainfall resulted in a decrease in production of some crops as well as pasture regeneration for livestock. The tourism sector performance decreased in 2014 on account of a number of factors. These include insecurity, negative travel advisories, and fear of continued spread of Ebola in West African countries. According to the 2015 Economic Survey, Kenya's economy expanded by 5.3 percent in 2014, compared to a growth of 5.7 percent in 2013. From the demand side, growth was driven mainly by an increase in private consumption and a rapid growth in capital investment. From the supply side, the major drivers of the economy were agriculture, forestry, and fishing; construction; wholesale and retail trade; education; and finance and insurance (KNBS 2015).

1.2 Basic Demographic Indicators

In the 2009 Population and Housing Census, Kenya's population stood at 38.6 million. Previous census results indicated an annual population growth rate of nearly 3 percent each year during the 1999-2009 period. Kenya's population is characterised as "very young." The 2009 population census reports that 43 percent of the population is under age 15 and only 4 percent is age 65 or older (KNBS 2012). This is attributed to high fertility and declining mortality.

Table 1.1 presents trends in basic demographic indicators for Kenya from 1969 to 2014. The population grew from 10.9 million people in 1969 to 38.6 million people in 2009. At the same time, the population density increased from 19.0 persons per sq km to 66.4 persons per sq km. The percentage of the population living in urban areas increased from 9.9 percent to 32.3 percent. The Kenya National Bureau of Statistics estimated the population to be 43.0 million in 2014, the density to be 73.9 persons per sq km, and the proportion urban to have remained unchanged.

Table 1.1 Basic demographic indicators

Selected demographic indicators for Kenya, 1969, 1979, 1989, 1999, 2009, and 2014

Indicator	1969	1979	1989	1999	2009	2014
Population (millions)	10.9	16.2	23.2	28.7	38.6	43.0[a]
Density (pop./km^2)	19.0	27.0	37.0	49.0	66.4	73.9[a]
Percent urban	9.9	15.1	18.1	19.4	32.3	32.3
Crude birth rate	50.0	54.0	48.0	41.3	34.8	30.5[b]
Crude death rate	17.0	14.0	11.0	11.7	10.4	10.4[b]
Inter-censal growth rate	3.3	3.8	3.4	2.9	2.9	2.9[b]
Total fertility rate	7.6	7.8	6.7	5.0	4.8	3.9
Infant mortality rate (per 1,000 births)	119	88	66	77	54	39
Life expectancy at birth	50.0	54.0	60.0	56.6	58.0	58.0[b]

[a] Projected figures
[b] Assumed to remain constant over the inter-censal period
Source: CBS 1970; CBS 1981; CBS 1994; CBS 2002; KNBS & ICF Macro 2010; KNBS 2012; KNBS and ICF International 2015

Several indicators also show improvement in development between 1969 and 2014. For instance, the total fertility rate declined from 7.6 to 3.9. Infant mortality declined from 119 deaths per 1,000 live births to 39. Life expectancy at birth increased from 50 to 58 years. The inter-censal growth

rate declined from 3.3 to 2.9 percent per annum. The crude death rate (i.e., the number of deaths occurring among the population in Kenya during a given year, per 1,000 mid-year total population) also declined from 17.0 to 10.4. Finally, the crude birth rate (i.e., the number of live births occurring during the year, per 1,000 population estimated at mid-year) dropped from 50.0 to 30.5.

1.3 Health Priorities and Strategies for Malaria Prevention

Kenya's development agenda is articulated in the Vision 2030, which aims to make Kenya a 'globally competitive and prosperous country with a high quality of life by 2030 (Government of Kenya 2007). The Vision's agenda is anchored on three pillars: social, political, and economic. Health issues are categorised in the social pillar and are further articulated in the Kenya Health Sector Strategic Plan (KHSSP) 2014-2018. The strategies and goals laid out in these documents focus on the need to improve the number of available health services, scale up coverage of required health services, and reduce the financial burden associated with using health services. The plan emphasises prevention and investment in maternal and newborn health. Specific targets include the following:

1. Reduce, by at least 50 percent, infant, neonatal, and maternal deaths
2. Reduce, by at least 25 percent, time spent by persons in ill health
3. Improve, by at least 50 percent, levels of client satisfaction with services
4. Reduce, by 30 percent, catastrophic health expenditures (MOH 2013)

1.3.1 Kenya Malaria Strategy 2009-2018 (Revised 2014)

The Kenya Malaria Strategy 2009-2018 (revised 2014), is a revision of the National Malaria Strategy 2009-2017 following a mid-term review in 2013-2014. The timing of the review was informed by emerging issues such as the devolution of health service delivery from national to county governments as well as updated technical guidance on malaria control from the World Health Organization (WHO). The main recommendation of the review was to consolidate the delivery of current malaria prevention and control interventions. The development of the revised malaria strategy was a multi-stakeholder and multi-sectoral participatory process led by the national and county governments in collaboration with civil society, development partners, and programs of the Ministry of Health. Furthermore, the revision has been informed by the KHSSP 2014-2018, the Kenya Health Policy 2012-2030, the Global Technical Strategy for Malaria 2016-2030 and the Roll Back Malaria Partnership's Action and Investment plan to defeat malaria 2016-2030 (MOH 2014).

The strategy is a concerted effort to achieve a malaria-free Kenya, and its mission is to direct and coordinate efforts against malaria though effective partnerships. The goal of the strategy is to reduce morbidity and mortality caused by malaria by two-thirds of the 2007-08 level by 2017.

The strategic objectives are:

1. To have at least 80 percent of people in malaria risk areas using appropriate malaria preventive interventions by 2018.

2. To have all suspected malaria cases that present to a health provider managed in accord with National Malaria Treatment Guidelines by 2018.

3. To ensure that all sub-counties in the malaria epidemic and seasonal transmission zones have the capacity to detect and respond in a timely manner to malaria epidemics by 2018.

4. To ensure that all malaria indicators are routinely monitored, reported, and evaluated in all counties by 2018.

5. To increase utilisation of all malaria control interventions by communities to at least 80 percent by 2018.

6. To improve capacity in coordination, leadership, governance, and resource mobilisation at all levels towards achievement of the malaria program objectives by 2018.

The main interventions in the strategy are vector control (which includes provision of long-lasting insecticidal nets); prevention of malaria in pregnancy by provision of intermittent preventive treatment (IPTp); diagnosis, and treatment; epidemic-preparedness and response; surveillance, monitoring, evaluation, and operational research; advocacy, communication, and social mobilisation; and program management (MOH 2014).

1.3.2 Epidemiology of Malaria in Kenya

Kenya has four main malaria epidemiological zones with diversity in risk determined largely by altitude, rainfall patterns, and temperature, as well as the prevalence of malaria.

Highland epidemic prone areas: Malaria transmission in the western highlands of Kenya is seasonal, with considerable year-to-year variation. The epidemic phenomenon is experienced when climatic conditions favour sustainability of minimum temperatures around 18°C. This increase in minimum temperatures during periods of long rains favours and sustains vector breeding, resulting in increased intensity of malaria transmission. The whole population is vulnerable, and case fatality rates during an epidemic can be up to 10 times greater than what is experienced in regions where malaria occurs regularly.

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[1] between 30 and 100.

Semi-arid, seasonal malaria transmission areas: This zone, in arid and semi-arid areas of the northern and south-eastern parts of the country, experiences short periods of intense malaria transmission during the rainfall seasons. Temperatures are usually high, and water pools created during the rainy season provide the malaria vectors with breeding sites. Extreme climatic conditions such as the El Niño southern oscillation lead to flooding in these areas, resulting in epidemic outbreaks with high morbidity rates due to the population's low immune status.

Low risk malaria areas: This zone covers the central highlands of Kenya, including Nairobi. Temperatures are usually too low to allow completion of the sporogonic cycle of the malaria parasite in the vector. However, increasing temperatures and changes in the hydrological cycle associated

[1] The entomological inoculation rate is the average number of inoculations with malaria parasites received by a person over a period of time (usually annually). It is used to measure malaria transmission intensity and is dependent on the frequency with which people living in an area are bitten by anopheline mosquitoes carrying sporozoites (WHO 2015).

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.

Because Kenya has different epidemiological zones, the malaria interventions described are not applied evenly across the entire country, a factor to consider in interpreting report results. The table below summarises which interventions are carried out in which malaria zones:

Epidemiological zone	Long-lasting insecticidal nets (LLIN) (Vector Control)	Intermittent preventive treatment during pregnancy (IPTp)	Case Management	Epidemic Preparedness and Response	Surveillance	Health Education/ Behaviour Change Communication
Highland epidemic	•		•	•	•	•
Endemic (lake and coast)	•	•	•		•	•
Semi-arid, seasonal			•	•	•	•
Low risk			•		•	•

Source: (MOH 2010)
Note: Indoor residual spraying (IRS), a vector control intervention, has not been implemented since 2012 in an effort to practice insecticide resistance management. Accordingly, in this report, results for IRS are not presented.

1.4 Survey Organisation and Methodology

The 2015 Kenya Malaria Indicator Survey (KMIS) is the third survey of its kind to be carried out in Kenya. The first Malaria Indicator Survey was implemented in 2007 (DOMC et al. 2009) and the second in 2010 (DOMC et al. 2011). As with the previous KMIS surveys, the 2015 survey was designed to follow the Roll Back Malaria Monitoring and Evaluation Working Group guidelines, the Kenya National Malaria Strategy 2009-2018 (revised 2014), and the Kenya Malaria Monitoring and Evaluation Plan 2009-2017.

The 2015 KMIS was carried out from July 6 to August 15, 2015, covering a nationally-representative sample of 7,313 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 14 years 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 Kenya Medical Research Institute (KEMRI) Walter Reed Project Malaria Diagnostics Centre of Excellence Laboratory in Kisumu where they were tested for the presence of malaria parasites.

1.4.1 Objectives of the Survey

The main objective of the 2015 KMIS was to measure progress achieved in key malaria indicators since the 2010 KMIS. Specific objectives were the following:

1. To determine the progress of key malaria interventions as stated in the Kenya Malaria Strategy 2009-2018 (revised 2014)

2. To assess malaria parasite prevalence among children age 6 months to 14 years

3. To determine anaemia prevalence among children age 6 months to 14 years

1.4.2 Survey Organisation

The 2015 KMIS was implemented by the National Malaria Control Programme (NMCP) of the Ministry of Health (MOH) and the Kenya National Bureau of Statistics (KNBS) with assistance from institutions and partners. The survey was overseen by the KMIS Steering Committee and coordinated by a sub-committee comprised of members from the Malaria Monitoring and Evaluation Technical Working Group. Field activities were coordinated by NMCP in collaboration with KNBS. The sample design, training of field staff, data collection, analysis, and report writing were carried out by NMCP and KNBS, in collaboration with WHO, the United States President's Malaria Initiative (PMI), ICF International, Population Services Kenya, MEASURE Evaluation PIMA, and KEMRI Walter Reed Project.

UKAID through WHO provided tablet computers used for data collection; the KEMRI Walter Reed Project assisted in training field staff in the collection of smears for malaria microscopy. The Demographic and Health Surveys (DHS) Program at ICF International assisted in programming the tablet computers, training, fieldwork, and report writing. Funding was provided by the United Kingdom's Department for International Development (UKAID), PMI, the United Nations Children's Fund (UNICEF), and the Global Fund.

1.4.3 Sample Design

The 2015 KMIS sample was designed to produce estimates for key indicators for the country as a whole, for urban and rural areas separately, and for each of the malaria epidemiologic zones: highland epidemic; lake endemic; coast endemic; semi-arid, seasonal; and low risk.

The sampling frame used for the 2015 KMIS was the Fifth National Sample Survey and Evaluation Program (NASSEP V) master sampling frame, which is created and maintained by KNBS for household-based surveys in Kenya. Development of the frame started in 2012. It contains a list of all enumeration areas (EAs) created for the 2009 census and covers the entire country. The frame is split into four equal subsamples, from one of which the 2015 KMIS sample was drawn. Kenya is administratively divided into 47 counties, created in the 2010 Constitution; within the frame, each county is stratified into urban and rural areas and is contained within one or two of the five malaria endemic zones.

The survey used a two-stage stratified cluster sampling design. In the first stage, 246 clusters (131 rural, 115 urban) were selected with equal probability from the NASSEP V. The second stage involved selection of a uniform sample of 30 households using systematic sampling from each of the selected clusters. Prior to household selection, all the clusters were updated by KNBS. This entailed undertaking a household listing in each of the selected clusters in order to update the list of residential households within it. As part of the listing, KNBS also updated the necessary maps and recorded the geographic coordinates of each cluster. Only selected households were interviewed, and replacement of nonresponding households was not allowed. Further details on the sample design are provided in Appendix A.

1.4.4 Questionnaires

Three types of questionnaires were used in the 2015 KMIS: a Household Questionnaire, a Woman's Questionnaire, and a Biomarker Questionnaire. These questionnaires were developed by the Roll Back Malaria Monitoring and Evaluation Reference Group in collaboration with ICF International. The questionnaires were adapted for use in Kenya by the KMIS Technical Working

Group and were translated into Kiswahili. A team from ICF International programmed the questionnaires into the tablet computers for data collection.

The Household Questionnaire was used to list all the usual members and visitors in the selected households. Some basic information was collected on the characteristics of each person listed, including age, sex, and relationship to the head of the household. The main purpose of the Household Questionnaire was to identify women age 15-49 eligible for the individual interview and children age 6 months to 14 years eligible for anaemia and malaria testing. The Household Questionnaire also collected information on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, materials used for the floor, roof, and walls of the house, ownership of various durable goods, and ownership and use of mosquito nets. In addition, this questionnaire was used to capture some information on attitudes about malaria.

The Woman's Questionnaire was used to collect information from women age 15-49 on background characteristics, reproductive history for the last 6 years, antenatal care and preventive malaria treatment for the most recent birth, fever prevalence and treatment among children under age 5, and knowledge and attitudes regarding malaria treatment and prevention.

The Biomarker Questionnaire was used to record haemoglobin measurements and results of malaria rapid diagnostic testing for children age 6 months to 14 years. The questionnaire was filled in by the field teams' health workers and transcribed into the tablet computer by the household interviewer. The questionnaires used in the KMIS are provided in Appendix F.

1.4.5 Anaemia and Malaria Testing

The 2015 KMIS incorporated three biomarkers. Finger- or heel- prick blood samples were collected from children age 6 months to 14 years to perform on-the-spot testing for anaemia and malaria, and thick and thin blood smears were prepared to be read in the laboratory to determine the presence of malaria parasitaemia. Each team included two health workers, a clinician and a laboratory technologist, who were responsible for implementing the malaria and anaemia testing and for making the blood smears, respectively. Clinicians were also responsible for ensuring that children who tested positive for malaria via the rapid diagnostic test but did not show signs of complicated malaria were offered a full course of medicine according to standard procedures for malaria treatment in Kenya. Clinicians provided a referral to a healthcare facility for children who tested positive and showed symptoms of complicated malaria.

Written, informed consent for testing was sought from the parent/guardian of all children. Additionally, for children age 6-12, verbal assent was sought, and for children age 13-14, written assent was sought. The protocol for the 2015 KMIS was approved by the Kenyatta National Hospital/University of Nairobi Scientific and Ethics Review Committee and ICF International's Institutional Review Board.

Anaemia Testing

Because there is a strong correlation between malaria infection and anaemia, the 2015 KMIS included anaemia testing for children age 6 months to 14 years. After obtaining consent, blood samples were collected using a single-use, spring-loaded, retractable, sterile lancet to make a finger- or heel- prick. Laboratory technologists then used a microcuvette to collect a drop of blood. Haemoglobin analysis was carried out on site using a battery-operated portable HemoCue® 301+ analyser, which produces results in less than a minute, and the results were given to the child's parent/guardian verbally and in written form. Children who had a haemoglobin level under 8.0 g/dl

(severe anaemia) were given a referral letter and recommendation to be taken to a health facility for follow-up care. Results of the anaemia test were recorded in the Biomarker Questionnaire as well as in a brochure that was left in the household to explain the causes and prevention of anaemia.

Malaria Rapid Diagnostic Tests

One of the major objectives of the KMIS 2015 was to provide information on the prevalence of malaria infection among children age 6 months to 14 years. Using the same finger- or heel- prick used for anaemia testing, a drop of blood was tested immediately using the SD Bioline rapid diagnostic test (RDT), which tests for *Plasmodium falciparum* and other *Plasmodium* species. The test includes a loop applicator that comes in a sterile packet. A tiny volume of blood is captured on the applicator and placed in the well of the device. The laboratory technicians read the results after 15 minutes. The results were provided to the child's parent/guardian in both oral and written form and were recorded in the Biomarker Questionnaire. Children who tested positive for malaria using the RDT were offered a full course of artemether-lumefantrine (AL), in accord with National Guidelines for the Treatment of Malaria in Kenya. The drug was provided by NMCP.

Malaria Microscopy

In addition to the RDT, both thick and thin blood smears were taken from all children tested in the field to be tested later in the laboratory for the presence of malaria parasites. Each blood smear slide was given a bar code label, with a duplicate label attached to the Biomarker Questionnaire. A copy of the same bar code label was affixed to a blood sample transmittal form, which accompanied the blood samples from the field to the laboratory. The blood smears were dried, fixed, and packed carefully in the field. They were periodically sent by courier to the KEMRI Walter Reed Project Malaria Diagnostics Centre of Excellence Laboratory in Kisumu for microscopic examination.

1.4.6 Training

Pretest

Prior to the start of fieldwork, a pretest was completed in order to field test the data collection program on the tablet computers, questionnaires, translations, and survey procedures. Two field teams were trained to conduct the pretest. The training was completed in Machakos from May 18-25 and was immediately followed by pretest fieldwork from May 26 to June 1, 2015. The pretest was conducted in clusters not selected for the actual survey sample and included both rural and urban households. Based on the findings of the pretest, the Household Questionnaire, Woman's Questionnaire, and Biomarker Questionnaire were further refined. Similarly, necessary revisions in the computer program files were made based on the suggestions and feedback resulting from the pretest.

Training of Field Staff

The main survey training took place from June 25 to July 4, 2015 in Nakuru. A total of 133 trainees participated in the training. These included 25 team supervisors, 50 interviewers and 50 health workers (25 clinicians and 25 laboratory technologists) and 8 reserves. The training schedule included sessions on survey background, interviewing techniques, the questionnaire, and testing procedures.

Team supervisors and the interviewers were trained on the content of the questionnaires, consent procedures, interviewing skills, and collection and transfer of data using the tablets. Health workers were trained on consent procedures, on conducting the anaemia and malaria testing, as well as making the thick and thin blood smears. The clinicians were trained on administering artemether-

lumefantrine to those who tested positive for malaria, according to the national guidelines, and in how to refer complicated malaria cases.

As part of the training, there was a day of practice in eight urban and four rural clusters not included in the sample survey. The KNBS County Statistical Office in Nakuru provided support in identifying local cluster boundaries.

1.4.7 Fieldwork

Fieldwork took a period of 6 weeks from July 6 to August 15, 2015. Twenty-five teams, each comprised of a supervisor, two interviewers, a clinician, and a laboratory technologist, completed the fieldwork. Each team was allocated clusters in the different counties according to their local language competency. The teams spent an average of 3 days in a cluster.

Details of the assigned clusters and sampled households were provided to field teams to enable them to properly identify the selected households; in each cluster, field teams were facilitated by the KNBS County Statistical Officer and a village guide. Where eligible respondents were absent from their home, a minimum of two additional callback visits were made on different days to facilitate the participation of the respondents. A courier service provided timely transport of the thick and thin blood smears from the field to the lab. Taking blood samples can be a sensitive issue in some communities. Therefore, sampled clusters received information about the KMIS through informational advertising and mass media.

Fieldwork was closely supervised by a team of national coordinators from NMCP and KNBS who visited the teams in the field to ensure that the survey was conducted according to the protocol and to provide solutions to any challenges encountered.

1.4.8 Data Processing

The 2015 KMIS used ASUS Transformer T100 tablet computers with data entry programs developed in CSPro by The DHS Program at ICF International. Tablets were Bluetooth-enabled to facilitate the electronic transfer of household assignment among field team members and the transfer of completed questionnaires to team supervisors for transfer to the central office. Code division multiple access wireless technology via Internet File Streaming System (IFSS) developed by The DHS Program was used to transfer encrypted data from the field to the central office in Nairobi. Each tablet was fitted with a micro-SD card for encrypted data back-up.

To facilitate communication and monitoring, each field worker was assigned a unique identification number. In the central office, data received from the field team supervisors' tablets were registered and checked against any inconsistencies and outliers. Data editing and cleaning included range checks and structural and internal consistency checks. Any anomalies were communicated to the respective team through their team supervisor. The corrected results were re-sent to the central processing office.

1.4.9 Ethical Considerations

The protocol for the 2015 KMIS was approved by the Kenyatta National Hospital/University of Nairobi Scientific and Ethics Review Committee and ICF International's Institutional Review Board. All data and other information were maintained confidentially to the greatest extent possible. The list of the identification numbers and respondents' names were stored separately during fieldwork and were

removed from the electronic database during analysis. The blood samples were stored only with bar-code identifiers to protect the identity of the respondent.

Written informed consent was sought, during which the risks and benefits of participation in the survey were explained to potential respondents. The risk of participation was minimal and was limited to temporary discomfort associated with either discussion of potentially sensitive information or with the finger- or heel- prick blood collection. Respondents unable to sign the consent form were allowed to use their thumbprint to indicate consent. The benefits of participation in the survey included anaemia and malaria testing for children and treatment or referral as appropriate. Also, the results will benefit NMCP's ability to monitor key health indicators and will provide evidence for decision-making that will enable NMCP to improve its policies and interventions. There was no compensation to respondents to participate.

1.4.10 Response Rates

Table 1.2 presents the results of the household and individual interviews and of the malaria and anaemia testing. A total of 7,313 households were selected for the study, of which 6,667 were occupied at the time of fieldwork. Of these, 6,481 households were successfully interviewed, yielding an overall household response rate of 97 percent.

Table 1.2 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Kenya 2015

	Residence		
Result	**Urban**	**Rural**	**Total**
Household interviews			
Households selected	3,444	3,869	7,313
Households occupied	3,099	3,568	6,667
Households interviewed	2,985	3,496	6,481
Household response rate[1]	96.3	98.0	97.2
Interviews with women age 15-49			
Number of eligible women	2,561	3,024	5,585
Number of eligible women interviewed	2,478	2,916	5,394
Eligible women response rate[2]	96.8	96.4	96.6
Malaria rapid diagnostic testing with children age 6 months to 14 years			
Number of eligible children	3,994	6,727	10,721
Number of eligible children tested	3,690	6,309	9,999
Eligible children response rate[3]	92.4	93.8	93.3
Malaria microscopy with children age 6 months to 14 years			
Number of eligible children	3,994	6,727	10,721
Number of eligible children tested	3,695	6,316	10,011
Eligible children response rate[3]	92.5	93.9	93.4
Anaemia testing with children age 6 months to 14 years			
Number of eligible children	3,994	6,727	10,721
Number of eligible children tested	3,699	6,306	10,005
Eligible children response rate[3]	92.6	93.7	93.3

[1] Households interviewed/households occupied
[2] Respondents interviewed/eligible respondents
[3] Children tested/eligible children

In the interviewed households, a total of 5,585 women were identified as eligible for the Woman's Questionnaire, of whom 5,394 were interviewed to generate a response rate of 97 percent. The number of children identified as eligible for malaria and anaemia testing in the interviewed households was 10,721. Of these, 9,999 underwent malaria rapid diagnostic testing, 10,011

underwent malaria microscopy testing, and 10,005 underwent anaemia testing to yield a response rate of 93 percent for each test. Response rates are more or less the same in both rural and urban areas.

1.4.11 Challenges and Limitations

Because the 2015 KMIS included children of school age and because fieldwork was completed during the school year, field teams faced challenges with logistics and timing in order to reach children. Often, field teams were required to make callbacks during lunch breaks or in the evening when the children were most likely to be at home. Poor infrastructure and vast distances between clusters in the sparsely populated regions meant more time was spent in data collection in some areas than in others.

Respondents had to recall from memory the name of any antimalarial medicine given for the last fever episode in young children. As medical records were not used to confirm that the medicine named was the actual medicine, it is possible that use of some medicines may have been over- or underestimated.

The 2015 KMIS is a cross-sectional survey, so it is not possible to establish a cause-and-effect relationship between measured behaviours and any program or policy. It is therefore recommended that in-depth analysis of the KMIS and other datasets be undertaken.

– 2 –

Characteristics of Households and Women

2 CHARACTERISTICS OF HOUSEHOLDS AND WOMEN

Key Findings

- Seventy-five percent of households in Kenya have access to an improved source of drinking water. Forty-eight percent of households get drinking water on their premises, while 22 percent of households spend more than 30 minutes in travel time to obtain drinking water.
- Twenty-eight percent of households use improved (and not shared) toilet facilities. Forty-two percent of households use non-improved facilities; the majority of which are pit latrines without a slab or open pits.
- A majority of households (58 percent) do not have access to electricity; a higher percentage of urban dwellers (78 percent) have access to electricity compared with those in rural households (16 percent).
- More than half of households (54 percent) have only one room used for sleeping, and 29 percent have only two rooms.
- Sixty percent of women reside in rural areas. Forty-six percent of women live in the malaria-prone highland epidemic, lake endemic, or coast endemic zones.
- Eight in 10 women have at least a primary education, and 31 percent have completed the secondary level or higher. Eight percent of women have never been to school. Almost 9 in 10 women are literate (87 percent).

This chapter provides information on the basic demographic and socioeconomic characteristics of households sampled in the 2015 Kenya Malaria Indicator Survey (KMIS). In the 2015 KMIS, a household is defined as a person or group of persons, related or unrelated, who usually live together, who acknowledge one adult member as the head of the household, and who have common cooking arrangements. Information was collected on all usual residents of a selected household (de jure population) as well as persons who had stayed in the selected household the night before the interview (de facto population).

This chapter presents information on the conditions of the households in which the survey population lives, including the source of drinking water, type of sanitation facilities, availability of electricity, building materials, possession of household durable goods, and wealth. Also presented are demographic and socioeconomic characteristics of the women respondents to the 2015 KMIS, including their religion and level of education. The information presented in this chapter is intended to facilitate interpretation of the key health indicators presented in later chapters and to assist in the assessment of the representativeness of the survey sample.

2.1 HOUSEHOLD ENVIRONMENT

The characteristics of households are important determinants of the health status of household members. The 2015 KMIS asked respondents a number of questions about their household environment, including the source of drinking water, type of toilet or latrine facility, type of cooking fuel, building characteristics, and number of rooms used for sleeping. Several of these measures correspond with Sustainable Development Goal 6: to ensure access to water and sanitation for all.

2.1.1 Drinking Water

The source of a household's drinking water is an indicator of water quality. Sources likely to be of suitable quality and considered an *improved* source include piped water into a dwelling, yard, or plot, or to the neighbour; public tap or standpipe; tubewell or borehole; protected dug well; protected spring; rainwater; and bottled water. Sources of unsuitable quality are considered to be non-improved sources, and include unprotected dug wells; unprotected springs; a tanker or cart with a drum; and surface water. Lack of easy access to an improved water source may limit the quantity of suitable drinking water that is available to a household as well as increase the risk of illness. Table 2.1 presents the percent distribution of households and the de jure population by source of drinking water and by the time required to obtain drinking water.

Table 2.1 Household drinking water

Percent distribution of households and de jure population by source of drinking water and time to obtain drinking water, according to residence, Kenya 2015

	Households			Population		
Background characteristic	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Source of drinking water						
Improved source	**89.8**	**64.7**	**75.1**	**87.5**	**62.3**	**70.8**
Piped water into dwelling/yard/plot	42.0	11.7	24.2	39.0	9.7	19.6
Piped to neighbour	7.1	5.2	6.0	7.8	4.8	5.8
Public tap/standpipe	14.1	10.6	12.0	13.6	9.5	10.9
Tubewell/borehole	7.2	7.5	7.3	6.9	8.0	7.6
Protected dug well	4.8	10.1	7.9	6.4	10.9	9.4
Protected spring	2.2	12.6	8.3	3.0	13.7	10.1
Rainwater	4.0	6.5	5.5	5.1	5.5	5.3
Bottled water	8.6	0.4	3.8	5.7	0.1	2.0
Non-improved source	**9.7**	**35.1**	**24.7**	**12.1**	**37.6**	**29.0**
Unprotected dug well	0.6	3.7	2.4	0.9	4.1	3.0
Unprotected spring	0.7	3.2	2.2	1.1	3.4	2.6
Tanker truck/cart with drum	4.2	2.5	3.2	4.0	1.8	2.6
Surface water	4.1	25.7	16.8	6.0	28.2	20.7
Other source	**0.4**	**0.2**	**0.3**	**0.5**	**0.1**	**0.3**
Total	100.0	100.0	100.0	100.0	100.0	100.0
Time to obtain drinking water (round trip)						
Water on premises	70.7	31.2	47.5	67.0	27.8	41.1
Less than 30 minutes	18.4	36.8	29.3	19.6	37.4	31.4
30 minutes or longer	8.9	31.7	22.3	11.6	34.5	26.8
Don't know	1.5	0.1	0.7	1.2	0.1	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	2,673	3,808	6,481	7,965	15,600	23,565

Note: Totals may not add up to 100 percent because households with missing information are not shown separately.

Seventy-five percent of households in Kenya have access to an improved source of drinking water: most commonly, piped water into the dwelling, yard, or plot (24 percent) or via a public tap or standpipe (12 percent). Urban households (90 percent) are more likely to use an improved source of drinking water compared with rural households (65 percent). Surface water is the most commonly used non-improved source of drinking water by households (17 percent). Households in rural areas (26 percent) are more likely to use surface water compared to urban households (4 percent).

Forty-eight percent of households access drinking water on their premises while 22 percent of households spend more than 30 minutes to obtain drinking water. Those households with drinking water on the premises are more likely to be urban while those households that spend time to obtain drinking water are more likely to be rural.

2.1.2 Household Sanitation Facilities

According to the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, a household's toilet/latrine is classified as hygienic if it is used only by household members (i.e., not shared with other households) and the type of facility effectively separates waste from human contact. The types of facilities most likely to accomplish this are considered improved facilities and include toilets/latrines that flush or pour-flush into a sewer system, septic tank, or pit latrine; ventilated improved pit (VIP) latrines; pit latrines with a slab; or composting toilets (WHO/UNICEF 2014).

Table 2.2 presents the percent distribution of households and the de jure population by type of toilet/latrine facilities usually used by household members. Twenty-eight percent of households use improved (and not shared) toilet facilities. Thirty percent of households use an improved facility that is shared by two or more households. Pit latrines with a slab are the most common improved facility and shared facility used by households (11 percent and 14 percent, respectively). Households in urban areas are more likely to use either improved facilities or shared facilities compared with those in rural areas. Forty-two percent of households are using non-improved facilities; the majority of which are pit latrines without a slab or open pits.

Table 2.2 Household sanitation facilities

Percent distribution of households and de jure population by type of toilet/latrine facilities, according to residence, Kenya 2015

	Households			Population		
Type of toilet/latrine facility	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Improved, not shared facility	**32.9**	**24.7**	**28.1**	**35.6**	**25.4**	**28.9**
Flush/pour flush to piped sewer system	18.1	0.1	7.5	16.0	0.0	5.4
Flush/pour flush to septic tank	4.6	1.0	2.5	4.7	0.7	2.0
Flush/pour flush to pit latrine	0.9	0.2	0.5	1.1	0.3	0.5
Ventilated improved pit (VIP) latrine	4.5	7.2	6.1	6.6	6.6	6.6
Pit latrine with a slab	4.8	15.8	11.3	7.3	17.4	14.0
Composting toilet	0.1	0.4	0.3	0.1	0.5	0.4
Shared facility[1]	**43.3**	**19.9**	**29.5**	**38.1**	**15.4**	**23.1**
Flush/pour flush to piped sewer system	6.0	0.0	2.5	5.0	0.0	1.7
Flush/pour flush to septic tank	2.3	0.1	1.0	1.9	0.1	0.7
Flush/pour flush to pit latrine	1.9	0.2	0.9	1.6	0.1	0.6
Ventilated improved pit (VIP) latrine	16.6	6.7	10.8	14.8	4.4	7.9
Pit latrine with a slab	16.4	12.7	14.2	15.0	10.7	12.2
Composting toilet	0.0	0.1	0.1	0.0	0.1	0.1
Non-improved facility	**23.8**	**55.4**	**42.4**	**26.2**	**59.1**	**48.0**
Flush/pour flush not to sewer/septic tank/ pit latrine	6.2	0.1	2.6	3.3	0.1	1.2
Pit latrine without slab/open pit	15.0	42.7	31.3	18.6	44.7	35.9
Bucket	0.5	0.0	0.2	0.6	0.0	0.2
Hanging toilet/hanging latrine	0.2	0.1	0.1	0.3	0.1	0.1
No facility/bush/field	1.8	12.4	8.0	3.3	14.1	10.5
Other	0.1	0.1	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	2,673	3,808	6,481	7,965	15,600	23,565

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

2.1.3 Housing Characteristics

Table 2.3 shows the percent distribution of households by housing characteristics according to place of residence. These characteristics are usually a function of the household's socioeconomic situation and have a direct bearing on the health and welfare of household members. The majority of households (58 percent) do not have electricity; a higher percentage of urban dwellers (78 percent) have access to electricity compared with those in rural households (16 percent).

The most commonly used flooring materials are cement (45 percent) and earth/sand (32 percent). More urban households (61 percent) have cement floors compared with rural households (33 percent); earth/sand is the most common flooring in rural homes (48 percent). Iron sheets are by far the most commonly used roofing materials (84 percent). In rural areas, the dominant wall materials are dung/mud/sod (44 percent), while stone with lime/cement is the wall material most commonly used in urban areas (47 percent).

More than half of households (54 percent) have only one room used for sleeping, while 29 percent have two rooms.

