

# **Evaluation of the Impact of Malaria Control Interventions on All-Cause Mortality in Children under Five Years of Age in Kenya 2003-2015**

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**Kenya Malaria Impact Evaluation Group**

**Part 2: Annexes**

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## Annex I. LiST Model Details

### A.1.1 Methods—Lives Saved Tool (LiST) Model

#### LiST Model

LiST is a computer-based projection tool used to model the impact of scaling up health interventions implemented to reduce maternal, newborn, and child mortality and morbidity.<sup>1</sup> As such, it is a powerful tool to inform planning and decision making as well as to help prioritize investments and evaluate existing programs (<http://livessavedtool.org/>). The model brings together effectiveness of interventions for maternal, fetal, neonatal, and child health with country-specific information about cause of death and coverage of interventions. For a given country, LiST estimates the number of lives saved by changes in key areas such as demography, family planning, HIV (incidence as well as preventions and treatments), and coverage of health interventions. It runs through the Spectrum Policy Modeling Software developed by Futures Institute. Spectrum links a LiST model containing maternal and child health interventions to the family planning module that accounts for changes in fertility and to the AIDS Impact Module (AIM) that contains information on HIV and AIDS prevalence and interventions.<sup>1</sup> LiST model projections and information are available from <http://livessavedtool.org/>. Spectrum version 5.441 was used for analysis, and unless otherwise indicated, the values in the standard projection for Kenya (Stover et al. 2010) were used.

#### Demographic Data

Default data from the United Nations Population Division in the Spectrum projection for Kenya

#### Family Planning Module

Standard projection for Kenya

#### AIDS Impact Module (AIM)

Standard projection for Kenya

#### Mortality and Cause-Specific Mortality Profile

The baseline mortality values for the year 2000 were obtained from IGME estimates for that year. Infant under-five mortality was estimated to be 66.5 deaths per 1,000 live births; cause-specific infant under-five mortality was estimated to be 107.9 deaths per 1,000 live births; and neonatal mortality was estimated to be 29.1 deaths per 1,000 live births (data were obtained from <http://www.childmortality.org/>).

The cause-specific profile for neonatal mortality for Kenya was based on 2000–2015 WHO estimates<sup>2</sup>, (<http://apps.who.int/gho/data/view.main.ghe3002015-KEN?lang=en>), and are as follows: diarrhea (0.6%), sepsis (15.9%), pneumonia (7.5%), asphyxia (33.3%), prematurity (27.9%), tetanus (1.5%), congenital anomalies (6.5%), and Other causes

(6.8%). The cause-specific mortality profile for children ages 1-59 months was based on the same WHO estimates, but given that the LiST model calculates AIDS mortality directly (16.3%), the WHO estimates for the causes of death were adjusted proportionately to total 100%. The adjusted distribution of causes of death for children ages 1–59 months is as follows: diarrhea (17.6%), pneumonia (22.8%), meningitis (4.1%), measles (2.0%), malaria (10.8%), pertussis (1.5%), AIDS (16.3%), injury (5.8%), and Other causes (19.1%).

### Intervention Coverage

Presented in Table A1.3 below are the values, definitions, and data sources for the prevention and treatment interventions used in this LiST analysis. The intervention coverage levels for indicators were obtained from the Kenya DHS 1998, DHS 2003, DHS 2008–2009, DHS 2014, MIS 2010, and WHO-UNICEF coverage estimates series. The values were linearly interpolated for the years between surveys. Values for nutritional conditions such as wasting and stunting are based on MICS and DHS data. In Table A1.3, “Data not available” suggests that data are not currently being collected and reported for the interventions. Values for coverage of tetanus toxoid (percent of children protected at birth) and immunization coverage (Hib, measles (MCV1), DPT3, Polio3, and BCG) were obtained from WHO-UNICEF ([http://www.who.int/immunization/monitoring\\_surveillance/routine/coverage/en/index4.html](http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index4.html)).

Data on water and sanitation were obtained from the WHO/UNICEF Joint Monitoring Program for Water and Sanitation ([http://www.wssinfo.org/documents/?tx\\_displaycontroller\(type\)=country\\_files](http://www.wssinfo.org/documents/?tx_displaycontroller(type)=country_files)).

### Malaria Control Intervention Coverage

The percentage of households owning at least one insecticide-treated net (ITN) was used as the indicator for malaria control intervention coverage. Values were obtained from the following surveys: Kenya MICS 2000, DHS 1998, DHS 2003, DHS 2008–2009, DHS 2014, and MIS 2015. To capture intermittent preventive treatment of malaria during pregnancy, the percentage used was based on the number of pregnant women who slept under an ITN the night before the survey or in a dwelling sprayed with indoor residual spraying (IRS) in the 12 months preceding the survey. Values from DHS 2003, DHS 2008–2009, DHS 2014, and MIS 2015 were 5.4 percent in 2003 (the same value used for 2000), 49 percent in 2008, 51.1 percent in 2014, and 57.8 percent in 2015.

### Malaria Intervention Protective Efficacy

Using evidence from trials and studies,<sup>6</sup> the preventive effect of household ownership of ITNs or the use of IRS as vector control methods for malaria in children ages 1–59 months is estimated to be 55 percent (a range of 49% to 60%). During pregnancy, the preventive effect of malaria control measures such as ITN use by pregnant women or use of another intermittent preventive treatment in pregnancy (IPTp) is estimated to be 35 percent (a range of 23% to 45%) during the first two pregnancies based on a review of

related trials.<sup>8</sup> Preventing malaria in pregnancy can reduce deaths of children ages 0–59 months by decreasing low birth weight and preventing intrauterine growth retardation.<sup>5,7</sup>

### Uncertainty Limits

Uncertainty about the number of malaria deaths actually prevented is based on the uncertainty surrounding the three primary model parameters: percentage of deaths due to malaria,<sup>3,4</sup> the estimated protective effect of malaria control interventions,<sup>7</sup> and the malaria intervention coverage estimates from the DHS survey sets.

## A.1.2 LiST Model References

<sup>1</sup> Stover J, McKinnon R and Winfrey B. Spectrum: a model platform for linking maternal and child survival interventions with AIDS, family planning, and demographic projections. *International Journal of Epidemiology*, 2010, 39:i7-i10.

<sup>2</sup> Bryce J et al. WHO estimates of the causes of death in children. *The Lancet*, 2005, 365(9465):1147-52.

<sup>3</sup> Rowe AK et al. The burden of malaria mortality among African children in the year 2000. *International Journal of Epidemiology*, 2006, 35(3):691-704.

<sup>4</sup> Rowe AK et al. Estimates of the burden of mortality directly attributable to malaria for children under five years of age in Africa for 2000. Complete report is available at: [http://rbm.who.int/partnership/wg/wg\\_monitoring/docs/CHERG\\_final\\_report.pdf](http://rbm.who.int/partnership/wg/wg_monitoring/docs/CHERG_final_report.pdf)

<sup>5</sup> de Onis M, Blossner M, Villar J. Levels and patterns of intrauterine growth retardation in developing countries. *Eur J Clin Nutr*, 1998, 52(1):s5-s15.

<sup>6</sup> Boschi-Pinto C, Lanata C, Black R. The Global Burden of Childhood Diarrhea. In: Ehiri, J. (Ed.). *Maternal and Child Health: Global Challenges, Programs, and Policies*. Springer Publishers, Washington DC, USA, 2009.

<sup>7</sup> Eisele TP, Larsen D, Steketee RW. Protective efficacy of interventions for preventing malaria mortality in children in *Plasmodium falciparum* endemic areas. *International Journal of Epidemiology*, 2010, 39(Suppl 1):i88-101.

<sup>8</sup> Walker N, Tam Y, Friberg I. Overview of the Lives Saved Tool (LiST). *BMC Public Health* 2013; 13(Suppl 3): S1. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3847271/>.

## A.1.3 Intervention Coverage Indicators and Values Used in LiST Analysis

Table A1.3: Indicators Used in Kenya LiST Analysis					
Intervention	IGME 2000	DHS 2003	DHS 2008	DHS 2014	Data Sources/ Indicator Information
<b>Periconceptual</b>					
All interventions	n/a	n/a	n/a	n/a	Data not available
<b>Pregnancy</b>					
Antenatal Care	56.6	50.9	45.7	57.6	% of women with a live birth in the five years preceding the survey and who had 4+ ANC visits for the most recent birth (DHS, MICS)
Tetanus toxoid	Yearly values under data sources				WHO-UNICEF ( <a href="http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index4.html">http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index4.html</a> ) (children protected at birth)
Pregnant women protected via IPT or sleeping under an ITN	5.4	5.4	49.0	51.1	Percentage of pregnant women who slept under an insecticide-treated net (ITN) the night before the survey or in a dwelling sprayed with indoor residual spraying (IRS) in the 12 months preceding the survey
Multiple micronutrient supplementation	n/a	n/a	n/a	n/a	Data not available
Balanced energy supplementation	n/a	n/a	n/a	n/a	Data not available
Case management of malaria	n/a	n/a	n/a	n/a	Data not available



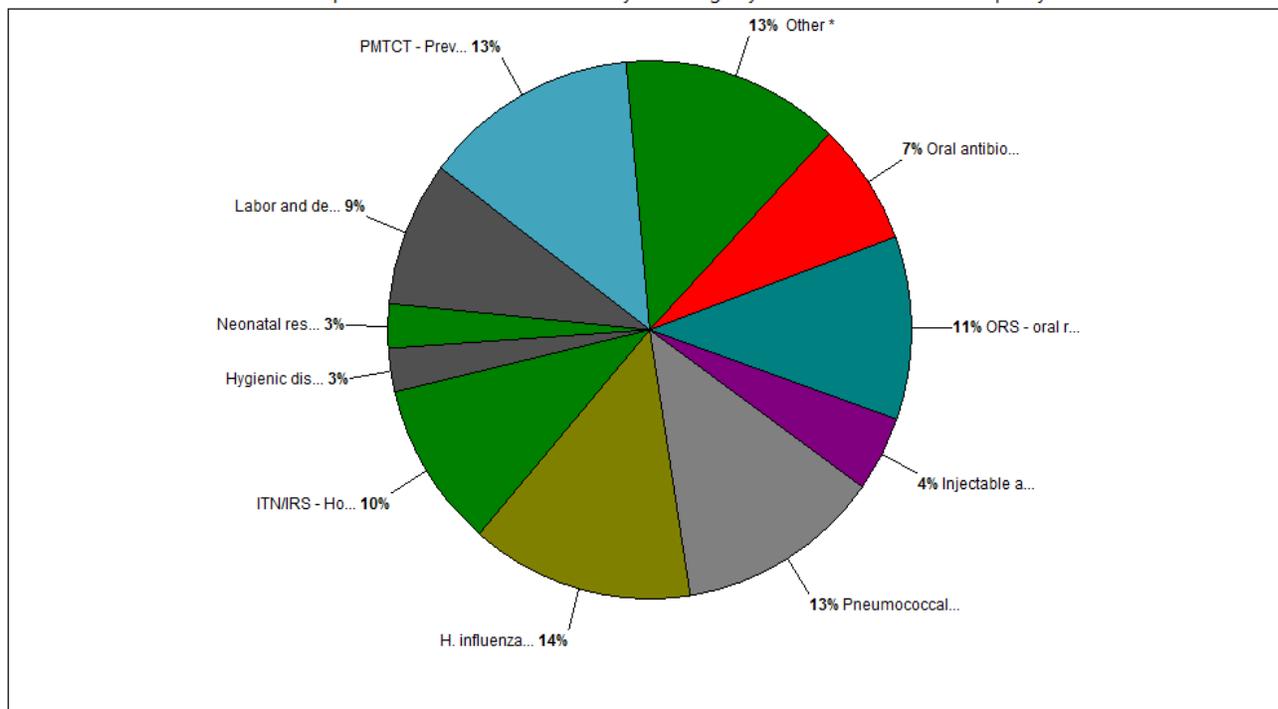
Table A1.3: Cont.						
Intervention	IGME 2000	DHS 2003	DHS 2008	DHS 2014	Data Sources/ Indicator Information	
<b>Childbirth</b>						
Skilled birth attendance (SBA)	42.3	41.6	44.7	61.8	% of live births assisted by a skilled birth attendant, (DHS, MICS)	
Institutional delivery (clinic and hospital)	41.0	40.2	42.6	61.2	% of live births delivered at a health facility (e.g., public, voluntary/religious, private) (DHS, MICS)	
Place and level of delivery	n/a	n/a	n/a	n/a	Use defaults calculated by LiST	
MgSO <sub>4</sub> management of eclampsia	n/a	n/a	n/a	n/a	Use defaults calculated by LiST	
Neonatal resuscitation (home)	n/a	n/a	n/a	n/a	Use defaults calculated by LiST	
<b>Breastfeeding</b>						
<i>&lt;1 month</i>						
Exclusive	40.6	43.4	52.8	52.8	% distribution of youngest children under the age of 3 years living with the mother by breastfeeding status (recomputed from DHS, MICS)	
Predominant	48.9	43.3	30.5	30.5		
Partial	9.7	11.3	15.0	15.0		
Not	0.8	2.0	1.7	1.7		
<i>1-5 months</i>						
Exclusive	8.6	8.1	29.6	29.6		
Predominant	20.3	19.8	14.4	14.4		
Partial	70.7	72.1	55.3	55.3		
Not	0.4	0.0	0.8	0.8		
<i>6-11 months</i>						
Any breastfeeding	96.4	96.6	96.4	96.4		
No breastfeeding	3.6	3.4	3.6	3.6		
<i>12-23 months</i>						
Any breastfeeding	76.5	76.3	71.8	71.8		
No breastfeeding	23.5	23.7	28.2	28.2		
<b>Preventative After Birth</b>						
Preventative postnatal care	35.6	35.6	35.6	35.6	Data typically not available. Proxy: % of women whose child's first postnatal checkup was 0–2 days after delivery (DHS, MICS)	
Complementary feeding—education only	38.5	38.5	38.5	38.5	% of 6–9 months breastfeeding and consuming complementary foods (DHS, MICS)	
Complementary feeding—education and supplementation	38.5	38.5	38.5	38.5	% of 6–9 months breastfeeding and consuming complementary foods (DHS, MICS)	
Vitamin A for prevention	41.0	23.0	27.0	28.0	% of children 6–59 months receiving one dose of Vitamin A within past 6 months (DHS, MICS)	
Zinc for prevention	n/a	n/a	n/a	n/a	Data not available	
Use of improved water source within 30 minutes	Yearly values under data sources				% households with improved source of drinking water (WHO/UNICEF Joint Monitoring Program for Water and Sanitation)	
Use of water connection in the home	Yearly values under data sources				% of households with water piped into the dwelling/yard/plot (WHO/UNICEF Joint Monitoring Program for Water and Sanitation)	
Improved excreta disposal (latrine/toilet)	Yearly values under data sources				% of households with access to flush toilet/VIP latrine (WHO/UNICEF Joint Monitoring Program for Water and Sanitation)	
Hand washing with soap	n/a	n/a	n/a	n/a	Data not available	
Hygienic disposal of children's stools	58.5	58.5	78.3	82.9	% of mothers whose youngest child under the age of 5 has stools which are contained (DHS,	

					MICS)
Insecticide-treated materials or indoor residual spraying	1.9	7.7	55.7	59.1	% households owning at least one ITN or conducting indoor residual spraying (IRS) in the past 12 months (DHS, MICS)

Intervention	IGME 2000	DHS 2003	DHS 2008	DHS 2014	Data Sources/ Indicator Information
<b>Vaccines</b>					
Rotavirus	n/a	n/a	n/a	n/a	data not available
Measles	Yearly values under data sources				MCV1: WHO-UNICEF
Hib	Yearly values under data sources				Hib3: WHO-UNICEF
Pneumococcal	n/a	n/a	n/a	n/a	Data not available
DPT	Yearly values under data sources				DPT3: WHO-UNICEF
Polio	Yearly values under data sources				Polio3: WHO-UNICEF
BCG	Yearly values under data sources				BCG: WHO-UNICEF
Hepatitis B	Yearly values under data sources				HepB3: WHO-UNICEF
<b>Curative after birth</b>					
Sepsis case management—basic	n/a	n/a	n/a	n/a	Data not available
Sepsis case management—comprehensive	n/a	n/a	n/a	n/a	Data not available
Kangaroo mother care	n/a	n/a	n/a	n/a	Data not available
Oral antibiotics: case management of severe neonatal infection	n/a	n/a	n/a	n/a	Data not available
Injectable antibiotics: case management of severe neonatal infection	n/a	n/a	n/a	n/a	Data not available
Full supportive care: case management of severe neonatal infection	n/a	n/a	n/a	n/a	Data not available
ORS	33.8	29.2	38.8	53.8	% of children with diarrhea given ORS packets (DHS,MICS)
Antibiotics for dysentery	14.2	14.2	14.2	15.9	DHS
Zinc for treatment	n/a	n/a	n/a	n/a	Data not available
Case management of pneumonia (oral antibiotics)	49.9	49.1	55.9	65.7	DHS
Vitamin A for measles treatment	41.0	23.0	27.0	28.0	Percentage of children ages 6-59 months receiving 1 dose of Vitamin A within past 6 months (DHS, MICS)
Antimalarials	n/a	n/a	n/a	n/a	Data not available
Therapeutic feeding	n/a	n/a	n/a	n/a	Data not available

### A.1.4 LiST Model Outputs

Additional deaths prevented in children under five years of age by intervention relative to impact year 2015





	DHS 2003	MIS 2007	MIS 2010	DHS 2008–2009	DHS 2014	MIS 2015
	urban/rural areas, and provinces	urban/rural areas, and provinces	urban/rural areas, and malaria epidemiologic zones	urban/rural areas, and malaria epidemiologic zones	urban/rural areas and region	urban/rural areas, and malaria epidemiologic zones
Sampling errors/design effect	See Final Report Appendix B	See Final Report Appendix B	See Final Report Appendix B	See Final Report Appendix B	See Final Report Appendix B	See Final Report Appendix B
Representativeness (designed to provide estimates for)	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>By region</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>By region</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>Malaria zones</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>By region</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>By region</li> <li>By County (selected priority indicators)</li> </ul>	<ul style="list-style-type: none"> <li>National</li> <li>Urban and Rural Areas</li> <li>Malaria zones</li> </ul>
Month(s) survey conducted	18 April–15 September 2003	10 July–15 August 2007	18 July–2 September 2010	13 November 2008–late February 2009	May 7–October 20, 2014	6 July–15 August 2015
Biomarkers	HIV prevalence	Hemoglobin and malaria parasitemia	Hemoglobin and malaria parasitemia	HIV prevalence		Hemoglobin and malaria parasitemia
Malaria microscopy	n/a	Thick and thin smears. Children 6–59 months were eligible for parasitemia testing.	Thick and thin smears. Children 3 months–14 years were eligible for parasitemia testing.	n/a	n/a	Thick and thin smears. Children 6 months–14 years were eligible for parasitemia testing.
Rapid Malaria Diagnosis (brand of RDT)	n/a	Yes	Yes (CareStat)	n/a	n/a	Yes (SD Bioline)
Hemoglobin values (brand of HemoCue /cuvettes)	n/a	n/a	Children born in 1995 or later, women aged 15–49, and men 15–54 were eligible for anemia testing.	Children 6–59 months, women aged 15–49, and men 15–54 were eligible for anemia testing.	Children 6–59 months, women 15–49, men 15–54 were eligible for anemia testing via HemoCue system.	Children 0–59 months were eligible for anemia testing. (HemoCue system).