Table 2.3 Household characteristics

Percent distribution of households by housing characteristics, according to residence, Kenya 2015

Housing characteristic	Residence		Total
	Urban	Rural	
Electricity			
Yes	78.1	16.0	41.6
No	21.9	84.0	58.4
Total	100.0	100.0	100.0
Flooring material			
Earth/sand	9.9	47.9	32.2
Dung	2.2	16.0	10.3
Wood planks	0.2	0.1	0.1
Parquet or polished wood	0.3	0.1	0.2
Vinyl/PVC/asphalt strips	1.7	0.4	0.9
Ceramic tiles	16.5	0.7	7.2
Cement	61.3	33.1	44.7
Carpet	7.8	1.6	4.1
Other	0.0	0.1	0.1
Total	100.0	100.0	100.0
Main roof material			
No roof	0.0	0.1	0.0
Thatch/grass/makuti	2.1	11.8	7.8
Dung/mud/sod	0.4	1.2	0.9
Iron sheets	81.3	85.8	83.9
Tin cans	0.1	0.1	0.1
Asbestos sheet	7.1	0.2	3.1
Concrete	7.5	0.1	3.1
Tiles	1.5	0.1	0.7
Other	0.0	0.6	0.4
Total	100.0	100.0	100.0
Main wall material			
No walls	0.1	0.1	0.1
Cane/palm/trunks	0.8	6.7	4.2
Dung/mud/sod	9.1	43.5	29.3
Bamboo with mud	0.4	1.4	1.0
Stone with mud	0.8	1.1	1.0
Uncovered adobe	0.2	2.4	1.5
Plywood	0.8	1.8	1.4
Cardboard	0.1	0.0	0.0
Reused wood	1.6	2.2	2.0
Iron sheets	14.8	4.6	8.8
Cement	13.7	10.6	11.9
Stone with lime/cement	47.4	10.3	25.6
Bricks	4.0	5.3	4.8
Cement blocks	5.2	2.2	3.4
Covered adobe	0.1	0.7	0.4
Wood planks/shingles	0.7	6.5	4.1
Other	0.1	0.7	0.4
Total	100.0	100.0	100.0
Rooms used for sleeping			
One	65.7	46.4	54.4
Two	21.6	34.5	29.2
Three or more	12.6	19.1	16.4
Total	100.0	100.0	100.0
Number	2,673	3,808	6,481

2.2 Household Possessions

Ownership of domestic goods such as furniture and electronics along with land and livestock provide a measure of household wealth and general well-being. Moreover, particular goods have specific benefits. Some household effects promote good hygiene and nutrition and can provide access to health information, while land and livestock support production of food and improve living standards. Table 2.4 shows the percentage of households possessing various household items and means of transport as well as land and livestock ownership.

A majority of households own a mobile phone (90 percent), and this percentage is high in both urban (97 percent) and rural areas (86 percent). Seventy-one percent of households own a radio, and 37 percent own a television. Urban households are somewhat more likely to have a radio (78 percent) compared with rural households (65 percent). Television ownership is far more likely in urban households (62 percent) compared with rural households (19 percent).

About one in five households owns a bicycle (20 percent), and 10 percent own a motorcycle or scooter. Six percent of households own a car/truck; ownership of this means of transport is concentrated in urban areas. Sixty-three percent of households own agricultural land, while 60 percent own livestock. Rural households are more likely to own both land and livestock compared with urban households; over three-quarters of rural households own land (77 percent) and own livestock (76 percent).

Table 2.4 Household possessions

Percentage of households possessing various household effects, means of transportation, agricultural land, and farm animals, by residence, Kenya 2015

	Residence		
Possession	**Urban**	**Rural**	**Total**
Household effects			
Radio	78.1	65.3	70.6
Television	61.5	19.4	36.8
Mobile telephone	96.7	85.5	90.1
Non-mobile telephone	1.9	0.7	1.2
Refrigerator	17.6	1.3	8.0
Solar panel	5.1	17.8	12.6
Table	88.7	83.8	85.8
Chair	87.5	90.0	89.0
Sofa	70.9	51.6	59.5
Bed	96.2	92.3	93.9
Cupboard	53.4	45.0	48.5
Clock	28.3	15.0	20.5
Watch	34.3	16.6	23.9
Microwave oven	10.7	1.0	5.0
Computer	21.0	1.7	9.7
DVD player	47.4	11.8	26.5
CD player	30.2	6.8	16.4
Means of transport			
Bicycle	15.1	23.2	19.9
Animal drawn cart	1.4	2.7	2.2
Motorcycle/scooter	7.8	10.7	9.5
Car/truck	10.9	2.9	6.2
Boat with a motor	0.2	0.4	0.4
Ownership of agricultural land	43.0	76.9	62.9
Ownership of farm animals[1]	37.4	76.0	60.0
Number	2,673	3,808	6,481

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

2.3 WEALTH INDEX

The wealth index used in this report and in many other DHS survey reports serves as a proxy for a household's long-term standard of living. It has been demonstrated to be consistent with expenditure and income measures (Rutstein 1999; Rutstein and Johnson 2004). The index is constructed using household asset data collected in the Household Questionnaire and is generated via a principal components analysis.

The wealth index takes into account urban-rural differences in scores and indicators of wealth by performing the first and second steps of its creation separately for urban and rural areas prior to creating a national wealth index in the last step. In the first step, a subset of indicators common to urban and rural areas is used to create wealth scores for households in both areas. Categorical variables to be used are transformed into separate dichotomous (0-1) indicators. These indicators and those that are continuous are then examined using a principal components analysis to produce a common factor score for each household. In the second step, separate factor scores are produced for households in urban and rural areas using area-specific indicators. The third step combines the separate area-specific factor scores to produce a nationally applicable combined wealth index by adjusting area-specific scores through a regression on the common factor scores. The resulting combined wealth index has a mean of zero and a standard deviation of one. Once the index is computed, national-level wealth quintiles (from lowest to highest) are obtained by assigning the household score to each de jure household member, ranking each person in the population by his or her score, and then dividing the ranking into five equal categories, each comprising 20 percent of the population.

Table 2.5 shows the percent distribution of the de jure household population by wealth quintile according to residence and malaria endemicity. Seven in ten urban residents (71 percent) are in the two highest wealth quintiles, while more than three-quarters of rural residents (76 percent) are in the lowest three quintiles. By malaria endemic zone, the semi-arid, seasonal zone has the highest proportion (42 percent) of households in the lowest wealth quintile followed by the coast endemic zone (33 percent). In comparison, the low risk zone has the highest percentage of households (37 percent) in the highest quintile.

Table 2.5 Wealth quintiles

Percent distribution of the de jure population by wealth quintiles, and the Gini Coefficient, according to residence and malaria endemicity, Kenya 2015

Residence/zone	Wealth quintile					Total	Number of persons	Gini coefficient
	Lowest	Second	Middle	Fourth	Highest			
Residence								
Urban	10.3	7.9	10.5	23.4	47.9	100.0	7,965	0.20
Rural	25.0	26.1	24.8	18.3	5.8	100.0	15,600	0.19
Malaria endemicity								
Highland epidemic	20.1	23.7	25.3	20.0	10.9	100.0	5,117	0.22
Lake endemic	12.7	32.0	26.9	18.3	10.1	100.0	5,226	0.25
Coast endemic	33.1	14.2	13.1	15.1	24.5	100.0	1,645	0.35
Semi-arid, seasonal	41.5	18.5	13.2	14.7	12.1	100.0	4,133	0.30
Low risk	10.3	11.1	16.8	25.3	36.6	100.0	7,444	0.23
Total	20.0	20.0	20.0	20.0	20.0	100.0	23,565	0.27

Table 2.5 also includes information on the Gini coefficient, which indicates the level of concentration of wealth. This ratio is expressed as a proportion between 0 and 1, with 0 being an equal distribution and 1 a totally unequal distribution. The coefficient indicates the distribution of wealth independent of the level of wealth. There is no urban-rural difference in the coefficient (0.20 compared with 0.19). By endemicity, the coefficient is highest in the coast endemic zone at 0.35 and in the semi-arid, seasonal zone at 0.30. The coefficient ranges between 0.22 and 0.25 in the other three zones, indicating that people in those zones are more similar to each other with regard to wealth than people in the coast endemic zone and semi-arid, seasonal zone.

2.4 House Population by Age, Sex, and Residence

The distribution of the de facto household population (i.e., those who stayed in the household the night before the interview) in the 2015 KMIS is shown in Table 2.6 by 5-year age groups, according to sex and residence. The de facto household population constitutes 23,517 people (11,450 males and 12,067 females). Fifteen percent of the population is children under age 5. Forty-three percent of the population is under age 15. In general, the proportion of the household population in each age group declines as the age increases, reflecting the young age structure of the population in Kenya.

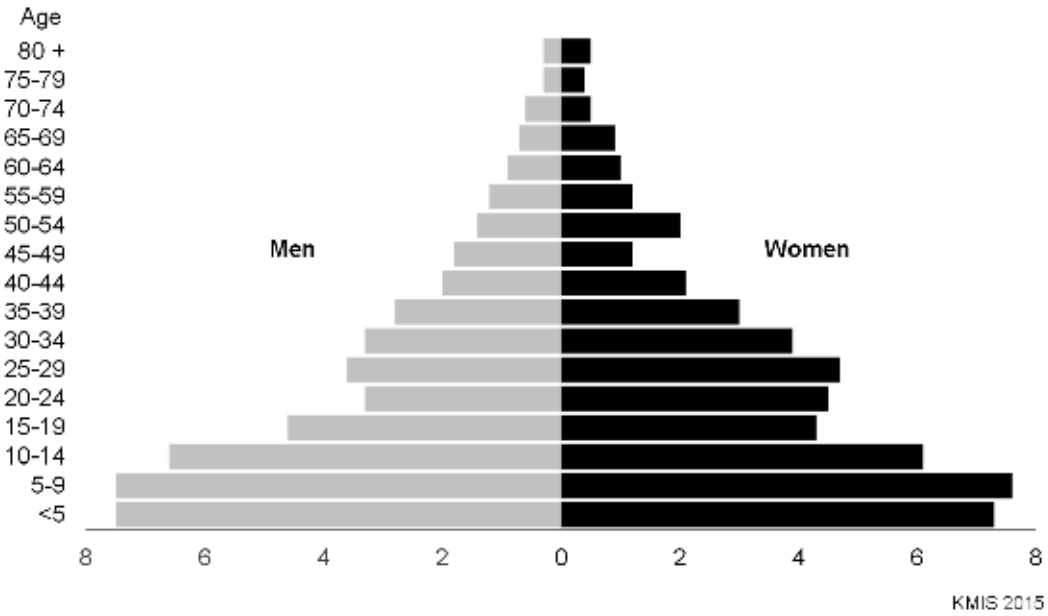
Table 2.6 Household population by age, sex, and residence

Percent distribution of the de facto household population by 5-year age groups, according to sex and residence, Kenya 2015

	Urban			Rural					
Age	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
<5	14.4	13.2	13.8	15.9	14.8	15.3	15.4	14.2	14.8
5-9	11.4	12.6	12.0	17.6	15.9	16.7	15.5	14.8	15.1
10-14	10.2	9.4	9.8	15.1	13.1	14.1	13.5	11.9	12.6
15-19	7.0	7.7	7.4	10.7	8.6	9.6	9.4	8.3	8.9
20-24	8.8	12.4	10.7	5.8	6.8	6.3	6.8	8.7	7.8
25-29	11.1	12.7	11.9	5.4	7.5	6.5	7.4	9.2	8.3
30-34	9.8	9.0	9.4	5.2	6.8	6.0	6.7	7.5	7.2
35-39	7.1	6.5	6.8	5.1	5.5	5.3	5.8	5.9	5.8
40-44	5.2	4.1	4.6	3.6	4.2	3.9	4.2	4.1	4.2
45-49	4.5	2.6	3.5	3.2	2.4	2.8	3.6	2.4	3.0
50-54	3.4	3.6	3.5	2.7	4.0	3.3	2.9	3.9	3.4
55-59	2.0	1.8	1.9	2.8	2.5	2.6	2.5	2.3	2.4
60-64	1.7	1.0	1.3	2.0	2.4	2.2	1.9	1.9	1.9
65-69	0.8	1.2	1.0	1.9	2.0	1.9	1.5	1.7	1.6
70-74	0.9	0.7	0.8	1.2	1.1	1.2	1.1	0.9	1.0
75-79	0.3	0.6	0.5	0.6	0.9	0.8	0.5	0.8	0.7
80 +	0.4	0.6	0.5	0.8	1.3	1.0	0.7	1.1	0.9
Don't know	0.9	0.1	0.5	0.4	0.3	0.3	0.5	0.3	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	3,881	4,090	7,971	7,568	7,978	15,546	11,450	12,067	23,517

Figure 2.1 illustrates the age-sex structure of the Kenyan population in a population pyramid. The broad base of the pyramid indicates that the majority of Kenya's population is young, with a high percentage under age 15. The drop in the female population between ages 10-14 and 15-19 is a bit steep and could be due partially to some interviewers estimating ages of women to be under the interview cutoff age of 15 to reduce their workload. Similarly, there is an increase in the female population between the two age ranges of 45-49 and 50-54, which might be caused by interviewers estimating some women to be older than the interview cutoff age of 49.

Figure 2.1 **Population pyramid**



2.5 HOUSEHOLD COMPOSITION

The number of members within a household may contribute to strain on household resources, which in turn may affect the general welfare of household members and their access to food, health care, mosquito nets, and other items. The percent distribution of households by sex of the household

head and by household size is presented in Table 2.7. The majority of households in Kenya are headed by men (64 percent), and 36 percent are headed by women. The mean household size is 3.6 persons; this is higher in rural areas (4.1 persons) than in urban areas (3.0 persons).

Table 2.7 Household composition

Percent distribution of households by sex and age of head of household and by household size and mean size of household, according to residence, Kenya 2015

Characteristic	Residence		Total
	Urban	Rural	
Household headship			
Male	66.1	62.4	63.9
Female	33.9	37.6	36.1
Total	100.0	100.0	100.0
Age of household head			
Less than 20	1.1	1.0	1.1
20-29	28.4	16.1	21.2
30-39	31.0	25.5	27.8
40-49	17.3	18.2	17.8
50-59	11.8	16.0	14.3
60-69	5.3	12.5	9.5
70 or over	3.9	9.6	7.2
Don't know	1.3	0.9	1.1
Total	100.0	100.0	100.0
Number of usual members			
0	0.1	0.1	0.1
1	31.3	14.8	21.6
2	17.5	11.9	14.2
3	16.3	17.2	16.8
4	14.7	16.2	15.6
5	9.2	14.3	12.2
6	5.4	10.9	8.6
7	2.7	6.9	5.1
8	1.2	4.2	2.9
9+	1.7	3.6	2.8
Total	100.0	100.0	100.0
Mean size of households	3.0	4.1	3.6
Number of households	2,673	3,808	6,481

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

2.6 Characteristics of Women Respondents

This section provides a demographic and socio-economic profile of female respondents in the 2015 KMIS. The information is essential for interpretation of the findings presented later in the report and provides an indication of the representativeness of the survey.

Table 2.8 presents the percent distribution of women age 15-49 by selected background characteristics. The distribution of women tends to decline with increasing age, reflecting the comparatively young age structure of the Kenyan population. Fifty-six percent of the women interviewed are between age 15 and age 29. A majority of women are Protestant (69 percent), 22 percent are Roman Catholic, and 6 percent are Muslim. Sixty percent of women reside in rural areas, and 40 percent live in urban areas. Forty-six percent of women live in the malaria-prone highland epidemic, lake endemic, or coast endemic zones.

Thirty-one percent of women completed secondary school or higher, while around half have only primary education (46 percent). Eight percent of women have never been to school. Almost 9 in 10 women are literate (87 percent). About one-quarter of women (27 percent) live in households in the highest wealth quintile. The percentages of women in the lower quintiles are more evenly distributed between 16 and 21 percent.

Table 2.8 Background characteristics of respondents

Percent distribution of women age 15-49 by selected background characteristics, Kenya 2015

	Women		
Background characteristic	**Weighted percent**	**Weighted number**	**Unweighted number**
Age			
15-19	17.7	953	1,000
20-24	18.8	1,015	1,001
25-29	19.4	1,047	1,048
30-34	16.4	887	854
35-39	13.1	705	681
40-44	8.9	482	497
45-49	5.7	305	313
Religion			
Roman Catholic	22.0	1,185	1,072
Protestant/other Christian	69.3	3,736	3,486
Muslim	6.4	348	674
No religion	1.8	95	124
Other	0.6	31	38
Residence			
Urban	40.4	2,178	2,478
Rural	59.6	3,216	2,916
Malaria endemicity			
Highland epidemic	19.3	1,042	1,210
Lake endemic	19.2	1,038	1,000
Coast endemic	7.0	379	755
Semi-arid, seasonal	17.4	940	1,161
Low risk	37.0	1,995	1,268
Education			
No education	7.8	419	690
Primary incomplete	12.5	672	712
Primary complete	33.6	1,812	1,832
Secondary incomplete	15.4	831	785
Secondary complete	15.7	849	768
Higher	15.0	811	607
Literacy			
Literacy[1]	87.4	4,712	4,467
Illiterate	12.5	674	919
Blind/visually impaired	0.1	8	8
Wealth quintile			
Lowest	15.8	855	1,161
Second	18.0	969	1,013
Middle	18.5	1,000	1,008
Fourth	21.1	1,141	1,040
Highest	26.5	1,430	1,172
Total 15-49	100.0	5,394	5,394

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

– 3 –

Vector Control

3 VECTOR CONTROL

Key Findings

- A majority of households (63 percent) own at least one long-lasting insecticidal net (LLIN). However, less than one-half (40 percent) of households own at least one LLIN for every two persons who stayed in the household the night before the survey (universal coverage).
- Almost all the nets owned by households in Kenya are LLINs.
- Fifty-three percent of the household population has access to an LLIN.
- Nearly one-half of the household population (48 percent) slept under an LLIN the night before the survey. Seven in ten (71 percent) members of households with at least one LLIN slept under an LLIN the night before the survey; therefore, access to LLINs is a key determinant to net use.
- Fifty-six percent of children under age 5 slept under an LLIN the night before the survey; this is an increase from 39 percent in the 2010 KMIS.
- Fifty-eight percent of pregnant women age 15-49 slept under an LLIN the night before the survey, an increase from 36 percent reported in the 2010 KMIS.
- More than 90 percent of household respondents are extremely or very confident they can hang a net, feel that it is extremely or very important for young children to sleep under a net, and agree that treated mosquito nets are safe to sleep under.

Vector control is one of the key preventive interventions in malaria control. It has been and remains a major focus in the Kenya National Malaria Strategy 2009-2018 (revised 2014) (MOH 2014). As outlined in the document, the core vector control strategies are the distribution of long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS) in targeted areas, and larval source management (LSM).

LLINs are factory-treated mosquito nets made with netting material that has insecticide incorporated within or bound around the fibres. This type of net must retain its effective biological activity, without re-treatment after repeated washes, for 3 years of use under field conditions. The current generation of LLINs last 3 to 5 years, after which the nets should be replaced (WHO/Global Malaria Program 2007). The National Malaria Control Programme (NMCP) in Kenya distributes LLINs in the following ways:

- Mass distribution campaigns every 3 years in malaria endemic and epidemic-prone areas
- Routine distribution through antenatal care (ANC) and child welfare clinics for pregnant women and young children
- Social marketing of subsidized LLINs at designated locations in poor areas
- Commercial outlets that sell nets

IRS, a strategy aimed at reducing disease burden in malaria endemic areas and an early epidemic response, has not been implemented since 2012 due to insecticide resistance management. Accordingly, data on IRS were not collected in the 2015 KMIS. LSM is recommended in areas where

mosquito breeding sites may be easily identified and may be implemented after expert evaluation. Data on LSM are not collected in MIS surveys.

This chapter presents data assessing the ownership and use of LLINs and other mosquito nets. These data include the percentage of households possessing nets and the percentage of household members, pregnant women, and children who slept under a net the night before the survey. Data are also presented on universal coverage (the proportion of households with at least one net for every two people), source and cost of nets, access to nets, and net condition.

3.1 Household Ownership of Mosquito Nets

3.1.1 Ownership of Mosquito Nets

All households interviewed in the 2015 KMIS were asked whether they owned a mosquito net and, if so, how many. Respondents were also asked to show the mosquito nets they owned to the interviewer so that the interviewer could identify the brand and type. While LLINs are the recommended net for malaria prevention, other varieties of treated and untreated nets may be found in Kenya from markets or other sources. Household ownership of mosquito nets and of LLINs is summarized in Table 3.1.

Table 3.1 Household possession of mosquito nets

Percentage of households with at least one mosquito net (treated or untreated), more than one net, at least one long-lasting insecticidal net (LLIN), and more than one LLIN; average number of nets and of LLINs per household; and percentage of households with at least one net and the percentage with at least one LLIN per two persons who stayed in the household last night, by background characteristics, Kenya 2015

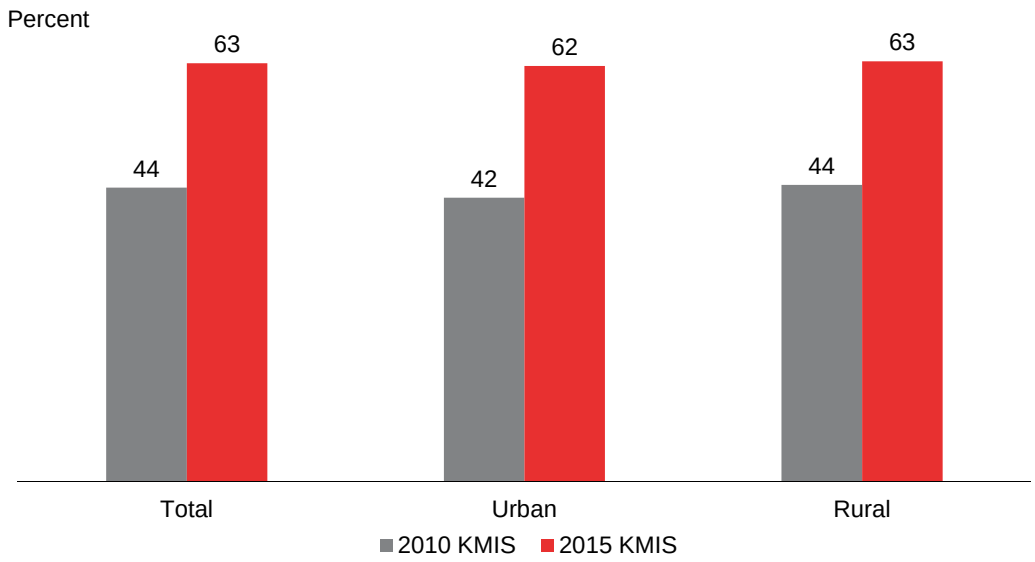
	Percentage of households with:				Average number of nets per household			Percentage of households with at least one mosquito net for every two persons who stayed in the household last night[1]		
Background characteristic	At least one mosquito net	More than one mosquito net	At least one long-lasting insecticidal net (LLIN)	More than one long-lasting insecticidal net (LLIN)	Any mosquito net	Long-lasting insecticidal net (LLIN)	Number of households	Any mosquito net	Long-lasting insecticidal net (LLIN)	Number of households with at least one person who stayed in the household last night
Residence										
Urban	65.5	33.7	62.1	31.9	1.2	1.1	2,673	48.1	45.4	2,640
Rural	63.7	40.5	62.8	39.8	1.4	1.3	3,808	37.1	36.3	3,793
Malaria endemicity										
Highland epidemic	72.9	53.9	72.9	53.8	1.7	1.7	1,186	45.7	45.6	1,182
Lake endemic	88.2	61.2	86.8	60.2	2.0	2.0	1,184	55.7	54.4	1,181
Coast endemic	78.6	42.8	73.3	39.4	1.5	1.4	441	50.1	45.4	439
Semi-arid, seasonal	53.7	23.7	52.4	22.7	0.9	0.9	1,081	25.1	24.2	1,080
Low risk	51.8	24.5	49.1	23.1	0.9	0.8	2,589	38.7	36.5	2,552
Wealth quintile										
Lowest	50.5	26.8	49.1	26.2	0.9	0.9	1,120	26.3	25.8	1,119
Second	63.8	37.5	63.2	37.0	1.3	1.3	1,174	35.4	34.6	1,170
Middle	68.0	41.3	67.6	41.0	1.4	1.4	1,215	42.4	41.9	1,203
Fourth	64.1	34.9	62.1	33.8	1.3	1.2	1,410	41.4	39.9	1,396
Highest	72.5	45.4	68.0	42.6	1.5	1.4	1,562	57.0	53.1	1,545
Total	64.5	37.7	62.5	36.5	1.3	1.3	6,481	41.6	40.0	6,433

[1] De facto household members

Overall, 65 percent of households own at least one mosquito net, while 38 percent own more than one. Sixty-three percent of households own at least one LLIN, while 37 percent have more than one. Therefore, almost all the nets owned by households in Kenya are LLINs. The average number of LLINs per household is 1.3, an increase from 0.8 measured in the 2010 KMIS. Forty percent of households in Kenya have reached universal LLIN coverage; that is, about 4 in 10 households have at least one LLIN for every two persons who slept in the household the night before the survey.

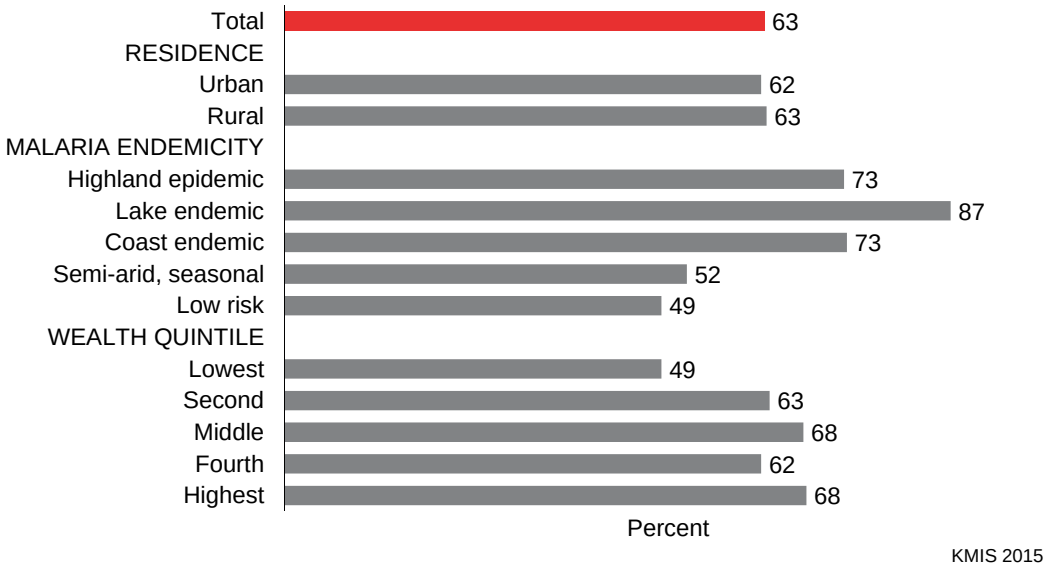
Figure 3.1 compares LLIN ownership in the 2010 and in the 2015 KMIS surveys. Nationally, ownership of at least one LLIN has increased by 19 percentage points since 2010, from 44 percent to 63 percent. LLIN ownership has similarly increased among both urban and rural households, and there is no noticeable difference between the two types of household in current ownership.

Figure 3.1 **Trends in ownership of LLINs**



As shown in Table 3.1 and Figure 3.2, households in the lake and coast endemic zones and in the highland epidemic zone are more likely to own at least one LLIN compared with households in other malaria transmission zones. A large majority (87 percent) of households in the lake endemic zone own an LLIN as do nearly three-quarters of households in the coast endemic and the highland epidemic zone (73 percent each). Closer to one-half of households in the semi-arid, seasonal zone (52 percent) and the low risk zone (49 percent) own an LLIN. Ownership of LLINs does not clearly increase with household wealth, although households in the four highest wealth quintiles are more likely to own nets compared with households in the lowest quintile.

Figure 3.2 **Household ownership of at least one LLIN**



3.1.2 Source and Cost of Mosquito Nets

Table 3.2 shows the percent distribution of mosquito nets by source and by cost of net and the mean cost of net, according to background characteristics. The majority of nets (69 percent) are accessed through routine LLIN distribution, that is through either the 2014-15 mass net distribution campaign, other distribution campaigns, or distribution by government, clinical, and faith-based health facilities. Households in the lake endemic or highland epidemic zone received most of the nets distributed through campaigns. These two regions are specifically targeted by both campaign and routine distribution. Furthermore, at the time of the 2015 KMIS data collection, the 2014-15 campaign had completed free mass net distribution in 6 of the targeted 23 counties in these zones.

Overall, 13 percent of nets come from supermarkets or retail shops, and 8 percent are from dukas and rural shops. The semi-arid, seasonal and low risk zones are more likely to access nets from these sources than other malaria transmission zones.

Nationally, the majority of nets are accessed for free (69 percent), and another 16 percent of nets cost 500 Kenyan Shillings (KSH) or less. Eighty-three percent of nets in rural areas were accessed for free compared with 46 percent of nets in urban areas. In the highland epidemic and lake endemic zones, almost all nets were accessed free (93 percent and 88 percent, respectively). In other malaria transmission zones, one- to two-thirds of nets are free. Nets owned by households in the highest wealth quintile (39 percent) are less likely to be free than those in lower wealth quintiles (71 percent or higher). Among nets that were not free, the average cost was 555.2 KSH.

Table 3.2 Source and cost of mosquito nets

Percent distribution of mosquito nets by source of net, percent distribution by cost of net, and mean cost of net, according to background characteristics, Kenya 2015

	Source of net									Cost of net						
Background characteristic	2014-15 Mass net campaign	Other campaign	Govern-ment/ FBO Clinic/ Hospital	Duka/ Rural shop	Super-market/ retail shop	Friends/ relative	Other	Don't know	Total	Free	1-500 KSH	501+ KSH	Not sure	Total	Mean cost of net[1]	Number of mosquito nets
Residence																
Urban	11.0	8.3	24.7	10.5	26.5	6.7	7.5	4.9	100.0	46.4	22.0	13.0	18.6	100.0	728.6	3,231
Rural	28.2	15.3	40.6	6.0	4.2	3.6	1.1	0.9	100.0	83.3	12.8	1.2	2.8	100.0	283.5	5,179
Malaria endemicity																
Highland epidemic	33.8	22.2	37.7	1.1	2.8	1.9	0.2	0.4	100.0	92.8	5.6	1.0	0.6	100.0	338.3	2,044
Lake endemic	45.8	13.9	28.2	3.2	3.5	3.8	0.6	1.0	100.0	88.0	7.1	2.1	2.8	100.0	410.2	2,399
Coast endemic	3.7	23.1	39.2	8.7	13.6	5.8	3.7	2.2	100.0	67.0	19.6	7.0	6.4	100.0	560.1	665
Semi-arid, seasonal	0.1	2.7	51.1	25.4	9.2	4.6	5.2	1.8	100.0	55.3	32.2	5.6	6.9	100.0	381.6	987
Low risk	0.1	4.0	29.8	10.5	32.4	8.2	8.9	6.0	100.0	35.2	27.7	13.2	23.9	100.0	687.5	2,316
Wealth quintile																
Lowest	23.5	11.2	47.8	8.5	1.2	5.1	1.8	0.8	100.0	84.7	13.4	0.5	1.4	100.0	228.5	1,037
Second	35.1	15.4	35.4	5.7	1.9	4.8	0.6	1.1	100.0	87.1	9.7	1.0	2.2	100.0	256.8	1,519
Middle	31.2	11.7	42.2	6.6	2.5	4.0	1.1	0.7	100.0	83.5	13.2	1.6	1.8	100.0	279.0	1,702
Fourth	17.9	16.0	36.1	7.7	10.8	4.6	5.0	2.0	100.0	71.0	18.9	3.6	6.4	100.0	394.5	1,764
Highest	8.0	9.6	21.4	9.6	33.4	5.4	7.0	5.5	100.0	39.3	22.2	15.5	23.1	100.0	809.8	2,389
Total	21.6	12.6	34.5	7.7	12.8	4.8	3.6	2.4	100.0	69.1	16.3	5.7	8.8	100.0	555.2	8,411

FBO = Faith-based organisation; KSH = Kenyan Shillings

[1] Calculation of mean cost of net excludes free nets and nets for which the price was not known.

3.1.3 Access to Long-Lasting Insecticidal Nets

The 2015 KMIS data can be used to show the proportion of the population that could sleep under an LLIN if each LLIN in the household were used by up to two people. This population is considered to have access to an LLIN. Coupled with data on actual mosquito net usage, LLIN access data provide useful information on the magnitude of the behavioural gap in LLIN ownership and use or, in other words, the population with access to an LLIN but not using it. If the difference between these indicators is substantial, programmatic efforts may need to focus on behaviour change and identify the main drivers of or barriers to LLIN use to design an appropriate intervention. This analysis helps LLIN programmes determine whether they need to achieve higher LLIN coverage, promote LLIN use, or both.

Table 3.3 presents the percent distribution of the de facto household population by the number of LLINs the household owns, according to the number of persons who stayed in the household the night before the survey. One-third (33 percent) of the population slept in homes without any LLINs the night before the survey and, therefore, were not able to use an LLIN. About 2 in 10 individuals stayed in households that own one LLIN (20 percent) or two LLINs (23 percent), and 13 percent of the population slept in homes with three LLINs. Few individuals slept in homes with more than four LLINs (11 percent). Overall, 53 percent of the population has access to an LLIN. LLIN access tends to decrease as household size increases beyond households with five or more persons. For example, 57 percent of households where five persons slept the night before the survey had access to an LLIN, whereas 46 percent of households where more than eight people slept had access to an LLIN.