	DHS 2003	MIS 2007	MIS 2010	DHS 2008–2009	DHS 2014	MIS 2015
Under-five mortality estimate	Direct method (complete birth history)	n/a	n/a	Direct method (complete birth history)	Direct method (complete birth history)	n/a
ITN ownership	Complete net roster is included. We know number of nets, brand, the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net	Complete net roster is included. We know number of nets, brand, the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net	Complete net roster is included. We know number of nets, brand, whether each is a long lasting insecticidal net (LLIN), the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net	Complete net roster is included. We know number of nets, brand, whether each is a long lasting insecticidal net (LLIN), the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net.	Complete net roster is included. We know number of nets, brand, whether each is a long lasting insecticidal net (LLIN), the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net	Complete net roster is included. We know number of nets, brand, whether each is a long lasting insecticidal net (LLIN), the treatment history of nets, timing since treatment, duration of ownership <3 yrs of each net, where the net was obtained, and, if the net was not used last night, the reasons why.
ITN use	Complete net roster allows us to estimate this.	Complete net roster allows us to estimate this.	Complete net roster allows us to estimate this.	Complete net roster allows us to estimate this.	Complete net roster allows us to estimate this.	Complete net roster allows us to estimate this.
IRS		available	available	available	available	available
<b>Survey Response Rate</b>						
Households sampled	9,865	7,200	7,223	9,936	39,679	7,313
Households occupied	8,889	7,200	7,025	9,268	36,812	6,667
Households interviewed	8,561	6,854	6,538	9,057	36,430	6,481

	DHS 2003	MIS 2007	MIS 2010	DHS 2008–2009	DHS 2014	MIS 2015
Household response rate	96.3	95.2	93.1	97.7	99.0	97.2
	Individual interviews:					
Number of women	8,717	6,893	6,120	8,767	32,172	5,585
Number of women interviewed	8,195	6,111	5,749	8,444	31,079	5,394
Eligible woman rate	94.0	88.7	93.9	96.3	96.6	96.6

## A.2.2 Summary of Rollback Malaria, Malaria Control Indicators

Intervention	Indicator Description
<b>Prevention</b>	
Vector Control via ITN and IRS	1. Proportion of households with at least one ITN
	2. Proportion of households with at least one ITN for every two people (NEW)
	3. Proportion of population with access to an ITN within their household (NEW)
	4. Proportion of population who slept under an ITN the previous night
	5. Proportion of children under 5 years old who slept under an ITN the previous night
	6. Proportion of pregnant women who slept under an ITN the previous night
	7. Proportion of households with at least one ITN and/or sprayed by IRS in the last 12 months
Intermittent Preventive Treatment	8. Proportion of women who received intermittent preventive treatment for malaria during ANC visits during their last pregnancy
<b>Case Management</b>	
Diagnosis	9. Proportion of children under 5 years old with fever in the last 2 weeks who had a finger or heel stick
Treatment	10. Proportion of children under 5 years old with fever in the last 2 weeks for whom advice or treatment was sought (NEW)
	11. Proportion receiving first line treatment among children under five years old with fever in the last two weeks who received any antimalarial drugs (NEW)
<b>Impact Measure</b>	<b>Indicator Description</b>
Mortality Indicator	12. All-cause under five mortality rate (5q0).
Morbidity Indicators	13. Parasitemia Prevalence: proportion of children ages 6-59 months with malaria infection.
	14. Anemia Prevalence: proportion of children ages 6-59 months with a hemoglobin measurement of <8 g/dL

### A.2.3. Data and Indicators on ITN Coverage

Standard RBM indicators were used to estimate coverage of vector control interventions for each survey year and for changes in coverage over the study period. These indicators are outlined in table A2.3a.

Table A2.3a: RBM Indicators on ITN Coverage

RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Insecticide-treated nets (ITNs)	Proportion of households with at least one ITN.	Number of households surveyed with at least one ITN	Total number of households surveyed	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of households with at least one ITN for every two people	Number of households with at least one ITN for every two people	Total number of households surveyed	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of population with access to an ITN within their household	Total number of individuals who could sleep under an ITN if each ITN in the household is used by two people	Total number of individuals who spent the previous night in surveyed households	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of individuals who slept under an ITN the previous night.	Number of individuals who slept under an ITN the previous night	Total number of individuals who slept in surveyed households the previous night	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of children under 5 years old who slept under an ITN the previous night.	Number of children under 5 who slept under an ITN the previous night	Total number of children under 5 who spent the previous night in surveyed households	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of pregnant women who slept under an ITN the previous night.	Number of pregnant women aged ages 15-49 who slept under an ITN the previous night	Total number of pregnant women ages 15-49 who spent the previous night in surveyed households	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS

In addition, several supplemental ITN indicators were calculated as shown in table A2.3b.

Table A2.3b: Supplemental RBM Indicators on ITN Coverage

Supplemental RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Insecticide-treated nets (ITNs)	S1. Proportion of children under five years old sleeping in households with ITNs who slept under an ITN the previous night	Number of children under 5 who slept under an ITN the previous night	Total number of children under 5 who spent the previous night in surveyed households owning at least one ITN	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS
Prevention and control of malaria in pregnant women	S2. Proportion of pregnant women sleeping in households with ITNs who slept under an ITN the previous night.	Number of pregnant women ages 15-49 who slept under an ITN the previous night	Total number of pregnant women ages 15-49 who spent the previous night in surveyed households owning at least one ITN	2003 DHS 2007 MIS 2008/9 DHS 2010 MIS 2014 DHS 2015 MIS

### Calculating Indicators

Data used to produce estimates of ITN ownership and use come from DHS and MIS surveys. Although attempts have been made recently to standardize questionnaires across surveys, the questions and methods required to calculate ITN indicators for this analysis vary somewhat between these surveys.

In the 2003 DHS and 2007 MIS, questions on household ownership of bed nets were asked as was a question about whether nets were ever treated with a product to kill mosquitoes. Thus, a rough estimate of household ownership of ITNs can be calculated from these data, but a precise estimate, as would be generated from a full net roster, cannot. Parents and caretakers of children under the age of five were asked if the child slept under a net the night before the interview, whether the net was treated, and how long ago it was last treated. If we assume that pretreated nets were not available—an ITN is defined as a net that has been treated in the past 6–12 months—ITN use can be determined for children under the age of five. In addition to children under the age of five, women were asked whether they slept under a net the night before the interview, whether the net was treated, and how long ago it was last treated. Prevention and control of malaria in pregnant women can be constructed since we know the pregnancy status of the women interviewed.

In subsequent DHS and MIS surveys, data on bed net ownership and use were collected in a different format. Respondents reporting ownership of any nets were asked to provide specific treatment information about each net and were then asked which household members slept under each net the night prior to the interview. This “bed net roster” allows estimation of standard ITN indicators, including the proportion of

households with ITNs, the proportion of target populations (children under the age of five, pregnant women) using ITNs, as well as non-standard indicators such as proportion of the total population using ITNs, average number of ITNs per household, and average duration of net ownership (table A2.3c).

Table A2.3c: Bed net roaster

Available Information on Nets						
	DHS 2003	MIS 2007	DHS 2008-09	MIS 2010	DHS 2014	MIS 2015
Brand	n/a	Permanet Brand A Brand B Pretreated Net Brand C Brand D Other DK Brand	Long Lasting Net Permanet Olyset Supanet Extra Conventional Net Kinga Net Supanet Unbranded Rural Net Other DK Brand	Long Lasting Net Permanet Olyset Supanet Extra Factory Net with Insecticide Kit Kinga Net Supanet Unbranded Rural Net Other DK Brand	Long Lasting Net Permanet Olyset NetProtect Conventional Net Kinga Net Supanet Unbranded Rural Net Other DK Brand	Long Lasting Net Permanet Olyset NetProtect Yorkkool Conventional Net Unbranded Net Other DK Brand
Duration of ownership	Monthly 0–36 36+ months	Monthly 0–36 36+ months	Monthly 0–36 37+ months	Monthly 0–36 37+ months	Monthly 0–35 months OR 36+ months	Monthly 0–35 months OR 36+ months
Treated/dipped with insecticide since it was obtained	n/a	Yes	Yes	Yes	Yes	n/a
Timing of last treatment	n/a	Monthly 0–24 months OR 25+ months	Monthly 0–24 months OR 25+ months	Monthly 0–24 months OR 25+ months	Monthly 0–24 months OR 25+ months	n/a

### Potential Biases

Some limitations may affect the validity of the indicators to correctly measure parameters of interest. Correct specification of a net as an ITN requires information on the kind of net owned or used which might not be accurately reported if interviewers were not allowed to view the net. It also requires information on treatment of nets (the timing and the substance used to treat) which is subject to recall bias. The true protection offered by ITNs requires proper use: The timing of sleep under an ITN, the condition of the net (e.g., without holes), and proper net installation, are all important factors that were not measured in these surveys. For more information on RBM

indicators including calculations, strengths, and limitations, see “Household Survey Indicators for Malaria Control, June 2013”.<sup>1</sup>

#### A.2.4. Data and Indicators on IRS

Standard RBM indicators on the use of indoor residual spraying for the prevention and control of malaria were used in this report. The standard vector control coverage indicator is outlined in table A2.4.

Table A2.4: RBM Indicators on IRS

RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Indoor Residual Spraying (IRS)	Proportion of households whose interior walls were sprayed in the 12 months preceding the survey.	Number of households whose interior walls were sprayed in the 12 months preceding the survey.	Total number of households surveyed.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS

#### A.2.5. Data and Indicators on Preventing Malaria in Pregnancy

Standard RBM indicators on the use of interventions to prevent and control malaria in pregnant women were used in this report. These indicators are outlined in table A2.5.

Table A2.5: RBM Indicators on preventing malaria in pregnancy

RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Prevention and control of malaria in pregnant women	Proportion of pregnant women who slept under an ITN the previous night.	Number of pregnant women who slept under an ITN the previous night.	Total number of pregnant women within surveyed households.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS
	Proportion of women who received intermittent preventive treatment for malaria during ANC visits during their last pregnancy.	Number of women who received two or more doses of SP to prevent malaria at least once during ANC visit during their last pregnancy that led to a live birth in the last two years.	Total number of women surveyed who delivered a live baby within the last two years.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS

<sup>1</sup> RBM/MERG 2013. Household survey indicators for malaria control.

### Calculating Indicators

Data used to estimate these indicators came from the DHS and MIS. In these surveys, all women ages 15–49 from selected households were asked to participate in an interview. In the course of this interview each woman was asked if she was pregnant. This information, along with the responses from the household questionnaire on ITN ownership and use, was used to estimate the proportion of pregnant women who slept under an ITN the night before the interview. As mentioned in the previous section, the ITN questions were somewhat different across surveys.

Typically in a DHS or MIS, women interviewed who report a live birth in the two years prior to the interview are also asked to provide information about use of antenatal care (ANC) services and other malaria prevention behaviors. This information was used to estimate the proportion of these women who received at least two doses of SP for prevention of malaria during their last pregnancy which led to a live birth, with at least one dose received during an ANC visit. The 2008–2009 and 2015 DHS and the 2007, 2010, and 2015 MIS included questions regarding SP use and dosage. For the 2000–2001 DHS, the only information available for malaria prevention during pregnancy included the percent of women who received a prophylaxis (fansidar, chloroquine, metakelfin, camaquine, and quinine), and the source of the drug (antenatal visit, facility visit, or another source).

### Potential Biases

The IPTp indicator is dependent on recall by women interviewed over the two-year period preceding the survey. Women were asked to remember not only whether or not they took medication for malaria prevention, but also the type of medication, the number of doses, and the source of the medication. Accurate information for all of these parameters is necessary for construction of the IPTp indicator. In addition, these questions were asked only of women whose most recent pregnancy ended in a live birth in the two years preceding the survey, excluding stillbirths and miscarriages. As birth outcomes are known to be affected by malaria, and IPTp is known to reduce the risk of malaria, the results may not be representative of the general population and may bias the observed relationships. In addition, the data for this indicator came from interviews with live women: Women who died in childbirth or from malaria acquired during pregnancy are not included. Thus, some selection bias may be present and the indicator may not be truly representative of the population.

### A.2.6. Data and Indicators on Case Management of Malaria

The following RBM indicators measuring case management of malaria were used in this report (Table A2.6a):

In addition, several supplemental case management indicators were calculated. These are historical case management indicators which have been replaced by the RBM-MERG. Due to the retrospective nature of the evaluation, these historical indicators were referenced (table A2.6b).

Table A2.6a: RBM Indicators on case management of malaria

RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Diagnosics	Proportion of children under 5 years old with fever in last two weeks who received a finger or heel stick.	Number of children under 5 years old with fever in last two weeks who received a finger or heel stick.	Total number of children under 5 years old who had a fever in previous two weeks	2008–09 DHS 2010 MIS 2014 DHS 2015 MIS
Treatment	Proportion of children under 5 years old with fever in last two weeks who sought treatment from an appropriate provider.	Number of children under 5 years old who had a fever in previous two weeks who sought treatment from an appropriate provider.	Total number of children under 5 years old who had a fever in previous two weeks	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS
	Number of children under 5 years old with fever in last two weeks who received antimalarial treatment, proportion who received ACTs.	Number of children under 5 years old who had a fever in previous two weeks who received ACTs.	Total number of children under 5 years old who had a fever in previous two weeks who received any antimalarial.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS

Table A2.6b: Additional RBM Indicators on case management of malaria

RBM Intervention	Indicator Description	Numerator	Denominator	Data Availability
Treatment	11. Proportion of children under 5 years old with fever in last two weeks who received any antimalarial treatment.	Number of children under 5 years old who had a fever in previous two weeks who received any antimalarial treatment.	Total number of children under 5 years old who had a fever in previous two weeks.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS
	12. Proportion of children under 5 years old with fever in last two weeks who received antimalarial treatment according to national policy within 24 hours from onset of fever.	Number of children under 5 years old who had a fever in previous two weeks who received recommended antimalarial treatment according to national policy <24 hours from fever	Total number of children under 5 years old who had a fever in previous two weeks.	2003 DHS 2007 MIS 2008–09 DHS 2010 MIS 2014 DHS 2015 MIS

		onset.		
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### Calculating Indicators

Data used to calculate these indicators came from DHS and MIS surveys from 2000–2011. Mothers were asked whether or not they sought treatment for their child’s fever and, if so, where care was sought and what treatments were received. The timing of this treatment in relation to onset of fever was also asked in all DHS and MIS surveys. Interpretation of trends in these indicators is challenging as the treatment options and the recommended treatments changed over the course of the evaluation period. The treatment options included in each survey are summarized in the table A2.6c.

Table A2.6c: RBM Indicators on case management of malaria treatment options

Antimalarial Drugs Taken for Treatment of Fever					
DHS 2003	MIS 2007	DHS 2008–2009	MIS 2010	DHS 2014	MIS 2015
SP/Fansidar/ Matkelfin Chloroquine Amodiaquine Quinine	SP/Fansidar/ Chloroquine Coartem/ACT Amodiaquine Quinine Other Antimalarial	SP/Fansidar Chloroquine Coartem/AL Amodiaquine Quinine Other Antimalarial	SP/Fansidar Chloroquine ACT/AL Amodiaquine Quinine Other Antimalarial	SP/Fansidar Chloroquine Coartem/AL Amodiaquine Quinine Other Antimalarial	SP/Fansidar Chloroquine Coartem/ACT Amodiaquine Other Antimalarial

One potentially useful indicator that is less affected by changing drug recommendations is the proportion of all antimalarial treatments that are first-line. This gives an indication of whether or not the recommended antimalarials are being dispensed.

To determine whether or not the antimalarial medication given to children with fever was “prompt”, mothers were asked when the child first took the medication. Responses of “Same Day” or “Next Day” following fever onset were considered “prompt” and were included in the calculation of the second treatment indicator.

More recent surveys included a question asking whether or not a child with fever had a finger or heel stick. This question was used to estimate the proportion of children with fever who were given diagnostic tests for malaria.

Prior to 1998, the first-line drug for the treatment of uncomplicated malaria was chloroquine (CQ). By 1991, widespread CQ clinical failures had been reported across the country. In 1998, CQ was replaced with SP as first-line treatment and national treatment guidelines were revised. However, by 2003 SP had also failed in the treatment of clinical malaria across the country (Bousema et al., 2003). In 2004, a consensus policy change from SP to artemisinin-based combination therapies (ACT) was approved, artemether-

lumefantrine for first-line treatment of uncomplicated malaria was selected, and ACT policy implementation began in the public sector.

#### Potential Biases

A potential bias is introduced by the nature of data collection for these surveys. Data were collected on biological children of women interviewed. Children whose mothers were deceased at the time of the interview were not included in this estimate. This may introduce bias if the children with deceased mothers were more likely than others to have fever or if they had different treatment-seeking patterns. Another potential issue is the non-specificity of the denominator. Coverage of appropriate antimalarial treatment is only relevant if a child is actually infected with *Plasmodium spp.* parasites. In this analysis, an assumption was made that any child with fever was likely to have malaria, without the requirement of official clinical diagnosis. However, many households included in the interviews did not have access to facilities that provide diagnostic testing for malaria or did not have the resources needed to access these services, so limiting the denominator of this indicator to diagnosed cases was not practical. Following WHO recommendations, many national malaria control programs have changed standards to require diagnostic testing by RDT or microscopy before administering malaria treatment. Until widespread implementation of these standards has occurred, the current treatment indicator (i.e., no diagnostic testing required) remains the most practical. The new indicator on diagnosis represents a proxy measure of the prevalence of diagnostic testing of children with fever. It can be used to gauge when transition to using a more specific denominator of confirmed malaria cases might be possible.

Another potential problem with this indicator was the necessity to recall types of medications. Errors in the specification of medications taken could reduce the validity of these estimates. Additionally, proper dosage was not verified.

#### A.2.7. Data and Indicators on Malaria Morbidity

Morbidity indicators measured for this report include parasitemia and severe anemia prevalence in children under five years of age. The details of these indicators are outlined in table A2.7.

Table A2.7: RBM Indicators on malaria morbidity

RBM Impact Measures	Indicator Description	Numerator	Denominator	Data Availability*
Morbidity Indicator	Parasitemia Prevalence: proportion of children ages 6–59 months with malaria	Number of children ages 6–59 months with malaria infection	Total number of children ages 6–59 months tested for malaria parasites by	2007 MIS 2010 MIS 2015 MIS

	infection.	detected by microscopy.	microscopy.	
	Anemia Prevalence: proportion of children ages 6–59 months with a hemoglobin measurement of <8 g/dL.	Number of children ages 6–59 months with a hemoglobin measurement of <8g/dL.	Total number of children ages 6–59 months who had hemoglobin measurements obtained during household survey.	2007 MIS 2010 MIS 2015 MIS

\* RDT and microscopy results are available for the all the MIS.

### Calculating Indicators

The data used to calculate these indicators came from the MIS. Biomarker data were collected for all children 6-59 months of age. Parasitemia was measured using both microscopy and rapid diagnostic tests (RDTs).

- **Parasitemia:** Infection with *Plasmodium falciparum* parasites was measured in all children younger than 60 months for whom parental permission was granted to sleep in a selected household the night before the survey. Blood was taken from a finger or heel stick using a cuvette. Thick and thin blood smears were prepared for microscopy. A rapid diagnostic blood test for *Plasmodium falciparum* antigens was then performed. For the purposes of these analyses, parasitemia is defined as a positive result for any *Plasmodium* species via microscopy.
- **Severe Anemia:** Severe anemia, defined as less than 8 grams of hemoglobin per deciliter of blood, in children ages 6-59 months who slept in a selected household the night before the survey is another outcome of interest. Hemoglobin levels were measured using the HemoCue® system (e.g., a light photometer) and samples of capillary blood from finger or heel sticks. Hemoglobin quantities resulting from this test were adjusted for altitude according to the standard methodology used by the DHS.
- The adjustment was made with the following formulas:

$$\text{adjust} = -0.032 * \text{alt} + 0.022 * \text{alt}^2$$

$$\text{adjHg} = \text{Hg} - \text{adjust} \text{ (for adjust > 0),}$$

where *adjust* is the amount of the adjustment, *alt* is altitude in feet (converted from meters by multiplying by 3.3), *adjHg* is the adjusted hemoglobin level, and *Hg* is the measured hemoglobin level in grams per deciliter. No adjustment is made for altitudes below 1,000 meters.