Table 3.3 Household population with access to an LLIN

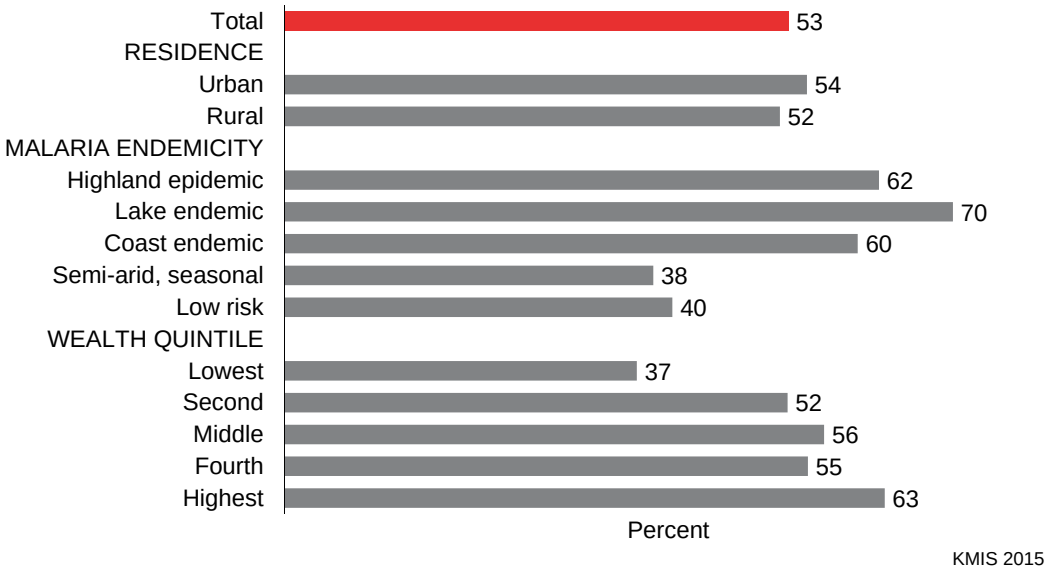
Percent distribution of the de facto household population by number of LLINs the household owns, and percentage with access to an LLIN, according to number of persons who stayed in the household the night before the survey, Kenya 2015

	Number of persons who stayed in the household the night before the survey								
Number of LLINs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8+**	**Total**
0	49.1	45.8	34.2	34.2	27.8	31.0	32.5	26.4	33.2
1	40.1	30.0	30.4	19.2	17.1	14.8	15.6	12.0	20.4
2	8.4	15.3	23.4	30.5	24.8	24.4	21.0	19.0	22.6
3	1.9	6.4	8.3	10.6	19.0	17.4	14.9	14.9	12.9
4	0.4	2.1	3.2	3.8	7.9	9.0	10.7	16.4	7.3
5	0.1	0.2	0.3	1.2	2.9	2.1	3.0	6.1	2.2
6	0.1	0.1	0.1	0.5	0.2	0.9	0.9	2.3	0.7
7+	0.0	0.0	0.0	0.0	0.3	0.5	1.4	2.8	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	1,348	1,896	3,276	3,929	3,981	3,329	2,378	3,379	23,517
Percent with access to an LLIN[1]	50.9	54.2	55.6	56.1	57.0	51.0	45.2	46.3	52.5

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

Figure 3.3 shows the percentage of the de facto population with access to an LLIN in the household by residence, malaria endemicity, and wealth quintile. Although there is little difference in LLIN access between urban and rural areas (54 percent and 52 percent, respectively), there are wide variations in LLIN access across the malaria transmission zones. The majority of the population in the highland epidemic, lake endemic, and coast endemic zones, had access to an LLIN (62 percent, 70 percent, and 60 percent, respectively). Less than one-half of the population in the semi-arid, seasonal zone (38 percent) and the low risk zone (40 percent) have access to an LLIN. Access to LLINs among household members generally increases with increasing household wealth, from 37 percent in the lowest wealth quintile to 63 percent in the highest quintile.

Figure 3.3 **Access to an LLIN by the household population**



3.2 USE OF MOSQUITO NETS

Community-level protection against malaria helps reduce the spread of the disease and offers an additional level of protection against malaria for the most vulnerable groups, such as children under age 5 and pregnant women. The 2015 KMIS asked about use of mosquito nets by household members, including young children and pregnant women, during the night before the survey.

3.2.1 Use of Mosquito Nets by Persons in the Household

Table 3.4 presents the percentage of the de facto household population that slept under a mosquito net of any type or under an LLIN the night before the survey. Nearly one-half of the household population (48 percent) slept under an LLIN the night before the survey. Seven in 10 (71 percent) members of households with at least one LLIN slept under an LLIN the night before the survey.

A slightly higher percentage of women (50 percent) than men (45 percent) slept under an LLIN the night prior to the survey. Similar percentages of urban and rural residents (49 percent and 47 percent, respectively) slept under an LLIN the previous night. The malaria-prone areas have the highest percentages of the household population that slept under an LLIN the night prior to the survey: 67 percent in lake endemic, 59 percent in coast endemic, and 54 percent in highland epidemic. The low risk zone (34 percent) has the lowest percentage. The percentage of the household population that slept under an LLIN the night before the survey increases notably from 35 percent in the lowest wealth quintile to 49 percent or more in the higher wealth quintiles.

As expected, ready access to an LLIN in the household appears to increase the likelihood of net use. Net usage among the population in households that own at least one LLIN and among the population in households that own at least one LLIN for every two people in the household is greater than that of the general population. Variations by background characteristics in LLIN use among households that own at least one LLIN or own an LLIN for every two people are similar to those within the general population.

The percentage of the household population sleeping under an LLIN has increased over time from 29 percent in the 2010 KMIS to 48 percent in 2015. Increases are especially notable in the malaria endemic and epidemic zones. The lake endemic zone showed the greatest increase in the percentage of household members sleeping under a net: from 33 percent to 67 percent.

Table 3.4 Use of mosquito nets by persons in the household

Percentage of the de facto household population who slept the night before the survey under a mosquito net (treated or untreated) and the percentage who slept under a long-lasting insecticidal net (LLIN); among the de facto household population in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey; and among the de facto household population in households with at least one LLIN for every two people, the percentage who slept under an LLIN the night before the survey, by background characteristics, Kenya 2015

	Household population			Household population in households with at least one LLIN		Household population in households with at least one LLIN for every two people	
Background characteristic	Percentage who slept under any net last night	Percentage who slept under an LLIN last night	Number	Percentage who slept under an LLIN last night	Number	Percentage who slept under an LLIN last night in households with an LLIN for every two people	Number
Age							
<5	57.9	56.1	3,633	79.2	2,573	87.3	1,034
5-14	44.9	43.9	6,382	64.7	4,332	83.3	1,889
15-34	46.7	45.1	7,532	67.9	5,004	79.7	2,611
35-49	52.8	51.0	3,074	78.0	2,010	85.1	1,185
50+	49.0	47.5	2,803	77.3	1,722	86.2	1,118
Don't know	60.1	60.1	93	78.2	72	(84.9)	40
Sex							
Male	46.5	45.2	11,450	68.5	7,553	81.6	3,811
Female	51.5	49.9	12,067	73.8	8,161	84.9	4,066
Residence							
Urban	51.8	49.2	7,971	74.5	5,257	83.7	3,118
Rural	47.7	46.8	15,546	69.6	10,457	83.0	4,759
Malaria endemicity							
Highland epidemic	54.5	54.4	5,116	71.7	3,878	82.1	2,038
Lake endemic	68.4	66.9	5,186	76.3	4,547	88.1	2,290
Coast endemic	63.5	59.0	1,638	73.5	1,313	83.3	570
Semi-arid, seasonal	37.4	36.0	4,133	64.2	2,316	85.8	751
Low risk	35.1	33.5	7,445	68.1	3,661	78.6	2,229
Wealth quintile							
Lowest	35.6	34.5	4,655	65.9	2,436	83.1	898
Second	50.0	49.2	4,703	70.6	3,276	86.1	1,385
Middle	51.8	51.2	4,669	71.1	3,359	82.8	1,613
Fourth	50.4	49.2	4,741	72.1	3,233	82.2	1,668
Highest	57.4	53.9	4,749	75.0	3,411	82.9	2,312
Total	49.1	47.6	23,517	71.2	15,714	83.3	7,877

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

Table 3.5 presents the percentage of LLINs used in the household by anyone the night before the survey, by background characteristics. This measures the use of existing LLINs and can be useful for assessing the utilization of existing LLINs and determining the magnitude of non-use of LLINs. Overall, 75 percent of LLINs were used by anyone in the household the night before the survey. Net use was similar in urban (74 percent) and in rural areas (76 percent). Net use is highest in the semi-arid, seasonal zone (83 percent), the coast endemic zone (82 percent), and the lake endemic zone (79 percent). Households in the highest wealth quintile are least likely to use existing LLINs (71 percent).

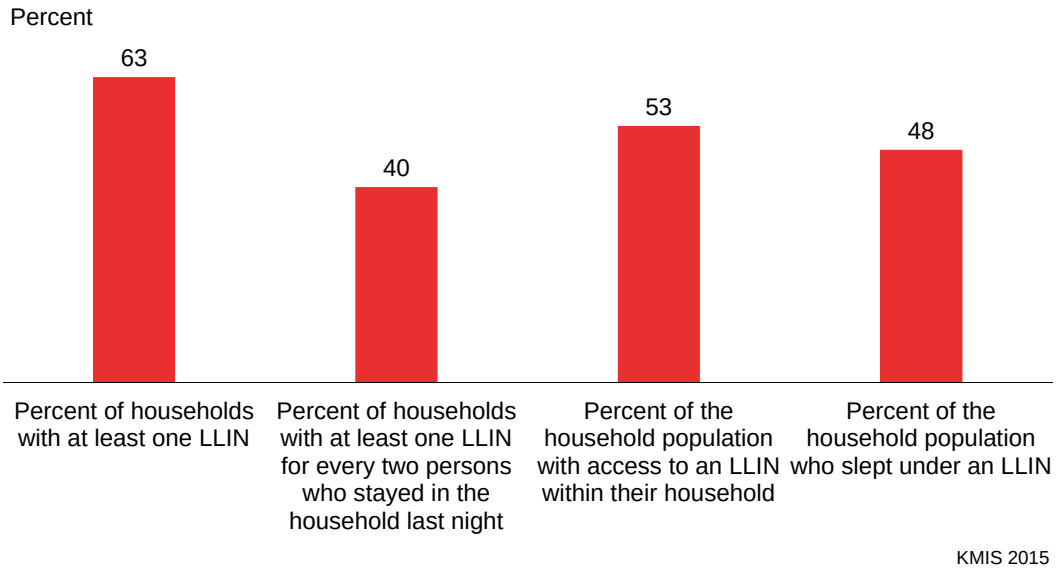
Table 3.5 Use of existing LLINs

Percentage of long-lasting insecticidal nets (LLINs) that were used by anyone the night before the survey, by background characteristics, Kenya 2015

Background characteristic	Percentage of existing LLINs used last night	Number of LLINs
Residence		
Urban	74.3	3,052
Rural	75.7	5,082
Malaria endemicity		
Highland epidemic	72.4	2,041
Lake endemic	78.7	2,343
Coast endemic	82.0	612
Semi-arid, seasonal	82.7	951
Low risk	69.0	2,188
Wealth quintile		
Lowest	76.8	1,010
Second	76.6	1,493
Middle	76.9	1,682
Fourth	77.0	1,711
Highest	70.9	2,237
Total	75.2	8,134

Figure 3.4 summarises the information on ownership of, access to, and use of LLINs. Although a majority of households own at least one LLIN (63 percent), less than one-half (40 percent) own at least one LLIN for every two persons who stayed in the household the night before the survey. Fifty-three percent of the household population has access to an LLIN, and 48 percent slept under an LLIN.

Figure 3.4 **Ownership of, access to, and use of LLINs**



KMIS 2015

3.2.2 Use of Mosquito Nets by Children under Age 5

Young children are especially vulnerable to malaria. For about 6 months following birth, antibodies acquired from the mother during pregnancy protect children born in areas of endemic malaria. This immunity is gradually lost, but children start to develop their own immunity to malaria. The pace at which immunity is developed depends on their exposure to malaria infection, and, in highly malaria-endemic areas, children are thought to have attained a high level of immunity by their fifth birthday. Such children may experience episodes of malarial illness but usually do not suffer from severe, life-threatening malaria. Immunity in areas of low malaria transmission is acquired more slowly, and malarial illness affects all age groups of the population.

Table 3.6 and Figure 3.5 show that 56 percent of children under age 5 sleep under an LLIN; this is an increase from 39 percent in the 2010 KMIS. The lake endemic zone showed a particularly notable increase in children sleeping under an LLIN, growing from 42 to 73 percent over the same 5-year period.

As Table 3.5 shows, around 6 in 10 children under age 2 sleep under an LLIN (62 to 64 percent), compared with about one-half of children between age 2 and age 5 (50 to 53 percent). Children in urban areas are more likely to sleep under an LLIN (60 percent) than those in rural areas (54 percent). Compared with children in the low risk and semi-arid, seasonal transmission zone, children in the malaria-prone zones are more likely to sleep under a net (42 to 46 percent, respectively, compared with 61 to 73 percent). The percentage of children who slept under an LLIN the night before the survey increases with increasing wealth.

Access to LLINs appears to be a key determinant of use. In households with at least one LLIN for every two people, 87 percent of children sleep under an LLIN. Moreover, zonal differences are not as great, with the use rate ranging from 74 percent in the semi-arid, seasonal transmission area to 82 percent in the lake endemic zone.

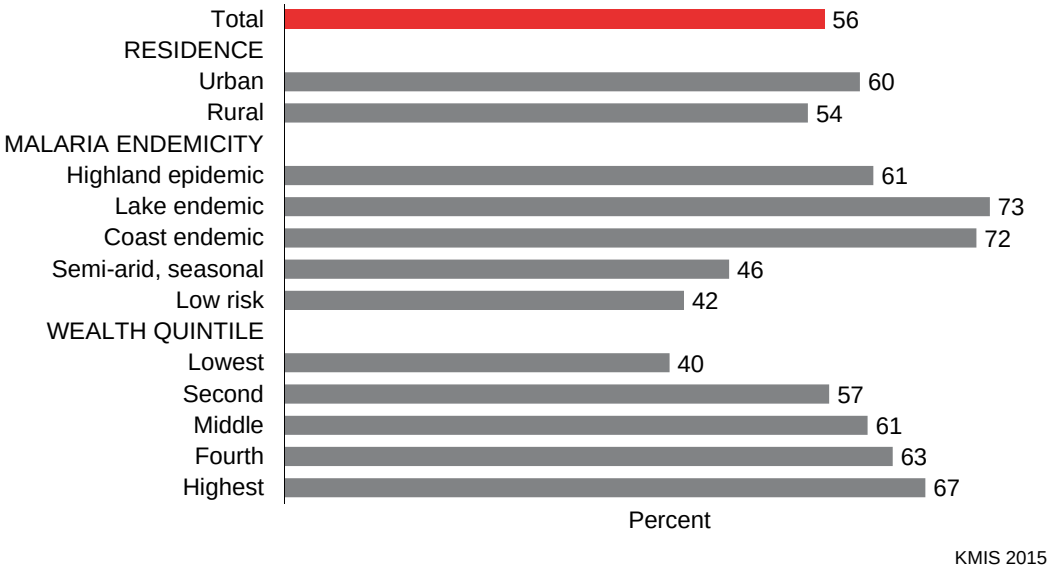
Table 3.6 Use of mosquito nets by children

Percentage of children under age 5 who, the night before the survey, slept under a mosquito net (treated or untreated), the percentage who slept under a long-lasting insecticidal net (LLIN); among children under age 5 in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey; and, among children under age 5 living in households with at least one LLIN for every two people, the percentage who slept under an LLIN the night before the survey, by background characteristics, Kenya 2015

	Children under age 5 in all households			Children under age 5 in households with at least one LLIN		Children under age 5 living in households with at least one LLIN for every two people	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of children	Percentage who slept under an LLIN last night	Number of children	Percentage who slept under an LLIN last night in households with an LLIN for every two people	Number
Age (in months)							
<12	65.6	62.3	725	83.3	542	88.9	193
12-23	65.5	64.1	645	84.9	486	91.4	203
24-35	54.6	53.2	719	78.7	486	89.8	169
36-47	51.5	49.8	744	74.9	494	87.2	222
48-59	53.4	52.5	801	74.4	566	81.2	247
Sex							
Male	56.7	55.4	1,835	79.7	1,276	86.6	525
Female	59.1	56.8	1,798	78.7	1,297	88.1	509
Residence							
Urban	62.8	59.8	1,130	83.3	811	90.6	367
Rural	55.6	54.4	2,503	77.3	1,762	85.5	668
Malaria endemicity							
Highland epidemic	61.2	61.2	810	77.3	641	84.4	307
Lake endemic	75.3	73.3	801	82.4	712	88.7	300
Coast endemic	75.8	71.9	273	81.2	242	83.9	73
Semi-arid, seasonal	48.5	46.2	715	73.9	447	89.6	101
Low risk	43.4	41.5	1,034	80.7	532	89.3	253
Wealth quintile							
Lowest	41.8	40.0	909	74.2	490	86.0	133
Second	57.6	56.6	783	76.3	581	86.3	212
Middle	61.7	60.6	656	77.9	511	84.3	218
Fourth	64.8	63.2	666	82.2	512	87.5	188
Highest	70.4	66.6	620	86.0	480	90.8	283
Total	57.9	56.1	3,633	79.2	2,573	87.3	1,034

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

Figure 3.5 **Use of an LLIN by children under age 5**



3.2.3 Use of Mosquito Nets by Pregnant Women

In malaria endemic areas, adults usually have acquired some degree of immunity to severe, life-threatening malaria. However, pregnancy leads to depression of the immune system, and thus pregnant women, especially those in their first pregnancy, have a higher risk of malaria. During pregnancy, women can reduce their risk of adverse malaria effects by sleeping under LLINs.

Table 3.7 shows that 58 percent of pregnant women age 15-49 slept under an LLIN the night before the survey, an increase from 36 percent reported in the 2010 KMIS. The KMIS found, as expected, that net use by pregnant women is directly related to access to nets within a household. In households with at least one LLIN, 82 percent of pregnant women slept under an LLIN the previous night. Looking at the socioeconomic differences in net use, the percentage of pregnant women who slept under an LLIN the previous night was higher in urban (61 percent) than in rural areas (57 percent). Net usage was lowest among pregnant women with no education (37 percent) and those in the lowest wealth quintile (35 percent).

Finally, a principal goal of Kenya National Malaria Strategy (2009-2018) (revised 2014) is to have at least 80 percent of all pregnant women living in malaria-risk areas sleeping under an LLIN every night. In the effort to achieve that goal, the lake and coast endemic areas and the highland epidemic-prone areas are being targeted for mass and routine LLIN distribution. Table 3.7 shows that these three regions had substantially higher rates of LLIN usage by pregnant women than the semi-arid, seasonal and low risk transmission zones. Overall, the proportion of pregnant women sleeping under an LLIN ranged from 41 percent in the semi-arid, seasonal transmission zones to a high of 83 percent in the coast endemic region.

Table 3.7 Use of mosquito nets by pregnant women

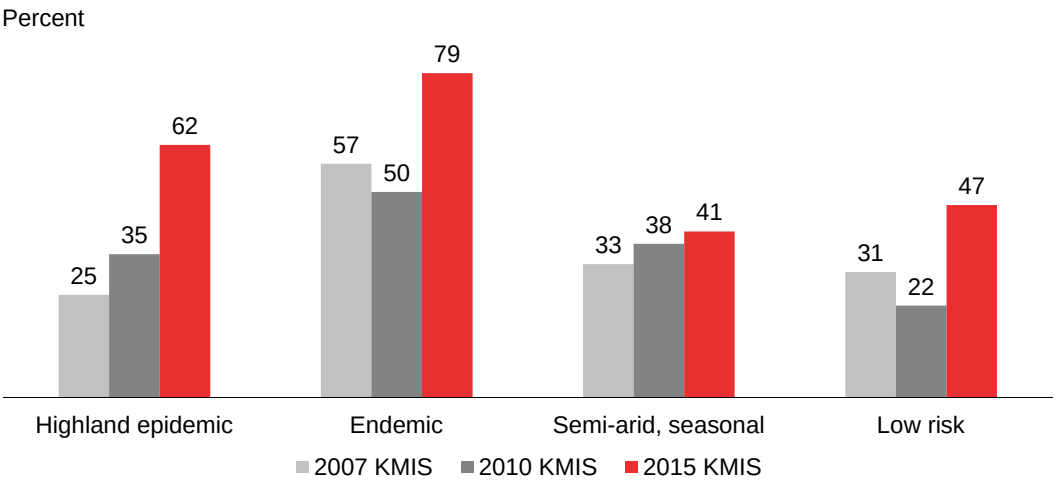
Percentage of pregnant women age 15-49 who, the night before the survey, slept under a mosquito net (treated or untreated) and the percentage who slept under a long-lasting insecticidal net (LLIN); among pregnant women age 15-49 in households with at least one LLIN, the percentage who slept under an LLIN the night before the survey; and, among pregnant women in households with at least one net for every two people, the percentage who slept under an LLIN the night before the survey, by background characteristics, Kenya 2015

	Among pregnant women age 15-49 in all households			Among pregnant women age 15-49 in households with at least one LLIN		Pregnant women living in households with at least one LLIN for every two people	
Background characteristic	Percentage who slept under any mosquito net last night	Percentage who slept under an LLIN last night	Number of women	Percentage who slept under an LLIN last night	Number of women	Percentage who slept under an LLIN last night in households with an LLIN for every two people	Number
Residence							
Urban	61.2	59.9	130	85.6	91	92.9	58
Rural	56.6	56.5	205	79.4	146	83.1	65
Malaria endemicity							
Highland epidemic	61.6	61.6	63	72.7	54	(78.9)	31
Lake endemic	78.1	77.6	73	89.5	63	(96.5)	28
Coast endemic	83.7	83.1	27	88.9	25	(87.1)	10
Semi-arid, seasonal	42.4	40.5	72	68.9	42	*	13
Low risk	46.9	46.9	101	(88.6)	53	*	40
Education							
No education	36.8	36.8	45	(88.5)	19	*	4
Primary	65.6	64.4	142	81.2	113	85.6	48
Secondary	55.6	55.4	101	77.9	72	(90.6)	44
More than secondary	(63.2)	(63.2)	48	(88.0)	35	*	27
Wealth quintile							
Lowest	35.8	35.0	72	75.4	33	*	12
Second	64.0	64.0	72	84.1	55	*	17
Middle	71.9	71.9	54	79.9	48	(86.3)	26
Fourth	53.2	51.7	53	(79.3)	35	*	20
Highest	67.7	67.0	85	85.7	66	(92.0)	47
Total	58.4	57.8	336	81.8	237	87.7	123

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 denotes a figure based on fewer than 25 cases that has been suppressed.

Figure 3.6 presents information on the proportion of pregnant women reported to have slept under any insecticide-treated net (ITN) in the 2007 KMIS and the proportion of pregnant women reported to have slept under an LLIN in the 2010 and 2015 surveys according to the malaria endemicity regions. The results show increases in net usage among pregnant women over time in Kenya in all areas. The increases in use of LLINs by pregnant women between the 2010 and 2015 surveys are particularly marked in the highland epidemic and in the coast and lake endemic areas, which were a primary target for LLIN distribution during the period. In the highland epidemic-prone zone, LLIN use among pregnant women rose from 35 percent in 2010 to 62 percent in 2015. In endemic areas, LLIN use among pregnant women was 50 percent in 2010 compared with 79 percent in 2015.

Figure 3.6 **Trends in use of mosquito nets by pregnant women**



Note: Data for the 2007 KMIS excluded Nairobi, Kiambu, Nyandarua, Nyeri, Meru Central and Laikipia districts and are for insecticide treated nets (ITNs) only. The 2007 KMIS defined ITN as (1) a net that is factory treated and does not require any further treatment (LLIN) or (2) a net that has been soaked in insecticide within the past six months. Data for the 2010 and 2015 KMIS are for LLINs only; estimates for the lake and coast endemic areas are combined for comparison wth 2007.

3.2.4 Mosquito Net Condition

In the 2015 KMIS, interviewers asked about or observed for holes in each households' mosquito nets. Interviewers either recorded 'no holes' or the size of the largest hole for each net; this data is presented in Table 3.8 for household members who slept under nets the night before the survey. Although a majority of the household population who slept under a net the night before the survey slept under a net that had no holes (60 percent), 30 percent slept under nets with holes 2 cm or larger. There are no clear patterns by urban-rural residency or by wealth in the population sleeping under nets with or without holes; however, there are some differences by zone. Among those household members who slept under a net the previous night, those in the highland epidemic zone (68 percent), the low risk zone (65 percent), and the lake endemic zone (60 percent) were more likely to have slept under a net without holes than their counterparts in other zones.

Table 3.8 Condition of mosquito nets in households

Percent distribution of the de facto household population who slept under a mosquito nets with no holes and with varying sizes of holes, Kenya 2015

Background characteristic	No holes	Hole smaller than a thumb/finger (0.5-2 cm)	Hole larger than thumb but smaller than fist/hand (2-10 cm)	Hole larger than fist/hand but smaller than head (10-25 cm)	Hole larger than head (more than 25 cm)	Total	Number of household members who slept under any net the night before the survey
Residence							
Urban	60.9	10.9	13.8	9.2	5.2	100.0	4,130
Rural	59.8	9.0	12.9	10.1	8.2	100.0	7,409
Malaria endemicity							
Highland epidemic	67.8	5.1	11.0	8.2	7.9	100.0	2,787
Lake endemic	60.1	10.4	13.6	8.0	7.7	100.0	3,549
Coast endemic	45.3	11.6	20.5	16.8	5.7	100.0	1,040
Semi-arid, seasonal	49.6	12.4	14.0	13.3	10.6	100.0	1,547
Low risk	64.5	10.9	11.7	8.9	4.0	100.0	2,616
Wealth quintile							
Lowest	54.7	8.6	16.8	11.0	8.9	100.0	1,656
Second	59.1	9.1	12.2	11.6	8.0	100.0	2,352
Middle	63.2	9.9	12.8	8.5	5.6	100.0	2,416
Fourth	55.5	9.8	14.9	10.4	9.5	100.0	2,390
Highest	66.1	10.3	10.9	8.1	4.6	100.0	2,725
Total	60.2	9.6	13.2	9.8	7.1	100.0	11,539

Note: If more than one hole is present, only the largest hole was recorded.

3.2.5 Alternative Net Use and Disposal

Respondents to the 2015 KMIS Household Questionnaire were asked about net disposal and about net use for purposes other than sleeping. Table 3.9 shows the percentage of households who have given away a mosquito net in the past 12 months and the percentage who have sold a mosquito net in the past 12 months. Also shown are the percent distribution of household respondents who believe their community uses nets for purposes other than sleeping and the percentage of households which have disposed of nets in various ways.

Only a small percentage of households have given away a mosquito net in the past 12 months (7 percent) or have sold a net in the past 12 months (1 percent). Sixty-six percent of household respondents believed nets were not being used for alternative purposes in their community. When asked the method by which households last disposed of their old nets, 27 percent threw away the old nets and 24 percent reported they burned the nets, with the remainder reporting other methods of disposal.

Table 3.9 Alternative uses of mosquito nets

Percentage of households who have given away a mosquito net in the past 12 months and who have sold a mosquito net in the past 12 months; the percent distribution of households who report their community uses nets for purposes other than sleeping by net type; and the method of net disposal by households, by background characteristics, Kenya 2015

Background characteristic	Percentage who have given away a mosquito net in past 12 months	Percentage who have sold a mosquito net in past 12 months	Percentage of household respondents who report their community uses nets for purposes other than sleeping					Net disposal								Number of households
			Nets 2 years old or newer	Nets 3 years old or newer	Both old and new	Does not report nets used for alternative purposes	Total	Burn	Bury	Throw away	Recycle	Gave to someone else	Exchanged for a new one	Other	Don't know	
Residence																
Urban	8.9	0.4	0.5	19.5	3.4	76.6	100.0	20.3	1.4	33.0	6.1	7.8	0.9	27.5	6.4	2,673
Rural	5.6	0.5	1.1	36.7	3.8	58.3	100.0	26.5	2.2	22.4	17.7	3.0	1.5	27.5	6.4	3,808
Malaria endemicity																
Highland epidemic	6.4	0.6	0.8	25.8	4.2	69.2	100.0	39.2	4.7	20.5	17.4	2.8	1.5	19.6	8.8	1,186
Lake endemic	10.1	0.8	1.1	52.4	5.7	40.7	100.0	29.4	1.6	17.1	23.8	3.1	4.6	18.9	7.7	1,184
Coast endemic	16.2	0.4	2.2	32.5	7.9	57.5	100.0	13.8	0.7	42.0	12.5	12.0	0.7	15.4	6.5	441
Semi-arid, seasonal	5.0	0.5	0.2	36.9	3.1	59.8	100.0	20.0	2.2	28.8	15.1	5.1	0.4	22.3	11.5	1,081
Low risk	5.0	0.2	0.8	17.4	2.0	79.8	100.0	17.9	0.8	30.6	5.1	5.6	0.2	39.4	2.5	2,589
Wealth quintile																
Lowest	3.3	0.5	1.0	26.7	4.0	68.2	100.0	19.2	1.3	27.5	17.2	2.8	1.1	26.5	10.0	1,120
Second	6.7	0.4	0.7	41.8	3.2	54.3	100.0	23.9	3.0	24.2	18.0	3.6	1.9	25.4	7.4	1,174
Middle	6.3	0.3	1.1	35.6	4.2	59.2	100.0	28.4	2.0	21.6	16.6	4.1	1.7	28.4	4.8	1,215
Fourth	6.4	0.5	0.6	27.0	3.8	68.5	100.0	26.1	1.6	24.3	10.6	4.7	1.3	30.8	4.7	1,410
Highest	10.7	0.6	0.8	20.3	3.2	75.7	100.0	22.0	1.7	34.5	5.2	8.6	0.5	26.2	5.8	1,562
Total	6.9	0.5	0.8	29.6	3.7	65.9	100.0	24.0	1.9	26.8	12.9	5.0	1.3	27.5	6.4	6,481

3.3 ATTITUDES TOWARDS MOSQUITO NETS

Attitudes among the population towards mosquito nets influence net access and use. Respondents to the 2015 KMIS Household Questionnaire were asked a number of questions about their attitudes towards mosquito nets and malaria risk, the results of which are presented in Table 3.10.

A majority of respondents feel positively towards net use and malaria prevention, both nationally and by transmission zone. More than 90 percent are extremely or very confident they can hang a net, feel that it is extremely or very important for young children to sleep under a net, and agree that treated mosquito nets are safe to sleep under. These attitudes did not vary substantially by transmission zone except that households in the coast endemic and low risk zones were less likely to be confident in hanging a net compared with households in other zones. These attitudes have improved over time since the 2010 KMIS.

Eighty-four percent of households say they would never use a bed net for purposes other than for sleeping, and 86 percent agree they could hang a net any place people sleep in their house. These attitudes differed somewhat by zone. Opinions in support of never using a net for alternative purposes ranged from 93 percent among households in the low risk zone to 73 percent of households in the semi-arid, seasonal zone. Agreement about hanging a net any place in one's house ranged from 95 percent in the lake endemic zone to 79 percent in the low risk zone.

About 6 in 10 households (63 percent) felt that most people in their community slept under a net every night. Finally, one-quarter (25 percent) incorrectly believed that people are at risk of getting malaria only during the rainy season; this is a decrease from the 35 percent reported in the 2010 KMIS.

Table 3.10 Attitudes towards mosquito nets

Percentage of household respondents reporting specific attitudes related to mosquito nets, Kenya 2015

	Malaria endemicity					
Background characteristic	**Highland epidemic**	**Lake endemic**	**Coast endemic**	**Semi-arid, seasonal**	**Low risk**	**Total**
Extremely/very confident in hanging a net	94.8	97.3	87.6	91.9	87.1	91.2
Extremely/very important for young children to sleep under a net	98.2	99.2	98.9	98.2	99.2	98.8
Never use bed net other than for sleeping	79.5	77.6	84.9	73.3	92.8	83.8
Strongly/somewhat agree that treated nets are safe	96.4	98.3	96.3	93.0	95.7	95.9
Strongly/somewhat agree that most people in community sleep under an ITN every night	75.0	83.9	78.8	57.1	48.8	63.4
Strongly/somewhat agree you can hang a net any place people sleep in your house	87.1	95.4	93.7	85.4	78.8	85.5
Strongly/somewhat agree that people are at risk of getting malaria only during rainy season	28.5	26.1	22.6	36.0	19.8	25.4
Number of households	1,186	1,184	441	1,081	2,589	6,481

3.4 CONCLUSIONS

Household ownership of LLINs has increased over time. Forty-four percent of households owned an LLIN in 2010 compared with 63 percent reported in the 2015 KMIS. The average number of LLINs per household increased from 0.8 in 2010 to 1.3 in 2015. Forty percent of households in Kenya have reached universal LLIN coverage; that is, about 4 in 10 households have at least one LLIN for every two persons who slept in the household the night before the survey.

Net use has increased since 2010 among the household population, children under age 5, and pregnant women. Improvements are especially notable in the lake and coast endemic zones and the highland epidemic zone. Access to household LLINs at the household level largely determines use.

Forty percent of the household members that slept under a net the night before the survey slept under a net with holes, which may not have provided adequate protection from mosquito bites.

A majority of respondents feel positively towards net use and malaria prevention, both nationally and by transmission zone. A minority, one-quarter, incorrectly believe that people are at risk of getting malaria only during the rainy season.

3.5 RECOMMENDATIONS

The government and partners should utilize all practical strategies to achieve universal net coverage in the targeted malaria risk areas of the country. Because access to LLINs at the household level largely determines use, efforts should focus on increasing the number of LLINs in households, especially those with vulnerable populations such as young children and women of child-bearing age.

Advocacy, communication, and social mobilization efforts should be made to increase community demand for malaria prevention measures, including use of LLINs and appropriate net care.

– 4 –

Malaria in Pregnancy

4 MALARIA IN PREGNANCY

Key Findings

- Ninety-four percent of women received antenatal care services from a skilled provider—a doctor, nurse, or midwife.
- In the coast and lake endemic zones, 56 percent of pregnant women received two or more and 38 percent received the recommended three or more doses of intermittent preventive treatment.

Malaria in pregnancy (MIP) is an important public health problem in Kenya and is associated with considerable morbidity and mortality for pregnant women and infants. Infection during pregnancy can be asymptomatic or may present with clinical signs and symptoms. Both conditions are associated with adverse effects on pregnancy outcomes, including miscarriage, stillbirth, and low birth weight of infants as well as risk to the mother. Low birth weight (<2,500 grams), in particular, is associated with a high risk of neonatal death and poor child survival, especially in the first year of life.

The World Health Organization (WHO) recommends a three-pronged approach for reducing the effects of MIP: prompt diagnosis and treatment of confirmed infection, use of long-lasting insecticidal nets (LLINs), and intermittent preventive treatment during pregnancy (IPTp) (WHO 2012). Sulfadoxine-pyrimethamine (SP) is the only drug currently recommended for IPTp in Kenya (MOH 2009; MOH 2014).