### Potential Biases

Measuring parasitemia for use in comparative studies can be challenging as parasite prevalence in the population is influenced by a multitude of factors including temperature and rainfall. Thus, the timing of data collection plays an important role in ensuring comparability of data, especially in areas with seasonal patterns of malaria transmission. Another measurement issue arises due to the different methods available for diagnosing *Plasmodium* spp. infection. The current RBM recommendation is to report microscopy results; however, obtaining good quality microscopy data is often challenging due to logistical constraints. In this analysis, diagnosis was determined via microscopy and rapid diagnostic tests. Comparing RDT results with those obtained via microscopy may not produce valid results because RDTs measure parasite antigens whereas microscopy measures actual parasites. RDTs have been shown to have lower sensitivity than high quality microscopy in areas of low parasitemia. False positive RDT results can also occur when parasites have recently been cleared from the body via effective treatment.

Severe anemia is not a very specific proxy for malaria because there are many other potential etiologies. Anemia data are dependent on valid hemoglobin readings from the HemoCue® machine which can be affected by the skill of the technician drawing blood and on the number of blood tests being conducted with the same sample. This varied by survey. Severe anemia prevalence is also subject to seasonal variation to the extent that it is a result of malaria infection or other time-varying factors.

### A.2.8 Data and Indicators on Under-five Mortality

All-cause mortality in children under the age of five is the outcome variable of greatest interest in this report.

Table A2.8: RBM Indicators on mortality

RBM Impact Measures	Indicator Description	Data Availability
Mortality Indicator	All-cause under-five mortality rate (5q0): direct estimation	2003 DHS 2008–09 DHS 2014 DHS

### Calculating Indicators

Estimates of mortality require significant amounts of data, as death is a fairly rare event; thus, mortality rates for Kenya were estimated using data from the birth histories from DHS interviews. The DHS calculates these estimates using information collected from birth histories of each woman interviewed. Women are asked the dates of each live birth, regardless of the current survival status of the child. For any death, child age at death is recorded. There is no time limit on this birth history, so every live birth a

woman ever had during her lifetime should be recorded. With this information, 5-year mortality rates, approximating a point estimate of mortality rates approximately 2.5 years before the survey, are calculated using a synthetic cohort life table approach similar to that described in detail in the “DHS Guide to Statistics”.<sup>4</sup>

Mortality rates are calculated for ages 0 months, 1–2, 3–5, 6–11, 12–23, 24–35, 36–47, and 48–60 months using a Stata program. Each rate is calculated with a generalized linear model with binomial error, log link, and an appropriate offset for risk. Adjustments are made for the survey design using the ‘svyset’ command in Stata. Stata produces robust standard errors and 95 percent confidence intervals for the log of each rate. These confidence intervals are mapped onto confidence intervals for the standard set of under-five mortality rates. The rates agree exactly with the CSPro program used by DHS, and the confidence intervals differ only slightly from the results of the jack knife procedure used by DHS.

#### Potential Biases

Because birth history information was collected from women interviewed in the DHS, the mortality of children whose mothers have died is missing from the estimate. Children whose mothers have died are known to have worse survival, which may lead to mortality being underestimated. Other potential biases include under-reporting of deaths and misreported age at death. These issues and the measures taken to avoid erroneous data are discussed in depth in the Guide to DHS Statistics.<sup>4</sup>

### A.2.9. Additional Survey Data

#### Monitoring Outpatient Malaria Case-management Following Implementation of New Diagnostic and Treatment Polices in Kenya Surveys

In 2010, the NMCP set up biannual health facility surveys with an aim to monitor progress in achieving NMS targets in the availability of malaria case-management commodities and the quality of outpatient malaria case-management practices at public health facilities. The surveys are able to determine the national levels and trends in the availability of recommended and non-recommended antimalarials and malaria diagnostics in public health facilities, and to determine the national levels and trends in health workers’ adherence to outpatient guidelines for malaria diagnosis, treatment, counselling, and drug dispensing for patients across all age groups in public health facilities. By 2015, ten rounds of the surveys had been conducted.

Table A2.9: Quality of care survey data and indicators

	Quality of Care Survey
Sample design	Cross-sectional public health facility surveys
Sampling frame	Public health facilities in the master facility list
Number of sampling points	170 public health facilities
Sample weights	Available
Representativeness	National
Month(s) survey conducted	Every 6 months
Indicators	<p><b>A) Health facility level—essential malaria case-management commodities</b></p> <p><b><u>A1) Availability on the survey day</u></b></p> <ul style="list-style-type: none"> <li>• % of facilities having recommended non-expired ACT in stock</li> <li>• % of facilities having expired ACT in stock</li> <li>• % of facilities having other recommended antimalarials in stock</li> <li>• % of facilities having non-recommended antimalarials in stock</li> <li>• % of facilities having non-expired RDTs in stock</li> <li>• % of facilities having expired RDTs in stock</li> <li>• % of facilities providing functional malaria microscopy</li> <li>• % of facilities providing any malaria diagnostic services</li> <li>• % of facilities having functional weighing scale</li> <li>• % of facilities having at least one trained health worker on ACT case management</li> <li>• % of facilities having ACT case management guidelines</li> <li>• % of facilities having displayed ACT case management wall charts</li> </ul> <p><b><u>A2) Availability in past 3 months</u></b></p> <ul style="list-style-type: none"> <li>• % of facilities reporting at least seven consecutive days of ACT stockout</li> <li>• Median number of ACT stockout days</li> <li>• % of facilities reporting at least seven consecutive days of RDT stockout</li> <li>• Median number of RDT stockout days</li> <li>• % of facilities reporting at least seven consecutive days without functional microscopy</li> <li>• Median number of days without functional microscopy</li> <li>• % of facilities reporting at least seven consecutive days without any diagnostic service</li> <li>• Median number of days without any malaria diagnostic service</li> </ul> <p><b>B) Health worker-patient level—case-management practices stratified by age (&lt;5 years and &gt;5 years)</b></p> <p><b><u>B1) Primary indicator</u></b></p> <ul style="list-style-type: none"> <li>• % of febrile patients who are tested for malaria AND positive test results are treated with ACT or negative test results are not treated for malaria</li> </ul> <p><b><u>B2) Secondary indicators</u></b></p> <ul style="list-style-type: none"> <li>• % of febrile patients tested for malaria</li> <li>• % of febrile test-positive patients treated with recommended ACT</li> <li>• % of febrile test-positive patients treated with other antimalarials</li> <li>• % of febrile test-negative patients not treated for malaria</li> <li>• % of febrile patients without test performed treated with recommended ACT</li> <li>• % of febrile patients without test performed treated with other antimalarials</li> <li>• % of febrile patients with ACT prescribed having weight taken</li> <li>• % of febrile patients with ACT prescribed in correct weight-specific dose</li> <li>• % of febrile patients with ACT prescribed who had ACT dispensed at facility</li> </ul>

	<ul style="list-style-type: none"> <li>• % of febrile patients with ACT dispensed who had first dose given at facility</li> <li>• % of febrile patients with ACT dispensed who were advised how to take drugs at home</li> <li>• % of febrile patients with ACT dispensed who were advised what to do in case of vomiting</li> </ul>
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### Annex 3. Stratification of Kenya's Counties into Malaria Epidemiological Zones

#### Coastal Endemic

Kilifi, Kwale, Lamu, Mombasa, Taita-Taveta

#### Highland Epidemic Prone

Baringo, Bomet, Kericho, Kisii, Nandi, Narok, Nyamira, Trans-Nzoia, Uasin Gishu, West Pokot

#### Lake Endemic

Kakamega, Bungoma, Busia, Homa Bay, Kisumu, Migori, Siaya, Vihiga

#### Low Risk

Kiambu, Laikipia, Machakos, Makueni, Murang'a, Nairobi, Nakuru, Nyandarua, Nyeri, Kirinyaga

#### Seasonal Low Transmission

Elgeyo Marakwet, Embu, Garissa, Kitui, Mandera, Marsabit, Meru, Samburu, Tana River, Tharaka-Nithi, Turkana, Wajir, Kajiado, Isiolo

## Annex 4. Data Tables with Values, 95% Confidence Limits, and Sample Sizes

Table A4.1.1: Household ownership of insecticide-treated nets in Kenya, 2003-2014																												
Percentage of households with at least one insecticide-treated net (ITN) among all the households interviewed, by background characteristics																												
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change			
	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	(95% CI)		p-value													
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL		LL	UL		
Total (national)	7.7	6.7	9	8,561	47.7	44.3	51	6,818	55.7	52.7	58.7	9,057	46.4	42.9	49.9	6,308	58.9	57.8	60.1	36,430	62.5	58.9	66	6,481	54.8	53.5	56.1	<0.0001
Residence																												
Rural	5.8	4.8	7.1	5,668	47.7	44	51.4	5,597	55	51.5	58.5	6,147	45.5	42	49.1	5,251	61	59.4	62.6	22,516	62.8	57.6	67.7	3,496	57	55.2	58.7	<0.0001
Urban	13.5	11	16.5	2,893	0.476	38.8	56.6	1,221	57.8	51	64.3	2,910	50	40.2	59.7	1,057	56.1	54	58.2	13,914	62.1	56.5	67.4	2,985	48.6	46.5	50.7	<0.0001
Malaria risk zone																												
Low risk	4.9	3.7	6.4	3,402	38.4	31.7	45.7	1,413	41.6	35.7	47.7	2,678	32.9	27.4	39	1,576	41.8	39.4	0.443	8,574	49.1	43.1	55.1	1,605	44.2	41.6	46.7	<0.0001
Seasonal transmission	6	3.9	9	1,485	42.5	34.6	50.7	1,651	56.8	52.2	61.2	2,140	46.3	38	54.8	1,171	52.1	49.8	54.3	10,777	52.4	44.7	60	1,431	46.4	43.6	49.3	<0.0001
Highland epidemic	7.7	5.3	11.1	1,166	46.4	37.7	55.3	1,044	57.7	50.8	64.4	1,244	49.9	42.3	57.4	1,197	74.5	72.5	76.3	7,075	72.9	65.6	79	1,369	65.2	62.4	68	<0.0001
Coastal endemic	12.8	8.9	16.7	934	55.1	47.5	62.4	942	65.5	56.7	74.3	1,112	57.5	46.8	67.4	966	69.5	66.7	72.1	3,739	73.3	65.6	79.7	894	60.5	56.9	64.1	<0.0001
Lake endemic	12.4	9.3	15.5	1,574	56.5	51.6	61.3	1,768	73.1	69.1	69.1	1,883	58.7	51.9	65.2	1,398	80.7	79.2	82	6,265	86.8	82.4	90.2	1,182	74.4	71.9	76.9	<0.0001
Wealth quintiles																												
Lowest	3	1.8	5	1,385	35.3	28.2	43.1	1,362	49.4	44.6	54.1	1,777	49	44.7	53.2	2,189	50.8	48.7	53	9,114	49.1	42.4	55.9	1,528	46.1	43.4	48.7	<0.0001
Second	3.7	2.5	5.4	1,310	49.6	45.1	54.1	1,360	58.1	52.8	63.2	1,361	43.1	35.3	51.2	344	61.2	59.4	63	6,994	63.2	57.4	68.6	1,230	59.5	56.6	62.4	<0.0001
Middle	5.7	4.2	7.6	1,507	44.3	39.6	49.1	1,365	60.2	55.3	64.9	1,488	43.1	38.6	47.8	1,715	63.8	61.6	65.9	6,849	67.6	61.2	73.5	1,203	61.9	59	64.8	<0.0001
Fourth	7.9	6.4	9.7	1,624	55.2	50.4	60	1,366	54.7	49.3	60	1,702	43.7	36.7	51	911	56.7	54.7	58.6	7,267	62.1	57.3	66.7	1,289	54.2	51.2	57.1	<0.0001
Highest	14.8	12.3	17.7	2,735	50.9	43.9	57.8	1,365	55.9	50.1	61.6	2,729	49.7	42.6	56.8	1,149	61.2	58.7	63.6	6,206	68	60.5	74.6	1,231	53.2	50.3	56.1	<0.0001
Note: n=Weighted number of households (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																												
Baseline for the chi-square test is DHS 2003 compared with results of MIS 2015.																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																												

Indicator: Percentage of households with at least one insecticide-treated net (ITN) and/or sprayed by indoor residual spray (IRS) in the last 12 months among all the households interviewed, by background characteristics																												
Background characteristic	KDHS 2003			KMIS 2007			KDHS 2008–09			KMIS 2010			KDHS 2014			MIS 2015			Percentage point change									
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	95% CI		p-value					
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL					
<b>Total (national)</b>	7.7	6.7	9.0	8,561	51.8	47.7	55.7	6,818	55.7	52.7	58.7	9,057	51.9	48	55.8	6308	59.1	58	63	36,430	62.5	58.9	66	6,481	54.8	53.5	56.1	<0.0001
<b>Residence</b>																												
<i>Rural</i>	5.8	4.8	7.1	5,668	52.4	48	56.8	5,597	55	51.5	58.5	6,147	52.2	48	56.3	5251	61.2	59.6	62.8	22,516	62.8	57.6	67.7	3,496	57	55.7	58.3	<0.0001
<i>Urban</i>	13.5	11.0	16.5	2,893	48.5	39.8	57.4	1,221	57.8	51	64.3	2,910	50.9	41.1	60.6	1057	56.3	54.2	58.4	13,914	62.1	56.5	67.4	2,985	48.6	47.2	50	<0.0001
<b>Malaria risk zone</b>																												
<i>Low risk</i>	4.9	3.7	6.4	3,402	38.4	31.7	45.7	1,413	41.6	35.7	47.7	2,678	33	27.5	39	1576	41.9	39.5	44.3	8,574	49.1	43.1	55.1	1,605	44.2	42.9	45.5	<0.0001
<i>Seasonal transmission</i>	6.0	3.9	9.0	1,485	43.1	35.1	51.4	1,651	56.8	52.2	61.2	2,140	46.4	38.1	54.9	1171	52.2	49.9	54.4	10,777	52.4	44.7	60	1,431	46.4	45.1	47.7	<0.0001
<i>Highland epidemic</i>	7.7	5.3	11.1	1,166	62	50.4	72.3	1,044	57.7	50.8	64.4	1,244	69.1	59.4	77.3	1197	74.9	73	76.7	7,075	72.9	65.6	79	1,369	65.2	64	66.4	<0.0001
<i>Coastal endemic</i>	12.8	8.9	16.7	934	55.8	48.3	63	942	65.5	56.7	74.3	1,112	58.7	49	67.8	966	69.8	67.1	72.4	3,739	73.3	65.6	79.7	894	60.5	59.2	61.8	<0.0001
<i>Lake endemic</i>	12.4	9.3	15.5	1,574	57.2	52.2	62.1	1,768	73.1	69.1	69.1	1,883	67	60.8	72.7	1398	80.9	79.4	82.2	6,265	86.8	82.4	90.2	1,182	74.4	73.3	75.5	<0.0001
<b>Wealth quintiles</b>																												
<i>Lowest</i>	3.0	1.8	5.0	1,385	38.4	30.2	47.3	1,362	49.4	44.6	54.1	1,777	57.5	52.7	62.2	2189	51.1	48.9	53.2	9,114	49.1	42.4	55.9	1,528	46.1	44.8	47.4	<0.0001
<i>Second</i>	3.7	2.5	5.4	1,310	55.7	50.5	60.8	1,360	58.1	52.8	63.2	1,361	51	42.3	59.7	344	61.4	59.6	63.2	6,994	63.2	57.4	68.6	1,230	59.5	58.3	60.7	<0.0001
<i>Middle</i>	5.7	4.2	7.6	1,507	49.2	43.8	54.5	1,365	60.2	55.3	64.9	1488	49.9	44.4	55.4	1715	63.9	61.8	66	6,849	67.6	61.2	73.5	1,203	61.9	60.7	63.1	<0.0001
<i>Fourth</i>	7.9	6.4	9.7	1,624	59.4	54.2	64.4	1,366	54.7	49.3	60	1702	47.3	39.6	55.1	911	56.9	54.9	58.8	7,267	62.1	57.3	66.7	1,289	54.2	52.9	55.5	<0.0001
<i>Highest</i>	14.8	12.3	17.7	2,735	52.9	45.7	60	1,365	55.9	50.1	61.6	2729	50.5	43.3	57.6	1149	61.3	58.9	63.7	6,206	68	60.5	74.6	1,231	53.2	51.8	54.6	<0.0001
Note: n=Weighted number of households (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months; limited to spraying performed by government worker, private company, or other (not by self or family member).																												
Baseline for the chi-square test is DHS 2003, compared with results of MIS 2015.																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																												

**Table A4.1.3: Use of insecticide-treated nets among de facto population in Kenya**

Percentage of de facto population who slept under an insecticide-treated net <sup>1</sup> (ITN) the previous night, by background characteristics																													
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008–2009				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change				
	%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		p-value
	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL			
<b>National</b>	4.7	3.9	5.5	36,439	28	25.8	30.4	30,049	35.1	32.9	37.5	37,780	30.5	27.9	33.2	26,144	42.6	41.5	43.7	144,858	47.6	44.1	51	24,892	42.9	42.2	43.6	<0.0001	
<b>Age (years)</b>																													
<5	6	5.1	7.1	5,717	39.2	36	42.5	5,840	46.7	43.2	50.2	6,098	40.3	37.3	43.4	4,734	54.2	52.7	55.7	21,367	56.1	51.6	60.5	4,036	50.1	48.4	51.7	<0.0001	
5-14	3.4	2.7	4.2	10,226	21.9	19.4	24.6	8,238	27.8	25.4	30.3	10,881	25.7	22.9	28.6	7,568	36.6	35.4	37.8	45,056	43.9	40.1	47.9	7,063	40.5	39.3	41.7	<0.0001	
15-24	3.7	2.9	4.6	7,394	22.5	20.2	25	5,203	28.5	26.1	31	6,933	24.7	22	27.6	4,377	34.6	33.2	36	23,831	38.5	34.7	42.4	4,069	34.8	33.2	36.3	<0.0001	
25-34	7.1	5.9	8.5	5,037	33.6	30.3	37	4,106	44.8	41.5	48.1	5,003	34.9	30.8	39.3	3,427	48.4	47	49.8	19,597	52.4	48.3	56.4	3,555	45.3	43.5	47.1	<0.0001	
35-44	6.5	5.3	7.9	3,345	32	29	35.2	2,639	41.2	37.8	44.6	3,306	36.9	33.1	40.8	2,267	48.2	46.6	49.9	13,480	52	46.9	57.1	2,382	45.5	43.3	47.7	<0.0001	
45 and plus	3.5	2.7	4.7	4,709	22.8	20.3	25.5	4,023	33.4	30.6	36.3	5,559	26.1	23.1	29.5	3,771	42.7	41.3	44.2	21,527	47.5	43.2	51.9	3,787	44	42.3	45.6	<0.0001	
<b>Sex</b>																													
Male	4.3	3.6	5.1	18,015	25.5	23.3	27.7	14,556	32.8	30.5	35.1	18,392	29.3	26.6	32.2	12,457	40.2	39.1	41.4	70,794	45.1	41.7	48.5	12,177	40.8	39.8	41.7	<0.0001	
Female	5	4.2	6	18,449	30.4	27.9	33	15,493	37.4	34.8	40	19,398	31.5	28.9	34.3	13,687	44.9	43.7	46	74,064	49.9	46.2	53.6	12,715	44.9	44	45.8	<0.0001	
<b>Residence</b>																													
Urban	10.4	8.4	12.8	10,313	32.9	26	40.5	4,725	46.6	42	51.3	9,518	36.4	26.8	47.2	3,367	45.8	43.8	47.7	47,599	49	42.9	55.2	10,266	38.6	37.5	39.2	<0.0001	
Rural	3.2	2.6	4.1	26,151	27.2	24.7	29.8	25,324	32.3	29.7	35	28,272	29.4	27	32	22,777	41	39.5	42.4	97,259	46.8	42.4	51.2	14,626	43.6	42.7	44.4	<0.0001	
<b>Malaria risk zone</b>																													
Low risk	3.5	2.7	4.6	12,919	22.8	17.9	28.5	5,444	28.5	23.7	33.9	9,182	21.5	17.2	26.4	5,413	31	28.9	33.1	28,776	33.3	27.4	39.9	5,000	29.8	29.2	30.4	<0.0001	
Seasonal transmission	3.8	2.4	5.9	7,091	27.5	21.5	34.4	7,853	33	28.6	37.7	10,001	29	22.3	36.9	4,888	31.5	29.2	33.9	45,711	36	30.4	42	5,579	32.2	31.6	32.8	<0.0001	
Highland epidemic	3.9	2.5	5.9	5,631	23.9	19.7	28.6	4,917	31.8	26.5	37.6	5,561	32.3	27.4	37.6	5,416	50.1	47.7	52.4	29,434	54.4	47.5	61.1	5,743	50.5	49.8	51.1	<0.0001 <sup>1</sup>	
Coastal endemic	8.3	5.5	12.2	4,043	36.7	30.4	43.6	3,947	45.2	39.2	51.3	4,516	40.5	31.1	50.6	4,212	55.9	52.4	59.4	13,999	59	50.8	66.7	3,491	50.7	50	51.4	<0.0001	
Lake endemic	6.6	4.6	9.4	6,780	32.6	28.6	36.8	7,888	45.5	41.6	49.5	8,530	36.8	32.4	41.4	6,215	57.5	55.7	59.3	26,938	66.9	61.6	71.7	5,079	60.3	59.7	60.9	<0.0001	
<b>Wealth quintiles</b>																													
Lowest	1.1	0.5	2.3	7,279	21.1	16.6	26.4	6,196	26.2	22.9	29.9	9,122	30	26.8	33.4	10,379	30.6	28.5	32.7	41,580	34.5	29.2	40.3	6,549	33.4	32.8	34	<0.0001	
Second	1.8	1.1	2.8	6,415	24.2	21.2	27.4	7,119	32.1	28.1	36.4	6,612	29.1	23.6	35.3	1,330	41.2	39.6	42.8	29,917	49.1	44	54.3	5,000	47.3	46.7	47.9	<0.0001	
Middle	3.2	2.4	4.4	6,759	27.8	24.6	31.2	5,270	35.3	31.8	39	6,756	26.6	23.3	30.1	7,407	46.6	44.6	48.6	27,446	51.1	46	56.2	4,670	47.9	47.3	48.5	<0.0001	
Fourth	5.4	4.3	6.8	6,937	33.2	29.9	36.8	6,218	36.9	32.8	41.2	6,975	33.4	27.6	39.8	3,299	45.1	43.4	46.9	25,434	49.1	44.2	54	4,468	43.7	43	44.4	<0.0001	
Highest	11.7	9.6	14.2	9,074	33.6	28.8	38.8	5,246	44.9	40.6	49.4	8,325	36.8	29.2	45.1	3,640	49.5	47.2	51.9	20,481	53.8	46.1	61.2	4,205	42.1	41.4	42.8	<0.0001	
Note: n=Weighted number of children (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																													
<sup>1</sup> =First baseline for the chi-square test is DHS 2003, 2=second baseline is DHS 2007. Both baselines are compared with results of MIS 2015.																													
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007.																													

Table A4.1.4: Use of insecticide-treated nets among de facto population living in households with at least one ITN in Kenya																												
Percentage of de facto population from households with at least one insecticide-treated net <sup>1</sup> (ITN) who slept under an ITN the previous night, by background characteristics																												
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change			
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI		p-value
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL	
National	59.4	55.3	63.3	3,091	53.8	51.6	56.1	15,851	57.6	55.3	59.9	24116	59.5	57.1	61.8	14192	67	66	67.9	90,545	71.2	68.9	73.4	16,829	11.8	9.9	13.7	<0.0001
<b>Age (years)</b>																												
<5	71.8	66.2	76.8	521	66.1	63.3	68.9	3,482	68.6	65.7	71.3	4313	69.3	66.6	71.9	2,902	76.9	75.7	78.1	14,455	79.2	76.7	81.5	2,885	7.4	3.5	11.3	<0.0001 <sup>1</sup>
5-14	46.5	40.3	52.8	782	41.6	38.3	45.1	4,376	45.7	42.5	48.8	6993	50	46.7	53.4	4,133	56.9	55.5	58.2	27,837	64.7	61.5	67.8	4,848	18.2	14.6	21.7	<0.0001 <sup>1</sup>
15-24	46.2	39.7	52.9	636	45.1	41.6	48.7	2,663	46.5	43.4	49.6	4416	48.4	45.1	51.6	2,352	55.6	54	57.2	14,737	59.5	55.4	63.4	2,719	13.3	9.3	17.2	<0.0001 <sup>1</sup>
25-34	69.4	63.8	74.5	590	62.6	59.6	65.5	2,256	70.8	67.6	73.7	3341	67.2	63.4	70.8	1,925	75.9	74.7	77.1	12,686	76.6	73	79.9	2,413	7.3	3.5	11.1	<0.0001 <sup>1</sup>
35-44	78.4	71.8	83.8	296	60.6	57.4	63.7	1,418	69	65.8	72	2071	68.6	64.6	72.3	1,273	76.8	75.3	78.3	8,588	78	74.6	81.1	1,620	-0.4	-5.1	4.4	0.877
45 and plus	64.8	56.1	72.6	272	56.6	53	60.2	1,656	64.6	61.1	67.9	2982	64.6	60.5	68.5	1,607	74.5	73.2	75.8	12,242	77.3	74.1	80.3	2,344	12.6	6.9	18.3	<0.0001
<b>Sex</b>																												
Male	56.8	51.9	61.6	1,474	49.5	47.2	51.9	7,596	54.3	51.7	56.8	11,629	57.2	54.6	59.9	6,749	64.3	63.2	65.3	43,594	68.4	65.9	70.8	8,133	11.6	9	14.2	<0.0001
Female	61.6	57.6	65.5	1,627	57.7	55.2	60.1	8,255	60.7	58.3	63.1	12,490	61.4	58.9	63.9	7,443	69.4	68.4	70.4	46,951	73.8	71.3	76.2	8,696	12.2	9.8	14.7	<0.0001
<b>Residence</b>																												
Urban	67.8	62	73.1	1,618	65	60.5	69.2	2,761	53.7	51.2	56.1	17,676	68.5	60.9	75.3	1,992	74.6	73.3	75.9	31,242	74.5	70.8	77.8	7,067	6.7	4.3	9.1	<0.0001
Rural	54	48.7	59.3	1,483	52	49.7	54.4	13,090	73	69.9	76	6,443	57.8	55.5	60	12,200	63.2	61.9	64.4	59,303	69.6	66.6	72.4	9,762	15.6	13	18.2	<0.0001
<b>Malaria risk zone</b>																												
Low risk	70.1	62.6	76.6	743	53.8	49	58.6	2,524	64	59.3	68.4	4,206	58.6	53.1	63.9	1,985	69.3	67.4	71.2	12,128	67.9	62.4	73	2,220	-2.2	-5.6	1.1	0.204
Seasonal transmission	66.1	52.9	77.2	412	59.2	54.8	63.5	3,590	54.5	48.8	60	6,388	58.9	51.6	65.9	2,492	57.9	55	60.8	22,899	64.2	58	70	2,880	-1.8	-6.5	2.8	0.446
Highland epidemic	48.4	41.5	55.4	484	46	41.1	50.9	2,590	50.5	44.9	56.1	3,519	59.9	55.1	64.5	2,927	64.4	62.4	66.4	22,619	71.8	67.7	75.6	4,374	23.5	18.9	28	<0.0001
Coastal endemic	69.9	62	76.8	497	61.9	56.5	67	2,379	63.5	57.4	69.1	3,318	67.3	62.7	71.6	2,856	74.7	72.2	77.2	10,630	73.5	66.5	79.6	2,879	3.7	-0.4	7.8	0.067
Lake endemic	52.9	44.3	61.3	965	54.3	51.2	57.3	4,768	58.7	55.4	62	6,688	57.4	54.2	60.6	3,932	69.6	68.1	71.1	22,269	76.2	72.2	79.9	4,476	23.4	20.1	26.6	<0.0001
<b>Wealth quintiles</b>																												
Lowest	36.3	20.2	56.1	192	53.5	47.6	59.3	2,486	49	45.5	52.6	5,371	56.3	53.2	59.4	5,830	55.8	53.3	58.3	20,149	65.8	60.7	70.6	3,515	29.3	22.5	36.2	<0.0001
Second	47.7	38.7	56.9	240	44.1	40.2	48.1	3,819	50.4	46.1	54.6	4,377	57.7	49	65.8	670	62.7	61.2	64.3	19,955	70.6	66.4	74.6	3,574	23.1	16.7	29.5	<0.0001
Middle	48.2	41.9	54.6	421	56.9	53.1	60.6	2,698	55.1	51.7	58.5	4,385	55.1	51.4	58.8	3,606	67.3	65.6	68.8	19,021	71.1	67.3	74.6	3,477	22.9	18.1	27.7	<0.0001
Fourth	61.6	55.3	67.4	641	56	52.7	59.2	3,774	59.8	55.9	63.6	4,444	65	60.3	69.5	1,912	71.8	70.1	73.4	16,949	72.1	69.1	74.9	3,138	10.5	6.7	14.3	<0.0001
Highest	69.2	63.4	74.4	1,607	62.5	58.8	66	3,074	72.9	69.4	76.1	5,542	68.4	61.1	74.8	2,170	75.7	73.9	77.3	14,471	74.9	70.6	78.8	3,125	5.7	3.4	8.1	<0.0001
Note: n=Weighted number of children (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007.																												

**Table A4.1.5: Use of insecticide-treated nets among children under five years of age in Kenya**

Percentage of children under five years of age who slept under an insecticide-treated net <sup>1</sup> (ITN) the previous night, by background characteristics																												
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008–2009				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change			
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI		p-value
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL	
<b>National</b>	6	5.1	7.1	5,711	39.2	36	42.5	5,840	46.2	42.7	49.7	6,171	40.3	38.6	42	4734	54.2	52.7	55.7	21,367	56.1	51.6	60.5	4,036	50.1	48.4	51.7	<0.0001
<b>Age (in months)</b>																												
<12	7.2	5.6	9.1	1,258	40.5	36	45.2	1,277	55.3	50.6	59.9	1,302	47.8	43.8	51.8	946	63.1	60.6	65.4	4,000	61.9	55.7	67.8	718	54.6	50.8	58.4	<0.0001
12-23	5.6	4.3	7.3	1,122	42.8	38.5	47.3	1,076	51.8	47.2	56.5	1,178	47.8	43.7	52	888	57.6	55.4	59.7	4,210	64.2	58.2	69.8	796	58.6	55	62.2	<0.0001
24-35	6.3	4.9	8.1	1,104	38.4	34.2	42.7	1,159	45.7	40.7	50.7	1,256	40.5	36.6	44.5	983	54.7	52.4	57.1	4,300	53.2	46.8	59.5	815	46.9	43.2	50.6	<0.0001
36-47	5	3.6	6.8	1,171	36.5	32.8	40.4	1,144	39.8	35.1	44.8	1,195	34.5	30.9	38.3	960	48.4	46.2	50.7	4,561	49.8	43.9	55.6	829	44.8	41.2	48.4	<0.0001
47-59	5.9	4.4	7.9	1,062	37.5	33.5	41.7	1,184	38.4	33.8	43.2	1,240	31.6	28.2	35.2	957	48.4	46.3	50.5	4,296	52.5	47.1	58	878	46.6	43	50.2	<0.0001
<b>Sex</b>																												
Male	6.5	5.5	7.8	2,873	37.8	34.4	41.4	2,955	45.7	42	49.4	3,173	40.8	38.3	43.3	2370	54.9	53.2	56.6	10,814	55.4	50.3	60.4	2,038	48.9	46.5	51.2	<0.0001
Female	5.5	4.3	6.8	2,844	40.5	37	44.1	2,885	46.7	42.7	50.8	2,998	39.8	37.4	42.3	2364	53.5	51.8	55.3	10,553	56.8	52.1	61.3	1,998	51.3	49	53.6	<0.0001
<b>Residence</b>																												
Urban	12.1	9.5	15.3	1,430	42.5	32.6	53	865	43.1	39.3	47.1	4,755	45.4	39.1	51.9	553	59.2	56.4	62	6,680	59.8	51.4	67.7	1,562	47.7	44.7	50.7	<0.0001
Rural	4.7	3.8	5.9	4,287	38.6	35.2	42.2	4,975	61.2	56.4	65.8	1,416	39.4	37.7	41.1	4181	51.8	50	53.6	14,687	54.4	48.9	59.8	2,474	49.7	47.7	51.8	<0.0001
<b>Malaria risk zone</b>																												
Low risk	4.5	3.2	6.2	1,759	33.2	25.1	42.4	848	38.2	29.4	47.8	1,200	29.2	25.3	33.5	795	44.7	41.3	48.1	3,597	41.5	32.1	51.5	714	37	33.2	40.7	<0.0001
Seasonal transmission	5.4	3.6	8	1,170	37.4	29.4	46.1	1,490	42.9	35.4	50.7	1,707	37.4	33.6	41.3	905	42.1	38.9	45.4	7,167	46.2	37.3	55.3	1,025	40.9	37.5	44.2	<0.0001
Highland epidemic	5.6	3.5	8.6	1,011	36.3	30.1	43	945	43.9	37.3	50.8	947	43.2	39.9	46.6	1055	57.9	54.9	60.9	4,461	61.2	53.6	68.2	949	55.6	52.2	59	<0.0001
Coastal endemic	8.2	5.1	12.9	640	48.3	40.3	56.3	869	56	50.2	61.7	759	51.6	45.8	57.3	728	66.6	62.9	70	1,964	71.9	64.7	78.1	565	63.7	59.5	68	<0.0001
Lake endemic	8.3	6.2	11.1	1,137	42.4	37	47.9	1,688	56	51.9	60.1	1,558	46.7	43.6	49.8	1251	68.1	65.9	70.3	4,178	73.3	66.9	78.8	783	65	61.6	68.5	<0.0001
<b>Wealth quintiles</b>																												
Lowest	1.5	0.8	2.9	1,426	29.1	22.9	36.1	1,374	37.8	31.4	44.6	1,830	39.3	36.9	41.8	2040	40.4	37.7	43.2	7,413	40	32	48.4	1,290	38.5	35.8	41.3	<0.0001
Second	3	1.8	4.9	1,089	37.3	33	41.8	1,409	42.1	36.5	47.8	1,115	39.4	32.4	46.8	232	55.3	52.7	57.8	4,550	56.6	50.5	62.5	867	53.6	50.1	57.1	<0.0001
Middle	6.2	4.4	8.5	1,062	38.6	34.2	43.2	1,025	48.1	42.6	53.5	1,011	37.8	34.9	40.8	1348	57.5	54.7	60.2	3,564	60.6	54.4	66.5	682	54.3	50.4	58.3	<0.0001
Fourth	7.4	5.4	10.1	946	46.5	41.2	51.8	1,199	49.7	43.3	56.2	1,021	43.5	38.3	48.9	539	59.8	56.9	62.7	3,167	63.2	55	70.7	606	55.8	51.6	60	<0.0001
Highest	14.6	11.6	18.1	1,194	44.5	36.7	52.5	833	57.7	51.3	63.9	1,194	46.1	40.2	52.1	565	63	59.6	66.3	2,673	66.6	56	75.8	591	52.1	47.8	56.4	<0.0001

Note: n=Weighted number of children (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.

Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007.

Table A4.1.6: Use of insecticide-treated nets among children under five years of age living in households with at least one ITN in Kenya																													
Percentage of children under five years of age in households with at least one insecticide-treated net (ITN) who slept under an ITN the previous night, by background characteristics																													
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008–2009				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change				
	%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		%		95% CI		p-value
	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL			
National	71.8	66.2	76.8	521	66.1	63.3	68.9	3,482	67.9	65	70.6	4,365	69.3	67.2	71.4	2,902	76.9	75.7	78.1	14,455	79.2	76.7	81.5	2,885	7.4	3.3	11.6	<0.0001	
Age (in months)																													
<12	76.4	66.7	84	129	69.5	65.2	73.5	762	73.8	69.5	77.7	987	74.2	69.8	78.2	645	82.3	80.4	84.2	2,916	82.4	77.8	86.3	559	5.7	-2.2	13.7	0.132	
12-23	66.7	54.8	76.8	105	70.2	65.9	74.3	663	73.6	69.1	77.6	863	75.5	70.8	79.7	578	80.9	79	82.7	2,882	85.6	81.7	88.9	585	19	9.5	28.4	<0.0001	
24-35	75.4	64.3	83.9	107	65.2	60.7	69.4	692	68.3	63.2	73	870	71.6	66.9	75.9	575	77.7	75.5	79.8	2,884	78.7	73.3	83.2	549	3	-5.8	11.8	0.494	
36-47	67.5	54.8	78.1	82	61.8	57.3	66	676	61.4	56.1	66.5	819	65.5	60.6	70	538	71.3	69.1	73.5	3,024	74.9	70	79.3	567	7.9	-2.9	18.7	0.128	
47-59	71.8	60.7	80.8	98	63.5	58.5	68.2	689	60.7	55	66.1	826	58	52.8	63	566	72	69.8	74.2	2,749	74.4	70.1	78.3	625	3	-6.6	12.5	0.533	
Sex																													
Male	74.8	67.7	80.8	274	65.4	62	68.7	1,727	66.8	63.2	70.2	2,286	69.8	66.8	72.6	1,449	77.8	76.4	79.2	7,319	79.7	76.5	82.5	1,438	4.9	2.2	7.7	0.001	
Female	68.5	61.2	75.1	247	66.9	63.7	70	1,755	69	65.4	72.5	2,079	68.9	65.8	71.8	1,453	76	74.3	77.5	7,136	78.7	75.6	81.5	1,447	10.2	7.3	13.1	<0.0001	
Residence																													
Urban	74.4	67.2	80.5	247	74.4	68.9	79.2	557	64.7	61.5	67.7	3,301	79.7	72.3	85.4	370	84.5	82.7	86.1	4,865	83.3	79.4	86.6	1,176	8.8	3	14.7	0.001	
Rural	70.5	67.2	80.5	274	64.8	61.7	67.8	2,925	81.9	78.8	84.7	1,064	67.5	65.3	69.7	2,532	73.2	71.6	74.8	9,590	77.3	74.1	80.2	1,709	6.9	1.1	12.6	0.013	
Malaria risk zone																													
Low risk	79.1	68.2	87	120	65.1	58.5	71.1	490	72.8	66.5	78.3	639	73.3	66.9	78.9	344	81.4	78.8	83.7	1,831	80.7	74	86	344	1.6	-6.7	10	0.696	
Seasonal transmission	78.3	65.3	87.3	77	70.9	64.8	76.3	742	64.3	55.9	71.9	1,186	67.1	61.7	72.1	505	69.7	65.5	73.5	3,913	73.9	68.7	78.5	582	-4	-14	5.9	0.446	
Highland epidemic	70	57.9	79.8	81	62.4	55.6	68.6	555	63.7	57.3	69.7	648	70.4	66.4	74.1	653	72.9	70.3	75.4	3,503	77.3	72.5	81.5	756	6.9	-3.5	17.3	0.165	
Coastal endemic	75.4	61.8	85.3	73	72.2	66.6	77.3	586	73.8	67.8	79	601	75.3	69.5	80.4	531	82.5	79.6	85.1	1,588	81.2	75	86.1	502	5.9	-4.5	16.4	0.232	
Lake endemic	64.6	53.5	74.4	170	64.6	59.7	69.3	1,109	68.5	64.2	72.5	1,291	66.3	62.7	69.7	869	79	77.2	80.8	3,620	82.4	77	86.7	701	17.7	10	25.5	<0.0001	
Wealth quintiles																													
Lowest	42.3	21.3	66.5	45	64.1	58	69.8	628	63.2	57.2	68.9	1,181	66.5	63.3	69.5	1,272	66.5	63.3	69.5	3,979	74.2	69.1	78.7	729	32	17.2	46.8	<0.0001	
Second	65.3	52.7	76	50	60.3	55.1	65.3	847	60.5	55.1	65.6	813	60.6	50.9	69.5	142	74.4	71.9	76.8	3,369	76.3	71	80.9	647	10.4	-3.2	23.9	0.101	
Middle	74.5	63.7	83	81	65.8	60.3	71	627	66	61.1	70.7	747	67.6	63.7	71.3	766	77.1	74.7	79.4	2,656	77.9	73.4	81.8	554	3.9	-6.2	14.1	0.432	
Fourth	74.7	62.6	83.9	100	69.4	64.4	73.9	831	70.7	65.3	75.6	733	74.2	68.2	79.5	348	83	80.6	85.2	2,373	82.2	77.2	86.3	476	7.1	-2	16.3	0.099	
Highest	78.9	71.7	84.7	245	73	66.9	78.4	549	81.7	77	85.5	891	78.2	71.4	83.8	374	85.5	83.1	87.6	2,078	86	80.5	90.1	479	7.2	1.2	13.2	0.013	
Note: n=Weighted number of children (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																													
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007.																													