Research shows IPTp to be highly cost-effective in reducing maternal morbidity and poor birth outcomes despite widespread SP resistance (Fernandes et al. 2015; Desai et al. 2016). Consistent with WHO guidelines, the current recommendation is to administer full treatment dosages of SP to pregnant women living in malaria endemic areas at every antenatal clinic visit starting early in the second trimester. Visits should be at least 4 weeks apart, with a delivery target of at least three SP doses (WHO 2012; MOH 2014).

4.1 Coverage of Antenatal Care

Antenatal care (ANC) is beneficial to pregnant women because they can access a full package of interventions, including MIP interventions, to improve pregnancy outcomes. ANC services should ideally be provided by skilled health care providers who can assess the status of the pregnancy, deliver the package of interventions, and provide appropriate additional clinical management if necessary.

Table 4.1 shows the percent distribution of women age 15-49 who had a live birth in the 2 years preceding the survey by the source of ANC services, stratified by background characteristics. Use of ANC services and, thus, potential access to MIP interventions, is widespread in Kenya. Ninety-four percent of women received ANC services from a skilled provider, either a doctor (42 percent) or a nurse or midwife (52 percent). Less than 1 percent of women received ANC services from either a community health worker or a traditional birth attendant, and 6 percent did not access ANC services during pregnancy.

Women with secondary or higher education (96 percent) were most likely to have received ANC services from a skilled provider, and women with no education (83 percent) were least likely.

Similarly, women in the highest wealth quintile (98 percent) were most likely to have seen a skilled provider for antenatal care, and women in the lowest quintile (89 percent) least likely. Access differed only slightly between women in urban and women in rural areas (96 and 92 percent, respectively). The coast and lake endemic zones had the highest percentages of women reporting antenatal care from a skilled provider (98 percent and 97 percent, respectively) and the semi-arid, seasonal transmission areas the lowest (89 percent).

Table 4.1 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 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 2015

	Antenatal care provider								
Background characteristic	Doctor	Nurse/ midwife	Community health worker	Traditional birth attendant	Other	No ANC	Total	Percentage receiving antenatal care from a skilled provider[1]	Number of women
Mother's age at birth									
<20	41.3	50.1	0.8	0.0	0.0	7.8	100.0	91.4	167
20-34	43.1	51.4	0.3	0.4	0.1	4.7	100.0	94.5	984
35-49	35.0	54.7	0.0	1.2	0.0	9.2	100.0	89.7	117
Birth order									
1	45.8	49.3	0.9	0.0	0.0	4.0	100.0	95.1	369
2-3	44.0	49.0	0.2	0.6	0.2	6.0	100.0	93.0	491
4-5	41.3	54.6	0.1	0.3	0.0	3.7	100.0	95.9	256
6+	29.0	59.6	0.0	0.9	0.0	10.5	100.0	88.6	153
Residence									
Urban	48.0	48.2	0.2	0.2	0.0	3.4	100.0	96.2	419
Rural	39.3	53.2	0.4	0.5	0.1	6.5	100.0	92.4	849
Malaria endemicity									
Highland epidemic	42.0	51.7	0.7	0.5	0.0	5.1	100.0	93.7	285
Lake endemic	42.8	54.5	0.4	0.4	0.0	2.0	100.0	97.3	244
Coast endemic	23.9	74.3	0.0	0.3	0.0	1.5	100.0	98.2	101
Semi-arid, seasonal	31.2	57.8	0.2	1.0	0.4	9.5	100.0	89.0	259
Low risk	54.2	39.1	0.3	0.0	0.0	6.4	100.0	93.3	379
Education									
No education	28.3	54.4	0.7	0.7	0.0	15.8	100.0	82.8	167
Primary incomplete	40.0	56.6	0.0	0.2	0.0	3.1	100.0	96.7	187
Primary complete	48.4	46.0	0.3	0.8	0.0	4.4	100.0	94.4	404
Secondary+	42.5	53.0	0.4	0.0	0.2	3.9	100.0	95.5	511
Wealth quintile									
Lowest	30.2	58.9	0.8	0.8	0.0	9.3	100.0	89.1	300
Second	42.8	51.0	0.0	0.3	0.0	5.9	100.0	93.8	271
Middle	44.6	47.9	0.5	0.4	0.0	6.6	100.0	92.5	224
Fourth	44.5	52.1	0.4	0.4	0.4	2.2	100.0	96.6	231
Highest	51.8	45.8	0.0	0.0	0.0	2.5	100.0	97.5	242
Total	42.1	51.5	0.4	0.4	0.1	5.5	100.0	93.7	1,268

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, or midwife

4.2 Use of Intermittent Preventive Treatment of Malaria in Pregnancy

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 upon a change in the WHO guidance (WHO 2004), the Kenya National Malaria Strategy was revised to limit IPTp to women residing in malaria-endemic areas. In line with the most recent WHO guideline for IPTp, the malaria strategy currently calls for women living in malaria-endemic areas to receive at least three doses of SP during pregnancy (WHO 2012; MOH 2014).

To assess the use of IPTp, the 2015 KMIS asked women who had a live birth in the 2 years prior to the survey if they had taken SP or Fansidar, the brand name for SP, to prevent them from getting malaria during pregnancy. Women reporting they had taken SP/Fansidar were asked how many doses they had taken, and if they had received ANC services, they were asked if they received the SP/Fansidar during an antenatal visit.

Tables 4.2 and 4.3 present the proportion of women who gave birth during the 2-year period prior to the survey, and who received IPTp during the most recent pregnancy, according to the number of SP doses they received (one or more, two or more, and three or more). For a woman to be counted as having had IPTp, at least one of the doses of SP had to be received during an ANC visit. Table 4.2 shows that nationally 51 percent of the women received one or more doses of IPTp, 35 percent received two or more doses, and 22 percent received at least three doses. Although IPTp is not recommended outside of malaria-endemic areas, a substantial proportion of women in non-endemic areas received IPTp during their recent pregnancies.

Table 4.2 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 preceding the last birth, received one or more doses of SP/Fansidar at least one of which was received during an ANC visit, received two or more doses of SP/Fansidar at least one of which was received during an ANC visit, and received three or more doses of SP/Fansidar at least one of which was received during an ANC visit, by background characteristics, Kenya 2015

Background characteristic	Percentage who received 1 or more doses of SP/Fansidar[1]	Percentage who received 2 or more doses of SP/Fansidar[1]	Percentage who received 3 or more doses of SP/Fansidar[1]	Number of women with a live birth in the 2 years preceding the survey
Residence				
Urban	49.6	34.5	22.0	419
Rural	51.3	34.8	21.9	849
Malaria endemicity				
Highland epidemic	45.4	30.7	20.3	285
Lake endemic	77.4	54.7	35.3	244
Coast endemic	75.8	58.1	42.8	101
Semi-arid, seasonal	40.2	28.6	16.0	259
Low risk	38.2	22.9	12.9	379
Education				
No education	44.2	31.6	20.8	167
Primary incomplete	55.6	40.3	22.6	187
Primary complete	57.5	39.2	25.0	404
Secondary+	45.8	30.2	19.6	511
Wealth quintile				
Lowest	51.7	38.7	24.1	300
Second	54.8	35.5	21.8	271
Middle	57.3	40.2	25.8	224
Fourth	45.3	29.1	15.8	231
Highest	44.3	29.2	21.5	242
Total	50.8	34.7	21.9	1,268

[1] Received the specified number of doses of SP/Fansidar, at least one of which was received during an ANC visit.

Table 4.3 presents information on the use of IPTp solely in the coast and lake endemic zones where IPTp is recommended by the Kenya National Malaria Strategy. Overall, taking both zones into consideration, 77 percent of women who gave birth in the 2 years prior to the survey received at least one dose of SP, 56 percent received two or more doses, and 38 percent received the currently recommended 3 doses or more. Considering the coast and lake zones separately, Table 4.3 shows women were somewhat more likely to have received SP in the coast endemic zone than in the lake endemic zone. The largest differential between the two zones was in the proportion of pregnant women who had received at least three doses: 43 percent in the coast zone compared with 35 percent in the lake zone.

Table 4.3 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 preceding the last birth, received one or more doses of SP/Fansidar at least one of which was received during an ANC visit; received two or more doses of SP/Fansidar at least one of which was received during an ANC visit; and received three or more doses of SP/Fansidar at least one of which was received during an ANC visit, by background characteristics, Kenya 2015

Background characteristic	Percentage who received 1 or more doses of SP/Fansidar[1]	Percentage who received 2 or more doses of SP/Fansidar[1]	Percentage who received 3 or more doses of SP/Fansidar[1]	Number of women with a live birth in the 2 years preceding the survey
Residence				
Urban	76.4	59.4	47.5	96
Rural	77.1	54.3	33.7	249
Malaria endemicity				
Lake endemic	77.4	54.7	35.3	244
Coast endemic	75.8	58.1	42.8	101
Education				
No education	79.4	50.1	38.1	27
Primary incomplete	66.0	50.0	33.9	64
Primary complete	84.2	59.6	38.8	134
Secondary+	74.1	55.6	37.9	120
Wealth quintile				
Lowest	73.7	55.0	39.7	68
Second	73.2	46.9	28.8	107
Middle	80.9	58.6	33.1	71
Fourth	79.9	61.2	41.0	53
Highest	80.7	66.3	57.0	47
Total	76.9	55.7	37.5	345

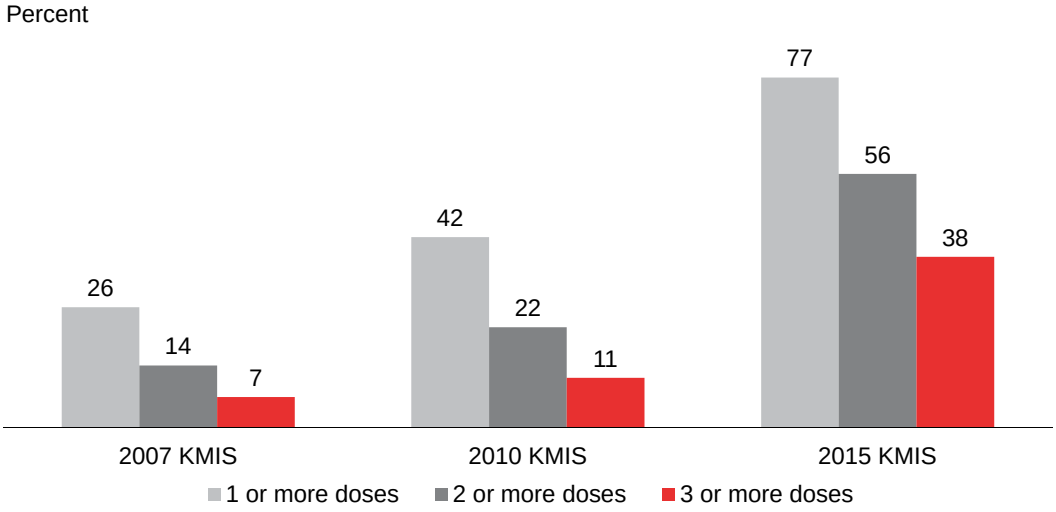
[1] Received the specified number of doses of SP/Fansidar, at least one of which was received during an ANC visit.

With respect to socioeconomic differentials in IPTp use within endemic areas, Table 4.3 shows that women living in urban areas in the endemic zones were more likely than rural women to have received IPTp. The urban-rural differential is particularly marked with respect to the receipt of three or more doses of SP; just under half of urban women living in endemic areas received three or more doses compared with only one-third of rural women. Table 4.3 also shows that the likelihood of receiving IPTp in malaria endemic areas did not vary consistently with either education or wealth.

Finally, Figure 4.1 presents the trend in the proportion of women in malaria endemic areas in Kenya receiving IPTp according to the number of doses of SP they received.[1] The results show that the proportion of women living in endemic areas who reported receiving at least one dose of SP during a recent pregnancy nearly tripled between 2007 and 2015, rising from 26 percent to 77 percent. Over half of the women received two or more doses in 2015 compared with 14 percent in 2007. The proportion of women in endemic areas who took three doses of SP during pregnancy also increased substantially from 7 percent in 2007 to 38 percent in 2015.

[1] The questions employed to collect information on IPTp use in the 2015 KMIS differed from the questions that were in both the 2007 and 2010 KMIS surveys. As a result, while the steady upward trend in IPTp coverage throughout the period 2007-2015 is unquestionable, some caution is necessary when assessing the exact magnitude of the difference in IPTp coverage between the 2015 KMIS and the earlier surveys.

Figure 4.1 **Trends in IPTp in malaria endemic areas**



Note: Refers to the percentage of women with a live birth during the 2 years prior to the survey who took the referenced doses of SP, at least 1 of which was received during an ANC visit.

4.3 CONCLUSIONS

IPTp coverage in malaria-endemic areas increased substantially compared with findings of previous surveys. However, despite substantial improvement, only 38 percent of pregnant women in malaria endemic regions received at least 3 doses of IPTp, which is well below the Kenya National Malaria Strategy target of 80 percent.

4.4 RECOMMENDATIONS

To meet the target of 80 percent of pregnant women receiving 3 or more doses of IPTp in malaria endemic areas, continued investments in ANC services and the malaria in pregnancy intervention package are necessary. The government should continue to prioritise free ANC services; ensure SP availability for IPTp; provide continuous training and capacity building for health providers; and develop enhanced advocacy, communication, and social mobilisation efforts to increase community demand for malaria prevention and control measures.

Especially in light of the survey results indicating IPTp is often given in non-endemic areas where the intervention is not recommended, it is imperative for the NMCP to engage the non-endemic regions (and respective county governments) in a dialogue to reinforce adherence to policy guidelines to prevent misuses of commodities and wastage of limited resources.

– 5 –

Case Management

5 CASE MANAGEMENT

Key Findings

- Mothers reported seeking advice or treatment for more than 7 in 10 children under age 5 who had a fever in the 2 weeks before the survey; for the vast majority of children, the advice or treatment was received from a government or private health provider.
- Thirty-nine percent of children with fever had a blood sample taken from a finger or heel prick for testing, and 27 percent of children with fever were treated with antimalarials, mainly with ACT (25 percent).
- Among children with fever who were treated with ACT, 60 percent were treated with ACT on the same or next day following the onset of the fever.
- Less than half of mothers of young children think that it is very important to obtain care immediately when a child gets a fever, and fewer than 4 in 10 mothers consider treatment affordable if their child has a fever.
- Only 4 in 10 women age 15-49 identify ACT/AL as the recommended treatment for malaria in Kenya, and only half report seeing or hearing information about ACT/AL.

Malaria case management, including prompt diagnosis and treatment within 24 hours of onset of symptoms with appropriate and effective medicines, is one of the cornerstones of the Kenya National Malaria Strategy 2009–2018 (revised 2014). Access to prompt and effective treatment as well as improvement of the quality of care are key to reducing malaria-associated morbidity and mortality. The National Malaria Treatment Guidelines recommend that all suspected cases of malaria in Kenya be confirmed using microscopy or a rapid diagnostic test (RDT) before being treated with an antimalarial drug. For uncomplicated malaria cases, artemisinin-based combination therapy (ACT) is the recommended first line of treatment.

This chapter presents results from the 2015 KMIS related to the case management of fever and malaria in children under age 5. The chapter also reviews information from the survey on knowledge and attitudes concerning the treatment of fever and malaria in young children. The latter findings are useful in the design of advocacy, communication, and social mobilization programs to support the effective case management of fever and malaria in young children.

5.1 Prevalence, Diagnosis, and Prompt Treatment of Children with Fever

Fever is the most common symptom of malaria. Fever is also associated with many other infections in young children. In the 2015 KMIS, mothers of children under 5 were asked whether their child had a fever in the 2 weeks preceding the survey and, if so, whether any treatment was sought. For children with fever, information also was collected from mothers about whether a blood sample was obtained for testing, what types of medicines were given to the sick child, and how long after onset of symptoms the drugs were given.

Table 5.1 shows the percentage of children under age 5 who had fever in the 2 weeks preceding the survey and, among children under age 5 with fever, the percentages for whom advice or treatment was sought and a drop of blood was taken from a finger- or heel-prick for testing (considered a proxy for malaria testing). Table 5.1 also provides information on the percentage of children who were treated with an antimalarial, the percentage treated specifically with ACT, and the percentages treated promptly, that is, the same day or the next day.

Thirty-six percent of children under age 5 had a fever in the 2 weeks prior to the survey. As Table 5.1 shows, the prevalence of fever in children under age 5 varies by zone. The lake and coast endemic zones had the highest proportions of children under 5 with fever at 53 and 39 percent, respectively. In the low risk zone, the percentage of children with fever in the 2 weeks preceding the survey was 27 percent.

Table 5.1 Prevalence, diagnosis, and prompt treatment of children with fever

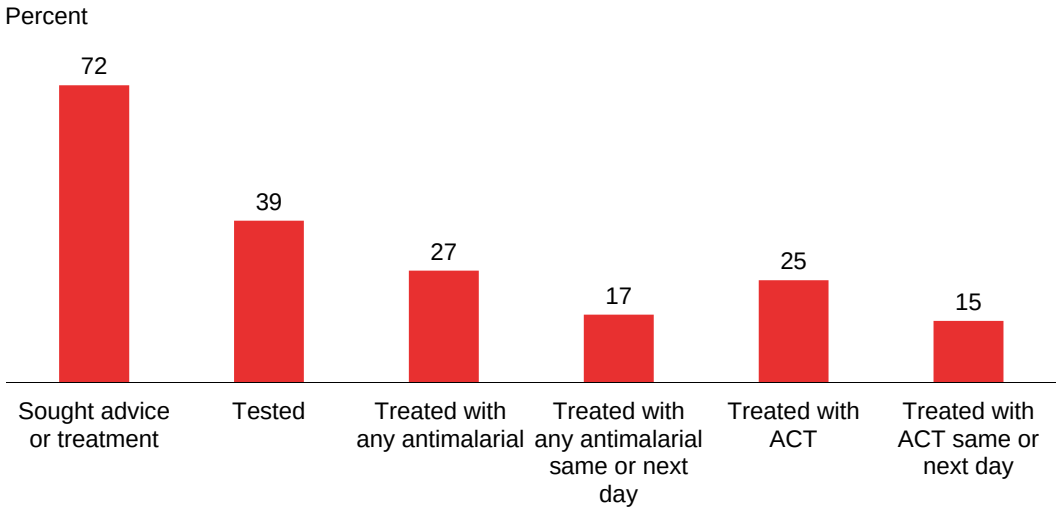
Percentage of children under age 5 with fever in the 2 weeks preceding the survey; among children under age 5 with fever, percentage for whom advice or treatment was sought, percentage who had blood taken from a finger or heel for testing, percentage who took any antimalarial and took it the same or next day, and the percentage who took any ACT and took it the same or next day; and among children under age 5 with fever who took ACT, the percentage who took ACT the same or next day, by background characteristics, Kenya 2015

	Children under age 5:		Children under age 5 with fever:							Children under age 5 with fever who took any ACT:	
Background characteristic	Percentage with fever in the 2 weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought[1]	Percentage who had blood taken from a finger or heel for testing	Percentage who took antimalarial drugs	Percentage who took antimalarial drugs same or next day	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	32.5	617	73.6	31.6	19.9	13.8	15.5	10.5	201	(67.8)	31
12-23	45.0	652	74.7	43.2	25.5	14.5	24.0	14.0	293	58.2	70
24-35	35.7	642	69.8	41.9	26.6	17.2	24.7	15.1	229	61.3	56
36-47	34.6	618	70.1	38.3	31.9	22.2	29.6	20.4	214	69.0	63
48-59	32.4	640	70.3	38.8	32.1	15.6	30.4	15.0	207	49.4	63
Sex											
Male	37.5	1,609	71.6	36.7	26.2	14.7	23.8	13.2	604	55.6	144
Female	34.6	1,560	72.2	42.0	28.2	18.6	26.0	16.9	540	65.1	140
Residence											
Urban	31.7	1,046	74.6	44.0	23.5	11.9	21.9	10.5	331	48.1	72
Rural	38.3	2,122	70.8	37.2	28.6	18.4	26.1	16.8	812	64.5	212
Malaria endemicity											
Highland epidemic	36.1	686	81.8	37.6	22.4	13.1	20.8	12.1	248	58.2	52
Lake endemic	53.4	638	64.9	59.0	55.3	38.7	51.8	36.5	340	70.5	176
Coast endemic	39.3	241	73.1	43.9	18.4	8.8	17.4	7.8	95	(45.0)	17
Semi-arid, seasonal	31.4	650	72.5	22.7	13.9	5.9	11.5	3.9	204	(33.7)	23
Low risk	27.0	953	70.8	25.7	7.9	1.9	6.3	0.7	257	*	16
Mother's education											
No education	29.9	459	60.4	29.2	14.4	10.1	11.1	7.4	137	(66.7)	15
Primary incomplete	41.6	490	65.8	29.0	30.3	19.2	25.4	16.3	204	64.1	52
Primary complete	39.1	1,098	74.5	41.5	29.2	17.9	27.2	16.3	429	59.8	117
Secondary+	33.3	1,121	76.4	45.8	27.6	16.0	26.9	15.6	373	57.9	100
Wealth quintile											
Lowest	34.6	800	62.7	29.2	19.7	11.4	16.5	9.5	277	57.4	46
Second	39.5	653	72.3	42.3	35.2	23.3	33.0	22.3	258	67.6	85
Middle	40.5	562	74.3	39.7	30.0	21.5	27.7	19.5	228	70.4	63
Fourth	37.6	554	78.2	37.5	29.9	13.5	28.9	12.3	208	42.6	60
Highest	28.8	599	75.4	51.8	19.6	11.9	17.3	10.1	173	(58.4)	30
Total	36.1	3,168	71.9	39.2	27.1	16.5	24.8	15.0	1,144	60.3	284

ACT = Artemisinin-based combination therapy
Note: Figures in parentheses are based on 25-49 unweighted cases; an asterisk denotes a figure based on fewer than 25 cases that has been suppressed.
[1] Includes advice or treatment from public and private health facilities and shops and excludes advice or treatment from a traditional practitioner, relative/friend, and others.

Figure 5.1 highlights the actions taken in response to the fever. Advice or treatment was sought for more than 7 in 10 of the children with fever (72 percent), and 39 percent had blood taken for testing. Twenty-seven percent of children with fever were treated with antimalarials, mainly ACT (25 percent). Among the children treated with ACT, Table 5.1 shows that 60 percent began treatment on the same day or the next day following the onset of the fever.

Figure 5.1 **Management of childhood fever**

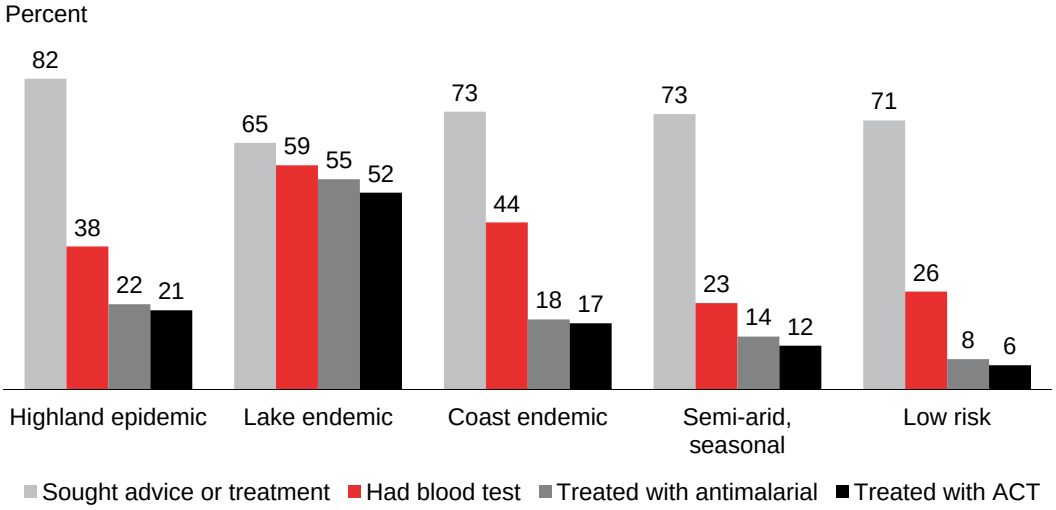


Percentage of children under age 5 with fever in the 2 weeks before the survey for whom specified actions were taken

KMIS 2015

Figure 5.2 presents zonal differences in the management of childhood fever. Advice or treatment seeking for children with fever was highest in the highland epidemic area (82 percent) and lowest in the lake endemic zone (65 percent). Blood testing was reported most often in the lake endemic zone (59 percent), followed by the coast endemic zone (44 percent) and the highland epidemic zone (38 percent). In the lake area, the majority of children with fever were treated with antimalarial drugs (55 percent). In the other areas, the proportion of children with fever who received antimalarial drugs varied from 8 percent in the low risk zone to 22 percent in the highland epidemic zone. ACT was by far the most common treatment in all areas.

Figure 5.2 **Zonal difference in management of childhood fever**



Percentage of children under age 5 with fever in the 2 weeks before the survey for whom specified actions were taken

KMIS 2015

A comparison to the results of the 2015 KMIS with findings from earlier surveys indicates that there have been improvements in several key aspects of the diagnosis and treatment of childhood fever. For example, treatment-seeking behaviour is continuing to expand; the proportion of children with fever for whom advice or treatment was sought was 72 percent in the 2015 KMIS compared to 49 percent at the time of the 2008-09 KDHS. The proportion of children with fever for whom a blood test was conducted is continuing to rise, from 35 percent at the time of the 2014 KDHS to 39 percent in the 2015 KMIS. The proportion of children given antimalarials who are being treated with ACT also has risen sharply. In the 2008-09 KDHS, mothers reported that among children ill with fever who were given an antimalarial, one-third received an ACT while, in 2015, 92 percent of children whose fever was treated with an antimalarial were given an ACT.

5.2 Sources of Advice or Treatment

The 2015 KMIS collected information on the sources from which advice or treatment was sought when a child experienced fever. The question was asked for all children with fever in the 2 weeks before the survey for whom the mother reported advice or treatment was sought from any source. Mothers were asked to name all sources of advice or treatment.

Among children with fever for whom treatment or advice was sought, Table 5.2 shows that 70 percent received care at government health facilities. Private health facilities provided care for one-quarter of the children with fever for whom any advice or treatment was sought. Much smaller proportions of children received advice or treatment from faith-based facilities (3 percent), shops (3 percent), or community health workers (1 percent). Traditional healers were rarely consulted (less than 1 percent).

In all subgroups shown in Table 5.2, the majority of children received care at government facilities. However, the proportion seeking care from government facilities varied by residence. Government facilities were consulted in the case of 75 percent of rural children receiving any advice or treatment for fever compared with 56 percent of their urban counterparts. Government facilities were less likely to have been consulted in low risk zones (59 percent) compared with other zones (68-76 percent).

Advice or treatment was sought from a government health facility in the case of 81 percent of children receiving any care in the lowest wealth quintile compared with 55 percent in the highest wealth quintile. The likelihood that advice or treatment was sought from a government facility also related to the mother's education, with children whose mothers had primary or less education more likely to have received advice or treatment at a government facility than children whose mothers had a secondary or higher education.

Table 5.2 Source of advice or treatment for children with fever

Percentage of children under age 5 with fever in the 2 weeks preceding the survey for whom advice or treatment was sought from specific sources, by background characteristics, Kenya 2015

Background characteristic	Source of advice or treatment for fever							Number of children for whom advice or treatment was sought
	Government	Private[1]	Faith-based[2]	Community health worker	Shop	Traditional healer	Other	
Age (in months)								
<12	73.7	24.7	0.0	1.3	2.9	0.0	2.7	79
12-23	74.7	23.1	0.7	0.0	1.3	0.8	1.4	158
24-35	64.2	26.7	4.4	1.6	2.6	0.0	1.2	143
36-47	67.4	22.5	5.8	2.4	3.4	0.6	0.5	204
48-59	69.8	26.9	1.6	0.9	2.5	0.0	0.5	247
Sex								
Male	68.2	25.8	3.0	1.9	2.3	0.3	0.6	426
Female	71.0	23.9	2.6	0.5	2.8	0.3	1.4	405
Residence								
Urban	56.3	40.5	2.9	0.4	1.8	0.0	2.1	251
Rural	75.3	18.1	2.7	1.6	2.9	0.4	0.5	579
Malaria endemicity								
Highland epidemic	75.7	19.7	1.8	0.0	3.8	1.2	0.1	202
Lake endemic	72.8	18.0	4.2	3.6	1.1	0.0	2.3	227
Coast endemic	67.8	25.0	3.6	1.4	7.8	0.0	2.4	71
Semi-arid, seasonal	70.5	23.8	3.4	0.0	3.6	0.0	0.8	148
Low risk	58.6	39.9	1.4	0.7	0.0	0.0	0.0	182
Mother's education								
No education	72.5	19.6	4.2	0.0	6.5	0.0	2.9	84
Primary incomplete	73.2	17.4	0.9	3.8	4.6	1.7	0.0	137
Primary complete	72.1	24.5	1.7	1.2	1.6	0.0	0.4	320
Secondary+	64.1	30.3	4.4	0.4	1.4	0.0	1.5	289
Wealth quintile								
Lowest	80.7	11.7	2.1	0.0	6.2	0.7	1.1	176
Second	77.0	19.1	2.3	1.8	1.9	0.0	0.9	188
Middle	72.5	22.5	4.0	1.7	1.5	0.0	0.0	169
Fourth	58.2	34.6	1.6	2.5	2.4	0.7	0.2	164
Highest	54.8	41.3	4.3	0.0	0.0	0.0	3.2	134
Total	69.6	24.9	2.8	1.2	2.5	0.3	1.0	831

[1] Private includes private hospitals/clinics, pharmacies, mobile clinics, and other private medical sources
[2] Faith-based includes mission hospitals and clinics

5.3 Type and Timing of Antimalarial Use

Table 5.3 presents information on the specific types of antimalarials that children take and on the timing of the first receipt of the antimalarial following the onset of the fever. The predominance of ACT is evident. More than 90 percent of children given an antimalarial received an ACT in most subgroups. The proportion receiving an ACT was less than 90 percent only among children less than 12 months, children living in the semi-arid, seasonal zone, children whose mother had less than a primary education, and children in the lowest wealth quintile. With respect to the timing of antimalarial use, 61 percent of children receiving an antimalarial to treat fever began taking the drug on the same or next day of onset of symptoms.

Table 5.3 Type of antimalarial drugs used

Among children under age 5 years with fever in the 2 weeks preceding the survey who took any antimalarial medication, the percentage who took specific antimalarial drugs, by background characteristics, Kenya 2015

	Percentage of children who took drug:										
Background characteristic	Any ACT	SP/ Fansidar	Chloro-quine	Amodia-quine	Quinine pills	Quinine injection/IV	Artesunate rectal	Artesunate injection/IV	Other anti-malarial	Percentage who took any antimalarial medicine the same or next day	Number of children with fever who took any anti-malarial drug
Age (in months)											
<12	(77.7)	(5.3)	(3.3)	(6.5)	(2.5)	(0.0)	(0.0)	(4.6)	(0.0)	(69.2)	40
12-23	94.3	0.7	3.6	2.4	0.0	0.3	0.0	2.6	0.0	56.8	75
24-35	92.8	1.1	0.1	0.0	2.7	3.5	0.0	1.8	0.0	64.7	61
36-47	92.8	2.1	0.0	0.0	1.6	5.3	0.0	2.0	0.0	69.7	68
48-59	94.7	1.2	2.4	3.7	0.6	0.0	0.0	0.0	0.0	48.7	66
Sex											
Male	91.0	1.0	1.0	2.9	1.3	3.2	0.0	2.3	0.0	56.2	158
Female	92.3	2.5	2.7	1.5	1.3	0.6	0.0	1.7	0.0	66.1	152
Residence											
Urban	92.9	6.8	1.0	0.4	0.8	0.0	0.0	0.8	0.0	50.5	78
Rural	91.2	0.1	2.1	2.8	1.5	2.6	0.0	2.4	0.0	64.6	232
Malaria endemicity											
Highland epidemic	92.8	1.4	5.0	1.1	1.8	0.7	0.0	2.7	0.0	58.3	56
Lake endemic	93.6	0.8	1.1	2.2	1.6	2.0	0.0	0.6	0.0	69.9	188
Coast endemic	(94.6)	(0.0)	(0.0)	(0.0)	(1.2)	(3.2)	(0.0)	(0.9)	(0.0)	(47.9)	17
Semi-arid, seasonal	(82.5)	(1.9)	(0.0)	(5.9)	(0.0)	(4.3)	(0.0)	(12.5)	(0.0)	(42.5)	28
Low risk	*	*	*	*	*	*	*	*	*	*	20
Mother's education											
No education	(76.8)	(1.0)	(0.0)	(3.1)	(0.0)	(5.8)	(0.0)	(15.3)	(0.0)	(69.7)	20
Primary incomplete	83.8	2.4	0.0	5.2	6.1	4.1	0.0	0.8	0.0	63.5	62
Primary complete	93.1	3.0	1.8	0.5	0.3	0.8	0.0	1.4	0.0	61.1	125
Secondary+	97.4	0.2	3.4	2.3	0.0	1.2	0.0	1.0	0.0	57.8	103
Wealth quintile											
Lowest	83.8	0.7	2.4	1.1	1.6	2.1	0.0	9.0	0.0	57.7	55
Second	93.7	0.0	0.0	3.5	1.8	1.0	0.0	0.0	0.0	66.1	91
Middle	92.4	2.1	1.3	0.0	2.4	2.4	0.0	1.5	0.0	71.8	68
Fourth	96.8	1.0	4.5	2.1	0.0	3.6	0.0	0.0	0.0	45.1	62
Highest	(88.0)	(9.1)	(2.0)	(5.0)	(0.0)	(0.0)	(0.0)	(0.9)	(0.0)	(60.5)	34
Total	91.6	1.8	1.8	2.2	1.3	1.9	0.0	2.0	0.0	61.0	310

ACT = Artemisinin-based combination therapy
Note: Figures in parentheses are based on 25-49 unweighted cases; an asterisk denotes a figure based on fewer than 25 cases that has been suppressed.

5.4 Knowledge and Attitudes about Malaria Case Management in Children

The objective of advocacy, communication, and social mobilization (ACSM) is to bring about behaviour change to enhance the uptake of all malaria control interventions by communities in Kenya. ACSM for case management specifically encourages those with a fever to promptly seek diagnosis and treatment at the nearest health facility and helps create demand for parasitological testing, which, if found to be positive for malaria, is to be followed by treatment with the appropriate dose of ACT/AL. Case management communications have also emphasised that treatment for malaria is free at public health facilities and, in the lake endemic region, through community health volunteers. Treatment is also available at a subsidized cost in the private sector.

Table 5.4 presents information on the attitudes of mothers of children under age 5 with regard to the importance of seeking malaria treatment promptly when a child develops a fever and the affordability of care when a young child has a fever. The results show that less than half of mothers (45 percent) consider it extremely or very important to seek antimalarial treatment immediately if a child has a fever. The proportion of mothers who considered immediate care with antimalarials as

extremely or very important was lowest in the low risk zone (36 percent). However, even in the lake and coast endemic zones, only around half of women felt it was extremely or very important to seek immediate care when a child had a fever.

The 2015 KMIS results also show that only 38 percent of mothers of children under age 5 regard treatment for a child with fever as very affordable or affordable. The proportion of mothers considering care affordable varies from 33 percent in the lake endemic zone to 43 percent in the highland epidemic area.

Table 5.4 Attitudes towards treatment of fever

Among mothers of children under age 5, the percentage with specific knowledge and attitudes towards treatment, by malaria endemicity, Kenya 2015

	Malaria endemicity					
Attitude towards treatment	**Highland epidemic**	**Lake endemic**	**Coast endemic**	**Semi-arid, seasonal**	**Low risk**	**Total**
Extremely/very important to seek antimalarial treatment immediately if child has a fever	51.4	49.4	50.6	50.5	36.1	45.1
Treatment very affordable/ affordable when child had a fever	42.7	33.0	38.4	38.6	36.5	37.5
Total	1,042	1,038	379	940	1,995	5,394

5.5 KNOWLEDGE OF ACT

Case management ACSM has sought to increase the general level of awareness of ACT and AL, which is the recommended first-line treatment for malaria in Kenya. Two questions were included in the 2015 KMIS to gauge ACT/AL awareness among all women age 15-49. The first question asked women to identify the recommended treatment for malaria, and the second question concerned whether the women had seen or heard any information about ACT or AL.

Table 5.5 shows that nationally 42 percent of women age 15-49 identified ACT/AL as the recommended treatment for malaria. The lake endemic area has the highest proportion of women (72 percent) who identified ACT/AL as the recommended treatment for malaria. The proportion of women identifying ACT or AL as the recommended treatment for malaria is notably lower in the other zones, varying from 25 percent in low risk areas to 56 percent in the highland epidemic zone. A woman's level of education is positively related to knowledge about ACT/AL as the recommended malaria treatment; 44 percent of women who completed the primary level or higher were able to identify ACT/AL as the recommended malaria treatment compared with 26 percent with no education.

Table 5.5 also shows that just over half of women had seen or heard information about ACT/AL (53 percent), which is slightly lower than the 56 percent who reported receiving information about ACT/AL at the time of the 2010 KMIS. Women in the lake endemic region (71 percent) are most likely to report having seen or heard information about ACT/AL while women with no education (28 percent) are least likely to have received information about ACT/AL.

Table 5.5 Knowledge of ACT/AL

Percent distribution of women age 15-49 by specific medicine mentioned as the recommended treatment for malaria, and the percentage of women who have seen or heard information about ACT/AL, Kenya 2015

Background characteristic	ACT/AL	SP/ Fansidar	Chloro-quine	Amodia-quine	Other	Don't know	Total	Have heard or seen information about ACT/AL	Number of women
Residence									
Urban	39.4	6.2	1.5	2.6	10.4	39.9	100.0	50.9	2,178
Rural	43.4	6.3	2.4	0.8	7.7	39.4	100.0	54.1	3,216
Malaria endemicity									
Highland epidemic	56.1	5.4	1.3	0.4	4.1	32.8	100.0	60.8	1,042
Lake endemic	71.9	2.0	0.9	0.4	7.9	16.9	100.0	71.1	1,038
Coast endemic	37.9	3.2	0.6	0.1	10.1	48.2	100.0	44.9	379
Semi-arid, seasonal	29.9	8.5	4.0	1.3	5.3	50.9	100.0	48.3	940
Low risk	25.0	8.5	2.3	3.2	13.1	47.9	100.0	42.7	1,995
Education									
No education	26.3	4.6	0.9	0.5	5.8	62.0	100.0	27.9	419
Primary incomplete	38.5	3.7	0.9	2.3	8.0	46.6	100.0	51.3	672
Primary complete	43.7	7.3	1.7	1.7	9.0	36.5	100.0	55.8	1,812
Secondary+	43.9	6.5	2.7	1.5	9.3	36.1	100.0	55.3	2,491
Wealth quintile									
Lowest	32.5	4.5	2.0	0.3	5.0	55.7	100.0	42.4	855
Second	43.6	4.9	2.3	1.3	9.5	38.4	100.0	53.2	969
Middle	47.6	8.2	2.4	0.7	8.7	32.3	100.0	56.7	1,000
Fourth	44.9	6.9	1.7	2.4	9.1	35.0	100.0	54.2	1,141
Highest	39.6	6.3	1.9	2.4	10.3	39.4	100.0	55.0	1,430
Total	41.8	6.3	2.0	1.6	8.8	39.6	100.0	52.8	5,394

ACT = Artemisinin-based combination therapy; AL = artemether lumefantrine

5.6 CONCLUSIONS

Treatment seeking for children with fever has been improving, with more than 7 in 10 children who have fever getting advice or treatment for the illness. Public and private health facilities provide most of the care that children with fever receive. Testing for malaria continues to expand, with almost 4 in 10 children with fever having blood taken from a finger or heel prick for testing. Use of ACT is widespread: among children with fever treated with antimalarials, 92 percent received ACT and 60 percent of children who took ACT were treated on the same or next day.

Less encouraging is the fact that the majority of mothers do not recognize how critical it is to seek care immediately when a child is ill. Only around half of women are aware of ACT/AL. Perceptions with regard to the affordability of care may also be a barrier to obtaining care for febrile illness in children.

5.7 RECOMMENDATIONS

The increase in testing may be attributed to the scale up of malaria diagnostic capacity in public health facilities and commodity security for malaria diagnostics. However, there remains a need to intensify efforts for advocacy and capacity building of both health workers and women on the need for testing.

The observed increase in the proportion of children who took ACT compared with any other antimalarials is related to improved uptake of the recommended treatment guidelines and commodity security for malaria diagnostics. It will be important to sustain advocacy on use of the recommended first-line treatment for uncomplicated malaria.

While health facilities are providing care for the majority of children with fever, there remains a need to scale up community case management, particularly in endemic areas.

ACSM efforts are still needed, particularly to increase awareness of the importance of seeking care immediately after the onset of fever, to broaden awareness of ACT/AL by the public, and to address issues with respect to the affordability of treatment of febrile illness in children.

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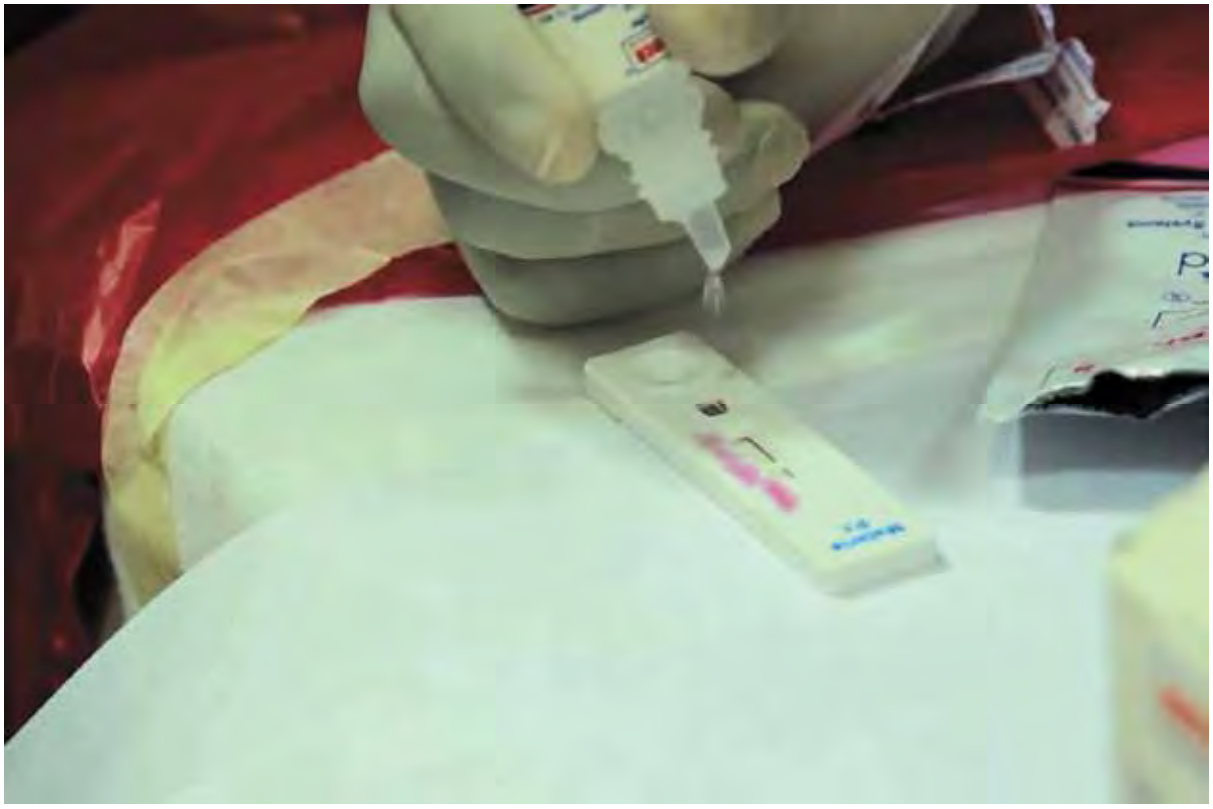


Malaria and Anaemia in Children

6 MALARIA AND ANAEMIA IN CHILDREN

Key Findings

- Nationally, 8 percent of children age 6 months to 14 years have malaria compared with 11 percent in the 2010 KMIS.
- Among children age 6-59 months, who are considered especially vulnerable, malaria prevalence has decreased from 8 percent in 2010 to 5 percent in 2015.
- Malaria prevalence continues to be much higher in the lake endemic zone than in other zones, but the rate among children age 6 months to 14 years is markedly lower in 2015 (27 percent) than in 2010 (38 percent).
- In contrast, among children in the coast endemic area, malaria prevalence has increased from 4 percent in 2010 to 8 percent in 2015.
- One in 4 children age 6 months to 14 years is anaemic, and 1 percent are severely anaemic.
- The anaemia rate is more than twice as high in the lake endemic zone (38 percent) as in the low risk transmission area (16 percent).

A major objective of the 2015 KMIS was to assess the prevalence of malaria among children age 6 months to 14 years. Because of the correlation between malaria infection and anaemia, the KMIS also included anaemia testing for children in the same age group. Finger- or heel-prick blood samples were collected from eligible children for whom consent was obtained from a parent or other caretaker. Test results for malaria rapid diagnostic testing (SD Bioline *Pf/Pan*) and for anaemia testing (HemoCue®) were available immediately and were provided to the child's parent or guardian. Children with a positive malaria rapid diagnostic test (RDT) who did not show signs of complicated malaria were offered a full course of medicine according to standard procedures for malaria treatment in Kenya. Additionally, confirmatory testing for malaria was done using thick and thin blood smears that were prepared in the field from the finger- or heel-prick procedures and periodically transported to KEMRI/Walter Reed Project Malaria Diagnostics Centre of Excellence Laboratory in Kisumu.

Overall, 10,721 children were eligible for the anaemia and malaria testing. Test results were available for 93 percent of eligible children (Table 6.1). The proportion of children with test results exceeded 90 percent in all subgroups except children age 6-8 months, where just under 80 percent of children were tested.

Table 6.1 Coverage of testing for anaemia and malaria in children

Percentage of eligible children age 6 months to 14 years who were tested for anaemia and for malaria, by background characteristics (unweighted), Kenya 2015

Background characteristic	Percentage tested for			Number of children
	Anaemia	Malaria with RDT	Malaria by microscopy	
Age				
6-8 months	79.2	78.7	79.2	197
9-11 months	92.3	92.3	92.3	168
12-17 months	92.9	92.9	92.7	423
18-23 months	94.9	94.6	95.2	373
24-35 months	94.4	94.0	94.0	815
36-47 months	93.0	93.1	93.4	829
48-59 months	94.3	94.0	94.4	878
6-59 months	93.0	92.8	93.0	3,683
5-9 years	94.2	94.2	94.3	3,894
10-14 years	92.6	92.6	92.6	3,144
Sex				
Male	93.5	93.5	93.6	5,420
Female	93.2	93.1	93.2	5,301
Residence				
Urban	92.6	92.4	92.5	3,994
Rural	93.7	93.8	93.9	6,727
Malaria endemicity				
Highland epidemic	95.8	96.2	96.3	2,650
Lake endemic	95.1	94.6	94.9	2,353
Coast endemic	90.8	90.8	90.7	1,450
Semi-arid, seasonal	91.7	91.5	91.6	2,435
Low risk	91.6	91.5	91.6	1,833
Mother's education[1]				
No education	92.5	92.1	92.2	755
Primary incomplete	96.3	96.5	96.9	544
Primary complete	96.0	95.8	96.0	1,113
Secondary+	92.9	92.9	92.9	960
Wealth quintile				
Lowest	92.1	92.0	92.1	3,269
Second	93.7	93.8	93.8	2,291
Middle	95.8	96.1	96.2	1,997
Fourth	94.8	94.5	94.7	1,726
Highest	90.1	89.9	90.0	1,438
Total	93.3	93.3	93.4	10,721

RDT = Rapid Diagnostic Test SD Bioline
[1] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

6.1 PREVALENCE OF MALARIA

Table 6.2 shows the malaria RDT and microscopy results by background characteristics. Among children age 6 months to 14 years, the prevalence of malaria was 13 percent by RDT and 8 percent by microscopy. The higher prevalence observed in the RDT results compared with microscopy is expected since an RDT detects 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.

The microscopy results in Table 6.2 show that malaria prevalence was highest among children age 10-14 years (11 percent), followed closely by children age 5-9 years (10 percent). Among children age 6-59 months, who are the most vulnerable if infected with malaria, the rate was 5 percent. Although the pattern was not uniform, malaria prevalence generally decreased with the mother's education and wealth.

Table 6.2 Prevalence of malaria in children

Percentage of children age 6 months to 14 years classified in two tests as having malaria, by background characteristics, Kenya 2015

	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
Background characteristic	**RDT positive**	**Number of children**	**Microscopy positive**	**Number of children**
Age				
6-8 months	1.6	143	0.4	143
9-11 months	6.0	151	3.7	151
12-17 months	4.3	348	3.4	348
18-23 months	9.1	315	4.2	316
24-35 months	10.5	673	6.5	672
36-47 months	9.4	693	4.5	696
48-59 months	11.7	751	6.2	754
6-59 months	9.1	3,073	5.0	3,080
5-9 years	15.4	3,266	9.5	3,269
10-14 years	14.6	2,691	10.5	2,693
Sex				
Male	13.4	4,586	8.3	4,594
Female	12.6	4,444	8.1	4,448
Residence				
Urban	4.3	2,520	2.9	2,521
Rural	16.4	6,510	10.3	6,521
Malaria endemicity				
Highland epidemic	4.9	2,256	3.1	2,261
Lake endemic	42.4	2,290	26.7	2,296
Coast endemic	11.4	594	8.1	593
Semi-arid, seasonal	1.0	1,565	0.5	1,567
Low risk	0.5	2,325	0.3	2,326
Mother's education[1]				
No education	6.5	402	3.6	402
Primary incomplete	12.9	478	8.9	482
Primary complete	10.3	1,040	5.6	1,043
Secondary+	5.5	958	2.7	958
Wealth quintile				
Lowest	12.1	2,070	8.2	2,072
Second	22.6	1,985	14.2	1,986
Middle	15.7	1,905	10.2	1,910
Fourth	8.5	1,697	5.1	1,699
Highest	2.3	1,373	0.9	1,375
Total	13.0	9,030	8.2	9,042

Notes: RDT = Rapid Diagnostic Test
[1] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Figure 6.1 highlights differences in malaria prevalence by residence. Malaria prevalence was more than three times higher in rural areas than in urban areas (10 percent and 3 percent, respectively). A similar pattern was observed in both the 2007 and 2010 KMIS and reflects the fact that urban areas tend to have lower malaria transmission than rural areas.

As expected, malaria prevalence varied markedly across the different malaria epidemiological zones (Figure 6.1). The lake endemic zone had the highest malaria prevalence at 27 percent compared with 8 percent in the coast endemic zone, 3 percent in the highland epidemic zone, and less than 1 percent in the semi-arid, seasonal and low risk areas.

Figure 6.1 **Malaria prevalence by residence and zone, according to microscopy**

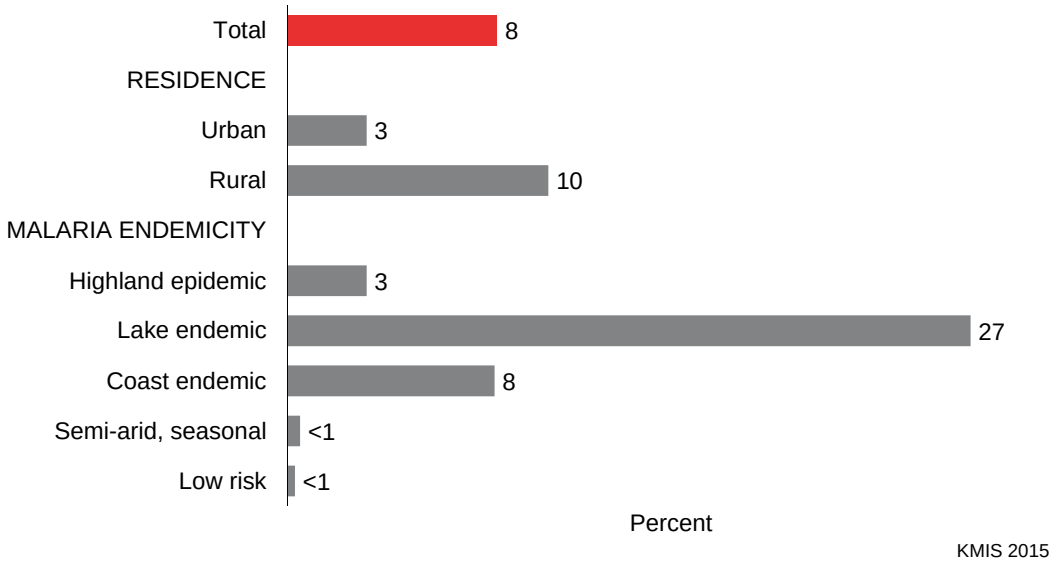
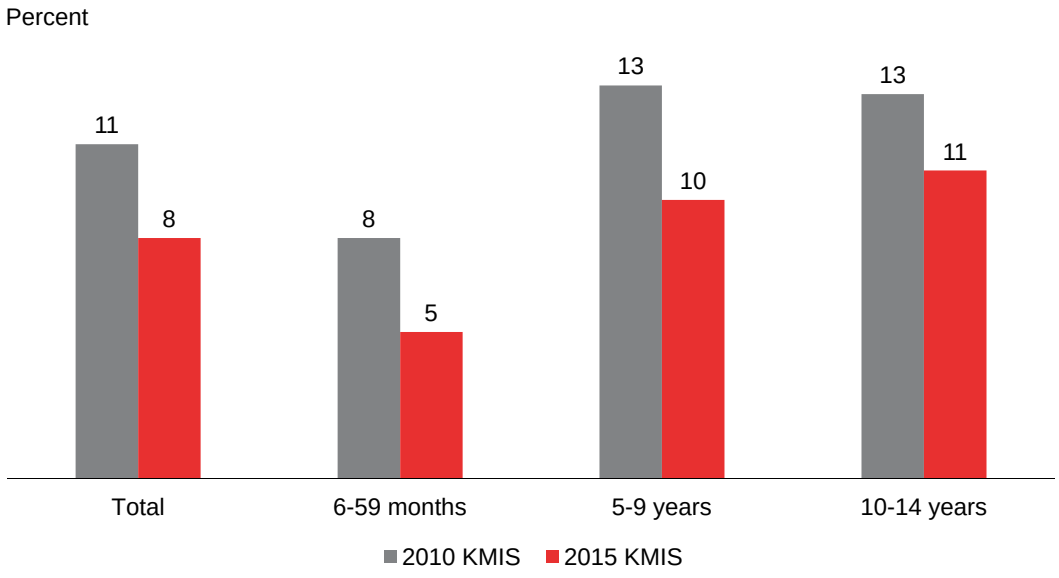


Figure 6.2 shows the trend in malaria prevalence (according to microscopy results) between the 2010 and the 2015 KMIS. Among all children age 6 months to 14 years, malaria prevalence declined from 11 percent at the time of the 2010 KMIS to 8 percent in the 2015 KMIS. Among children age 6-59 months, the age group most vulnerable if infected with malaria, the prevalence dropped by nearly 40 percent from 8 percent in 2010 to 5 percent in 2015.

Figure 6.2 **Trends in malaria prevalence by age, according to microscopy**



As Figure 6.3 shows, the decline in malaria prevalence between 2010 and 2015 is especially notable in the lake endemic zone, with the rate among children age 6 months to 14 years dropping from 38 percent in 2010 to 27 percent in 2015. Figure 6.3 also shows that, in contrast with the situation in the lake zone, malaria prevalence in the coast endemic zone has increased, from 4 percent in 2010 to 8 percent in 2015. In the other three zones, the malaria rate remained largely stable at 3 percent or less.

Figure 6.3 **Trends in malaria prevalence by malaria endemicity zone, according to microscopy**

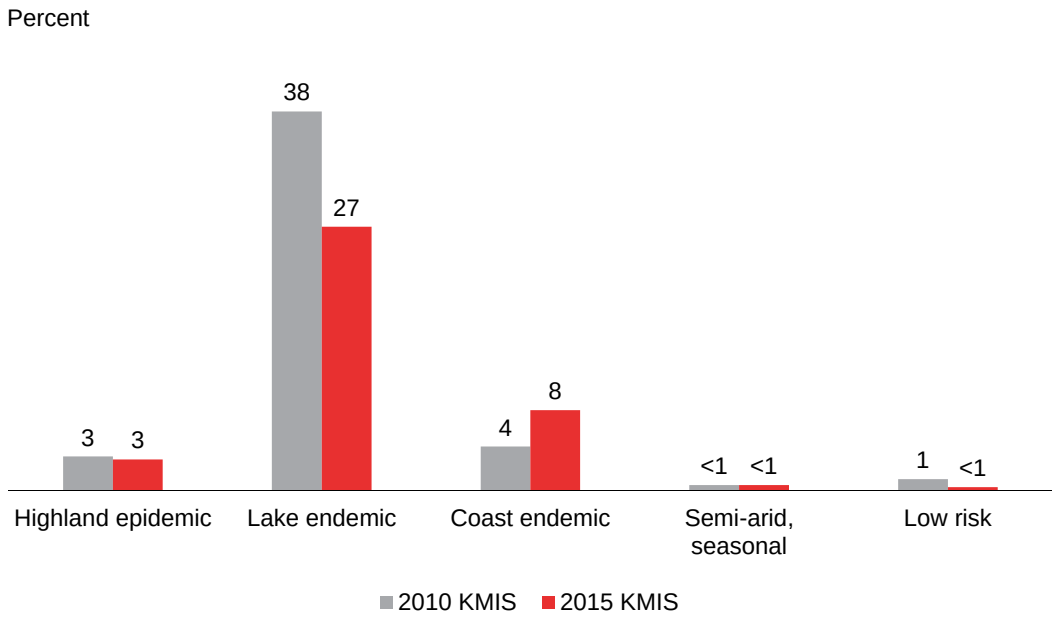


Table 6.3 shows the prevalence of malaria by the type of species with which children were infected. The predominance of *Plasmodium falciparum* infections is evident. Seven percent of children had pure *P. falciparum* infections, and an additional 1 percent of children were infected with *P. falciparum* in combination with *Plasmodium malariae, Plasmodium ovale,* or both. Less than 1 percent of children had pure *P. malariae* or *P. ovale* infections.

Table 6.3 Prevalence of malaria in children by species

Percentage of children age 6 months to 14 years shown by microscopy to be infected with various *Plasmodium* species, by background characteristics, Kenya 2015

Background characteristic	Positive for *Pf*	Positive for *Pm*	Positive for *Po*	Positive *Pf+Po*	Positive *Pf+Pm*	Positive *Pf+Pm+Po*	Number of children
Age							
6-8 months	0.4	0.0	0.0	0.0	0.0	0.0	143
9-11 months	3.1	0.0	0.0	0.0	0.0	0.0	151
12-17 months	1.8	0.5	0.0	0.0	0.5	0.0	348
18-23 months	3.1	0.7	0.0	0.0	0.5	0.0	316
24-35 months	4.4	0.4	0.2	0.2	0.9	0.2	672
36-47 months	3.8	0.1	0.0	0.0	0.6	0.0	696
48-59 months	4.8	0.4	0.0	0.1	0.6	0.0	754
6-59 months	3.7	0.3	0.0	0.1	0.6	0.0	3,080
5-9 years	7.7	0.2	0.0	0.2	0.9	0.1	3,269
10-14 years	8.8	0.3	0.0	0.1	1.0	0.1	2,693
Sex							
Male	6.8	0.3	0.1	0.1	0.9	0.1	4,594
Female	6.5	0.2	0.0	0.1	0.8	0.1	4,448
Residence							
Urban	2.3	0.3	0.0	0.1	0.2	0.1	2,521
Rural	8.3	0.3	0.1	0.1	1.1	0.1	6,521
Malaria endemicity							
Highland epidemic	2.3	0.2	0.0	0.1	0.3	0.1	2,261
Lake endemic	22.2	0.6	0.1	0.3	2.6	0.2	2,296
Coast endemic	5.3	1.1	0.1	0.1	1.2	0.0	593
Semi-arid, seasonal	0.3	0.0	0.0	0.0	0.1	0.0	1,567
Low risk	0.1	0.0	0.0	0.1	0.0	0.0	2,326
Mother's education[1]							
No education	2.5	0.0	0.1	0.0	0.5	0.4	402
Primary incomplete	6.7	0.4	0.0	0.2	0.7	0.2	482
Primary complete	4.3	0.0	0.0	0.3	0.8	0.0	1,043
Secondary+	1.4	0.6	0.0	0.0	0.3	0.0	958
Wealth quintile							
Lowest	6.2	0.2	0.0	0.1	1.2	0.1	2,072
Second	11.0	0.4	0.1	0.3	1.6	0.1	1,986
Middle	8.8	0.1	0.1	0.1	0.7	0.1	1,910
Fourth	4.3	0.3	0.0	0.0	0.3	0.0	1,699
Highest	0.8	0.1	0.0	0.0	0.1	0.0	1,375
Total	6.6	0.3	0.0	0.1	0.8	0.1	9,042

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

6.2 Prevalence of Anaemia

Anaemia is one of the complications of malaria infection, especially in children. Other causes of anaemia are nutritional deficiencies, helminth infestation, damage to bone marrow through heavy metal or other toxins, and genetically acquired diseases like sickle cell disease.

Table 6.4 shows the results of the anaemia testing conducted among children age 6 months to 14 years in the 2015 KMIS. Overall, one-quarter of the children suffered from some degree of anaemia. The majority of children were mildly anaemic. However, 7 percent were found to be moderately anaemic, and 1 percent of children were severely anaemic.

Table 6.4 Prevalence of anaemia

Percent distribution of children age 6 months to 14 years by anaemia status, according to background characteristics, Kenya 2015

Background characteristic	Severe anaemia	Moderate anaemia	Mild anaemia	No anaemia	Total	Number of children
Age						
6-8 months	2.0	18.3	31.4	48.2	100.0	143
9-11 months	4.3	22.5	27.6	45.6	100.0	151
12-17 months	2.3	28.8	31.6	37.3	100.0	348
18-23 months	3.4	21.7	28.1	46.8	100.0	315
24-35 months	3.5	15.4	21.8	59.3	100.0	675
36-47 months	1.7	8.0	15.6	74.7	100.0	692
48-59 months	0.6	5.7	10.5	83.2	100.0	753
6-59 months	2.2	14.0	20.1	63.7	100.0	3,077
5-9 years	0.9	4.4	16.4	78.3	100.0	3,264
10-14 years	0.3	1.9	13.8	84.0	100.0	2,692
Sex						
Male	1.3	7.7	17.0	74.0	100.0	4,587
Female	1.0	6.1	16.8	76.1	100.0	4,445
Residence						
Urban	0.8	6.0	13.7	79.5	100.0	2,526
Rural	1.3	7.3	18.1	73.3	100.0	6,507
Malaria endemicity						
Highland epidemic	1.0	6.3	14.1	78.6	100.0	2,247
Lake endemic	2.1	10.5	25.1	62.4	100.0	2,300
Coast endemic	1.2	6.9	18.1	73.8	100.0	594
Semi-arid, seasonal	1.4	7.4	15.3	75.9	100.0	1,566
Low risk	0.3	3.7	12.3	83.8	100.0	2,326
Mother's education[1]						
No education	4.1	18.8	22.8	54.3	100.0	403
Primary incomplete	2.6	16.7	21.5	59.2	100.0	477
Primary complete	2.0	12.8	20.5	64.8	100.0	1,044
Secondary+	1.2	10.4	20.3	68.1	100.0	959
Wealth quintile						
Lowest	1.5	10.5	19.4	68.6	100.0	2,070
Second	1.7	8.0	19.1	71.1	100.0	1,982
Middle	1.1	5.7	16.8	76.4	100.0	1,901
Fourth	0.8	5.3	16.1	77.9	100.0	1,701
Highest	0.5	3.8	11.0	84.8	100.0	1,377
Total	1.2	6.9	16.9	75.0	100.0	9,033

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 (WHO 2011).
[1] Includes only children age 6-59 months whose mothers were interviewed with the Woman's Questionnaire

Anaemia prevalence was closely associated with the child's age. Around one-third of children age 6-59 months were anaemic compared with 22 percent of children age 5-9 years and 16 percent of children age 10-14 years. Anaemia prevalence decreased with both the mother's education and the wealth quintile. Children living in rural areas were somewhat more likely to be anaemic than their urban counterparts (27 percent and 21 percent, respectively).

Anaemia rates varied widely across the epidemiological zones. The lake endemic zone (38 percent) had the highest prevalence of anaemia. In the other zones, the prevalence of anaemia varied from 16 percent in low risk areas to 26 percent in the coast endemic zone. As Figure 6.4 shows, anaemia rates were lower in 2015 in the country as a whole and in all of the epidemiological zones compared with the levels observed at the time of the 2010 KMIS.[1]

[1] As recommended by the Roll Back Malaria Partnership, Table 6.4 uses a cutoff of <8.0 g/dl for all age groups. In classifying children as severely anaemic (MEASURE Evaluation et al. 2013). To identify children who were moderately or mildly anaemic, the table employs age-specific haemoglobin cutoffs recommended by WHO (WHO 2011). The latter cutoffs differ slightly from the cutoffs that were used in assessing anaemia prevalence in the 2010 KMIS. To facilitate trend comparisons, Table D.5 in Appendix D shows anaemia prevalence at the time of the 2010 KMIS anaemia results based on the cutoffs used in Table 6.4.

Figure 6.4 **Trends in anaemia prevalence by malaria endemicity zone**

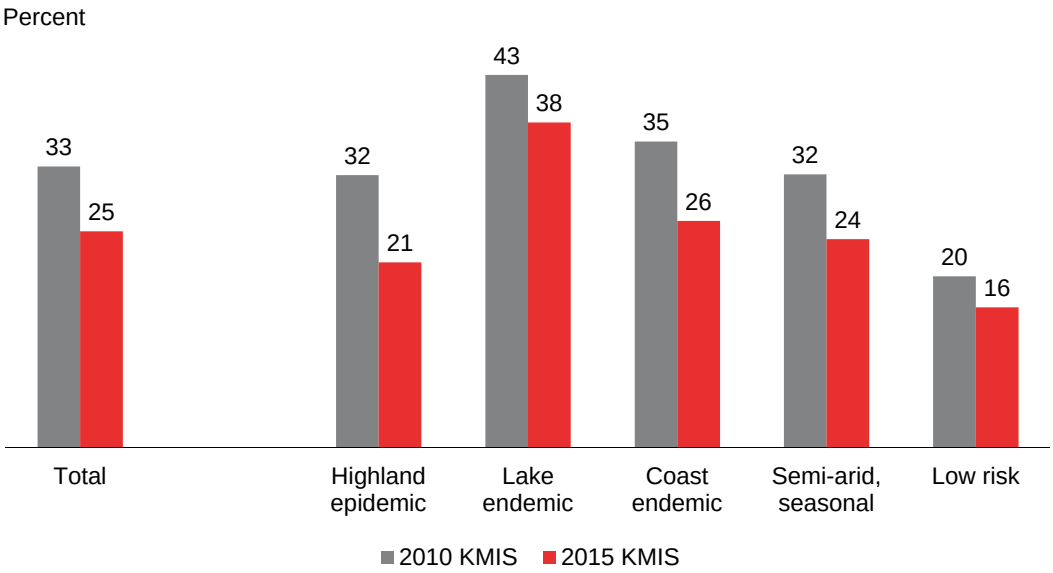


Table 6.5 shows the malaria and anaemia test results among the 9,026 children age 6 months to 14 years for whom outcomes of both the malaria (microscopy) and anaemia tests conducted in the 2015 KMIS were available. As expected, anaemia was more common among children found to have malaria than among children who did not have malaria. Four hundred of the 737 children who had malaria (54 percent) were anaemic, while 1,852 of the 8,289 children who did not have malaria (22 percent) were anaemic.

Table 6.5 Comparison of malaria and anaemia prevalence

Percent distribution of children 6 months to 14 years who had a result from both the malaria (microscopy) and anaemia tests by the outcome of the tests, Kenya 2015

Outcome of anaemia and malaria tests	Percent	Number
Malaria positive	**8.1**	**737**
Anaemic	4.4	400
Not anaemic	3.7	337
Malaria negative	**91.8**	**8,289**
Anaemic	20.6	1,852
Not anaemic	71.3	6,437
Total	100.0	9,026

Note: Table is based on children who stayed in the household the night before the interview. Undetermined slide microscopy results were excluded.