	2003	2004	2005	2006	2007	2008	2007	2010	2011	2012	2013	2014	2015
Total ITNs distributed	-	410,365	2,192,393	5,185,759	1,503,498	1,855,920	2,387,794	2,640,449	10,204,117	5,218,732	1,544,678	5,566,707	11,516,871

Source: National Malaria Control Program.

**Table A4.1.8 Universal coverage of insecticide-treated nets in Kenya, 2003–2015**

Percentage of households with universal coverage of insecticide-treated nets (ITNs), by background characteristics																										
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008–2009				KMIS 2010				KDHS 2014				KMIS 2015				% point change (95% CI)	p-value
	%	95% CI		N	%	95% CI		N	%	95% CI		N	%	95% CI		N	%	95% CI		N	%	95% CI		N		
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			
Total (national)	3.7	2.9	4.6	8561	17.6	15.8	19.5	6818	27.2	25.1	29.4	9057	19.6	17.1	22.2	6308	34.5	33.5	35.6	36430	40.2	36.8	43.6	6481	36.5 (35.2-37.8)	<0.0001
<b>Residence</b>																										
<i>Rural</i>	2.3	1.6	3.1	5,668	16.3	14.3	18.5	1221	38.4	33.9	43.1	2,910	17.6	15.6	19.8	5,251	32.2	30.9	33.6	22,516	36.2	32	40.7	3,496	33.9 (32.3-35.6)	<0.0001
<i>Urban</i>	7.9	6	10.2	2,893	23.6	19	29	5597	23.3	20.9	25.9	6,147	27.6	19.6	37.4	1,057	37.7	35.9	39.6	13,914	45.7	40.2	51.4	2,985	37.8 (35.7-39.8)	<0.0001
<b>Malaria risk zone</b>																										
<i>Low risk</i>	2.9	2.1	3.9	3,402	14.8	11.3	19.1	1,413	25	21.1	29.3	2,678	16	12	21.2	1,576	26.4	24.4	28.5	8,574	36.9	30.7	43.5	1,605	34 (31.5-36.4)	<0.0001
<i>Seasonal transmission</i>	3.1	1.4	6.5	1,485	15.4	11.3	20.7	1,651	23.5	19.3	28.2	2,140	18.9	12.7	27.1	1,171	28	25.8	30.2	10,777	24.2	20.3	28.6	1,431	21.1 (18.7-23.5)	<0.0001
<i>Highland epidemic</i>	2.1	1.1	3.9	1,166	13.9	10.6	17.9	1,044	23.2	18.8	28.4	1,244	19.3	14.5	25.2	1,197	44.2	42.2	46.3	7,075	45.6	38.5	52.8	1,369	43.5 (40.8-46.3)	<0.0001
<i>Coastal endemic</i>	6.7	4.5	9.9	934	25.5	19.7	32.2	942	36.4	28.2	45.5	1,112	26.3	21.4	32	966	44.4	41.2	47.6	3,739	45.5	39.6	51.5	894	38.8 (35.1-42.4)	<0.0001
<i>Lake endemic</i>	5.7	3.6	8.9	1,574	21.3	17.7	25.4	1,768	34.5	29.7	39.7	1,883	23	19.1	27.5	1,398	43.5	41.4	45.5	6,265	54.4	47.6	61	1,182	48.7 (45.6-51.7)	<0.0001
<b>Wealth quintiles</b>																										
<i>Lowest</i>	0.7	0.2	2.4	1,385	10.3	7.8	13.5	1362	12	9.9	14.6	1,777	16.1	13.7	18.7	2,189	20.6	19.1	22.1	9,114	25.9	21.7	30.6	1,528	25.2 (23-27.4)	<0.0001
<i>Second</i>	1	0.5	2	1,310	10.2	8.2	12.6	1360	20	16.7	23.8	1,361	17.8	13.3	23.3	344	28.6	27.2	30.1	6,994	34.6	29.8	39.8	1,230	33.6 (30.9-36.4)	<0.0001
<i>Middle</i>	1.7	1	2.8	1,507	17.3	14.4	20.7	1365	26.5	23.3	30.1	1,488	14.9	12.3	17.9	1,715	36.3	34.4	38.2	6,849	41.6	36.3	47.1	1,203	39.8 (37-42.7)	<0.0001
<i>Fourth</i>	3.3	2.4	4.4	1,624	20.5	17.8	23.6	1366	30.1	26	34.5	1,702	21.1	17.2	25.6	911	37.8	36.1	39.5	7,267	40.1	35.7	44.6	1,289	36.8 (34-39.6)	<0.0001
<i>Highest</i>	9	7.1	11.4	2,735	28	23.5	32.9	1365	39	34.7	43.6	2,729	29.2	22.2	37.3	1,149	44.4	42.3	46.6	6,206	53.5	47.3	59.5	1,231	44.5 (41.6-47.5)	<0.0001
Note: n=Weighted number of households (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																										
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																										
Universal coverage is defined as one net between two persons in a household.																										

Table A4.2.1: Use of Intermittent preventive treatment among pregnant women in Kenya																										
Percentage of women ages 15-49 with a live birth in the two years preceding the survey who received intermittent preventive treatment (IPTp) with two or more doses of SP/Fansidar for malaria during ANC visits during their last pregnancy, by background characteristics																										
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change (95% CI)	p-value
	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n		
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			
Total	4.5	3.6	5.6	2,359	11.9	10	14.3	1980	14.9	13	17.2	2430	25.5	21.6	29.8	1504	17.5	16.2	18.9	7826	34.7	31.2	38.3	1401	30.2(27.6-32.8)	<0.0001
Residence																										
Urban	5.3	3.7	7.6	602	12	6.4	21.4	329	16.6	11.5	23.3	622	28.2	13	50.9	171	14.5	12.6	16.6	2,484	34.4	29.2	40.1	563	29.1(24.8-33.5)	<0.0001
Rural	4.3	3.3	5.6	1,755	11.9	9.9	14.4	1651	14.5	12.5	16.8	1808	25.1	21.3	29.2	1333	19.1	17.2	21.1	5,342	34.8	30.2	39.8	838	30.6(27.2-33.9)	<0.0001
Malaria risk zone																										
Low risk	2.1	1.3	3.4	705	17.1	10.2	27.3	315	14.3	10.2	19.7	476	22.8	15.7	31.9	158	5.3	4	6.9	1,306	23.4	18.3	29.4	258	21.1 (15.9-26.44)	<0.0001
Seasonal transmission	7.1	4.5	11	476	11.2	7.3	16.8	480	13.9	10.7	17.8	624	29	23.4	35.2	335	12.1	10.3	14.1	2,696	29.8	23	37.7	357	22.6 (17.3-27.8)	<0.0001
Highland epidemic	3.3	1.9	5.7	415	6.5	4	10.6	363	13.9	9.7	19.4	370	23.2	18.7	28.5	409	6.2	4.9	7.7	1,627	30.5	24.7	37.1	345	27.1(21.9-32.2)	<0.0001
Coastal endemic	5.4	3.3	8.8	272	26	19.1	34.5	287	14.4	9	22.2	317	21.8	12.4	35.3	248	54.8	48.9	60.6	744	59.6	50.3	68.3	214	54.3 (47.2-61.4)	<0.0001
Lake endemic	6.5	4.4	9.7	489	9.2	6.4	13.1	535	17.5	13.8	21.9	643	28.5	23.1	34.7	354	33.3	30	36.7	1,453	52.6	43	62	227	45.9 (39.0-52.7)	<0.0001
Wealth quintile																										
Lowest	3.3	1.9	5.5	580	8.1	4.6	13.9	423	12	8.6	16.5	674	23	18.1	28.6	640	20.5	17.9	23.5	2,788	36.3	29.3	43.9	423	33.1(28.3-37.9)	<0.0001
Second	4.7	2.9	7.7	453	11	8.1	14.8	469	14.9	11.7	18.7	431	18.8	10.4	31.4	80	17.5	14.9	20.5	1,612	36.3	30	43.1	268	31.6(25.5-37.6)	<0.0001
Middle	5.6	3.5	9	427	11.3	7.9	16	367	16.6	11.9	22.5	376	28	23.1	33.4	429	21.1	17.7	24.9	1,274	30.4	23.1	39	246	24.9(18.7-31)	<0.0001
Fourth	4.2	2.5	6.8	371	14.7	10.7	19.8	398	16.3	12.5	21.1	403	23	16.5	31.3	178	14.4	12.1	17	1,140	38.2	27.3	50.4	254	33.9(27.6-40.2)	<0.0001
Highest	5	3.4	7.2	526	14.3	9.2	21.6	323	15.8	11	22.3	546	33.9	25.1	44	177	12.9	10.6	15.8	1,012	32.3	25.6	39.7	210	27.4(20.8-34)	<0.0001
Education																										
None	3	1.5	6	450	8.7	6	12.5	619	7.5	5.2	10.6	469	17.7	11.5	26	277	18.7	15.4	22.6	1,689	32.2	25.5	39.6	283	29.0(23.4-34.7)	<0.0001
Primary	3.9	3	5.2	1,403	12.6	10.2	15.5	1015	14.5	12	17.4	1395	25.3	20.5	30.7	880	18.6	16.7	20.7	4,038	38.5	33.3	43.9	646	34.6(30.7-38.5)	<0.0001
Secondary +	7.5	5.3	10.4	504	14.2	9.7	20.1	346	19.7	15.1	25.2	566	30.1	22.8	38.6	347	15.3	13.4	17.3	2,099	31	25.8	36.8	472	23.4(18.6-28.2)	<0.0001
Note: n=Weighted number of women (denominator).																										
Source: DHS 2003, DHS 2008–2009, DHS 2015 and MIS 2007, MIS 2010, MIS 2015.																										

**Table A4.2.2: Use of insecticide-treated nets among pregnant women in Kenya**

Percentage of pregnant women who slept under an insecticide-treated net <sup>1</sup> (ITN) the previous night, by background characteristics																												
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change		p-value	
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL		UL
<b>Total</b>	5.4	3.9	7.5)	637	39.8	34.4	45.5	524	48.2	41.3	55.2	629	39.1	32.1	46.7	382	50.6	47.4	53.7	2,076	57.8	51	64.2	368	52.5	47.2	57.9	<0.0001
<b>Residence</b>																												
<i>Urban</i>	6.6	3.7	11.3)	174	42.3	30.9	54.6	85	50.8	38.1	63.4	171	38.1	14.6	68.9	47	51	45.4	56.6	706	60	49.1	70	164	53.4	45.1	61.8	<0.0001
<i>Rural</i>	5.1	3.4	7.6)	463	39.4	33.3	45.8	439	47.4	39.2	55.7	458	39.3	33	46	335	50.3	46.5	54	1,370	56.3	47.4	64.9	204	51.2	44.1	58.3	<0.0001
<b>Malaria risk zone</b>																												
<i>Low risk</i>	4.6	2.4	8.7)	187	34.2	21	50.5	73	24.2	14.5	37.6	117	34.6	23.8	47.2	81	39.7	33	46.9	350	45.4	31.2	60.3	61	41.1	28.2	54	<0.0001
<i>Seasonal transmission</i>	6.2	2.7	13.4)	132	30.5	20.9	42.2	148	53.2	42.4	63.7	179	51.9	36.2	67.3	88	40.4	34.8	46.2	755	42.6	29.6	56.7	100	36.9	26.4	47.5	<0.0001
<i>Highland epidemic</i>	4.4	1.9	9.9)	112	26.3	16.5	39.2	90	46.8	33.7	60.4	88	49.7	37.4	62.1	68	53.1	47.9	58.2	415	59.5	45.2	72.4	78	54.5	42.9	66.1	<0.0001
<i>Coastal Endemic</i>	6.4	2.5	15.5)	69	50.4	36.8	64	75	63.7	52.4	73.8	73	37.6	26.1	50.6	66	64.7	55.8	72.8	191	82.9	64.6	92.7	55	77.8	66.6	89.1	<0.0001
<i>Lake Endemic</i>	6.5	3.4	12.0)	137	58.1	49.8	66	138	63.1	51	73.7	172	31.1	17.5	48.9	79	69.5	62.9	75.5	365	75.9	65.1	84.1	74	69.1	58.5	79.7	<0.0001
<b>Wealth quintile</b>																												
<i>Lowest</i>	1.7	0.4	6.9)	143	34.4	23.7	47	132	44.5	34.6	54.9	182	43.3	32.5	54.8	140	38.2	33.1	43.7	735	35	23.5	48.6	111	33.7	24.6	42.8	<0.0001
<i>Second</i>	4	1.6	9.5)	121	34.9	24.6	46.7	93	50.5	32.2	68.7	97	31.9	15.2	55	22	56.6	50.4	62.6	380	63.7	50.8	74.8	71	59.2	47.5	71	<0.0001
<i>Middle</i>	6.6	2.8	14.6)	107	42.9	33.1	53.2	104	46.9	35	59.2	107	38.2	28.5	49	113	58.2	51.3	64.8	346	71.5	56	83.2	56	64.9	52.2	77.6	<0.0001
<i>Fourth</i>	7.4	3.7	14.1)	109	49.1	38.1	60.3	108	61.3	48.3	72.8	97	46.8	32.3	61.8	50	51.1	43.6	58.6	329	52.4	37.7	66.8	52	44.6	30.1	59	<0.0001
<i>Highest</i>	7.6	4.4	12.8)	157	35.9	26.1	47	87	43.2	30.9	56.4	146	29.3	13.6	52.2	57	52	44	59.8	286	67	51.9	79.3	78	59	47.8	70.3	<0.0001
Note: n=Weighted number of women (denominator). An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months.																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																												

**Table A4.2.3: Use of insecticide-treated nets among pregnant women living in households with at least one ITN in Kenya**

Percentage of pregnant women who slept under an insecticide-treated net <sup>1</sup> (ITN) the previous night, in households with one or more ITN																													
Background characteristic	KDHS 2003				KMIS 2007				KDHS 2008				KMIS 2010				KDHS 2014				KMIS 2015				Percentage point change		p-value		
	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)			
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL		UL	LL
<b>Total</b>	83.5	66.7	92.7	48	69.5	62.9	75.4	308	76.4	70.7	81.4	436	70.5	59.8	76.4	230	76.3	72.8	79.5	1311	81.8	75.8	86.6	260	-1.4	-	-	10.1	0.001
Note: n=Weighted number of women (denominator); An insecticide-treated net (ITN) is (1) a factory-treated net that does not require any further treatment (LLIN) or (2) a pretreated net obtained within the past 12 months or (3) a net that has been soaked with insecticide within the past 12 months; Due to small sample size, only a national estimate will be provided for this indicator. Source: DHS 2003, 2008/9, 2015 and MIS 2007, 2010, 2015																													



Table A4.3.1: Treatment seeking from an appropriate provider among children under five years of age in Kenya																												
Percentage of children under five years of age with fever in the two weeks preceding the survey who sought treatment from an appropriate provider, by background characteristics																												
Background characteristic	KDHS 2003			KMIS 2007			KDHS 2008-09			KMIS 2010			KDHS 2014			KMIS 2015			Percentage point change			p-value						
	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n			(95% CI)					
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL				LL	UL				
Total (national)	59.8	56.6	62.9	2215	50.6	46.4	54.7	1516	57.7	53.5	61.7	1351	50.4	45.6	55.2	876	72.2	70.3	74.1	4618	70.4	66.3	74.1	1290	10.6	7.3	13.8	<0.0001
Sex																												
Male	59.8	55.8	63.7	1100	52.7	48.1	57.3	789	58.8	52.7	64.7	713	54.4	47.8	60.9	447	72.1	69.4	74.7	2,339	70.1	65.1	74.8	654	10.2	5.7	14.8	<0.0001
Female	59.8	56.1	63.4	1115	48.2	42.5	53.9	727	56.4	51.2	61.5	638	46.3	40.7	52.1	429	72.3	69.8	74.7	2,279	70.6	65.3	75.4	636	10.8	6.2	15.3	<0.0001
Residence																												
Urban	68.9	63	74.2	562	55.9	47.1	64.4	222	60.5	48.7	71.2	294	66.3	52.1	78		73.4	69.3	77.1	1,460	73.6	66.7	79.5	460	7.4	0.2	14.6	0.045
Rural	57.7	54	61.3	1653	49.8	45.2	54.4	1,294	57.1	52.6	61.4	1057	49.1	44.1	54		71.7	69.5	73.7	3,158	69	64	73.6	830	11.3	7.4	15.3	<0.0001
Wealth quintile																												
Lowest	56.4	50.1	62.5	495	48	39.1	57	298	57	49.3	64.4	450	42.3	36.4	48.4	398	68.3	64.6	71.7	1,454	59	50.9	66.6	393	2.7	-3.9	9.2	0.424
Second	56	50.4	61.5	456	48.4	41.8	55.1	375	52.5	43.6	61.3	219	53.4	35.8	70.2	48	73.5	0.7	76.6	1,108	71.4	64.5	77.4	287	15.5	8.6	22.4	<0.0001
Middle	58.7	51.6	65.4	406	49.8	41.8	57.8	295	64.5	57.4	70.9	219	53.4	46.4	60.1	236	72	67.7	76	827	73.8	65.1	81	241	15.2	7.9	22.6	<0.0001
Fourth	61.7	54.5	68.5	373	51.4	43.5	59.3	339	55.5	45.6	64.9	248	54.9	42.6	66.6	109	72.5	67.6	76.9	697	76.3	67.4	83.3	201	14.5	6.8	22.1	<0.0001
Highest	67.8	61.7	73.4	485	57.1	49.5	64.3	209	58.7	47.1	69.5	215	72.4	59	82.7	85	76.4	70.9	81.2	532	75.4	66.2	82.7	168	7.8	0	15.5	0.059
Malaria risk zone																												
Low risk	59.9	53.2	66.3	707	51.8	41.1	62.2	198	50.9	42.5	59.2	226	51.2	39.1	63.1	72	72.1	66.4	77.2	560	69.7	58.5	78.9	162	9.9	2	17.9	0.019
Seasonal transmission	57.9	50.1	65.3	324	51.1	43.6	58.6	366	51.7	41.9	61.4	348	56.4	42.1	69.6	162	71	66.8	74.9	1,172	70.3	59.2	79.5	289	12.2	4.7	19.7	0.002
Highland epidemic	62.5	54.7	69.6	330	56.3	47.1	65.1	235	60.6	48.7	71.4	136	50.1	42.4	57.7	201	72.1	68.2	75.7	894	79.4	71.4	85.6	298	17.1	10.2	24.1	<0.0001
Coastal endemic	61.9	55.9	67.5	243	55.2	44.2	65.8	161	64.8	55	73.5	222	58.2	44	71.1	164	78.2	73.3	82.4	466	68.9	53.2	81.2	212	7.1	-1.6	15.9	0.111
Lake endemic	58.2	53	63.2	611	45.3	37.4	53.4	556	63.2	56.8	69.2	419	45.3	38.3	52.5	277	71.1	68	74.1	1,526	65	59.4	70.3	329	6.8	0.3	13.2	0.042
Note: n=Weighted number of children (denominator).																												
Appropriate provider includes public/private health professional or pharmacy, excludes shop and traditional healer.																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																												

**Table A4.3.2: Any antimalarial treatment of fever among children under five years of age in Kenya**

Percentage of children under five years of age who received any antimalarial treatment among children under five years of age with fever in the two weeks preceding the survey, by background characteristics.