Although having malaria more than doubled the likelihood that a child would be anaemic, it is also important to note that most of the children who were anaemic did not have malaria. More than 80 percent (1,852/2,252) of the children who were anaemic did not have malaria. This reflects the fact that anaemia among young children in Kenya has diverse causes, including dietary deficiencies as well as malaria and other childhood illnesses.

Finally, a comparison with the results of the 2010 KMIS (see Table D.6 in Appendix D) suggests that children who suffered from malaria were slightly more likely to be anaemic in 2015 than in 2010 (54 percent and 52 percent, respectively). On the other hand, among children who did not have malaria, the anaemia rate dropped from 29 percent in 2010 to 22 percent in 2015.

6.3 CONCLUSIONS

Nationally malaria prevalence has been reduced to less than 10 percent. Malaria rates are twice as high among children age 5-14 compared with younger children. The malaria rate remains markedly higher in the lake endemic zone than in the other epidemiological areas. However, the rate has clearly decreased; just over one-quarter of children age 6 months to 14 years in the lake area had malaria in 2015 compared with more than one-third in 2010.

Although malaria prevalence in the coast endemic zone (8 percent) is much lower than in the lake endemic zone, the rate in the coast zone has increased since 2010. The malaria rate is below one percent in the semi-arid, seasonal and low risk zones; thus it is likely that most fever cases in these zones are not due to malaria.

Nationally, one in four children is anaemic, and the anaemia rate is considerably higher in the lake endemic zone (38 percent) than in other areas (16-26 percent).

6.4 RECOMMENDATIONS

Malaria prevention and control interventions should be intensified in the lake endemic zone. Investment in ongoing interventions, including the drive to reach universal LLIN coverage, is critical to further reducing malaria rates in the region. Focused malaria prevention and control efforts should continue in the coastal region to reverse the slight increase in malaria prevalence compared with 2010.

In low prevalence zones, the importance of using a parasitological test to diagnose malaria prior to treatment should be emphasised since most fevers will not be due to malaria. Accurate diagnosis allows proper treatment for the underlying cause of a fever and prevents both wastage of and resistance to relatively expensive ACTs. In addition, investments in surveillance will be key, and routine health information systems should be a priority in these zones in the transition from control to pre-elimination and elimination phases of malaria prevention.

Control interventions targeting the school-age children who have the highest malaria rate prevalence should be implemented, and efforts to address the burden of anaemia in children caused by malaria and other deficiencies or diseases must be expanded.

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APPENDIX A SAMPLE DESIGN

A.1 INTRODUCTION

The 2015 Kenya Malaria Indicator Survey (KMIS) is a representative probability sample designed to produce estimates for the country as a whole, for urban and rural areas separately, and for each of the malaria endemic zones. The malaria endemic zones fully cover the country, and each of the 47 counties in the country falls within one or two of the zones as follows[1]:

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

A.2 SAMPLE FRAME

The sampling frame used for the 2015 KMIS was the Fifth National Sample Survey and Evaluation Program (NASSEP V) master sampling frame, which is based on the 2009 Population and Housing Census (PHC) Enumeration Areas (EAs) frame created by the Kenya National Bureau of Statistics (KNBS). The census frame contains a list of all enumeration areas (EAs) created for the 2009 census and covers the entire country. Kenya is administratively divided into 47 counties, identified in the 2010 Constitution; each county is contained within one or two of the malaria endemic zones.

Table A.1 gives the EAs and the household distribution in the 2009 census frame by malaria endemic zone and by type of residence. Table A.2 gives the population distribution by malaria endemic zone and by type of residence. The size of the population in each malaria endemic zone varies greatly, from 8 percent of the total population living in the coast endemic zone to 28 percent in the low risk zone. The urbanization of the zones also varies greatly; only 17 percent of the population in the semi-arid, seasonal risk zone lives in urban areas compared with 57 percent of the population in the low risk zone.

[1] Three counties are of mixed malaria zone classification. These are Baringo (highland epidemic and semi-arid, seasonal), Bungoma (lake endemic and highland epidemic), and Kakamega (lake endemic and highland epidemic).

Table A.1 Enumeration areas and households

Distribution of the enumeration areas and households in the census frame by malaria endemic zone and residence, Kenya 2015

	Number of enumeration areas in frame			Number of households in frame		
Malaria endemicity	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Highland epidemic	3,808	14,316	18,124	345,137	1,233,553	1,578,690
Lake endemic	4,465	13,454	17,919	409,788	1,306,333	1,716,121
Coast endemic	4,493	3,430	7,923	388,432	295,353	683,785
Semi-arid, seasonal risk	4,467	16,572	21,039	363,512	1,438,465	1,801,977
Low risk	19,611	11,636	31,247	1,831,849	1,155,359	2,987,208
Kenya	**36,844**	**59,408**	**96,252**	**3,338,718**	**5,429,063**	**8,767,781**

Table A.2 Population

Distribution of the population in the sampling frame by malaria endemic zone and residence, Kenya 2015

	Population in frame			Percent of total population	Percent urban
Malaria endemicity	**Urban**	**Rural**	**Total**		
Highland epidemic	1,415,776	6,202,355	7,618,131	19.7	18.6
Lake endemic	1,751,124	6,274,471	8,025,595	20.8	21.8
Coast endemic	1,411,103	1,674,129	3,085,232	8.0	45.7
Semi-arid, seasonal risk	1,565,990	7,691,037	9,257,027	24.0	16.9
Low risk	6,027,007	4,596,241	10,623,248	27.5	56.7
Kenya	**12,171,000**	**26,438,233**	**38,609,233**	**100.0**	**31.5**

A.3 Sample Design and Implementation

The 2015 KMIS was designed to provide reliable estimates for key indicators in each of the survey domains. A total sample of 7,380 households was expected to be drawn from 246 clusters, 115 in urban areas and 131 in rural areas, allocated based on a power allocation method between counties and between urban-rural residences within each county. Accordingly, the 2015 KMIS sample was not proportional to the population for the five malaria endemic zones or for urban-rural residence and required a final weighting adjustment, described in section A.4, to provide valid estimates for each of these survey domains.

The NASSEP V master sample is comprised of EAs selected with probability proportional to size from the 2009 census frame (EA size is the number of households recorded in the 2009 census). The KMIS sample was selected in two stages. First, EAs were selected as sample clusters from the NASSEP V master sample with equal probability and using a systematic sampling method. The second stage involved selection of a uniform sample of 30 households using systematic sampling from each of the selected clusters. Prior to household selection, all the clusters were updated by KNBS. This entailed undertaking a household listing in each of the selected clusters to update the list of residential households within it. As part of the listing, KNBS also updated the necessary maps and recorded the geographic coordinates of each cluster.

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 shows the distribution of the expected number of completed individual 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 by counties

Sample allocation of clusters and expected number of completed household interviews by county, according to residence, Kenya 2015

	Allocation of clusters			Allocation of households		
County/zone	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Kenya counties						
Kisii	2	3	5	60	90	150
Nyamira	2	3	5	60	90	150
West Pokot	2	3	5	60	90	150
Trans-Nzoia	2	3	5	60	90	150
Baringo	2	3	5	60	90	150
Uasin Gishu	3	3	6	90	90	180
Nandi	2	3	5	60	90	150
Narok	2	3	5	60	90	150
Kericho	2	2	4	60	60	120
Bomet	2	3	5	60	90	150
Siaya	2	4	6	60	120	180
Kisumu	3	3	6	90	90	180
Migori	2	3	5	60	90	150
Homa Bay	2	4	6	60	120	180
Kakamega	2	5	7	60	150	210
Vihiga	2	3	5	60	90	150
Bungoma	2	4	6	60	120	180
Busia	2	3	5	60	90	150
Mombasa	6	0	6	180	0	180
Kwale	3	5	8	90	150	240
Kilifi	4	5	9	120	150	270
Lamu	2	3	5	60	90	150
Taita Taveta	3	4	7	90	120	210
Tana River	2	2	4	60	60	120
Marsabit	2	2	4	60	60	120
Isiolo	2	2	4	60	60	120
Meru	2	2	4	60	60	120
Tharaka-Nithi	2	2	4	60	60	120
Embu	2	2	4	60	60	120
Kitui	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
Turkana	2	2	4	60	60	120
Samburu	2	2	4	60	60	120
Elgeyo Marakwet	2	2	4	60	60	120
Kajiado	2	2	4	60	60	120
Nairobi	7	0	7	210	0	210
Nyandarua	2	3	5	60	90	150
Nyeri	2	3	5	60	90	150
Kirinyaga	2	3	5	60	90	150
Murang'a	2	4	6	60	120	180
Kiambu	5	3	8	150	90	240
Machakos	3	3	6	90	90	180
Laikipia	2	3	5	60	90	150
Nakuru	4	4	8	120	120	240
Malaria endemic zones						
Highland epidemic	21	29	50	630	870	1,500
Lake endemic	16	27	43	480	810	1,290
Coast endemic	18	17	35	540	510	1,050
Semi-arid, seasonal risk	29	30	59	870	900	1,770
Low risk	31	28	59	930	840	1,770
Kenya	**115**	**131**	**246**	**3,450**	**3,930**	**7,380**

Table A.4 Sample allocation of completed interviews with women

Sample allocation of expected number of completed interviews with women by malaria endemic zone, according to residence, Kenya 2015

	Women 15-49		
Malaria endemic zones	**Urban**	**Rural**	**Total**
Highland epidemic	456	707	1,163
Lake endemic	347	658	1,005
Coast endemic	391	415	806
Semi-arid, seasonal risk	630	731	1,361
Low risk	673	683	1,356
Kenya	**2,497**	**3,194**	**5,691**

A.4 Sample Probabilities and Sample Weights

Because of the nonproportional allocation of the sample to the different counties and the possible differences in response rates, sampling weights are required for any analysis using the 2015 KMIS data. This approach ensures the actual representativeness of the survey results at a national as well as domain level. Since the 2015 KMIS sample is 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 the master sample selection probabilities, and for each cluster. We used the following notations:

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

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

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

For the NASSEP V master sample, it was selected with a stratified probability proportional-to-size (PPS) 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 ith EA, and $\sum M_{hi}$ the total measure of size (total number of households) in the stratum h. The probability of selecting the ith 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 the stratum h of the NASSEP V master sample for the 2015 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 the 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 2015 KMIS is therefore the production 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:

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

Next, the design weight is adjusted for household nonresponse and individual nonresponse to get the sampling weights for households and for women, respectively. Nonresponse is adjusted at the sampling stratum level. For the household sampling weight, the household design weight is multiplied by the inverse of the household response rate, by stratum. For the women's individual sampling weight, the household sampling weight is multiplied by the inverse of the women's individual response rate, by stratum. After adjusting for nonresponse, the sampling weights are normalized to get 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, which are valid for estimating means, proportions, ratios, and rates, but not valid for estimating population totals or for pooled data.

Table A.5 Sample implementation: Households and women

Percent distribution of households and eligible women by results of the household and individual interviews, and household, eligible women and overall women response rates, according to urban-rural residence and malaria endemicity (unweighted), Kenya 2015

	Residence		Malaria endemicity					
Result	**Urban**	**Rural**	**Highland epidemic**	**Lake endemic**	**Coast endemic**	**Semi-arid, seasonal**	**Low risk**	**Total**
Selected households								
Completed (C)	86.7	90.4	91.4	91.6	86.0	83.1	90.9	88.6
Household present but no competent respondent at home (HP)	1.7	0.5	0.7	1.0	2.0	0.9	1.1	1.1
Postponed (P)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Refused (R)	1.3	0.9	0.6	0.3	1.5	2.4	0.5	1.1
Dwelling not found (DNF)	0.3	0.4	0.1	0.5	0.2	1.0	0.1	0.4
Household absent (HA)	6.0	4.4	4.9	4.0	5.6	7.0	3.9	5.1
Dwelling vacant/address not a dwelling (DV)	3.4	2.5	1.7	2.2	3.3	4.0	3.2	2.9
Dwelling destroyed (DD)	0.2	0.5	0.3	0.2	0.6	0.8	0.1	0.4
Other (O)	0.4	0.4	0.3	0.2	0.8	0.8	0.2	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sampled households	3,444	3,869	1,497	1,290	1,039	1,721	1,766	7,313
Household response rate (HRR)[1]	96.3	98.0	98.5	98.1	95.8	95.1	98.2	97.2
Eligible women								
Completed (EWC)	96.8	96.4	98.7	94.6	96.5	94.5	98.2	96.6
Not at home (EWNH)	1.3	1.9	0.4	4.8	1.5	1.2	0.7	1.6
Refused (EWR)	1.5	1.0	0.7	0.2	1.5	3.5	0.2	1.2
Partly completed (EWPC)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Incapacitated (EWI)	0.1	0.5	0.2	0.3	0.3	0.7	0.3	0.3
Other (EWO)	0.3	0.1	0.0	0.1	0.1	0.1	0.5	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of women	2,561	3,024	1,226	1,057	782	1,229	1,291	5,585
Eligible women response rate (EWRR)[2]	96.8	96.4	98.7	94.6	96.5	94.5	98.2	96.6
Overall women response rate (ORR)[3]	93.2	94.5	97.2	92.8	92.5	89.8	96.5	93.9

[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:

$$OWRR = HRR * EWRR/100$$

APPENDIX B ESTIMATES OF SAMPLING ERRORS

The estimates from a sample survey are affected by two types of errors: nonsampling errors and sampling errors. Nonsampling errors are the results of mistakes made in implementing data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions by either the interviewer or the respondent, and data entry errors. Although numerous efforts were made during the implementation of the 2015 Kenya Malaria Indicator Survey (KMIS) to minimize this type of error, nonsampling errors are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of respondents selected in the 2015 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 among 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 percent of all possible samples of identical size and design.

If the sample of respondents had been selected as a simple random sample, it would have been possible to use straightforward formulas for calculating sampling errors. However, the 2015 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 either ISSA or SAS, using programs developed by ICF International. These programs use the Taylor linearization method of variance estimation for survey estimates that are means, proportions, or ratios.

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

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

in which

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

where h represents the stratum which varies from 1 to H,

m_h is the total number of clusters selected in the hth stratum,

y_{hi} is the sum of the weighted values of variable y in the ith cluster in the hth stratum,

x_{hi} is the sum of the weighted number of cases in the ith cluster in the hth stratum, and

f is the overall sampling fraction, which is so small that it is ignored.

In addition to the standard error, the design effect (DEFT) for each estimate is 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 2015 KMIS are calculated for selected variables considered to be of primary interest. The results are presented in this appendix for the country as a whole, for urban and rural areas, and for each of the five malaria endemicity zones (highland epidemic; lake endemic; coast endemic; semi-arid, seasonal risk; and low risk). 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 percent 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 a child who has fever in the last 2 weeks) can be interpreted as follows: the overall average from the national sample is 0.361, and its standard error is 0.014. Therefore, to obtain the 95 percent confidence limits, one adds and subtracts twice the standard error to the sample estimate, i.e., 0.361 ± 2×0.014. There is a high probability (95 percent) that the true proportion of children who have fever in the last 2 weeks is between 0.334 and 0.388.

For the total sample, the value of the DEFT, averaged over all variables, is 1.72. This means that, due to multi-stage clustering of the sample, the average standard error is increased by a factor of 1.72 over that in an equivalent simple random sample.

Table B.1 List of selected variables for sampling errors, Kenya 2015

Variable	Type of Estimate	Base population
No education	Proportion	All women 15-49
Secondary education or higher	Proportion	All women 15-49
Owns at least 1 long-lasting insecticidal net (LLIN)	Proportion	Households
Child slept under an LLIN last night	Proportion	Children under 5 in households
Pregnant woman slept under an LLIN last night	Proportion	Pregnant women 15-49 in households
Received 2+ doses of SP/Fansidar antenatal visit	Proportion	Last birth of women 15-49 with live births last 2 years
Child has fever in last 2 weeks	Proportion	Child under 5 in women's birth history
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	Proportion	Child under 5 with fever in last 2 weeks
Child took artemisinin combination therapy (ACT)	Proportion	Child under 5 with fever in last 2 weeks who received any antimalarial drugs
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	Proportion	Child 6-59 months tested for anaemia
Child 6-59 months has malaria (on rapid test)	Proportion	Children 6-59 months tested (rapid test) for malaria
Child 6-59 months has malaria (on microscopy)	Proportion	Children 6-59 months tested (on microscopy) for malaria
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	Proportion	Child 6 months - 14 years tested for anaemia
Child 6 months - 14 years has malaria (on rapid test)	Proportion	Children 6 months - 14 years tested (rapid test) for malaria
Child 6 months - 14 years has malaria (on microscopy)	Proportion	Children 6 months - 14 years tested (on microscopy) for malaria

Table B.2 Sampling errors: Total sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.078	0.009	5,394	5,394	2.373	0.111	0.060	0.095
Secondary education or higher	0.462	0.019	5,394	5,394	2.843	0.042	0.423	0.500
Ownership of at least one LLIN	0.625	0.014	6,481	6,481	2.406	0.023	0.596	0.654
Child slept under an LLIN last night	0.561	0.019	4,036	3,633	1.961	0.034	0.522	0.599
Pregnant women slept under an LLIN last night	0.578	0.033	368	336	1.233	0.057	0.512	0.645
Received 2+ doses of SP/Fansidar during antenatal visit	0.347	0.019	1,385	1,268	1.409	0.054	0.310	0.385
Child has fever in last 2 weeks	0.361	0.014	3,496	3,168	1.489	0.038	0.334	0.388
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.719	0.018	1,290	1,144	1.245	0.025	0.683	0.755
Child took ACT	0.248	0.020	1,290	1,144	1.488	0.082	0.208	0.289
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.022	0.003	3,426	3,077	1.256	0.153	0.015	0.029
Child 6-59 months has malaria (based on rapid diagnostic test)	0.091	0.009	3,419	3,073	1.537	0.103	0.072	0.109
Child 6-59 months has malaria (based on microscopy)	0.050	0.005	3,427	3,080	1.234	0.108	0.039	0.060
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.012	0.001	10,005	9,033	1.156	0.116	0.009	0.014
Child 6 months - 14 years has malaria (based on rapid test)	0.130	0.012	9,999	9,030	2.125	0.088	0.107	0.153
Child 6 months - 14 years has malaria (based on microscopy)	0.082	0.008	10,011	9,042	2.011	0.101	0.066	0.099

Table B.3 Sampling errors: Urban sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.050	0.010	2,478	2,178	2.352	0.207	0.029	0.070
Secondary education or higher	0.632	0.032	2,478	2,178	3.298	0.051	0.568	0.696
Ownership of at least one LLIN	0.621	0.024	2,985	2,673	2.714	0.039	0.573	0.670
Child slept under an LLIN last night	0.598	0.038	1,562	1,130	2.350	0.063	0.522	0.674
Pregnant women slept under an LLIN last night	0.599	0.050	164	130	1.222	0.083	0.500	0.698
Received 2+ doses of SP/Fansidar during antenatal visit	0.345	0.027	556	419	1.254	0.079	0.290	0.399
Child has fever in last 2 weeks	0.317	0.022	1,381	1,046	1.560	0.070	0.272	0.361
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.746	0.027	460	331	1.122	0.036	0.693	0.800
Child took ACT	0.219	0.034	460	331	1.460	0.156	0.150	0.287
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.016	0.004	1,301	937	1.079	0.273	0.007	0.024
Child 6-59 months has malaria (based on rapid diagnostic test)	0.029	0.006	1,295	933	1.070	0.220	0.016	0.042
Child 6-59 months has malaria (based on microscopy)	0.019	0.005	1,298	934	1.061	0.261	0.009	0.029
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.008	0.002	3,699	2,526	1.152	0.251	0.004	0.012
Child 6 months - 14 years has malaria (based on rapid test)	0.043	0.009	3,690	2,520	1.618	0.208	0.025	0.061
Child 6 months - 14 years has malaria (based on microscopy)	0.029	0.008	3,695	2,521	1.734	0.256	0.014	0.044

Table B.4 Sampling errors: Rural sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.097	0.013	2,916	3,216	2.331	0.132	0.071	0.122
Secondary education or higher	0.347	0.020	2,916	3,216	2.237	0.057	0.307	0.386
Ownership of at least one LLIN	0.628	0.018	3,496	3,808	2.182	0.028	0.592	0.664
Child slept under an LLIN last night	0.544	0.022	2,474	2,503	1.780	0.041	0.500	0.589
Pregnant women slept under an LLIN last night	0.565	0.044	204	205	1.221	0.078	0.478	0.653
Received 2+ doses of SP/Fansidar during antenatal visit	0.348	0.025	829	849	1.439	0.071	0.299	0.398
Child has fever in last 2 weeks	0.383	0.017	2,115	2,122	1.429	0.045	0.349	0.417
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.708	0.023	830	812	1.240	0.032	0.662	0.753
Child took ACT	0.261	0.025	830	812	1.457	0.096	0.211	0.310
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.025	0.004	2,125	2,140	1.267	0.181	0.016	0.034
Child 6-59 months has malaria (based on rapid diagnostic test)	0.117	0.013	2,124	2,141	1.530	0.111	0.092	0.143
Child 6-59 months has malaria (based on microscopy)	0.063	0.008	2,129	2,147	1.234	0.119	0.048	0.078
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.013	0.002	6,306	6,507	1.124	0.131	0.010	0.017
Child 6 months - 14 years has malaria (based on rapid test)	0.164	0.016	6,309	6,510	2.142	0.096	0.132	0.195
Child 6 months - 14 years has malaria (based on microscopy)	0.103	0.011	6,316	6,521	2.022	0.111	0.080	0.126

Table B.5 Sampling errors: Highland epidemic sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.041	0.007	1,210	1,042	1.160	0.161	0.028	0.055
Secondary education or higher	0.406	0.017	1,210	1,042	1.185	0.041	0.373	0.440
Ownership of at least one LLIN	0.729	0.026	1,369	1,186	2.174	0.036	0.676	0.781
Child slept under an LLIN last night	0.612	0.031	949	810	1.619	0.050	0.550	0.673
Pregnant women slept under an LLIN last night	0.616	0.056	79	63	0.981	0.091	0.504	0.728
Received 2+ doses of SP/Fansidar during antenatal visit	0.307	0.025	337	285	0.981	0.081	0.257	0.357
Child has fever in last 2 weeks	0.361	0.032	838	686	1.791	0.090	0.296	0.426
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.818	0.032	295	248	1.347	0.039	0.755	0.881
Child took ACT	0.208	0.032	295	248	1.212	0.153	0.144	0.272
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.023	0.007	836	698	1.279	0.301	0.009	0.037
Child 6-59 months has malaria (based on rapid diagnostic test)	0.031	0.009	841	704	1.451	0.299	0.013	0.050
Child 6-59 months has malaria (based on microscopy)	0.026	0.011	841	704	1.734	0.418	0.004	0.047
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.010	0.002	2,540	2,247	0.968	0.188	0.006	0.014
Child 6 months - 14 years has malaria (based on rapid test)	0.049	0.014	2,550	2,256	2.489	0.294	0.020	0.078
Child 6 months - 14 years has malaria (based on microscopy)	0.031	0.014	2,553	2,261	2.992	0.454	0.003	0.059

Table B.6 Sampling errors: Lake endemic sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.041	0.006	1,000	1,038	0.928	0.142	0.030	0.053
Secondary education or higher	0.332	0.028	1,000	1,038	1.878	0.084	0.276	0.388
Ownership of at least one LLIN	0.868	0.016	1,182	1,184	1.607	0.018	0.836	0.899
Child slept under an LLIN last night	0.733	0.022	783	801	1.180	0.030	0.689	0.777
Pregnant women slept under an LLIN last night	0.776	0.050	68	73	1.046	0.065	0.676	0.877
Received 2+ doses of SP/Fansidar during antenatal visit	0.547	0.050	228	244	1.530	0.091	0.448	0.647
Child has fever in last 2 weeks	0.534	0.028	599	638	1.304	0.053	0.477	0.590
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.649	0.025	316	340	0.878	0.039	0.598	0.700
Child took ACT	0.518	0.044	316	340	1.457	0.084	0.430	0.605
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.035	0.010	682	707	1.460	0.286	0.015	0.054
Child 6-59 months has malaria (based on rapid diagnostic test)	0.335	0.028	675	700	1.409	0.084	0.279	0.391
Child 6-59 months has malaria (based on microscopy)	0.166	0.019	679	704	1.262	0.116	0.127	0.204
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.021	0.004	2,237	2,300	1.148	0.171	0.014	0.028
Child 6 months - 14 years has malaria (based on rapid test)	0.424	0.032	2,227	2,290	2.309	0.075	0.360	0.488
Child 6 months - 14 years has malaria (based on microscopy)	0.267	0.024	2,233	2,296	1.961	0.089	0.219	0.314

Table B.7 Sampling errors: Coast endemic sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.162	0.035	755	379	2.593	0.215	0.092	0.232
Secondary education or higher	0.394	0.056	755	379	3.135	0.142	0.282	0.506
Ownership of at least one LLIN	0.733	0.037	894	441	2.514	0.051	0.658	0.807
Child slept under an LLIN last night	0.719	0.038	565	273	1.617	0.052	0.644	0.794
Pregnant women slept under an LLIN last night	0.831	0.059	55	27	1.150	0.070	0.714	0.948
Received 2+ doses of SP/Fansidar during antenatal visit	0.581	0.045	214	101	1.295	0.078	0.491	0.672
Child has fever in last 2 weeks	0.393	0.028	505	241	1.185	0.073	0.336	0.450
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.731	0.072	212	95	2.014	0.099	0.586	0.876
Child took ACT	0.174	0.041	212	95	1.448	0.235	0.092	0.256
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.022	0.012	469	224	1.694	0.529	0.000	0.045
Child 6-59 months has malaria (based on rapid diagnostic test)	0.068	0.033	469	224	2.390	0.489	0.002	0.135
Child 6-59 months has malaria (based on microscopy)	0.053	0.024	468	224	2.047	0.456	0.005	0.102
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.012	0.004	1,317	594	1.312	0.358	0.003	0.021
Child 6 months - 14 years has malaria (based on rapid test)	0.114	0.040	1,317	594	2.626	0.346	0.035	0.193
Child 6 months - 14 years has malaria (based on microscopy)	0.081	0.030	1,315	593	2.700	0.375	0.020	0.141

Table B.8 Sampling errors: Semi-arid, seasonal sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.203	0.039	1,161	940	3.285	0.192	0.125	0.281
Secondary education or higher	0.371	0.046	1,161	940	3.246	0.125	0.278	0.463
Ownership of at least one LLIN	0.524	0.030	1,431	1,081	2.245	0.057	0.464	0.583
Child slept under an LLIN last night	0.462	0.038	1,025	715	1.963	0.081	0.387	0.537
Pregnant women slept under an LLIN last night	0.405	0.060	101	72	1.188	0.147	0.285	0.524
Received 2+ doses of SP/Fansidar during antenatal visit	0.286	0.042	351	259	1.654	0.146	0.202	0.369
Child has fever in last 2 weeks	0.314	0.019	906	650	1.097	0.061	0.276	0.352
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.725	0.046	280	204	1.445	0.063	0.633	0.816
Child took ACT	0.115	0.035	280	204	1.696	0.304	0.045	0.184
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.031	0.006	846	594	0.926	0.192	0.019	0.043
Child 6-59 months has malaria (based on rapid diagnostic test)	0.005	0.004	842	593	1.400	0.674	0.000	0.013
Child 6-59 months has malaria (based on microscopy)	0.005	0.004	846	596	1.400	0.674	0.000	0.013
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.014	0.003	2,232	1,566	1.043	0.210	0.008	0.019
Child 6 months - 14 years has malaria (based on rapid test)	0.010	0.007	2,227	1,565	2.544	0.683	0.000	0.023
Child 6 months - 14 years has malaria (based on microscopy)	0.005	0.002	2,231	1,567	1.476	0.479	0.000	0.010

Table B.9 Sampling errors: Low risk sample, Kenya 2015

Variable	R	SE	N	WN	DEFT	CV	LCL	UCL
No education	0.041	0.015	1,268	1,995	2.722	0.373	0.010	0.071
Secondary education or higher	0.615	0.036	1,268	1,995	2.628	0.059	0.543	0.687
Ownership of at least one LLIN	0.491	0.027	1,605	2,589	2.170	0.055	0.437	0.545
Child slept under an LLIN last night	0.415	0.047	714	1,034	2.060	0.114	0.320	0.510
Pregnant women slept under an LLIN last night	0.469	0.079	65	101	1.246	0.168	0.312	0.627
Received 2+ doses of SP/Fansidar during antenatal visit	0.229	0.029	255	379	1.085	0.128	0.170	0.287
Child has fever in last 2 weeks	0.270	0.022	648	953	1.181	0.083	0.225	0.315
Child sought care/treatment from a health facility, provider, pharmacy, shop, or market	0.708	0.042	187	257	1.171	0.060	0.623	0.793
Child took ACT	0.063	0.040	187	257	1.766	0.626	0.000	0.143
Child 6-59 months has severe anaemia (Haemoglobin <8.0 g/dl)	0.005	0.003	593	853	1.079	0.678	0.000	0.011
Child 6-59 months has malaria (based on rapid diagnostic test)	0.004	0.003	592	853	1.128	0.740	0.000	0.011
Child 6-59 months has malaria (based on microscopy)	0.004	0.003	593	853	1.140	0.809	0.000	0.010
Child 6 months - 14 years has severe anaemia (Haemoglobin <8.0 g/dl)	0.003	0.002	1,679	2,326	1.162	0.571	0.000	0.006
Child 6 months - 14 years has malaria (based on rapid test)	0.005	0.003	1,678	2,325	1.343	0.625	0.000	0.012
Child 6 months - 14 years has malaria (based on microscopy)	0.003	0.002	1,679	2,326	1.009	0.571	0.000	0.006

APPENDIX C DATA QUALITY TABLES

Table C.1 Household age distribution

Single-year age distribution of the de facto household population by sex (weighted), Kenya 2015

	Women		Men			Women		Men	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
0	332	2.7	342	3.0	37	118	1.0	118	1.0
1	323	2.7	321	2.8	38	121	1.0	126	1.1
2	346	2.9	330	2.9	39	117	1.0	95	0.8
3	357	3.0	366	3.2	40	165	1.4	182	1.6
4	362	3.0	403	3.5	41	79	0.7	85	0.7
5	385	3.2	349	3.1	42	124	1.0	89	0.8
6	355	2.9	355	3.1	43	82	0.7	75	0.7
7	383	3.2	385	3.4	44	52	0.4	45	0.4
8	332	2.8	362	3.2	45	80	0.7	144	1.3
9	331	2.7	324	2.8	46	83	0.7	77	0.7
10	361	3.0	371	3.2	47	48	0.4	57	0.5
11	213	1.8	328	2.9	48	41	0.3	66	0.6
12	322	2.7	349	3.0	49	41	0.3	72	0.6
13	280	2.3	287	2.5	50	136	1.1	122	1.1
14	253	2.1	209	1.8	51	84	0.7	42	0.4
15	218	1.8	259	2.3	52	112	0.9	63	0.5
16	227	1.9	249	2.2	53	78	0.6	74	0.6
17	162	1.3	185	1.6	54	57	0.5	34	0.3
18	195	1.6	244	2.1	55	103	0.8	82	0.7
19	202	1.7	143	1.2	56	45	0.4	61	0.5
20	228	1.9	198	1.7	57	35	0.3	52	0.5
21	198	1.6	131	1.1	58	45	0.4	60	0.5
22	197	1.6	155	1.3	59	49	0.4	32	0.3
23	226	1.9	154	1.3	60	95	0.8	83	0.7
24	199	1.7	141	1.2	61	33	0.3	35	0.3
25	249	2.1	212	1.9	62	28	0.2	43	0.4
26	214	1.8	137	1.2	63	53	0.4	38	0.3
27	218	1.8	173	1.5	64	22	0.2	21	0.2
28	270	2.2	198	1.7	65	83	0.7	65	0.6
29	165	1.4	122	1.1	66	24	0.2	16	0.1
30	322	2.7	273	2.4	67	49	0.4	35	0.3
31	126	1.0	123	1.1	68	27	0.2	31	0.3
32	211	1.7	145	1.3	69	26	0.2	23	0.2
33	133	1.1	115	1.0	70+	337	2.8	269	2.3
34	119	1.0	117	1.0	Don't know	31	0.3	62	0.5
35	221	1.8	228	2.0					
36	133	1.1	93	0.8	Total	12,067	100.0	11,450	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, interviewed women age 15-49; and percent distribution and percentage of eligible women who were interviewed (weighted), by five-year age groups, Kenya 2015

Age group	Household population of women age 10-54	Interviewed women age 15-49		Percentage of eligible women interviewed
		Number	Percentage	
10-14	1,430	na	na	na
15-19	1,004	939	17.4	93.6
20-24	1,048	1,020	18.9	97.4
25-29	1,116	1,079	20.0	96.7
30-34	911	892	16.5	97.9
35-39	708	695	12.9	98.2
40-44	500	495	9.2	99.0
45-49	293	285	5.3	97.4
50-54	468	na	na	na
15-49	5,581	5,406	100.0	96.9

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

Table C.3 Completeness of reporting

Percentage of observations missing information for selected demographic and health questions (weighted), Kenya 2015

Subject	Percentage with information missing	Number of cases
Month Only (Births in the 5 years preceding the survey)	2.18	3,280
Month and Year (Births in the 5 years preceding the survey)	0.00	3,280
Respondent's education (All women age 15-49)	0.00	5,394
Anaemia (Living children age 6-59 months from the Household Questionnaire)	7.43	3,323
Anaemia (Living children age 6 months to 14 years from the Household Questionnaire)	6.60	9,671
Malaria - rapid diagnostic test (Living children 6-59 months from the Household Questionnaire)	6.88	3,323
Malaria - rapid diagnostic test (Living children 6 months to 14 years from the Household Questionnaire)	6.39	9,671
Malaria - microscopy (Living children 6-59 months from the Household Questionnaire)	6.82	3,323

APPENDIX D SUPPLEMENTARY TABLES OF SURVEY RESULTS

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, by background characteristics (unweighted), Kenya 2015