Background characteristic	KDHS 2003			KMIS 2007			KDHS 2008–2009			KMIS 2010			KDHS 2014			KMIS 2015			Percentage point change		p-value							
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI						
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL					
<b>Total (national)</b>	26.2	23.7	28.9	2215	23.5	20.5	26.8	1516	23.7	20.1	27.7	1351	36.5	32	41.1	876	27.6	25.7	29.6	4618	27.1	22.8	31.9	1290	0.9	-2.1	4	0.54
<b>Sex</b>																												
<i>Male</i>	25.7	22.6	29	1100	21.3	17.9	25.1	789	24.9	19.8	30.8	713	41.2	34	48.7	447	27.7	25.4	30.2	2,339	26.2	21.4	31.5	654	0.5	-3.7	4.8	0.81
<i>Female</i>	26.7	23.5	30.2	1115	26	21.9	30.6	727	22.4	18.4	26.9	638	31.7	26.7	37.1	429	27.6	25	30.2	2,279	28.2	22.6	34.5	636	1.4	-2.9	5.8	0.52
<b>Residence</b>																												
<i>Urban</i>	21.1	16.7	26.2	562	30.1	20.3	42.1	222	25.8	16.4	38.2	294	44.9	25.2	66.3	85	20.8	18.1	23.8	1,460	23.5	17.3	31.2	460	-3.9	-9.3	1.4	0.15
<i>Rural</i>	27.4	24.4	30.5	1653	22.6	19.5	25.9	1294	23.2	19.6	27.4	1057	35.7	31.2	40.5	791	30.8	28.3	33.6	3,158	28.6	22.9	35	830	7.4	3.8	11.1	<0.0001
<b>Wealth quintile</b>																												
<i>Lowest</i>	27.5	22.7	32.9	495	17.3	11	26.1	298	21.5	15.7	28.8	450	34.2	28.7	40.2	398	24.3	20.8	28.1	1,454	19.7	14.9	25.7	393	7.7	2.8	12.5	0
<i>Second</i>	31.8	26.9	37.1	456	21.2	16.6	26.7	375	25.5	17	36.5	219	33.5	21.5	48.1	48	37	33	41.2	1,108	35.2	26.3	45.3	287	4.1	-2.9	11	0.25
<i>Middle</i>	28.4	22.6	34.9	406	23.8	19.1	29.3	295	30.9	23.6	39.3	219	32.9	25.5	41.3	236	32.4	28.4	36.7	827	30	21.3	40.5	241	3	-4.2	10.2	0.41
<i>Fourth</i>	24	18.8	30.1	373	26.7	20.9	33.4	339	18.4	11.9	27.1	248	38.3	24.4	54.4	109	26.7	22.6	31.2	697	29.9	20.4	41.5	201	-3.9	-12	4	0.34
<i>Highest</i>	17.5	13.8	21.9	485	29.1	21.5	38.2	209	23.4	15.6	33.5	215	57.3	46.1	67.8	85	13.3	10	17.4	532	19.6	14	26.9	168	-17	-25	-9.9	<0.0001
<b>Malaria risk zone</b>																												
<i>Low risk</i>	12	9.3	15.2	707	15.1	9.4	23.4	198	9.1	5.1	15.7	226	38.7	24.9	54.6	72	9.4	6.6	13.1	560	8.6	3.1	21.6	162	-19	-24	-14	<0.0001
<i>Seasonal transmission</i>	31.2	23.4	40.2	324	18.9	13.3	26.1	366	25.1	16.2	36.6	348	40.9	29	54	162	16	12.9	19.5	1,172	12	6.8	20.4	289	-20	-26	-13	<0.0001
<i>Highland epidemic</i>	26.7	20.9	33.5	330	24.3	18.1	31.9	235	21	13.1	32	136	25.8	17.7	36	201	21.1	17.5	25.2	894	20.9	15	28.3	298	-7.7	-14	-1	0.03
<i>Coastal endemic</i>	33.7	25.8	42.6	243	29.9	21.2	40.5	161	22.1	14.6	32	222	40	29.4	51.6	164	12.3	8.5	17.4	466	18.4	11.9	27.4	212	-5.5	-13	2	0.16
<i>Lake endemic</i>	37	31.9	42.4	611	26.8	21.9	32.4	556	34.9	29.2	41	419	38.8	32.6	45.4	277	51.4	48	54.7	1,526	54.9	45.6	63.8	329	37.5	31.3	43.7	<0.0001
<i>Low risk</i>	40.5	30	51.9	134	20.2	10	36.8	42	43.9	23.2	66.8	21	29	13.2	52.3	27	69.7	49.1	84.6	50	81.8	37.1	97.1	10	39.7	13.6	65.8	0.014
<i>Seasonal transmission</i>	38.9	29.1	49.7	137	20.8	9.1	41	57	39.3	26.2	54.1	77	54.8	37.7	70.8	48	68.1	57.2	77.3	188	84.2	63.6	94.2	41	46.7	33.1	60.2	<0.0001
<i>Highland epidemic</i>	52.4	40	64.4	115	14.2	6.3	28.9	52	42.9	18.4	71.4	23	44.2	29.8	59.7	52	70.5	62.8	77.2	182	89.8	75.8	96.1	68	37.5	25.9	49.2	<0.0001

Note: n=Weighted number of children (denominator).

Source: DHS 2003, DHS 2008–2009, DHS 2014( and MIS 2007, MIS 2010, MIS 2015.

Table A4.3.4: Recommended antimalarial treatment among children who received any antimalarials in Kenya																												
Percentage of children under the age of five with fever in the two weeks preceding the survey who received recommended antimalarial treatment among children under the age of five with fever who received any antimalarial treatment, by background characteristics																												
Background characteristic	KDHS2003				KMIS 2007				KDHS 2008-2009				KMIS 2010				KDHS 2014				KMIS 2015				Percentage Point Change		P-Value	
	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI		
		LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL		UL
Total (national)	41.5	36	47.3	574	11.2	7.6	16.1	350	33.5	26.9	40.8	311	52.2	44.4	59.9	303	85.8	83.1	88.2	1246	91.6	87.1	94.7	336	50.2	45.2	55.2	<0.0001
Sex																												
Male	40.3	33.6	47.3	278	11.6	7.5	17.7	170	35.1	2.56	45.9	166	53.5	43.6	63.2	167	84.3	80.3	87.6	625	91	84.3	95	169	50.8	43.7	58	<0.0001
Female	42.7	35.3	50.5	296	10.8	6.3	17.9	180	31.5	22.5	42.2	145	50.4	39.3	61.5	136	87.4	83.5	90.5	621	92.3	86.4	95.8	167	49.6	42.7	56.6	<0.0001
Residence																												
Urban	42.8	36.6	49.3	447	8.4	3	21.9	65	52.9	40.6	64.9	71	47.1	24.6	70.8	40	82.3	74.8	87.9	354	92.9	82.6	97.3	115	50.3	43.8	56.8	<0.0001
Rural	34.1	24.5	45.3	127	11.7	7.7	17.4	285	28.9	22.1	36.8	240	52.7	44.5	60.8	263	87	84.1	89.4	892	91.2	85.7	94.7	221	57.5	48.5	66.6	<0.0001
Wealth quintile																												
Lowest	36.2	25.6	48.4	83	6.6	1.3	28	34	27.8	18.7	39.2	90	55.4	43.7	66.5	128	83.4	77.8	87.7	310	83.8	70.5	91.8	84	47.2	34.1	60.2	<0.0001
Second	47.7	37.2	58.4	93	20.6	11.1	35.1	75	29.4	15.6	48.4	56	50.3	26.6	73.8	21	88.1	83.8	91.5	387	93.7	83.4	97.8	88	45.9	34.4	57.3	<0.0001
Middle	38	24.7	53.3	87	8.5	3.5	19.2	74	36.7	22	54.4	64	58.7	45.7	70.7	73	89.2	83.8	93	262	92.4	83	96.8	68	54.7	42.8	66.7	<0.0001
Fourth	53	43.7	62.1	83	8.2	3.9	16.7	99	25.6	13.7	42.6	47	40.8	17.6	69	41	85.8	78.1	91.1	200	96.8	86.5	99.3	56	43.4	31.6	55.2	<0.0001
Highest	40	30.4	50.4	228	9.2	3.8	20.3	68	49.5	34.1	65.1	54	44.6	25.4	65.6	40	72.2	56.4	83.9	87	88	67.3	96.3	40	47.6	35.5	59.6	<0.0001
Malaria risk zone																												
Coastal endemic	34.2	23.8	46.5	96	3	0.6	12.8	43	48.7	30.3	67.5	47	64.8	49	77.9	65	87.2	74.1	94.2	49	94.6	80.6	98.7	40	60.6	49.0	72.3	<0.0001
Lake endemic	40.1	28.5	53	92	6.8	3.5	12.7	156	23	15.5	32.7	143	57.8	45	69.7	111	93.2	90.5	95.1	777	93.8	87.7	97	177	53.6	42.9	64.2	<0.0001
Mother's education																												
None	44.3	32.9	56.4	97	10	4.7	20.2	80	18.7	10.4	26.9	58	56.6	37	74.3	41	84.3	73.4	91.2	102	76.8	51.6	91.1	39	32.6	16.1	49.1	0.001
Primary	39.3	33.2	45.8	354	13.8	8.4	21.9	200	38.6	29.4	47.8	120	54.4	45.1	63.4	191	85.4	81.8	88.4	836	90	83.8	94	201	50.8	44.2	57.3	<0.0001
Secondary +	46.2	35.7	57.1	123	4.5	1.4	13.1	70	29.7	13.6	45.8	92	45.3	31.4	60.1	71	87.4	82.5	91.1	308	97.4	91	99.3	96	51.6	42.3	60.8	<0.0001
Note: n=Weighted number of children (denominator). The recommended antimalarial for first-line treatment was SP in 2003; first-line treatment since 2004 is artemisinin combination therapies (ACTs) using artemether-lumefantrine (Coartem).																												
Source: DHS 2003, DHS 2008–2009, DHS 2014 and MIS 2007, MIS 2010, MIS 2015.																												

Table A4.3.5: Diagnostic testing for malaria among children under five years of age with fever in Kenya																
Percentage of children under five years of age with fever in the two weeks before the survey who had blood taken from a finger or heel for testing, by background characteristics																
Background characteristic	KMIS 2010				KDHS2014				KMIS 2015				Percentage point change			p-value
	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI		
		LL	UL			LL	UL			LL	UL			LL	UL	
Total (national)	13	10	16.7	874	35.1	33.1	37.1	4742	39.2	34.9	43.7	1290	26.2	22.7	29.7	<0.0001
<b>Sex</b>																
Male	14.1	9.8	19.8	445	35.2	32.5	38	2,402	36.7	31.9	41.8	654	22.5	17.6	27.5	<0.0001
Female	11.9	8.4	16.6	429	35	32.3	37.7	2,340	42	36.3	47.9	636	30.1	25.2	35	<0.0001
<b>Residence</b>																
Urban	27.9	15.7	44.5	85	38.8	35.1	42.7	1,484	44	36.7	51.5	460	15.7	5.1	26.3	0.007
Rural	11.7	8.8	15.4	789	33.3	31	35.8	3,258	37.2	31.8	42.9	830	25.6	21.6	29.5	<0.0001
<b>Wealth quintile</b>																
Lowest	9.1	5.9	13.9	396	30.6	27.3	34.1	1,524	29.2	23.1	36.3	393	20.2	14.9	25.5	<0.0001
Second	7.7	3.3	16.9	48	37	33.3	40.9	1,138	42.3	33.9	51.3	287	33.8	24.1	43.5	<0.0001
Middle	12.7	8.8	18.2	236	31.9	27.8	36.2	836	39.7	31.3	48.7	241	27.1	19.6	34.6	<0.0001
Fourth	12.4	6.6	22	109	34.1	29.7	38.7	706	37.5	28.6	47.3	201	24.5	15.3	33.6	<0.0001
Highest	37.3	24.4	52.4	85	44.5	39.3	49.9	538	51.8	41.7	61.8	168	14.1	1.4	26.9	0.033
<b>Malaria risk zone</b>																
Low risk	18.2	8.8	34.1	72	28.8	24.1	34	569	27.5	19.7	36.9	162	9.7	1.5	21.0	0.112
Seasonal transmission	13.3	6.1	26.5	162	32.1	27.6	37.1	1,213	21.4	14.3	30.6	289	7.8	0.8	15.0	0.039
Highland epidemic	10.7	6.3	17.8	201	25.8	22.1	29.8	913	36.5	29.3	44.4	298	25.6	18.7	32.6	<0.0001
Coastal endemic	14.3	7.8	24.8	162	36.6	30	43.6	494	43.9	31.8	56.8	212	29.7	21.1	38.2	<0.0001
Lake endemic	12.3	8.6	17.3	277	44.7	41.2	48.2	1,553	58.1	50.2	65.7	329	45.8	39.2	52.3	<0.0001
<b>Mother's education</b>																
None	3.5	1.2	9.7	137	28.8	17	29.9	702	29.2	21.1	39	244	25.4	19.0	32.0	<0.0001
Primary	13.2	9.7	17.8	545	34.6	22.8	35.7	2,863	37.5	32.4	42.8	689	24.2	19.6	28.8	<0.0001
Secondary +	16.8	10.3	26	192	37.9	32.1	37.1	1,177	45.8	38.4	53.4	357	29.3	21.9	36.7	<0.0001
Note: n=Weighted number of children (denominator).																
Source: DHS 2014 and MIS 2010, MIS 2015.																

Table A4.4.1: Prevalence of severe anemia (Hemoglobin < 8g/dL) in children ages 6-59 months in Kenya																
Percentage of children ages 6-59 months with hemoglobin lower than 8.0 g/dL, by background characteristics																
Background characteristic	KMIS 2007				KMIS 2010				KMIS 2015				Percentage point change		p-value	
	%	95% CI		n	%	95% CI		n	%	95% CI		n		95% CI		
		LL	UL			LL	UL			LL	UL			LL		UL
<b>Total</b>	4	3.2	4.8	4,658	4	3.1	5	4152	2.2	1.6	3	3,439	-1.8	-2.5	-1	<0.0001
<b>Sex</b>																
<i>Male</i>	4.4	3.4	5.6	2,353	4.8	3.5	6.4	2,058	2.5	1.7	3.6	1,732	-1.9	-3	-0.8	0.001
<i>Female</i>	3.6	2.7	4.6	2,305	3.2	2.3	4.5	2,094	1.9	1.3	2.9	1,707	-1.7	-2.7	-0.7	0.001
<b>Residence</b>																
<i>Urban</i>	6.6	4.5	9.6	644	1.6	0.7	3.9	479	1.6	0.9	2.6	1,304	-5.1	-7.1	-3	<0.0001
<i>Rural</i>	3.6	2.8	4.5	4,014	4.4	3.4	5.6	3,673	2.5	1.7	3.6	2,135	-1.1	-2	-0.3	0.017
<b>Wealth quintile</b>																
<i>Lowest</i>	6.2	4.2	9.1	1,056	5.2	3.8	7.1	1,807	2.9	1.8	4.7	1,104	-3.3	-5	-1.5	<0.0001
<i>Second</i>	3.2	2.1	4.8	1,158	3.4	1.4	8.2	214	3.6	2.2	5.9	744	0.4	-1.2	2.1	0.609
<i>Middle</i>	3.5	2.3	5.4	836	3.7	2.4	5.8	1,179	1.7	0.9	3	606	-1.8	-3.4	-0.2	0.036
<i>Fourth</i>	3.3	2.2	4.9	978	4	2.5	6.5	461	1.1	0.4	2.7	527	-2.1	-3.6	-0.7	0.012
<i>Highest</i>	4.3	2.9	6.3	630	1.7	0.8	3.7	491	1.1	0.5	2.4	458	-3.2	-5	-1.3	0.002
<b>Malaria risk zone</b>																
<i>Low risk</i>	1.3	0.4	3.7	681	0.6	0.2	2.1	697	0.5	0.1	1.7	593	-0.8	-1.8	0.2	0.133
<i>Seasonal transmission</i>	4.2	2.9	0.6	1,126	5.4	3.7	7.9	771	3.1	1.8	5.5	847	-1.1	-2.8	0.5	0.198
<i>Highland epidemic</i>	2.6	1.4	4.7	743	2.7	1.3	5.5	916	2.3	1.2	4.3	840	-0.3	-1.8	1.2	0.702
<i>Coastal endemic</i>	7.6	4.7	12.1	703	3.2	1.7	5.9	664	2.2	0.8	6	472	-5.4	-7.8	-3.1	<0.0001
<i>Lake endemic</i>	4.9	3.7	6.3	1,405	6.9	5.1	9.3	1,104	3.4	2	5.8	687	-1.6	-3.3	0.2	0.102
Note: n= Weighted number of children (denominator).																
Source: MIS 2007, MIS 2010, MIS 2015.																

Table A4.4.2: Prevalence of malaria infection in children ages 6-59 months in Kenya																
Percentage of children ages 6-59 months with malaria infection detected by microscopy, by background characteristics																
Background characteristic	KMIS 2007				KMIS 2010				KMIS 2015				Percentage point change			p-value
	%	(95% CI)		n	%	(95% CI)		n	%	(95% CI)		n		(95% CI)		
		LL	UL			LL	UL			LL	UL			LL	UL	
<b>Total (national)</b>	3.3	2.3	4.7	4,680	9.2	6.8	12.3	4152	4.9	3.8	6.5	3440	1.6	1	2.5	<0.0001
<b>Sex</b>																
<i>Male</i>	3.4	2.4	4.9	2360	9.7	7.3	12.9	2058	4.9	3.6	6.7	1,733	1.5	0.3	2.8	0.015
<i>Female</i>	3.2	2.1	4.9	2320	8.7	6.1	12.2	2094	5	3.6	6.8	1,707	1.8	0.5	3	0.004
<b>Residence</b>																
<i>Urban</i>	1.4	0.5	3.9	645	1	0.4	2.7	479	1.9	1.1	3.2	1,301	0.5	0.6	1.7	0.404
<i>Rural</i>	3.6	2.4	5.2	4035	10.7	8	14.2	3673	6.3	4.6	8.5	2,139	2.7	1.5	3.9	<0.0001
<b>Wealth quintile</b>																
<i>Lowest</i>	3.9	1.6	9.1	1060	13.8	9.8	19.1	1807	5.7	3.6	9.1	1,104	1.8	0	3.6	0.0406
<i>Second</i>	4	2.6	6.1	1163	7.6	3.9	14.1	214	8.9	6.4	12.4	745	4.8	2.5	7.2	<0.0001
<i>Middle</i>	4.2	2.4	7.2	845	10.7	7.4	15.2	1179	4.7	3.1	7.2	609	0.6	1.5	2.8	0.570
<i>Fourth</i>	2.8	1.7	4.5	982	3.7	2.1	6.6	461	2.9	1.7	5.1	526	0.1	1.6	1.9	0.908
<i>Highest</i>	0.7	0.3	1.7	630	0.6	0.1	2.3	491	0.9	0.3	2.9	456	0.2	0.8	1.3	0.645
<b>Malaria risk zone</b>																
<i>Low risk</i>	1.3	0.4	3.7	681	0.1	0	0.6	697	0.4	0.1	1.7	593	-0.8	-1.8	0.2	0.133
<i>Seasonal transmission</i>	0.2	0	1.1	1134	0.2	0	1.7	771	0.5	0.1	2	847	-1.1	-2.8	0.5	0.198
<i>Highland epidemic</i>	0.4	0.1	1.6	744	1.8	1	3.4	916	2.5	1.1	5.5	845	-0.3	-1.8	1.2	0.702
<i>Coastal endemic</i>	4	1.1	13.1	704	3.1	1.3	7.1	664	5.3	2.2	12.2	471	-5.4	-7.8	-3.1	<0.0001
<i>Lake endemic</i>	8.7	6	12.6	1416	32.9	26.1	40.5	1104	16.4	12.4	21.4	684	-1.6	-3.3	-0.2	0.102
Note: n= Weighted number of children (denominator)																
Source: MIS 2007, MIS 2010, MIS 2015																

All-cause mortality (per 1,000 live births) for five-year periods preceding the survey, by background characteristics									
Background characteristic	KDHS 1998		KDHS 2003		KDHS 2008–2009		KDHS 2014		Relative change
	per 1,000 live births (95% CI)		per 1,000 live births (95% CI)		per 1,000 live births (95% CI)		per 1,000 live births (95% CI)		%
Total (under five -5q <sub>0</sub> )	111.4	(101 ; 122)	114.5	(104 ; 125)	73.6	(64 ; 83)	52.3	(48 ; 57)	54.3
<b>Age</b>									
<i>Neonatal (NN)</i>	28.4	(23 ; 35)	33.3	(28 ; 40)	30.9	(24 ; 39)	22.3	(19 ; 26)	33.0
<i>Postneonatal(PNN)</i>	45.2	(38 ; 52)	43.8	(37 ; 51)	20.8	(16 ; 26)	16.4	(14 ; 19)	62.6
<i>Infant (1q<sub>0</sub>)</i>	73.7	(65 ; 82)	77.1	(68 ; 86)	51.7	(43 ; 60)	38.7	(35 ; 43)	49.8
<i>Child (4q<sub>1</sub>)<sup>1</sup></i>	40.7	(34 ; 47)	40.5	(34 ; 47)	23.1	(18 ; 28)	14.2	(12 ; 17)	64.9
<b>Sex</b>									
<i>Male</i>	113.1	(98 ; 128)	126.5	(111 ; 142)	81.8	(68 ; 96)	54.4	(48 ; 60)	57.0
<i>Female</i>	109.7	(96 ; 123)	102.0	(88 ; 116)	64.9	(52 ; 78)	50.2	(44 ; 57)	50.8
<b>Residence</b>									
<i>Urban</i>	86.7	(60 ; 113)	93.4	(76 ; 110)	64.6	(42 ; 86)	57.0	(48 ; 66)	38.9
<i>Rural</i>	116.6	(105 ; 128)	119.3	(107 ; 132)	75.5	(64 ; 87)	49.7	(45 ; 54)	58.3
<b>Malaria zone</b>									
<i>Low risk</i>	57.3	(40 ; 74)	70.5	(56 ; 85)	48.2	(38 ; 58)	55.2	(44 ; 66)	21.7
<i>Seasonal transmission</i>	84.6	(54 ; 114)	99.5	(73 ; 125)	70.9	(52 ; 89)	41.7	(34 ; 49)	58.1
<i>Highland epidemic</i>	121.3	(101 ; 141)	90.1	(69 ; 111)	46.3	(35 ; 57)	43.1	(34 ; 52)	52.1
<i>Coastal endemic</i>	107.5	(70 ; 143)	93.3	(68 ; 118)	65.4	(48 ; 83)	54.0	(42 ; 66)	42.1
<i>Lake endemic</i>	183.4	(156 ; 210)	213.0	(184 ; 241)	129.6	(112 ; 147)	64.1	(55 ; 73)	69.9
<b>Wealth quintile</b>									
<i>Lowest</i>	152.4	(128 ; 176)	145.7	(122 ; 169)	88.7	(71 ; 104)	52.8	(44 ; 62)	63.8
<i>Second</i>	133.2	(133 ; 133)	113.2	(89 ; 136)	78.3	(65 ; 92)	55.6	(46 ; 65)	50.9
<i>Middle</i>	95.2	(74 ; 116)	120.8	(94 ; 147)	81.0	(66 ; 96)	50.0	(41 ; 59)	58.6
<i>Fourth</i>	89.5	(68 ; 111)	81.5	(59 ; 103)	44.6	(35 ; 54)	56.5	(44 ; 69)	30.6
<i>Highest</i>	60.9	(37 ; 84)	98.3	(78 ; 118)	68.4	(48 ; 88)	46.6	(33 ; 60)	52.6
<b>Mother's education</b>									
<i>None</i>	136.3	(111 ; 161)	122.2	(97 ; 146)	83.1	(66 ; 99)	46.9	(37 ; 56)	61.6
<i>Primary incomplete</i>	131.0	(115 ; 147)	143.4	(125 ; 162)	90.4	(78 ; 103)	58.0	(50 ; 66)	59.6
<i>Primary complete</i>	100.3	(75 ; 125)	98.9	(77 ; 120)	58.0	(49 ; 67)	50.9	(43 ; 59)	48.6
<i>Secondary +</i>	65.8	(49 ; 82)	69.1	(53 ; 85)	60.2	(48 ; 72)	49.9	(40 ; 60)	27.8
<b>Birth order</b>									
<i>1</i>	102.8	(84 ; 122)	86.8	(70 ; 103)	65.9	(46 ; 85)	53.4	(43 ; 63)	38.4
<i>2</i>	86.6	(65 ; 107)	99.9	(79 ; 121)	79.5	(58 ; 100)	48.1	(38 ; 58)	51.9
<i>3+</i>	123.6	(110 ; 137)	131.5	(116 ; 147)	74.5	(61 ; 88)	53.6	(48 ; 59)	59.2
Note: n=Weighted number of children (denominator). <sup>1</sup> Child mortality (4q <sub>1</sub> ) is mortality between exact age 1 and exact age 5, per 1,000 children surviving to 12 months of age.									

Rainfall in millimetres																
	Average rainfall 1961-2013	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total annual rainfall (National)	975.9	685.5	1007.6	1091.3	946.0	912.3	772.0	1257.3	979.1	841.5	811.2	1042.3	1004.3	1055.9	1142.7	1072.8
Rainfall anomalies (National)		290.4	-31.7	-115.5	29.9	63.5	203.9	-281.4	-3.3	134.3	164.7	-66.4	-28.5	-80.0	-169.9	-96.9
Low risk area rainfall	844.3	518.6	994.7	939.4	853.1	826.2	687.6	1057.4	860.6	686.1	601.3	1013.7	855.5	989.5	1051.3	620.3
Low risk area rainfall anomalies		325.7	-150.4	-95.2	-8.9	18.1	156.7	-213.1	-16.3	158.2	243.0	-169.5	-11.2	-145.2	-207.0	224.0
Seasonal transmission area rainfall	726.9	265.6	523.5	844.4	686.6	626.9	422.2	948.1	592.0	530.9	543.6	589.4	723.4	668.8	743.2	448.4
Seasonal transmission area rainfall anomalies		461.3	203.4	-117.5	40.2	100.0	304.7	-221.2	134.9	196.0	183.2	137.5	3.5	58.0	-16.4	278.5
Highland epidemic area rainfall	1458.3	1248.4	1589.9	1510.4	1431.9	1346.7	1207.7	1724.3	1477.1	1341.2	1296.2	1632.9	1564.3	1680.8	1838.1	1758.6
Highland epidemic area rainfall anomalies		209.9	-131.6	-52.1	26.4	111.6	250.6	-266.0	-18.8	117.2	162.1	-174.6	-106.0	-222.4	-379.8	-300.3
Coastal endemic area rainfall	1017.2	843.7	888.4	973.2	667.5	820.6	763.3	1344.7	1056.8	760.5	765.9	894.7	769.1	766.5	985.6	744.5
Coastal endemic area rainfall anomalies		173.5	128.8	44.0	349.7	196.6	253.9	-327.5	-39.6	256.7	251.3	122.5	248.1	250.7	81.6	272.7
Lake endemic area rainfall	1680.5	1292.8	1777.8	1875.3	1696.5	1496.1	1437.2	1951.4	1601.9	1599.0	1599.7	1787.1	1794.1	1886.3	1761.2	2746.7
Lake endemic area rainfall anomalies		387.7	-97.3	-194.8	-16.0	184.5	243.4	-270.9	78.7	81.6	80.8	-106.6	-113.6	-205.8	-80.7	-1066.2
Note: The rainfall anomalies for each year are calculated by subtracting the annual value of rainfall of the year from the average annual rainfall.																
Source: Kenya National Meteorological Office, United States National Oceanic and Atmospheric Administration (NOAA)																

	Average T°C. 2000-2014	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean temperature (national)	22.3	22.1	22.3	22.2	22.2	22.1	22.4	22.3	22.2	22.0	22.6	22.5	22.5	22.2	22.2	22.6
Mean T°C anomalies (national)		0.2	0.0	0.1	0.1	0.2	-0.1	0.0	0.1	0.3	-0.3	-0.2	-0.2	0.1	0.1	-0.3
Minima temperature (national)	16.7	16.1	16.8	16.6	16.5	16.7	16.8	16.9	16.6	16.4	16.8	17.1	16.9	16.5	16.6	16.8
Minima T°C. anomalies (national)		-0.6	-0.1	0.1	0.2	-0.1	-0.1	-0.2	0.1	0.2	-0.1	-0.4	-0.2	0.2	0.1	-0.2
Maxima temperature (national)	27.9	28.0	27.8	27.8	27.9	27.5	28.1	27.7	27.8	27.6	28.4	27.8	28.1	27.9	27.7	28.4
Maxima T°C anomalies (national)		-0.2	0.1	0.1	0.0	0.4	-0.2	0.2	0.1	0.3	-0.5	0.1	-0.2	0.0	0.2	-0.5
Low risk area																
Mean temperature	19.4	19.1	19.6	19.1	19.0	19.5	19.4	19.2	19.0	18.9	19.7	19.2	19.4	19.2	19.3	20.7
Mean T°C anomalies		0.3	-0.2	0.3	0.4	-0.1	0.0	0.2	0.4	0.5	-0.3	0.2	0.0	0.2	0.1	-1.3
Minima temperature	13.3	12.6	13.9	13.1	12.8	13.5	13.2	13.3	13.0	12.8	13.3	13.5	13.2	12.9	13.2	15.0
Minima T°C. anomalies		0.7	-0.6	0.2	0.5	-0.2	0.1	0.0	0.3	0.5	0.0	-0.2	0.1	0.4	0.1	-1.7
Maxima temperature	25.4	25.6	25.4	25.0	25.1	25.6	25.6	25.1	24.9	25.0	26.0	24.9	25.5	25.5	25.4	26.4
Maxima T°C anomalies		-0.2	0.0	0.4	0.3	-0.2	-0.2	0.3	0.5	0.4	-0.6	0.5	-0.1	-0.1	0.0	-1.0
Seasonal transmission area																
Mean temperature	24.9	24.9	24.8	24.9	24.9	24.4	25.0	24.9	25.3	24.5	25.2	25.2	25.1	24.7	24.7	25.3
Mean T°C anomalies		0.0	0.1	0.0	0.0	0.5	-0.1	0.0	-0.4	0.4	-0.3	-0.3	-0.2	0.2	0.2	-0.4
Minima temperature	19.6	19.2	19.6	19.7	19.6	19.6	19.7	19.8	19.7	19.4	19.8	20.1	19.8	19.4	19.4	19.2
Minima T°C. anomalies		0.4	0.0	-0.1	0.0	0.0	-0.1	-0.2	-0.1	0.2	-0.2	-0.5	-0.2	0.2	0.2	0.4
Maxima temperature	30.3	30.6	30.0	30.1	30.3	29.2	30.4	30.0	30.9	29.8	30.7	30.3	30.4	30.1	30.0	31.3
Maxima T°C anomalies		-0.3	0.3	0.2	0.0	1.1	-0.1	0.3	-0.6	0.7	-0.4	0.0	-0.1	0.2	0.3	-1.0
Highland epidemic area																
Mean temperature	18.6	18.4	18.2	18.6	18.6	18.5	18.9	18.6	18.4	18.4	18.9	18.9	18.8	18.7	18.7	18.4
Mean T°C anomalies		0.2	0.4	0.0	0.0	0.1	-0.3	0.0	0.2	0.2	-0.3	-0.3	-0.2	-0.1	-0.1	0.2
Minima temperature	12.2	11.5	11.9	12.0	12.1	12.0	12.2	12.5	12.2	12.0	12.2	12.8	12.5	12.2	12.4	11.9
Minima T°C. anomalies		0.7	0.3	0.2	0.1	0.2	0.0	-0.3	0.0	0.2	0.0	-0.6	-0.3	0.0	-0.2	0.3
Maxima temperature	25.0	25.2	24.6	25.1	25.2	25.0	25.6	24.7	24.6	24.8	25.6	24.9	25.1	25.2	25.1	24.8
Maxima T°C anomalies		-0.2	0.4	-0.1	-0.2	0.0	-0.6	0.3	0.4	0.2	-0.6	0.1	-0.1	-0.2	-0.1	0.2
Coastal endemic area																
Mean temperature	26.7	26.2	26.4	26.6	26.8	26.7	26.7	26.5	26.7	26.5	27.0	27.0	27.1	26.9	26.7	27.0
Mean T°C anomalies		0.5	0.3	0.1	-0.1	0.0	0.0	0.2	0.0	0.2	-0.3	-0.3	-0.4	-0.2	0.0	-0.3
Minima temperature	22.7	22.0	22.2	22.5	22.6	22.7	22.7	22.6	22.7	22.4	23.0	23.0	23.1	22.9	22.7	23.2
Minima T°C. anomalies		0.7	0.5	0.2	0.1	0.0	0.0	0.1	0.0	0.3	-0.3	-0.3	-0.4	-0.2	0.0	-0.5
Maxima temperature	30.8	30.4	30.6	30.6	31.0	30.8	30.8	30.4	30.7	30.6	31.1	31.0	31.2	31.0	30.7	30.8
Maxima T°C anomalies		0.4	0.2	0.2	-0.2	0.0	0.0	0.4	0.1	0.2	-0.3	-0.2	-0.4	-0.2	0.1	0.0
Lake endemic area																
Mean temperature	22.4	22.2	22.1	22.5	22.3	22.2	22.8	22.6	22.1	22.2	22.7	22.9	22.5	22.3	22.3	22.4
Mean T°C anomalies		0.2	0.3	-0.1	0.1	0.2	-0.4	-0.2	0.3	0.2	-0.3	-0.5	-0.1	0.1	0.1	0.0
Minima temperature	16.0	15.5	16.0	16.2	16.1	16.1	16.2	16.3	15.8	15.9	16.1	16.6	16.2	15.9	15.8	15.9
Minima T°C. anomalies		0.5	0.0	-0.2	-0.1	-0.1	-0.2	-0.3	0.2	0.1	-0.1	-0.6	-0.2	0.1	0.2	0.1
Maxima temperature	28.8	29.0	28.1	28.9	28.6	28.2	29.4	28.9	28.5	28.5	29.3	29.2	28.8	28.7	28.7	28.9
Maxima T°C anomalies		-0.2	0.7	-0.1	0.2	0.6	-0.6	-0.1	0.3	0.3	-0.5	-0.4	0.0	0.1	0.1	-0.1

Note: The temperature anomalies for each year are calculated by subtracting the annual value of temperature of the year from the average annual temperature. Temperature in degree Celsius (°C)

Source: Kenya National Meteorological Office, Moderate Resolution Imaging Spectroradiometer (MODIS)