Background characteristic	Percentage tested for			Number of children
	Anaemia	Malaria with RDT	Malaria by microscopy	
Age in months				
6-8	79.2	78.7	79.2	197
9-11	92.3	92.3	92.3	168
12-17	92.9	92.9	92.7	423
18-23	94.9	94.6	95.2	373
24-35	94.4	94.0	94.0	815
36-47	93.0	93.1	93.4	829
48-59	94.3	94.0	94.4	878
Sex				
Male	93.8	93.6	93.8	1,842
Female	92.3	92.0	92.3	1,841
Residence				
Urban	91.5	91.1	91.3	1,422
Rural	94.0	93.9	94.2	2,261
Malaria endemicity				
Highland epidemic	96.1	96.7	96.7	870
Lake endemic	94.5	93.5	94.0	722
Coast endemic	90.2	90.2	90.0	520
Semi-arid, seasonal	92.8	92.3	92.8	912
Low risk	90.0	89.8	90.0	659
Mother's education[1]				
No education	92.5	92.1	92.2	670
Primary incomplete	96.5	96.7	97.1	490
Primary complete	96.0	95.7	95.9	994
Secondary+	92.8	92.8	92.8	867
Wealth quintile				
Lowest	93.4	92.9	93.4	1,177
Second	94.8	94.8	94.9	784
Middle	95.2	95.6	95.7	631
Fourth	94.1	93.7	93.9	559
Highest	85.9	85.5	85.5	532
Total	93.0	92.8	93.0	3,683

RDT = Rapid Diagnostic Test SD Bioline
[1] Excludes children whose mothers were not interviewed

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, by background characteristics, Kenya 2015

	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
Background characteristic	**RDT positive**	**Number of children**	**Microscopy positive**	**Number of children**
Age in months				
6-8	1.6	143	0.4	143
9-11	6.0	151	3.7	151
12-17	4.3	348	3.4	348
18-23	9.1	315	4.2	316
24-35	10.5	673	6.5	672
36-47	9.4	693	4.5	696
48-59	11.7	751	6.2	754
Sex				
Male	9.0	1,563	4.9	1,567
Female	9.1	1,511	5.0	1,514
Residence				
Urban	2.9	933	1.9	934
Rural	11.7	2,141	6.3	2,147
Malaria endemicity				
Highland epidemic	3.1	704	2.6	704
Lake endemic	33.5	700	16.6	704
Coast endemic	6.8	224	5.3	224
Semi-arid, seasonal	0.5	593	0.5	596
Low risk	0.4	853	0.4	853
Mother's education[1]				
No education	6.2	359	3.2	359
Primary incomplete	11.7	431	8.7	434
Primary complete	9.5	914	4.6	917
Secondary+	5.6	861	2.5	861
Wealth quintile				
Lowest	9.6	767	5.8	770
Second	17.5	668	8.9	669
Middle	8.4	574	4.8	576
Fourth	5.3	573	2.9	574
Highest	1.9	492	0.9	492
Total	9.1	3,073	5.0	3,080

RDT = Rapid Diagnostic Test
[1] Excludes children whose mothers were not interviewed

Table D.3 Prevalence of malaria in children age 6-59 months by species

Percentage of children age 6-59 months shown in microscopy to be infected with various *Plasmodium* species, by background characteristics, Kenya 2015

Background characteristic	Positive for *Pf*	Positive for *Pm*	Positive for *Po*	Positive *Pf+Po*	Positive *Pf+Pm*	Positive *Pf+Pm+Po*	Number of children
Age in months							
6-8	0.4	0.0	0.0	0.0	0.0	0.0	143
9-11	3.1	0.0	0.0	0.0	0.0	0.0	151
12-17	1.8	0.5	0.0	0.0	0.5	0.0	348
18-23	3.1	0.7	0.0	0.0	0.5	0.0	316
24-35	4.4	0.4	0.0	0.2	0.9	0.2	672
36-47	3.8	0.1	0.2	0.0	0.6	0.0	696
48-59	4.8	0.4	0.0	0.1	0.6	0.0	754
Sex							
Male	3.5	0.4	0.1	0.0	0.7	0.1	1,567
Female	3.8	0.2	0.0	0.1	0.5	0.0	1,514
Residence							
Urban	1.2	0.5	0.0	0.0	0.2	0.0	934
Rural	4.8	0.3	0.1	0.1	0.8	0.0	2,147
Malaria endemicity							
Highland epidemic	2.1	0.1	0.0	0.2	0.0	0.2	704
Lake endemic	12.8	0.8	0.2	0.2	2.1	0.0	704
Coast endemic	2.5	1.7	0.0	0.0	0.8	0.1	224
Semi-arid, seasonal	0.0	0.0	0.0	0.0	0.1	0.0	596
Low risk	0.3	0.0	0.0	0.0	0.1	0.0	853
Mother's education[1]							
No education	2.4	0.0	0.0	0.0	0.5	0.0	359
Primary incomplete	6.7	0.4	0.0	0.3	0.6	0.2	434
Primary complete	4.6	0.0	0.0	0.1	0.7	0.0	917
Secondary+	2.5	0.6	0.0	0.0	0.2	0.0	861
Wealth quintile							
Lowest	5.8	0.3	0.0	0.0	1.2	0.2	770
Second	8.9	0.5	0.2	0.2	0.8	0.0	669
Middle	4.8	0.2	0.0	0.2	0.4	0.0	576
Fourth	2.9	0.3	0.0	0.0	0.1	0.0	574
Highest	0.9	0.4	0.0	0.0	0.1	0.0	492
Total	3.7	0.3	0.0	0.1	0.6	0.0	3,080

Pf = *Plasmodium falciparum*; *Pm* = *Plasmodium malariae*; *Po* = *Plasmodium ovale*.
Note: No cases of *Plasmodium vivax* were found.
[1] Excludes children whose mothers were not interviewed

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

Percent distribution of children age 6-59 months by anaemia status, according to background characteristics, Kenya 2015

Background characteristic	Severe anaemia	Moderate anaemia	Mild anaemia	No anaemia	Total	Number of children
Age in months						
6-8	2.0	18.3	31.4	48.2	100.0	143
9-11	4.3	22.5	27.6	45.6	100.0	151
12-17	2.3	28.8	31.6	37.3	100.0	348
18-23	3.4	21.7	28.1	46.8	100.0	315
24-35	3.5	15.4	21.8	59.3	100.0	675
36-47	1.7	8.0	15.6	74.7	100.0	692
48-59	0.6	5.7	10.5	83.2	100.0	753
Sex						
Male	2.5	15.6	19.9	62.1	100.0	1,563
Female	1.9	12.4	20.4	65.3	100.0	1,513
Residence						
Urban	1.6	11.6	17.1	69.8	100.0	937
Rural	2.5	15.1	21.5	61.0	100.0	2,140
Malaria endemicity						
Highland epidemic	2.3	15.2	20.1	62.4	100.0	698
Lake endemic	3.5	19.7	25.1	51.7	100.0	707
Coast endemic	2.2	12.8	16.5	68.5	100.0	224
Semi-arid, seasonal	3.1	15.6	20.0	61.2	100.0	594
Low risk	0.5	7.6	17.0	74.9	100.0	853
Mother's education[1]						
No education	3.9	20.7	22.6	52.7	100.0	360
Primary incomplete	2.6	18.1	21.2	58.1	100.0	430
Primary complete	2.1	13.5	20.5	63.8	100.0	918
Secondary+	1.4	11.1	20.5	67.1	100.0	861
Wealth quintile						
Lowest	2.9	20.8	21.9	54.3	100.0	768
Second	3.6	14.9	22.0	59.5	100.0	668
Middle	1.7	11.8	21.5	65.0	100.0	572
Fourth	1.1	11.1	19.3	68.6	100.0	574
Highest	1.1	8.3	14.1	76.5	100.0	494
Total	2.2	14.0	20.1	63.7	100.0	3,077

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 >11.0 g/dl.

[1] Excludes children whose mothers were not interviewed.

Table D.5 Prevalence of anaemia

Percent distribution of children age 6 months to 14 years by anaemia status, according to background characteristics, Kenya 2010

Background characteristic	Severe anaemia	Moderate anaemia	Mild anaemia	No anaemia	Total	Number of children
Age						
6-8 months	7.2	28.4	27.1	37.2	100.0	174
9-11 months	5.1	25.9	30.3	38.7	100.0	220
12-17 months	7.5	33.1	24.8	34.6	100.0	473
18-23 months	6.3	27.4	24.6	41.7	100.0	370
24-35 months	6.0	18.2	23.8	52.1	100.0	948
36-47 months	4.1	13.5	20.5	61.9	100.0	893
48-59 months	3.0	11.2	15.4	70.4	100.0	862
6-59 months	5.1	19.1	21.9	53.8	100.0	3,940
5-9 years	1.6	6.4	20.1	71.9	100.0	3,701
10-14 years	0.5	2.6	16.8	80.1	100.0	3,012
Sex						
Male	2.9	10.7	19.6	66.8	100.0	5,294
Female	2.3	9.4	20.0	68.3	100.0	5,360
Residence						
Urban	1.4	10.4	16.0	72.2	100.0	1,515
Rural	2.8	10.0	20.4	66.8	100.0	9,139
Malaria endemicity						
Highland epidemic	2.1	10.1	19.3	68.5	100.0	2,439
Lake endemic	4.2	13.8	25.1	56.9	100.0	2,743
Coast endemic	1.9	11.4	22.1	64.6	100.0	816
Semi-arid, seasonal	3.1	9.2	19.4	68.4	100.0	2,514
Low risk	0.8	5.8	13.2	80.2	100.0	2,141
Mother's education[1]						
No education	3.7	12.8	23.6	59.9	100.0	1,104
Primary incomplete	3.6	12.4	21.8	62.2	100.0	2,108
Primary complete	3.3	11.7	21.2	63.8	100.0	1,426
Secondary+	2.6	11.6	17.7	68.1	100.0	1,289
Wealth quintile						
Lowest	3.6	12.7	22.7	61.0	100.0	2,439
Second	2.8	10.3	22.0	64.9	100.0	2,359
Middle	2.5	8.4	19.2	69.9	100.0	2,225
Fourth	2.3	9.0	18.4	70.2	100.0	2,037
Highest	1.4	9.2	14.8	74.7	100.0	1,593
Total	2.6	10.0	19.8	67.5	100.0	10,654

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 (WHO 2011).

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

Table D.6 Comparison of malaria and anaemia prevalence

Percent distribution of children 6 months to 14 years who had a result from both the malaria (microscopy) and anaemia tests by the outcome of the tests, Kenya 2010

Outcome of anaemia and malaria tests	Percent	Number
Malaria positive	**11.4**	**1,186**
Anaemic	5.9	656
Not anaemic	5.5	530
Malaria negative	**88.6**	**9,222**
Anaemic	26.1	2,717
Not anaemic	62.5	6,505
Total	100.0	9,026

Note: Table is based on children who stayed in the household the night before the interview. Undetermined slide microscopy results were excluded.
The table is based on weighted data and excludes children who did not have a result for both tests. Thus, the numbers (Ns) differ from Ns found in Table 6.5 in the 2010 KMIS report.

Table D.7 Household population with access to an LLIN

Percent distribution of the de facto household population by number of LLINs the household owns, and percentage with access to an LLIN, according to number of persons who stayed in the household the night before the survey, by malaria endemicity, Kenya 2015

	Number of persons who stayed in the household the night before the survey								
Number of LLINs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8+**	**Total**
HIGHLAND EPIDEMIC									
0	48.3	39.5	20.5	23.8	21.7	25.5	24.9	20.2	24.2
1	31.9	29.8	28.0	18.3	10.6	10.2	7.4	9.1	14.8
2	15.4	18.6	34.1	35.6	24.6	28.2	19.8	15.4	25.5
3	3.6	6.3	11.9	14.4	27.9	20.7	25.7	24.8	20.0
4	0.0	5.8	4.9	4.5	12.3	11.1	9.4	18.2	10.0
5	0.7	0.0	0.6	1.5	2.8	2.5	6.0	4.6	2.7
6	0.0	0.0	0.0	1.9	0.1	0.6	1.2	2.6	1.0
7+	0.0	0.0	0.0	0.1	0.0	1.2	5.7	5.1	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	115	269	651	792	928	907	583	871	5,116
Percent with access to an LLIN[1]	51.7	60.5	70.1	67.1	67.0	58.3	57.6	54.1	61.9
LAKE ENDEMIC									
0	20.1	17.2	9.1	11.9	11.7	9.4	13.9	13.5	12.3
1	61.4	38.5	32.7	20.0	15.0	20.4	12.0	8.5	19.1
2	12.4	29.8	33.4	36.7	34.2	30.4	33.5	24.8	30.9
3	3.3	9.3	19.1	22.1	22.6	21.0	15.1	14.7	18.1
4	2.8	3.8	3.4	6.8	11.2	11.4	20.3	23.9	13.1
5	0.0	1.4	1.5	2.1	4.7	4.2	2.9	8.8	4.3
6	0.0	0.0	0.8	0.4	0.7	2.8	2.3	2.7	1.6
7+	0.0	0.0	0.0	0.0	0.0	0.5	0.0	3.2	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	150	287	468	736	956	843	652	1,094	5,186
Percent with access to an LLIN[1]	79.9	82.8	80.0	78.1	72.5	66.9	61.0	59.0	69.6
COAST ENDEMIC									
0	41.4	38.4	18.2	26.6	12.9	14.6	19.3	11.9	19.8
1	51.5	36.8	40.0	20.4	23.2	18.1	20.5	16.2	25.6
2	6.9	20.6	33.2	35.0	29.3	37.8	15.2	24.3	26.8
3	0.1	3.0	8.0	15.4	22.4	15.4	15.4	17.7	14.0
4	0.0	0.9	0.6	2.3	10.8	12.5	23.1	17.7	10.0
5	0.1	0.2	0.0	0.0	1.3	0.9	6.5	4.7	2.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.9
7+	0.0	0.0	0.0	0.4	0.0	0.7	0.0	3.5	0.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	107	145	211	176	251	217	165	367	1,638
Percent with access to an LLIN[1]	58.6	61.6	68.4	63.2	67.3	60.8	57.3	48.0	59.7
SEMI-ARID, SEASONAL									
0	62.6	49.9	44.4	47.2	41.2	43.2	42.7	35.6	44.0
1	34.1	32.9	37.7	28.7	27.6	20.8	20.1	16.9	26.6
2	1.7	13.6	13.3	17.8	21.6	18.5	19.6	19.3	17.3
3	0.2	2.9	3.2	3.1	6.2	11.5	15.1	10.8	7.1
4	0.7	0.7	1.3	0.8	3.4	4.2	1.1	10.6	3.1
5	0.0	0.0	0.0	2.6	0.0	1.8	1.4	4.6	1.5
6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.2
7+	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.8	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	185	288	587	719	749	559	497	549	4,133
Percent with access to an LLIN[1]	37.4	50.1	43.1	38.5	37.9	36.8	32.4	35.5	38.4
LOW RISK									
0	52.6	56.6	47.5	45.4	41.2	55.9	60.8	66.4	50.8
1	37.1	25.3	26.0	14.7	15.7	9.0	24.2	16.2	20.7
2	8.3	9.5	17.8	30.4	18.1	14.1	8.7	8.2	16.7
3	2.0	7.1	5.0	6.0	16.4	14.4	1.2	0.6	7.3
4	0.0	1.1	3.7	3.6	3.6	6.4	5.0	2.3	3.2
5	0.0	0.0	0.0	0.0	3.9	0.0	0.0	5.7	0.9
6	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.6	0.1
7+	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	792	907	1,360	1,506	1,097	803	482	498	7,445
Percent with access to an LLIN[1]	47.4	43.4	43.8	47.3	45.8	33.4	17.9	15.6	40.4

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

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APPENDIX F QUESTIONNAIRES

KENYA MALARIA INDICATOR SURVEY
HOUSEHOLD QUESTIONNAIRE

MALARIA CONTROL UNIT
KENYA NATIONAL BUREAU OF STATISTICS

IDENTIFICATION

COUNTY _____

SUBLOCATION _____

NASSEP CLUSTER NUMBER . . . . . .

KMIS CLUSTER NUMBER . . . . . .

CLUSTER NAME _____

STRUCTURE NUMBER . . . . . .

HOUSEHOLD NUMBER . . . . . .

NAME OF HOUSEHOLD HEAD _____

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 ☐☐

TOTAL ELIGIBLE CHILDREN ☐☐

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE ☐☐

LANGUAGE OF QUESTIONNAIRE** 0 1

LANGUAGE OF INTERVIEW** ☐☐

TRANSLATOR (YES = 1, NO = 2) ☐

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:

01 ENGLISH			02 KISWAHILI
03 BORANA	07 KIKUYU	11 LUO	15 POKOT
04 EMBU	08 KISII	12 MAASAI	16 SOMALI
05 KALENJIN	09 LUHYA	13 MERU	17 TURKANA
06 KAMBA	10 MARAGOLI	14 MIJIKENDA	18 OTHER

SUPERVISOR: _____ NAME ☐☐☐ NUMBER

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INTRODUCTION AND CONSENT

ADMINISTER 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 LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD '95'.	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

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 LISTING THE NAMES AND RECORDING THE RELATIONSHIP AND SEX FOR EACH PERSON, ASK QUESTIONS 2A-2C TO BE SURE THAT THE LISTING IS COMPLETE. THEN ASK APPROPRIATE QUESTIONS IN COLUMNS 5-9 FOR EACH PERSON.	What is the relationship of (NAME) to the head of the household? SEE CODES BELOW.	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)? IF 95 OR MORE, RECORD '95'.	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		
11			1 2	1 2	1 2		11	11
12			1 2	1 2	1 2		12	12
13			1 2	1 2	1 2		13	13
14			1 2	1 2	1 2		14	14
15			1 2	1 2	1 2		15	15
16			1 2	1 2	1 2		16	16
17			1 2	1 2	1 2		17	17
18			1 2	1 2	1 2		18	18
19			1 2	1 2	1 2		19	19
20			1 2	1 2	1 2		20	20

TICK HERE IF CONTINUATION SHEET USED ☐

CODES FOR Q. 3: RELATIONSHIP TO HEAD OF HOUSEHOLD

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

HOUSEHOLD CHARACTERISTICS

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)	11, 12, 13 → 104 14, 21, 31, 32, 41, 42, 51, 61, 71, 81, 91 96 → 102
101A	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)	11, 12, 13 → 104
102	Where is that water source located?	IN OWN DWELLING . . . . . 1 IN OWN YARD/PLOT . . . . . 2 ELSEWHERE 3	1, 2 → 104
103	How long does it take to go there, get water, and come back?	MINUTES . . . . . [ ][ ][ ] DON'T KNOW 998	

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
104	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)	→ 107
105	Do you share this toilet facility with other households?	YES . . . . . 1 NO 2	→ 107
106	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	
107	How many rooms in this household are used for sleeping?	ROOMS . . . . . [ ][ ]	
108	Does this household own any livestock, herds, other farm animals, or poultry?	YES . . . . . 1 NO 2	→ 110
109	How many of the following animals does this household own? IF NONE, RECORD '00'. IF 95 OR MORE, RECORD '95'. IF UNKNOWN, RECORD '98'. a) Local cattle (indigenous)? b) Exotic/grade cattle? c) Horses, donkeys, or mules? d) Goats? e) Sheep? f) Chickens or other poultry?	a) LOCAL CATTLE . . . . . [ ][ ] b) EXOTIC/GRADE CATTLE . . . . . [ ][ ] c) HORSES/DONKEYS/MULES . . . . . [ ][ ] d) GOATS . . . . . [ ][ ] e) SHEEP . . . . . [ ][ ] f) CHICKENS/POULTRY . . . . . [ ][ ]	
110	Does any member of your household own any agricultural land?	YES . . . . . 1 NO 2	→ 112

HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	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 9999998	
112	Does your household have: a) Electricity? b) A radio? c) A television? d) A non-mobile telephone? e) A computer? f) A refrigerator? g) A solar panel? h) A table? i) A chair? j) A sofa? k) A bed? l) A cupboard? m) A clock? n) A microwave oven? o) A DVD player? p) A CD player?	YES NO a) ELECTRICITY . . . . . 1 2 b) RADIO . . . . . 1 2 c) TELEVISION . . . . . 1 2 d) NON-MOBILE TELEPHONE . . 1 2 e) COMPUTER . . . . . 1 2 f) REFRIGERATOR . . . . . 1 2 g) SOLAR PANEL . . . . . 1 2 h) TABLE . . . . . 1 2 i) CHAIR . . . . . 1 2 j) SOFA . . . . . 1 2 k) BED . . . . . 1 2 l) CUPBOARD . . . . . 1 2 m) CLOCK . . . . . 1 2 n) MICROWAVE OVEN . . . . . 1 2 o) DVD PLAYER . . . . . 1 2 p) CD PLAYER 1 2	
113	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 f) ANIMAL-DRAWN CART . . . . . 1 2 g) CAR/TRUCK . . . . . 1 2 h) BOAT WITH MOTOR 1 2	
113A	Did the household head ever attend school?	YES . . . . . 1 NO 2	→ 114
113B	What is the highest level of education the household head attended: primary, vocational, secondary, or higher?	PRIMARY . . . . . 1 POST-PRIMARY/VOCATIONAL . . . . . 2 SECONDARY/ 'A' LEVEL . . . . . 3 COLLEGE (MIDDLE LEVEL . . . . . 4 UNIVERSITY 5	
113C	Did the the household head complete that level?	YES . . . . . 1 NO 2	
114	Does any member of this household have a bank account?	YES . . . . . 1 NO 2	
117	Does your household have any mosquito nets?	YES . . . . . 1 NO 2	→ 128A
118	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS . . . . . [ ]	

MOSQUITO NET ROSTER

		NET #1	NET #2	NET #3
119	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD. IF MORE THAN 3 NETS, USE ADDITIONAL QUESTIONNAIRE(S).	OBSERVED . . . . . 1 NOT OBSERVED 2	OBSERVED . . . . . 1 NOT OBSERVED 2	OBSERVED . . . . . 1 NOT OBSERVED 2
120	How many months ago did your household get the mosquito net? IF LESS THAN ONE MONTH AGO, RECORD '00'.	MONTHS AGO . . . . . [ ][ ] MORE THAN 36 MONTHS AGO . . . . . 95 NOT SURE 98	MONTHS AGO . . . . . [ ][ ] MORE THAN 36 MONTHS AGO . . . . . 95 NOT SURE 98	MONTHS AGO . . . . . [ ][ ] MORE THAN 36 MONTHS AGO . . . . . 95 NOT SURE 98
121	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 (SUPA-NET EXTRA) . . . . . 11 PERMANET (SUPA-NET EXTRA) . . . . . 12 NETPROTECT . . . . . 13 YORKOOL . . . . . 14 OTHER/DON'T KNOW BRAND . . . . . 16 UNBRANDED . . . . . 71 OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET (SUPA-NET EXTRA) . . . . . 11 PERMANET (SUPA-NET EXTRA) . . . . . 12 NETPROTECT . . . . . 13 YORKOOL . . . . . 14 OTHER/DON'T KNOW BRAND . . . . . 16 UNBRANDED . . . . . 71 OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98	**LONG-LASTING INSECTICIDE-TREATED NET (LLIN)** OLYSET (SUPA-NET EXTRA) . . . . . 11 PERMANET (SUPA-NET EXTRA) . . . . . 12 NETPROTECT . . . . . 13 YORKOOL . . . . . 14 OTHER/DON'T KNOW BRAND . . . . . 16 UNBRANDED . . . . . 71 OTHER TYPE . . . . . 96 DON'T KNOW TYPE . . 98
121A	OBSERVE FOR OR ASK IF HOLES IN NET. RECORD THE SIZE OF THE LARGEST HOLE.	HOLE SMALLER THAN A THUMB/FINGER 0.5-2CM . . . . . 1 HOLE LARGER THAN THUMB BUT SMALLER THAN FIST/HAND 2-10CM . . . . . 2 HOLE LARGER THAN FIST BUT SMALLER THAN HEAD 10-25CM . . . . . 3 HOLE LARGER THAN HEAD, MORE THAN 25CM . . . . . 4 NO HOLES 5	HOLE SMALLER THAN A THUMB/FINGER 0.5-2CM . . . . . 1 HOLE LARGER THAN THUMB BUT SMALLER THAN FIST/HAND 2-10CM . . . . . 2 HOLE LARGER THAN FIST BUT SMALLER THAN HEAD 10-25CM . . . . . 3 HOLE LARGER THAN HEAD, MORE THAN 25CM . . . . . 4 NO HOLES 5	HOLE SMALLER THAN A THUMB/FINGER 0.5-2CM . . . . . 1 HOLE LARGER THAN THUMB BUT SMALLER THAN FIST/HAND 2-10CM . . . . . 2 HOLE LARGER THAN FIST BUT SMALLER THAN HEAD 10-25CM . . . . . 3 HOLE LARGER THAN HEAD, MORE THAN 25CM . . . . . 4 NO HOLES 5
125	Where did you get the net?	2014-15 CAMPAIGN . . . . . 01 OTHER CAMPAIGN . . . . . 02 GOVT./FBO CLINIC/ HOSPITAL . . . . . 03 DUKA/RURAL SHOP . . 04 SUPERMARKET/ RETAIL SHOP . . . . . 05 FRIEND/RELATIVE . . . . . 06 OTHER . . . . . 96 DON'T KNOW 98	2014-15 CAMPAIGN . . . . . 01 OTHER CAMPAIGN . . . . . 02 GOVT./FBO CLINIC/ HOSPITAL . . . . . 03 DUKA/RURAL SHOP . . 04 SUPERMARKET/ RETAIL SHOP . . . . . 05 FRIEND/RELATIVE . . . . . 06 OTHER . . . . . 96 DON'T KNOW 98	2014-15 CAMPAIGN . . . . . 01 OTHER CAMPAIGN . . . . . 02 GOVT./FBO CLINIC/ HOSPITAL . . . . . 03 DUKA/RURAL SHOP . . 04 SUPERMARKET/ RETAIL SHOP . . . . . 05 FRIEND/RELATIVE . . . . . 06 OTHER . . . . . 96 DON'T KNOW 98
125A	How much did you pay for the net?	COST . . . . . [ ][ ][ ][ ] FREE . . . . . 9995 NOT SURE 9998	COST . . . . . [ ][ ][ ][ ] FREE . . . . . 9995 NOT SURE 9998	COST . . . . . [ ][ ][ ][ ] FREE . . . . . 9995 NOT SURE 9998
126	Did anyone sleep under this mosquito net last night?	YES . . . . . 1 (SKIP TO 127) NO . . . . . 2 NOT SURE . . . . . 8 (SKIP TO 127B)	YES . . . . . 1 (SKIP TO 127) NO . . . . . 2 NOT SURE . . . . . 8 (SKIP TO 127B)	YES . . . . . 1 (SKIP TO 127) NO . . . . . 2 NOT SURE . . . . . 8 (SKIP TO 127B)

MOSQUITO NET ROSTER

		NET #1	NET #2	NET #3
126A	Why didn't someone sleep under this net last night?	NET NEVER USED ..... A THERE ARE EXCESS NETS ..... B IT WAS TOO HOT ..... C THERE WERE NO MOSQUITOS .. D THE NET WAS BEING WASHED ..... E PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... F OTHER _____ X (SPECIFY) (SKIP TO 127B)	NET NEVER USED ..... A THERE ARE EXCESS NETS ..... B IT WAS TOO HOT ..... C THERE WERE NO MOSQUITOS .. D THE NET WAS BEING WASHED ..... E PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... F OTHER _____ X (SPECIFY) (SKIP TO 127B)	NET NEVER USED ..... A THERE ARE EXCESS NETS ..... B IT WAS TOO HOT ..... C THERE WERE NO MOSQUITOS .. D THE NET WAS BEING WASHED ..... E PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... F OTHER _____ X (SPECIFY) (SKIP TO 127B)
127	Who slept under this mosquito net last night? RECORD THE PERSON'S NAME AND LINE NUMBER FROM HOUSEHOLD SCHEDULE.	NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ]	NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ]	NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ] NAME _____ LINE NO. ..... [ ][ ]
127B	OBSERVE FOR OR ASK IF THE NET IS HANGING FOR SLEEPING.	HANGING ..... 1 (SKIP TO 128) NOT HANGING 2	HANGING ..... 1 (SKIP TO 128) NOT HANGING 2	HANGING ..... 1 (SKIP TO 128) NOT HANGING 2
127C	What is the reason the net is not hanging for sleeping?	SHAPE DIFFICULT TO HANG UP ..... A TOO SHORT TO GIVE PROTECTION .. B NO SPACE TO HANG NET HANG NET ..... C PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... D OTHER _____ X (SPECIFY)	SHAPE DIFFICULT TO HANG UP ..... A TOO SHORT TO GIVE PROTECTION .. B NO SPACE TO HANG NET HANG NET ..... C PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... D OTHER _____ X (SPECIFY)	SHAPE DIFFICULT TO HANG UP ..... A TOO SHORT TO GIVE PROTECTION .. B NO SPACE TO HANG NET HANG NET ..... C PERSON NORMALLY USING NET DID NOT STAY HERE LAST NIGHT ..... D OTHER _____ X (SPECIFY)
128		GO BACK TO 119 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 128A.	GO BACK TO 119 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 128A.	GO TO 119 IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE NETS, GO TO 128A.

SOURCE AND USES OF MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
128A	In the last 12 months, has anyone in your household given away a mosquito net?	YES . . . . . 1 NO 2	
128B	In the last 12 months, has anyone in your household sold a mosquito net?	YES . . . . . 1 NO 2	
128C	In many places, some people use bednets for other things than sleeping, such as curtains or fishing nets. Are nets being used for alternative uses in this community?	YES . . . . . 1 NO 2	→ 128E
128D	What types of nets are being used for alternative uses: nets 2 years old or newer, nets 3 years old or older, or both types of nets?	NEW NETS . . . . . 1 OLD NETS . . . . . 2 BOTH OLD AND NEW 3	
128E	The last time you disposed of your old nets, what did you do? RECORD ALL MENTIONED.	BURN . . . . . A BURY . . . . . B THROW AWAY . . . . . C RECYCLE . . . . . D GAVE TO SOMEONE ELSE . . . . . E EXCHANGED FOR A NEW ONE . . . . . F OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	
128F **(1)**	Did you hear about the 2014-15 mass net distribution campaign?	YES . . . . . 1 NO 2	→ 128I
128G **(1)**	From where did you hear about the 2014-15 net distribution campaign? RECORD ALL MENTIONED.	BROCHURES/POSTERS . . . . . A RADIO . . . . . B TELEVISION . . . . . C NEWSPAPER . . . . . D CHIEF'S BARAZAS . . . . . E HEALTH WORKERS . . . . . F HOME VISIT FOR REGISTRATION . . . . . G COMMUNITY LEADERS . . . . . H FAMILY/FRIENDS . . . . . I OTHER _____ X (SPECIFY)	
128H **(1)**	What was the content of the messages you heard or saw? RECORD ALL MENTIONED.	GO GET REGISTERED . . . . . A GO COLLECT YOUR NET . . . . . B SLEEP UNDER YOUR NET EVERY NIGHT . . . . . C OTHER _____ X (SPECIFY)	
128I **(1)**	Have you heard or seen any communications on net use or malaria prevention in the past year that were not linked to the campaign?	YES . . . . . 1 NO 2	→ 128N
128J **(1)**	Did you hear the messages about net use or malaria prevention not linked to the campaign on the radio?	YES . . . . . 1 NO 2	→ 128L
128K **(1)**	Did any of the messages you heard on the radio include the phrase "lala ndani ya neti kila siku kila msimu"?	YES . . . . . 1 NO 2	

SOURCE AND USES OF MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
128L (1)	Did you hear the messages about net use or malaria prevention not linked to the campaign in a health talk in your community?	YES . . . . . 1 NO 2	→ 128N
128M (1)	During the health talk in your community, was there a demonstration of how to hang a mosquito net?	YES . . . . . 1 NO 2	
128N (1)	Have you attended a net hanging demonstration in the last year?	YES . . . . . 1 NO 2	
128O (1)	Was your household registered to receive nets during the recent campaign within the past one year?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 128Q → 128Q
128P (1)	What was the reason your household was not registered?	ABSENT . . . . . 1 REFUSED . . . . . 2 NOT VISTED BY REGISTRAR . . . . . 3 DID NOT KNOW ABOUT REGISTRATION . . . . . 4 OTHER 6	
128Q (1)	Did someone from your household go to a 2014-15 campaign distribution point to collect nets?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 128S → 128S
128R (1)	What was the reason your household did not go to a 2014-15 campaign distribution point?	NO TIME / MEANS . . . . . 1 NOT INTERESTED . . . . . 2 FORGOT OR MISSED THE DATE . . . . . 3 OTHER _____ 6 (SPECIFY)	→ 128Z
128S (1)	Did your household receive vouchers that look like this at a 2014-15 campaign distribution point? SHOW PICTURE OF VOUCHER TO RESPONDENT.	YES . . . . . 1 NO 2	
128T (1)	Did your household receive any mosquito nets at a 2014-15 campaign distribution point?	YES . . . . . 1 NO 2	→ 128Y
128U (1)	How many mosquito nets did your household receive at a 2014-15 campaign distribution point?	NUMBER OF NETS RECEIVED . . . . . [ ][ ]	
128V (1)	You indicated that your household received [NUMBER FROM 128U] mosquito nets at a 2014-15 campaign distribution point. Of these, how many are still in the possession of your household?	NUMBER OF NETS REMAINING . . . . . [ ][ ]	
128W (1)	COMPARE 128U AND 128V AND MARK: NUMBERS ARE DIFFERENT [ ] ↓	NUMBERS ARE SAME [ ]	→ 128Z
128X (1)	What happened to the missing mosquito nets? RECORD ALL MENTIONED.	NET WAS STOLEN . . . . . A NET WAS DESTROYED ACCIDENTALLY . . . . . B NET WAS SOLD . . . . . C NET WAS GIVEN AWAY . . . . . D OTHER X	→ 128Z
128Y (1)	Why did you not receive any mosquito nets at a 2014-15 campaign distribution point?	NO NETS AVAILABLE AT THIS TIME . . . . . 1 WAITING TIME TOO LONG . . . . . 2 THEY REFUSED TO GIVE NETS . . . . . 3 OTHER . . . . . 6 DON'T KNOW 8	
128Z	Which color of net would you prefer: blue or white or green?	GREEN . . . . . 1 BLUE . . . . . 2 WHITE . . . . . 3 DOES NOT CARE 4	

SOURCE AND USES OF MOSQUITO NETS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
129A	Which shape of net would you prefer: conical or rectangular?	CONICAL . . . . . 1 RECTANGULAR . . . . . 2 DOES NOT CARE 3	
129B	How confident are you that you can hang a mosquito net in your household: are you extremely confident, very confident, a little confident, or not at all confident?	EXTREMELY CONFIDENT . . . . . 1 VERY CONFIDENT . . . . . 2 A LITTLE CONFIDENT . . . . . 3 NOT AT ALL CONFIDENT 4	
129C	How important do you think it is for young children to sleep under a treated net: is it extremely important, very important, a little important, or not at all important?	EXTREMELY IMPORTANT . . . . . 1 VERY IMPORTANT . . . . . 2 A LITTLE IMPORTANT . . . . . 3 NOT AT ALL IMPORTANT 4	
129D	How frequently do you use mosquito nets for other things besides sleeping under: all the time, sometimes, rarely, or never?	ALL THE TIME . . . . . 1 SOMETIMES . . . . . 2 RARELY . . . . . 3 NEVER 4	
129E	Now I would like to ask your opinion about some issues. I'm going to read some statements and I would like you to tell me if you agree strongly, agree somewhat, disagree somewhat, or disagree strongly. Treated nets are safe to sleep under. Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?	STRONGLY AGREE . . . . . 1 SOMEWHAT AGREE . . . . . 2 SOMEWHAT DISAGRE . . . . . 3 STRONGLY DISAGREE 4	
129F	Most people in this community sleep under an insecticide treated net every night during every season. Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?	STRONGLY AGREE . . . . . 1 SOMEWHAT AGREE . . . . . 2 SOMEWHAT DISAGRE . . . . . 3 STRONGLY DISAGREE 4	
129G	You can hang a net any place people sleep in your house. Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?	STRONGLY AGREE . . . . . 1 SOMEWHAT AGREE . . . . . 2 SOMEWHAT DISAGRE . . . . . 3 STRONGLY DISAGREE 4	
129H	People are at risk of getting malaria only during the rainy season. Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?	STRONGLY AGREE . . . . . 1 SOMEWHAT AGREE . . . . . 2 SOMEWHAT DISAGRE . . . . . 3 STRONGLY DISAGREE 4	

(1) THESE QUESTIONS ONLY ASKED TO RESPONDENTS IN COUNTIES PARTICIPATING IN THE 2014-15 MASS NET DISTRIBUTION CAMPAIGN DURING OR BEFORE KMIS FIELDWORK: MIGORI, HOMA BAY, SIAYA, KISUMU, VIHIGA, AND WEST POKOT.

ADDITIONAL HOUSEHOLD CHARACTERISTICS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
129	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 PVC/VINYL OR ASPHALT STRIPS . . . . . 32 CERAMIC TILES . . . . . 33 CEMENT . . . . . 34 CARPET . . . . . 35 OTHER _____ 96 (SPECIFY)	
130	OBSERVE MAIN MATERIAL OF THE ROOF OF THE DWELLING. RECORD OBSERVATION.	**NATURAL ROOFING** NO ROOF . . . . . 11 THATCH/GRASS/MAKUTI . . . . . 12 DUNG/MUD/SOD . . . . . 13 **RUDIMENTARY ROOFING** IRON SHEETS . . . . . 21 TIN CANS . . . . . 22 **FINISHED ROOFING** ASBESTOS SHEET . . . . . 31 CONCRETE . . . . . 32 TILES . . . . . 33 OTHER _____ 96 (SPECIFY)	
131	OBSERVE MAIN MATERIAL OF THE EXTERIOR WALLS OF THE DWELLING. RECORD OBSERVATION.	**NATURAL WALLS** NO WALLS . . . . . 11 CANE/PALM/TRUNKS . . . . . 12 DUNG/MUD/SOD 13 **RUDIMENTARY WALLS** BAMBOO WITH MUD . . . . . 21 STONE WITH MUD . . . . . 22 UNCOVERED ADOBE . . . . . 23 PLYWOOD . . . . . 24 CARDBOARD . . . . . 25 REUSED WOOD . . . . . 26 IRON SHEETS . . . . . 27 **FINISHED WALLS** CEMENT . . . . . 31 STONE WITH LIME/CEMENT . . . . . 32 BRICKS . . . . . 33 CEMENT BLOCKS . . . . . 34 COVERED ADOBE . . . . . 35 WOOD PLANKS/SHINGLES . . . . . 36 OTHER _____ 96 (SPECIFY)	
132	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

KENYA MALARIA INDICATOR SURVEY
WOMAN'S QUESTIONNAIRE

MALARIA CONTROL UNIT
KENYA NATIONAL BUREAU OF STATISTICS

IDENTIFICATION

COUNTY _____

SUBLOCATION _____

NASSEP CLUSTER NUMBER . . . . . .

KMIS CLUSTER NUMBER . . . . . .

CLUSTER NAME _____

STRUCTURE NUMBER . . . . . .

HOUSEHOLD NUMBER . . . . . .

NAME OF HOUSEHOLD HEAD _____

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**

TRANSLATOR USED (YES = 1, NO = 2)

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:

01 ENGLISH	02 KISWAHILI		
03 BORANA	07 KIKUYU	11 LUO	15 POKOT
04 EMBU	08 KISII	12 MAASAI	16 SOMALI
05 KALENJIN	09 LUHYA	13 MERU	17 TURKANA
06 KAMBA	10 MARAGOLI	14 MIJIKENDA	18 OTHER

SUPERVISOR: _____ NAME NUMBER

INTRODUCTION AND CONSENT

ADMINISTER CONSENT

RESPONDENT AGREES TO BE INTERVIEWED . . 1 ↓

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

SECTION 1. RESPONDENT'S BACKGROUND

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

SECTION 1. RESPONDENT'S BACKGROUND

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
109	What is your religion?	ROMAN CATHOLIC . . . . . 1 PROTESTANT/OTHER CHRISTIA . . . . . 2 MUSLIM . . . . . 3 NO RELIGION . . . . . 4 OTHER _____ 6 (SPECIFY)	
110	What is your ethnic group / tribe?	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 BORANA . . . . . 13 MARAGOLI . . . . . 14 POKOT . . . . . 15 TURKANA . . . . . 16 OTHER _____ 96 (SPECIFY)	
111	In the past six months, have you seen or heard any messages about malaria?	YES . . . . . 1 NO 2	→ 201
112	Have you seen or heard these messages: a) On the radio? b) On the television? c) On a poster or billboard? d) From a community health worker? e) At a community event? f) Anywhere else?	YES NO RADIC . . . . . 1 2 TELEVISION . . . . . 1 2 POSTER/BILLBOARD . . . . . 1 2 COMMUNITY HEALTH WORKER . . . . . 1 2 COMMUNITY EVEN . . . . . 1 2 ANYWHERE ELSE 1 2	

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES . . . . . 1 NO 2	→ 204
203	a) How many sons live with you? b) And how many daughters live with you? IF NONE, RECORD '00'.	a) SONS AT HOME . . . . . [ ][ ] b) DAUGHTERS AT HOME . . . . . [ ][ ]	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES . . . . . 1 NO 2	→ 206
205	a) How many sons are alive but do not live with you? b) And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	a) SONS ELSEWHERE . . . . . [ ][ ] b) DAUGHTERS ELSEWHERE . . . . . [ ][ ]	
206	Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried, who made any movement, sound, or effort to breathe, or who showed any other signs of life even if for a very short time?	YES . . . . . 1 NO 2	→ 208
207	a) How many boys have died? b) And how many girls have died? IF NONE, RECORD '00'.	a) BOYS DEAD . . . . . [ ][ ] b) GIRLS DEAD . . . . . [ ][ ]	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL BIRTHS . . . . . [ ][ ]	
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL _____ births during your life. Is that correct? YES ☐ ↓ NO ☐ → PROBE AND CORRECT 201-208 AS NECESSARY.		
210	CHECK 208: ONE OR MORE BIRTHS ☐ ↓ NO BIRTHS ☐		→ 225
211	Now I'd like to ask you about your more recent births. How many births have you had in the last 5 years, that is since January 2010? RECORD ALL BIRTHS IN 2010-2015 IF NONE, RECORD '00'	TOTAL BIRTHS IN 2010-2015 . . . . . [ ][ ] NONE 00	→ 225

SECTION 2. REPRODUCTION

212 Now I'd like to record the names of all your births in the last 5 years, from January 2010 until today. I would like to list these births, whether still alive or not, starting with the most recent birth you have had.
RECORD NAMES OF ALL THE BIRTHS IN 2010-2015 IN 213. RECORD TWINS AND TRIPLETS ON SEPARATE ROWS. IF THERE ARE MORE THAN 5 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE STARTING WITH THE SECOND ROW.

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

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
222	Since January 2010, have you had any more live births that have not already been listed?	YES . . . . . 1 (RECORD BIRTH(S) IN TABLE) NO 2	
223	COMPARE 211 WITH NUMBER OF BIRTHS IN BIRTH HISTORY NUMBERS ARE SAME ☐ NUMBERS ARE DIFFERENT ☐ (PROBE AND RECONCILE)		
224	CHECK 216: ENTER THE NUMBER OF BIRTHS IN 2010-2015	NUMBER OF BIRTHS . . . . . ☐ NONE 0	
225	Are you pregnant now?	YES . . . . . 1 NO . . . . . 2 UNSURE 8	227
226	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS.	MONTHS . . . . . ☐☐	
227	CHECK 224: ONE OR MORE BIRTHS IN 2010 OR LATER ☐ GO TO 301 NO BIRTHS IN 2010 OR LATER ☐ Q. 224 IS BLANK ☐		427D 427D

SECTION 3. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	RECORD THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH FROM 213 AND 217, LINE 01:	MOST RECENT BIRTH NAME _____ LIVING ☐ DEAD ☐	
302	Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. When you got pregnant with (NAME), did you see anyone for antenatal care for this pregnancy?	YES . . . . . 1 NO 2	→ 304
302A	How many times did you see someone for antenatal care for this pregnancy?	TIMES . . . . . ☐☐	
303	Whom did you see? Anyone else? PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.	**HEALTH PERSONNEL** DOCTOR . . . . . A NURSE/MIDWIFE . . . . . B **OTHER PERSON** TRADITIONAL BIRTH ATTENDAN . . . . . C COMMUNITY HEALTH WORKER . . . . . D OTHER _____ X (SPECIFY)	
304	During this pregnancy, did you take SP/Fansidar to keep you from getting malaria?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	→ 308
305	How many times did you take SP/Fansidar during this pregnancy?	TIMES . . . . . ☐☐	
306	CHECK 303: ANTENATAL CARE FROM HEALTH PERSONNEL DURING THIS PREGNANCY	CODE 'A' OR 'B' CIRCLED ☐ OTHER ☐	→ 308
307	Did you get the SP/Fansidar during any antenatal care visit, during any other 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	
308	CHECK 216 AND 217:	ONE OR MORE LIVING CHILDREN BORN IN 2010 OR LATER ☐ → GO TO 401 NO LIVING CHILDREN BORN IN 2010 OR LATER ☐	→ 427D

SECTION 4. FEVER IN CHILDREN

401	CHECK 213: RECORD THE BIRTH HISTORY NUMBER IN 402 AND THE NAME AND SURVIVAL STATUS IN 403 FOR EACH BIRTH IN 2010-2015. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. IF THERE ARE MORE THAN 3 BIRTHS, USE ADDITIONAL QUESTIONNAIRE(S). Now I would like to ask some questions about the health of your children born since January 2010. (We will talk about each separately.)			
402	BIRTH HISTORY NUMBER FROM 213 IN BIRTH HISTORY.	LAST BIRTH BIRTH HIST NUMBER [ ][ ]	NEXT-TO-LAST BIRTH BIRTH HIST NUMBER [ ][ ]	SECOND-TO-LAST BIRTH BIRTH HIST NUMBER [ ][ ]
403	FROM 213 AND 217:	NAME _____ LIVING [ ] DEAD [ ] (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A)	NAME _____ LIVING [ ] DEAD [ ] (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A)	NAME _____ LIVING [ ] DEAD [ ] (GO TO 403 IN NEXT COLUMN OF NEW QUESTIONNAIRE OR, IF NO MORE BIRTHS, GO TO 427A)
404	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8
405	At any time during the illness, did (NAME) have blood taken from (NAME)'s finger or heel for testing?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8
406	Did you seek advice or treatment for the illness from any source?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 410)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 410)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 410)
407	Where did you seek advice or treatment? Anywhere else? PROBE TO IDENTIFY EACH TYPE OF SOURCE. IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE. _____ (NAME OF PLACE(S))	**PUBLIC SECTOR** GOVT HOSPITA . . A GOVT HEALTH CENTER . . . . . B GOVT DISPENSARY . . C OTHER PUBLIC _____ D (SPECIFY) **PRIVATE MEDICAL SECTOR** MISSION HOSP./ CLINIC . . . . . E PVT. HOSPITAL/ CLINIC . . . . . F PHARMACY . . . G OTHER PRIVATE _____ H (SPECIFY) MOBILE CLINIC I COMMUNITY HLTH WORKER . . . J **OTHER SOURCE** SHOP . . . . . K TRADITIONAL HEALER . . . . . L RELATIVE/FRIEND M OTHER _____ X (SPECIFY)	**PUBLIC SECTOR** GOVT HOSPITA . . A GOVT HEALTH CENTER . . . . . B GOVT DISPENSARY . . C OTHER PUBLIC _____ D (SPECIFY) **PRIVATE MEDICAL SECTOR** MISSION HOSP./ CLINIC . . . . . E PVT. HOSPITAL/ CLINIC . . . . . F PHARMACY . . . G OTHER PRIVATE _____ H (SPECIFY) MOBILE CLINIC I COMMUNITY HLTH WORKER . . . J **OTHER SOURCE** SHOP . . . . . K TRADITIONAL HEALER . . . . . L RELATIVE/FRIEND M OTHER _____ X (SPECIFY)	**PUBLIC SECTOR** GOVT HOSPITA . . A GOVT HEALTH CENTER . . . . . B GOVT DISPENSARY . . C OTHER PUBLIC _____ D (SPECIFY) **PRIVATE MEDICAL SECTOR** MISSION HOSP./ CLINIC . . . . . E PVT. HOSPITAL/ CLINIC . . . . . F PHARMACY . . . G OTHER PRIVATE _____ H (SPECIFY) MOBILE CLINIC I COMMUNITY HLTH WORKER . . . J **OTHER SOURCE** SHOP . . . . . K TRADITIONAL HEALER . . . . . L RELATIVE/FRIEND M OTHER _____ X (SPECIFY)

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-TO-LAST BIRTH NAME _____
408	CHECK 407:	2 OR MORE CODES CIRCLED ☐ → (SKIP TO 410) OTHER ☐	2 OR MORE CODES CIRCLED ☐ → (SKIP TO 410) OTHER ☐	2 OR MORE CODES CIRCLED ☐ → (SKIP TO 410) OTHER ☐
409	Where did you first seek advice or treatment? USE LETTER CODE FROM 407.	FIRST PLACE . . . ☐	FIRST PLACE . . . ☐	FIRST PLACE . . . ☐
410	At any time during the illness, did (NAME) take any drugs for the illness?	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A) DON'T KNOW 8
411	What drugs did (NAME) take? Any other drugs? RECORD ALL MENTIONED.	**ACT ANTIMALARIALS** AL . . . . . A ARTESUNATE/ AMODIAQUINE . B DHAP . . . . . C **NON-ACT ANTIMALAR.** SP/FANSIDAR . . . D CHLOROQUINE . . E AMODIAQUINE . . F QUININE PILLS . . . . . G INJECTION/IV . H ARTESUNATE RECTAL . . . . . I INJECTION/IV . . J OTHER ANTI-MALARIAL _____ K (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP . . . L INJECTION . . . M **OTHER DRUGS** ASPIRIN . . . . . N ACETAMINOPHEN/ PARACETAMOL O IBUPROFEN . . . P OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	**ACT ANTIMALARIALS** AL . . . . . A ARTESUNATE/ AMODIAQUINE . B DHAP . . . . . C **NON-ACT ANTIMALAR.** SP/FANSIDAR . . . D CHLOROQUINE . . E AMODIAQUINE . . F QUININE PILLS . . . . . G INJECTION/IV . H ARTESUNATE RECTAL . . . . . I INJECTION/IV . . J OTHER ANTI-MALARIAL _____ K (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP . . . L INJECTION . . . M **OTHER DRUGS** ASPIRIN . . . . . N ACETAMINOPHEN/ PARACETAMOL O IBUPROFEN . . . P OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z	**ACT ANTIMALARIALS** AL . . . . . A ARTESUNATE/ AMODIAQUINE . B DHAP . . . . . C **NON-ACT ANTIMALAR.** SP/FANSIDAR . . . D CHLOROQUINE . . E AMODIAQUINE . . F QUININE PILLS . . . . . G INJECTION/IV . H ARTESUNATE RECTAL . . . . . I INJECTION/IV . . J OTHER ANTI-MALARIAL _____ K (SPECIFY) **ANTIBIOTIC DRUGS** PILL/SYRUP . . . L INJECTION . . . M **OTHER DRUGS** ASPIRIN . . . . . N ACETAMINOPHEN/ PARACETAMOL O IBUPROFEN . . . P OTHER _____ X (SPECIFY) DON'T KNOW . . . . . Z
412	CHECK 411: ANY CODE A-K CIRCLED?	YES ☐ NO ☐ → (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A)	YES ☐ NO ☐ → (GO TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A)	YES ☐ NO ☐ → (GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 427A)
412A	CHECK 411: CODE 'A' OR 'B' CIRCLED?	CODE 'A' OR 'B' CIRCLED: ☐ CODE 'A' OR 'B' NOT CIRCLED: ☐ (SKIP TO 414C)	CODE 'A' OR 'B' CIRCLED: ☐ CODE 'A' OR 'B' NOT CIRCLED: ☐ (SKIP TO 414C)	CODE 'A' OR 'B' CIRCLED: ☐ CODE 'A' OR 'B' NOT CIRCLED: ☐ (SKIP TO 414C)

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-TO-LAST BIRTH NAME _____
412B	When you gave (AL/Aretesunate/Amodiaquine) to (NAME) did it have a logo that looks like this? SHOW LOGO TO RESPONDENT	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8
413A	CHECK 411: AL ('A') GIVEN	CODE 'A' CIRCLED ☐ ↓ CODE 'A' NOT CIRCLED ☐ → (SKIP TO 414A)	CODE 'A' CIRCLED ☐ ↓ CODE 'A' NOT CIRCLED ☐ → (SKIP TO 414A)	CODE 'A' CIRCLED ☐ ↓ CODE 'A' NOT CIRCLED ☐ → (SKIP TO 414A)
413B	How long after the fever started did (NAME) first take AL?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
414A	CHECK 411: ARTESUNATE/AMODIAQUINE ('B') GIVEN	CODE 'B' CIRCLED ☐ ↓ CODE 'B' NOT CIRCLED ☐ → (SKIP TO 414C)	CODE 'B' CIRCLED ☐ ↓ CODE 'B' NOT CIRCLED ☐ → (SKIP TO 414C)	CODE 'B' CIRCLED ☐ ↓ CODE 'B' NOT CIRCLED ☐ → (SKIP TO 414C)
414B	How long after the fever started did (NAME) first take Artesunate/Amodiaquine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
414C	CHECK 411: DHAP ('C') GIVEN	CODE 'C' CIRCLED ☐ ↓ CODE 'C' NOT CIRCLED ☐ → (SKIP TO 415)	CODE 'C' CIRCLED ☐ ↓ CODE 'C' NOT CIRCLED ☐ → (SKIP TO 415)	CODE 'C' CIRCLED ☐ ↓ CODE 'C' NOT CIRCLED ☐ → (SKIP TO 415)
414D	How long after the fever started did (NAME) first take DHAP?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
415	CHECK 411: SP/FANSIDAR ('D') GIVEN	CODE 'D' CIRCLED ☐ ↓ CODE 'D' NOT CIRCLED ☐ → (SKIP TO 417)	CODE 'D' CIRCLED ☐ ↓ CODE 'D' NOT CIRCLED ☐ → (SKIP TO 417)	CODE 'D' CIRCLED ☐ ↓ CODE 'D' NOT CIRCLED ☐ → (SKIP TO 417)
416	How long after the fever started did (NAME) first take SP/Fansidar?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-TO-LAST BIRTH NAME _____
417	CHECK 411: CHLOROQUINE ('E') GIVEN	CODE 'E' CIRCLED ☐ → (SKIP TO 419) CODE 'E' NOT CIRCLED ☐	CODE 'E' CIRCLED ☐ → (SKIP TO 419) CODE 'E' NOT CIRCLED ☐	CODE 'E' CIRCLED ☐ → (SKIP TO 419) CODE 'E' NOT CIRCLED ☐
418	How long after the fever started did (NAME) first take chloroquine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
419	CHECK 411: AMODIAQUINE ('F') GIVEN	CODE 'F' CIRCLED ☐ → (SKIP TO 421) CODE 'F' NOT CIRCLED ☐	CODE 'F' CIRCLED ☐ → (SKIP TO 421) CODE 'F' NOT CIRCLED ☐	CODE 'F' CIRCLED ☐ → (SKIP TO 421) CODE 'F' NOT CIRCLED ☐
420	How long after the fever started did (NAME) first take amodiaquine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
421	CHECK 411: QUININE ('G' OR 'H') GIVEN	CODE 'G' OR 'H' CIRCLED ☐ → (SKIP TO 423) CODE 'G' OR 'H' NOT CIRCLED ☐	CODE 'G' OR 'H' CIRCLED ☐ → (SKIP TO 423) CODE 'G' OR 'H' NOT CIRCLED ☐	CODE 'G' OR 'H' CIRCLED ☐ → (SKIP TO 423) CODE 'G' OR 'H' NOT CIRCLED ☐
422	How long after the fever started did (NAME) first take quinine?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
423	CHECK 411: ARTESUNATE ('I' OR 'J') GIVEN	CODE 'I' OR 'J' CIRCLED ☐ → (SKIP TO 425) CODE 'I' OR 'J' NOT CIRCLED ☐	CODE 'I' OR 'J' CIRCLED ☐ → (SKIP TO 425) CODE 'I' OR 'J' NOT CIRCLED ☐	CODE 'I' OR 'J' CIRCLED ☐ → (SKIP TO 425) CODE 'I' OR 'J' NOT CIRCLED ☐
424	How long after the fever started did (NAME) first take artesunate?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
425	CHECK 411: OTHER ANTIMALARIAL ('K') GIVEN	CODE 'K' CIRCLED ☐ → (SKIP TO 427) CODE 'K' NOT CIRCLED ☐	CODE 'K' CIRCLED ☐ → (SKIP TO 427) CODE 'K' NOT CIRCLED ☐	CODE 'K' CIRCLED ☐ → (SKIP TO 427) CODE 'K' NOT CIRCLED ☐

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-TO-LAST BIRTH NAME _____
426	How long after the fever started did (NAME) first take (OTHER ANTIMALARIAL)?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . . 2 THREE OR MORE DAYS AFTER FEVER . . 3 DON'T KNOW . . . 8
427		GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A.	GO BACK TO 403 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 427A.	GO TO 403 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 427A.

SECTION 4A. KNOWLEDGE AND ATTITUDES

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
427A	CHECK 224: ONE OR MORE BIRTHS IN 2010 OR LATER ☐	NO BIRTHS IN 2010 OR LATER ☐ Q. 224 IS BLANK ☐	427D 427D
427B	When your child/children has a fever, how important or unimportant is it to seek antimalarial treatment immediately? Is it extremely important, very important, a little important, or not at all important?	EXTREMELY IMPORTANT . . . . . 1 VERY IMPORTANT . . . . . 2 A LITTLE IMPORTANT . . . . . 3 NOT AT ALL IMPORTANT 4	
427C	When your child/children had a fever, how affordable or unaffordable was treatment? Was it very affordable, affordable, unaffordable, or very unaffordable?	VERY AFFORDABLE . . . . . 1 AFFORDABLE . . . . . 2 UNAFFORDABLE . . . . . 3 VERY UNAFFORDABLE 4	
427D	What is the recommended treatment for malaria?	ACT/AL 1 SP/FANSIDAR 2 CHLOROQUINE 3 AMODIAQUINE 4 OTHER 6 DON'T KNOW 8	
427E	Have you seen or heard any information about ACT or AL?	YES . . . . . 1 NO 2	 428
427F	Where did you see or hear about ACT or AL? Any other place or person? RECORD ALL MENTIONED	TELEVISION . . . . . A RADIO . . . . . B NEWSPAPER . . . . . C BARAZA . . . . . D RELATIVE/FRIEND . . . . . E COMMUNITY LEADER/ELDER . . . . . F COMMUNITY HEALTH WORKER . . . . . G ROAD SHOW . . . . . H OTHER X	
428	RECORD THE TIME	HOUR . . . . . ☐☐ MINUTES . . . . . ☐☐	

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT INTERVIEW:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

KENYA MALARIA INDICATOR SURVEY
BIOMARKER QUESTIONNAIRE

MALARIA CONTROL UNIT
KENYA NATIONAL BUREAU OF STATISTICS

IDENTIFICATION

COUNTY _____

SUBLOCATION _____

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

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

CLUSTER NAME _____

STRUCTURE NUMBER . . . . . [ ][ ][ ]

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

NAME OF HOUSEHOLD HEAD _____

NAME OF HOUSEHOLD INTERVIEWER _____

HEALTH TECHNICIAN VISITS

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

NOTES:

_____

_____

_____

_____

TOTAL ELIGIBLE CHILDREN [ ][ ]

TOTAL CHILDREN TESTED ANAEMIA [ ][ ]

TOTAL CHILDREN TESTED MALARIA [ ][ ]

LANGUAGE OF QUESTIONNAIRE** [0][1]

LANGUAGE OF INTERVIEW** [ ][ ]

TRANSLATOR (YES = 1, NO = 2) [ ]

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH 02 KISWAHILI

03 BORANA	05 KALENJIN	07 KIKUYU	09 LUHYA	11 LUO	13 MERU	15 POKOT	17 TURKANA
04 EMBU	06 KAMBA	08 KISII	10 MARAGOLI	12 MAASAI	14 MIJIKENDA	16 SOMALI	18 OTHER

SUPERVISOR: _____ [ ][ ][ ]
NAME NUMBER

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

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 1	CHILD 2	CHILD 3
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . [ ][ ] NAME _____	LINE NUMBER . . . . . [ ][ ] NAME _____	LINE NUMBER . . . . . [ ][ ] NAME _____
103	What is (NAME)'s date of birth?	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]
104	CHECK 103: CHILD BORN IN 2000-2015?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2
106	NAME OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD	NAME _____	NAME _____	NAME _____
107	CONSENT			
108	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER
109	CONSENT			
110	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			

		CHILD 1	CHILD 2	CHILD 3
		NAME _____	NAME _____	NAME _____
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE ANAEMIA AND MALARIA BROCHURE.	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)
115	CIRCLE THE RESULT OF THE MALARIA RDT HERE AND IN THE ANAEMIA AND MALARIA BROCHURE.	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)
117	SEVERE ANAEMIA REFERRAL RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.	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. (SKIP TO 130)		
118	Does (NAME) suffer from any of the following illnesses or symptoms: Extreme weakness? Heart problems? Loss of consciousness? Rapid or difficult breathing? Seizures? Abnormal bleeding? Jaundice or yellow skin? Dark urine?	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2
119	CHECK 118: ANY SYMPTOM CIRCLED 'YES'?	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2
120	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6

		CHILD 1	CHILD 2	CHILD 3
		NAME _____	NAME _____	NAME _____
121	In the past two weeks has (NAME) taken or is taking ACTs given by a doctor or health center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)
122	**SEVERE MALARIA REFERRAL** RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	The malaria test shows that (NAME OF CHILD) has malaria. Your child also has symptoms of severe malaria. The malaria treatment I have will not help your child, and I cannot give you the medication. Your child is very ill and must be taked to a health facility right away. (SKIP TO 128)		
123	**ALREADY TAKING ACTs 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. You should take the child to the nearest health facility for further examination. (SKIP TO 130)		
124	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called ACT. ACTs are very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6
126	CHECK 125: MEDICATION ACCEPTANCE OR REFUSAL	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)
127	READ INFORMATION FOR MALARIA TREATMENT TO PARENT/OTHER ADULT.	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 nedd to get additional tablets and repeat the dose.		

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

		(SKIP TO 130)		
128	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)
129	SEVERE ANAEMIA REFERRAL RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.	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.		
130	GO BACK TO 103 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

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

101	CHECK COLUMN 9 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-14 YEARS IN QUESTION 102; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).			
		CHILD 4	CHILD 5	CHILD 6
102	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 9.	LINE NUMBER . . . . . [ ][ ] NAME _____	LINE NUMBER . . . . . [ ][ ] NAME _____	LINE NUMBER . . . . . [ ][ ] NAME _____
103	What is (NAME)'s date of birth?	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]	DAY . . . . . [ ][ ] MONTH . . . . . [ ][ ] YEAR . . . [ ][ ][ ][ ]
104	CHECK 103: CHILD BORN IN 2000-2015?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)	YES . . . . . 1 NO . . . . . 2 (SKIP TO 130)
105	CHECK 103: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2	0-5 MONTHS . . . . . 1 (SKIP TO 130) OLDER 2
106	NAME OF PARENT/OTHER ADULT RESPONSIBLE FOR THE CHILD	NAME _____	NAME _____	NAME _____
107	CONSENT			
108	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER
109	CONSENT			
110	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER	GRANTED . . . . . 1 _____ (SIGN) REFUSED . . . . . 2 NOT PRESENT/OTHER . 3 [ ][ ][ ] HEALTH TECH'S NUMBER
111	PREPARE EQUIPMENT AND SUPPLIES ONLY FOR THE TEST(S) FOR WHICH CONSENT HAS BEEN OBTAINED AND PROCEED WITH THE TEST(S).			

		CHILD 4	CHILD 5	CHILD 6
		NAME _____	NAME _____	NAME _____
112	PLACE BAR CODE LABEL FOR MALARIA LAB TEST.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.	PUT THE 1ST BAR CODE LABEL HERE. NOT PRESENT ..... 99994 REFUSED ..... 99995 OTHER ..... 99996 PUT THE 2ND BAR CODE LABEL ON THE RDT, THE 3RD AND 4TH ON EACH SLIDE, THE 5TH ON THE TRANSMITTAL FORM.
113	RECORD HEMOGLOBIN LEVEL HERE AND IN THE ANAEMIA AND MALARIA BROCHURE.	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996	G/DL ..... [ ][ ].[ ] NOT PRESENT ..... 994 REFUSED ..... 995 OTHER 996
114	CIRCLE THE CODE FOR THE MALARIA RDT.	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)	TESTED ..... 1 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 116)
115	CIRCLE THE RESULT OF THE MALARIA RDT HERE AND IN THE ANAEMIA AND MALARIA BROCHURE.	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6	POSITIVE ..... 1 (SKIP TO 118) NEGATIVE ..... 2 OTHER 6
116	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)
117	SEVERE ANAEMIA REFERRAL RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.	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. (SKIP TO 130)		
118	Does (NAME) suffer from any of the following illnesses or symptoms: Extreme weakness? Heart problems? Loss of consciousness? Rapid or difficult breathing? Seizures? Abnormal bleeding? Jaundice or yellow skin? Dark urine?	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2	YES NO EXTREME WEAKNESS ... 1 2 HEART PROBLEMS 1 2 LOSS OF CONSCIOUSNESS 1 2 RAPID BREATHING 1 2 SEIZURES ..... 1 2 BLEEDING ..... 1 2 JAUNDICE ..... 1 2 DARK URINE 1 2
119	CHECK 118: ANY SYMPTOM CIRCLED 'YES'?	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2	ANY SYMPTOM ..... 1 (SKIP TO 122) NO SYMPTOM 2
120	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 (SKIP TO 122) 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER 6

		CHILD 4	CHILD 5	CHILD 6
		NAME _____	NAME _____	NAME _____
121	In the past two weeks has (NAME) taken or is taking ACTs given by a doctor or health center to treat the malaria? VERIFY BY ASKING TO SEE TREATMENT	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)	YES ..... 1 (SKIP TO 123) NO ..... 2 (SKIP TO 124)
122	**SEVERE MALARIA REFERRAL** RECORD THE RESULT OF THE MALARIA RDT ON THE REFERRAL FORM.	The malaria test shows that (NAME OF CHILD) has malaria. Your child also has symptoms of severe malaria. The malaria treatment I have will not help your child, and I cannot give you the medication. Your child is very ill and must be taked to a health facility right away. (SKIP TO 128)		
123	**ALREADY TAKING ACTs 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. You should take the child to the nearest health facility for further examination. (SKIP TO 130)		
124	READ INFORMATION FOR MALARIA TREATMENT AND CONSENT STATEMENT TO PARENT/OTHER	The malaria test shows that your child has malaria. We can give you free medicine. The medicine is called ACT. ACTs are very effective and in a few days it should get rid of the fever and other symptoms. You do not have to give the child the medicine. This is up to you. Please tell me whether you accept the medicine or not.		
125	CIRCLE THE APPROPRIATE CODE AND SIGN YOUR NAME.	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6	ACCEPTED MEDICINE 1 _____ (SIGN) REFUSED ..... 2 OTHER 6
126	CHECK 125: MEDICATION ACCEPTANCE OR REFUSAL	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)	ACCEPTED MEDICINE 1 REFUSED ..... 2 OTHER ..... 6 (SKIP TO 130)
127	READ INFORMATION FOR MALARIA TREATMENT TO PARENT/OTHER ADULT.	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 nedd to get additional tablets and repeat the dose.		

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

		(SKIP TO 130)		
128	CHECK 113: HEMOGLOBIN RESULT	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)	BELOW 8.0 G/DL, SEVERE ANAEMIA ... 1 8.0 G/DL OR ABOVE ... 2 NOT PRESENT ..... 4 REFUSED ..... 5 OTHER ..... 6 (SKIP TO 130)
129	SEVERE ANAEMIA REFERRAL RECORD THE RESULT OF THE ANAEMIA TEST ON THE REFERRAL FORM.	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.		
130	GO BACK TO 103 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF THE NEXT PAGE; IF NO MORE CHILDREN, END INTERVIEW.			

HEALTH TECHNICIAN'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING BIOMARKERS

SUPERVISOR'S OBSERVATIONS