Table A4.6.3: Trends in Key Contextual Factors in Kenya

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Household characteristics</b>											
Improved source of drinking water*	40.5	(37.4,43.7)	8175	63	(58.7,67.2)	9057	69.4	(67.8,70.9)	36423	28.9 (25.1, 32.8)	<0.001
<i>Low risk</i>	61.6	(55.9,67.0)	3115	75.7	(67.5,82.4)	2680	79.8	(77.3,82.1)	8573		
<i>Seasonal</i>	30.8	(24.9,37.5)	1475	53.7	(45.0,62.1)	2116	54.4	(50.4,58.3)	10773		
<i>Highland epidemic</i>	27.5	(19.6,37.2)	1121	52.5	(41.9,62.8)	1244	64.9	(61.4,68.2)	7074		
<i>Coast endemic</i>	65.7	(54.4,75.4)	876	66	(55.7,75.0)	1112	71.7	(65.7,77.1)	3738		
<i>Lake endemic</i>	17.4	(13.1,22.9)	1588	58.8	(50.6,66.5)	1905	65.9	(62.3,69.3)	6265		
Drinking water <15 min round-trip	32.3	(29.8,34.9)	5570	29.8	(26.4,33.5)	5508	33.2	(31.7,34.7)	23844	0.9 (-2.3, 4.1)	0.584
<i>Low risk</i>	43	(37.1,49.0)	1317	40.9	(32.9,49.4)	913	40.4	(36.5,44.5)	3927		
<i>Seasonal</i>	16	(12.1,20.8)	1278	16.9	(13.3,21.2)	1518	20.5	(18.3,23.0)	7458		
<i>Highland epidemic</i>	32.3	(27.4,37.7)	898	23.5	(19.4,28.2)	875	24.4	(22.2,26.6)	4698		
<i>Coast endemic</i>	53.6	(44.8,62.2)	710	45.2	(28.4,63.2)	643	54.8	(49.7,59.9)	2575		
<i>Lake endemic</i>	30.3	(25.9,35.0)	1367	30.7	(25.6,36.4)	1559	32.8	(30.6,35.1)	5186		
Access to improved toilet**	19.4	(17.4,21.6)	8561	22.7	(19.9,25.8)	9056	22.7	(21.1,24.3)	36421	3.3 (0.3, 6.2)	0.031
<i>Low risk</i>	32.2	(27.5,37.3)	3154	31	(24.2,38.7)	2680	26	(22.4,29.9)	8573		
<i>Seasonal</i>	11.5	(9.4,14.0)	1668	14.5	(11.2,18.6)	2116	19.9	(17.8,22.2)	10774		
<i>Highland epidemic</i>	12.2	(8.4,17.5)	1172	18.3	(13.2,24.9)	1243	22.5	(20.3,25.0)	7073		
<i>Coast endemic</i>	26.9	(20.2,34.8)	975	21.7	(14.3,31.4)	1112	22.2	(18.7,26.2)	3738		
<i>Lake endemic</i>	9.8	(7.0,13.4)	1592	20.8	(16.6,25.8)	1905	18.9	(16.8,21.3)	6264		
Household floor material not earth, sand or dung	37.8	(35.1,40.5)	8548	44.9	(40.1,49.7)	9051	52.7	(51.1,54.3)	36423	14.9 (11.3,18.5)	<0.001
<i>Low risk</i>	55.7	(50.7,60.6)	3147	65.6	(56.6,73.5)	2676	72.6	(70.0,75.1)	8574		
<i>Seasonal</i>	30.7	(25.8,36.1)	1664	30.1	(23.0,38.4)	2114	39.5	(36.3,42.7)	10775		
<i>Highland epidemic</i>	24.5	(17.7,32.9)	1172	28.2	(20.2,38.0)	1244	39.2	(35.4,43.1)	7072		
<i>Coast endemic</i>	45.2	(38.0,52.7)	974	65.2	(49.6,78.1)	1112	62.4	(58.5,66.2)	3738		
<i>Lake endemic</i>	24.3	(19.8,29.4)	1591	31	(25.0,37.8)	1905	32.7	(29.9,35.6)	6264		
Household has electricity	16	(14.0,18.3)	8548	23	(19.1,27.6)	9053	36	(34.3,37.7)	36409	20.0 (16.8, 23.1)	<0.001
<i>Low risk</i>	35.1	(30.3,40.3)	3145	43.3	(34.6,52.5)	2679	58.3	(54.9,61.6)	8572		
<i>Seasonal</i>	5.9	(4.4,7.9)	1667	11.2	(6.7,18.2)	2115	21.1	(18.8,23.7)	10776		
<i>Highland epidemic</i>	3.7	(1.0,12.1)	1172	6.6	(3.7,11.5)	1244	21.2	(18.2,24.6)	7070		
<i>Coast endemic</i>	19.4	(12.9,28.0)	974	34.1	(25.7,43.6)	1112	45.4	(41.5,49.4)	3731		
<i>Lake endemic</i>	4.4	(2.3,8.3)	1590	10.5	(5.9,18.1)	1903	14.1	(11.9,16.7)	6260		
Household has telephone (landline or mobile)	12.9	(11.4,14.5)	8543	61.6	(58.8,64.2)	9054	86.1	(85.4,86.7)	36408	73.2 (71.3, 75.1)	<0.001
<i>Low risk</i>	23.2	(19.5,27.3)	3140	75.2	(70.3,79.6)	2678	93.3	(92.6,94.0)	8569		
<i>Seasonal</i>	6	(4.4,8.1)	1667	48.5	(42.2,54.8)	2116	75.2	(73.1,77.2)	10772		
<i>Highland epidemic</i>	7.3	(5.3,10.1)	1172	55.7	(51.4,59.9)	1244	84.2	(82.6,85.6)	7072		
<i>Coast endemic</i>	15.1	(11.3,20.0)	974	65.5	(58.9,71.5)	1111	88.3	(86.6,89.8)	3734		
<i>Lake endemic</i>	6.8	(5.1,9.0)	1590	54.6	(49.9,59.2)	1905	82.7	(81.2,84.1)	6261		

\*Improved water sources include: piped water into dwelling/yard/plot; public tap/standpipe; tubewell/borehole; protected dug well; protected spring; rainwater; bottled water; as per DHS VI Standard Tab plan.

\*\*Improved, not shared toilet facility includes: flush/pour flush to piped sewer system; flush/pour flush to septic tank; flush/pour flush to a pit latrine; ventilated improved pit (VIP) latrine; pit latrine with a slab; composting toilet; and does not include any toilets that are shared with other households, as per DHS VI Standard Tabs.

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Socio-demographic factors</b>											
Proportion of women 15-49 with at least a primary school education	49.4	(47.2,51.5)	8195	57.4	(54.2,60.4)	8444	65.8	(64.6,66.9)	31079	16.4 (13.6, 19.2)	<0.001
<i>Low risk</i>	68.4	(64.4,72.2)	2863	73.5	(68.5,78.0)	2353	83.1	(81.5,84.5)	6957		
<i>Seasonal</i>	40.5	(36.3,44.8)	1625	40.4	(34.4,46.7)	1970	48.5	(45.9,51.1)	9110		
<i>Highland epidemic</i>	43.8	(38.5,49.2)	1250	55.6	(49.5,61.6)	1224	61.7	(59.5,63.9)	6312		
<i>Coast endemic</i>	37.2	(31.0,43.9)	938	48.3	(39.0,57.7)	1040	56.1	(52.8,59.4)	3190		
<i>Lake endemic</i>	38.2	(34.6,41.9)	1519	51	(45.3,56.8)	1857	57.2	(55.1,59.4)	5510		
Proportion of women 15-49 literate	78.5	(76.5,80.4)	8195	84.9	(82.7,86.9)	8444	88	(87.3,88.7)	31079	9.5 (7.3, 11.7)	<0.001
<i>Low risk</i>	88.8	(85.4,91.5)	2863	92.7	(89.8,94.8)	2353	95.4	(94.6,96.1)	6957		
<i>Seasonal</i>	70	(65.5,74.2)	1625	68.3	(60.4,75.3)	1970	71.8	(69.4,74.1)	9110		
<i>Highland epidemic</i>	78.3	(72.2,83.4)	1250	88.5	(85.2,91.1)	1224	88.9	(87.4,90.3)	6312		
<i>Coast endemic</i>	65.6	(58.1,72.3)	938	73	(63.4,80.8)	1040	82.4	(79.6,84.8)	3190		
<i>Lake endemic</i>	76.2	(72.7,79.4)	1519	87.5	(84.1,90.3)	1857	90.7	(89.5,91.7)	5510		
Proportion of women 15-49 married	54.5	(53.0,55.9)	8195	54.2	(52.5,55.9)	8444	54.6	(53.6,55.5)	31079	0.1 (-1.7, 1.9)	0.891
<i>Low risk</i>	51.4	(48.9,53.9)	2863	51.5	(48.5,54.4)	2353	52.7	(50.7,54.8)	6957		
<i>Seasonal</i>	59	(55.6,62.3)	1625	59.7	(56.1,63.2)	1970	59.7	(58.1,61.4)	9110		
<i>Highland epidemic</i>	50.8	(46.7,54.9)	1250	51.7	(47.3,56.1)	1224	54.6	(52.6,56.6)	6312		
<i>Coast endemic</i>	57.6	(52.9,62.2)	938	60.9	(56.8,64.7)	1040	54.3	(52.0,56.5)	3190		
<i>Lake endemic</i>	56.9	(54.4,59.5)	1519	53.9	(50.9,56.9)	1857	53.5	(51.5,55.4)	5510		

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Fertility-related risk</b>											
High-risk birth*	57.2	(55.4,58.9)	5949	55.5	(53.2,57.8)	6079	50.3	(49.2,51.5)	20964	-6.8 (-9.1, -4.6)	<0.001
<i>Low risk</i>	46.3	(42.6,50.0)	1574	44.6	(38.5,50.9)	1197	35.6	(33.0,38.3)	3596		
<i>Seasonal</i>	57	(53.7,60.3)	1352	58.9	(54.0,63.7)	1634	55.1	(53.0,57.2)	7043		
<i>Highland epidemic</i>	58.7	(54.7,62.6)	1057	56.8	(52.2,61.3)	916	52.4	(49.8,54.9)	4365		
<i>Coast endemic</i>	59.6	(54.9,64.2)	699	59.4	(53.7,64.9)	770	56.5	(53.1,59.8)	1976		
<i>Lake endemic</i>	66.9	(63.2,70.3)	1267	61.5	(57.8,65.1)	1562	61.8	(60.0,63.7)	3984		
Avoidable risk birth**	56	(54.2,57.8)	5949	54.6	(52.3,56.9)	6079	48.7	(47.5,49.9)	20964	-7.3 (-9.6, -5.0)	<0.001
<i>Low risk</i>	45.4	(41.6,49.2)	1574	43.2	(37.0,49.7)	1197	33	(30.4,35.7)	3596		
<i>Seasonal</i>	56	(52.7,59.3)	1352	58.4	(53.4,63.1)	1634	53.7	(51.6,55.7)	7043		
<i>Highland epidemic</i>	57.2	(53.0,61.2)	1057	56.3	(51.8,60.8)	916	51.1	(48.6,53.5)	4365		
<i>Coast endemic</i>	57.7	(53.0,62.4)	699	57.1	(51.5,62.6)	770	55	(51.6,58.4)	1976		
<i>Lake endemic</i>	65.7	(62.0,69.3)	1267	60.9	(57.2,64.5)	1562	61	(59.1,62.9)	3984		
Unavoidable risk birth***	18.2	(17.0,19.4)	5949	17.1	(15.8,18.6)	6079	21	(20.0,22.0)	20964	2.8 (1.1, 4.5)	0.001
<i>Low risk</i>	25.7	(23.1,28.6)	1574	22	(18.3,26.2)	1197	30	(27.3,32.9)	3596		
<i>Seasonal</i>	17.6	(15.4,20.1)	1352	12.5	(10.4,14.8)	1634	18	(16.6,19.4)	7043		
<i>Highland epidemic</i>	15.3	(12.8,18.1)	1057	17.3	(14.4,20.7)	916	19.1	(17.7,20.7)	4365		
<i>Coast endemic</i>	15.9	(11.6,21.3)	699	17	(13.8,20.8)	770	20.2	(17.6,23.1)	1976		
<i>Lake endemic</i>	14.1	(12.3,16.1)	1267	15.8	(13.3,18.7)	1562	13.2	(12.0,14.6)	3984		
Birth intervals <24 months	17.4	(16.3,18.6)	5949	17.5	(16.1,19.0)	6079	13.1	(12.5,13.8)	20964	-4.2 (-5.6, -2.9)	<0.001
<i>Low risk</i>	13.9	(11.4,16.7)	1574	22	(18.3,26.2)	1197	9.1	(7.9,10.3)	3596		
<i>Seasonal</i>	17.6	(15.3,20.2)	1352	12.5	(10.4,14.8)	1634	15.9	(14.5,17.4)	7043		
<i>Highland epidemic</i>	17.3	(15.2,19.6)	1057	17.3	(14.4,20.7)	916	13.2	(11.9,14.5)	4365		
<i>Coast endemic</i>	16.2	(13.1,19.9)	699	17	(13.8,20.8)	770	13.2	(11.5,15.1)	1976		
<i>Lake endemic</i>	21.5	(19.1,24.1)	1267	15.8	(13.3,18.7)	1562	16.3	(15.0,17.7)	3984		
Fourth or higher birth	69.4	(67.7,70.9)	11611	68.6	(66.5,70.6)	11433	64.3	(63.3,65.4)	39997	-5.0 (-7.1, -2.9)	<0.001
<i>Low risk</i>	57.3	(53.8,60.7)	2573	59	(54.1,63.7)	1989	48.1	(45.1,51.2)	6136		
<i>Seasonal</i>	72.2	(69.1,75.1)	2878	71.2	(67.0,75.1)	3118	68.2	(66.3,70.1)	13269		
<i>Highland epidemic</i>	70.5	(66.6,74.0)	2163	74	(69.3,78.3)	1900	66.6	(64.5,68.7)	8382		
<i>Coast endemic</i>	69.2	(64.7,73.5)	1399	66	(59.5,72.0)	1373	68.3	(65.4,71.1)	3800		
<i>Lake endemic</i>	75.9	(72.7,78.9)	2598	70.8	(67.2,74.2)	3053	74.1	(72.4,75.6)	8410		
Mother age <18 years or >34 years	19.1	(17.8,20.4)	5949	17.7	(16.2,19.4)	6079	17.9	(17.1,18.7)	20964	-1.2 (-2.7, 0.4)	0.138
<i>Low risk</i>	16.8	(14.4,19.6)	1574	16.6	(13.6,20.2)	1197	13.5	(12.0,15.2)	3596		
<i>Seasonal</i>	17.5	(15.2,20.1)	1352	18.1	(15.8,20.5)	1634	19	(17.6,20.4)	7043		
<i>Highland epidemic</i>	20.9	(17.7,24.4)	1057	17	(13.5,21.1)	916	18.9	(17.3,20.6)	4365		
<i>Coast endemic</i>	19.8	(16.1,24.1)	699	19.7	(14.9,25.6)	770	22.1	(19.4,25.1)	1976		
<i>Lake endemic</i>	21	(18.9,23.2)	1267	18.7	(15.5,22.3)	1562	20.1	(18.5,21.8)	3984		

\*A high risk birth is defined as any birth to a birth interval <24 months, a multiple birth, birth order <3, or any birth to a woman younger than 18 or older than 34 years.  
\*\*An avoidable high risk birth is a birth to a woman <18 years or >34 years, a birth interval <24 months, or a birth order >3.  
\*\*\* An unavoidable high risk birth is a first birth born to women ages 18–34



Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>ANC coverage</b>											
Antenatal care ( $\geq 4$ visits)	52.3	(50.2,54.4)	3972	47.1	(44.8,49.5)	4082	57.6	(56.4,58.8)	14945	5.3 (2.8, 7.8)	<0.001
<i>Low risk</i>	64	(60.6,67.3)	1166	56.4	(50.2,62.4)	924	66.2	(63.9,68.4)	2880		
<i>Seasonal</i>	40.5	(36.8,44.4)	870	43.3	(38.6,48.1)	1005	50.4	(48.0,52.8)	4713		
<i>Highland epidemic</i>	49.6	(43.6,55.6)	676	40.8	(36.2,45.5)	629	48.6	(46.3,50.9)	3165		
<i>Coast endemic</i>	51.9	(46.1,57.7)	467	50.2	(43.9,56.6)	523	63.3	(59.7,66.7)	1421		
<i>Lake endemic</i>	51.9	(47.4,56.4)	793	43.8	(39.8,47.8)	1001	56.6	(54.1,59.0)	2766		
At least 2 doses of tetanus toxoid during pregnancy	51.9	(49.9,53.9)	3972	55	(52.6,57.4)	4082	51.1	(49.4,52.7)	7161	-0.8 (-3.5, 1.8)	0.552
<i>Low risk</i>	59.6	(56.9,62.3)	1166	61.5	(56.4,66.3)	924	57.8	(54.2,61.3)	1374		
<i>Seasonal</i>	49.9	(45.4,54.4)	870	53.4	(48.0,58.7)	1005	47.8	(44.8,50.9)	2253		
<i>Highland epidemic</i>	49.9	(45.1,54.8)	676	49.6	(43.4,55.9)	629	42	(39.2,44.9)	1539		
<i>Coast endemic</i>	54.6	(48.2,61.0)	467	64.4	(55.6,72.4)	523	65	(60.6,69.2)	676		
<i>Lake endemic</i>	45	(40.3,49.8)	793	50.3	(45.9,54.6)	1001	45.9	(42.2,49.6)	1319		
Postnatal Vitamin A supplementation	14.2	(12.8,15.7)	3972	45.8	(43.0,48.7)	4082	54	(52.1,55.8)	7160	39.8 (37.2, 42.1)	<0.001
<i>Low risk</i>	15.2	(12.8,18.0)	1166	48.3	(41.3,55.2)	924	59.8	(55.9,63.6)	1376		
<i>Seasonal</i>	12.6	(9.9,15.9)	870	38	(33.9,42.3)	1005	48.3	(45.4,51.3)	2252		
<i>Highland epidemic</i>	12.3	(9.4,15.8)	676	46.2	(41.3,51.2)	629	47.7	(44.9,50.5)	1540		
<i>Coast endemic</i>	22.9	(17.1,30.0)	467	58.8	(51.3,65.9)	523	44.3	(38.9,49.9)	676		
<i>Lake endemic</i>	13	(10.5,16.0)	793	44.8	(39.3,50.4)	1001	60.5	(56.3,64.7)	1316		
Delivery in a health facility*	40.1	(37.7,42.6)	5949	43.5	(40.3,46.8)	6079	61.5	(60.0,62.9)	20850	21.4 (18.1, 24.6)	<0.001
<i>Low risk</i>	64.6	(58.3,70.4)	1574	61.1	(51.9,69.6)	1197	80.6	(78.1,82.9)	3585		
<i>Seasonal</i>	32.3	(28.1,36.8)	1352	34.3	(27.0,42.4)	1634	49.6	(46.4,52.7)	7006		
<i>Highland epidemic</i>	32.5	(27.6,37.9)	1057	39	(32.4,46.0)	916	51.9	(48.6,55.2)	4335		
<i>Coast endemic</i>	31.2	(23.6,40.1)	699	46.7	(38.2,55.4)	770	60.5	(55.4,65.3)	1967		
<i>Lake endemic</i>	31.4	(26.9,36.3)	1267	36	(30.6,41.8)	1562	55.1	(51.9,58.1)	3957		
Skilled attendant at birth**	41.6	(39.0,44.1)	5949	43.8	(40.5,47.1)	6079	61.8	(60.4,63.3)	20964	20.3 (17.0, 23.6)	<0.001
<i>Low risk</i>	65.7	(59.4,71.5)	1574	60.4	(51.2,68.9)	1197	80.6	(78.1,82.8)	3596		
<i>Seasonal</i>	33.2	(28.8,37.9)	1352	36.1	(28.5,44.6)	1634	50.4	(47.2,53.6)	7043		
<i>Highland epidemic</i>	34.5	(29.4,40.0)	1057	39.3	(32.5,46.5)	916	53.1	(49.7,56.4)	4365		
<i>Coast endemic</i>	33.8	(26.2,42.4)	699	47.2	(39.1,55.5)	770	60.8	(55.7,65.6)	1976		
<i>Lake endemic</i>	32.8	(27.9,38.1)	1267	35.8	(30.4,41.6)	1562	55	(52.0,58.0)	3984		

\*Health facility includes all public and private places of delivery response options.\*\*Skilled provider includes doctor, nurse, trained birth attendant, medical assistant, midwife.

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>IMCI coverage*</b>											
Oral rehydration therapy (ORT) for diarrhea**	29.2	(25.2,33.5)	866	88.9	(87.3,90.3)	946	91.7	(90.3,93.0)	20964	62.5 (59.2, 65.7)	<0.001
<i>Low risk</i>	31.5	(25.2,38.6)	157	91.3	(88.3,93.6)	135	92.2	(91.1,93.1)	3596		
<i>Seasonal</i>	36.7	(29.7,44.4)	179	88	(84.4,90.8)	237	91.2	(90.2,92.2)	7043		
<i>Highland epidemic</i>	24.4	(15.7,36.0)	156	90.7	(87.6,93.1)	122	88	(85.4,90.1)	4365		
<i>Coast endemic</i>	43.4	(30.6,57.2)	140	81.2	(72.4,87.7)	161	88.2	(86.9,89.5)	1976		
<i>Lake endemic</i>	20.4	(14.6,27.9)	234	88.1	(84.9,90.6)	291	90.6	(90.0,91.2)	3984		
Oral rehydration salt solution (ORS) for diarrhea	29.2	(25.2,33.5)	866	71.5	(66.6,75.9)	6079	54.1	(51.5,56.6)	2936	24.9 (20.0, 29.8)	<0.001
<i>Low risk</i>	31.5	(25.2,38.6)	157	67.7	(55.8,77.7)	1197	56.6	(50.8,62.2)	407		
<i>Seasonal</i>	36.7	(29.7,44.4)	179	76.5	(67.4,83.6)	1634	48	(43.1,52.9)	870		
<i>Highland epidemic</i>	24.4	(15.7,36.0)	156	67.9	(53.3,79.7)	916	53.6	(48.2,58.8)	549		
<i>Coast endemic</i>	43.4	(30.6,57.2)	140	74.3	(59.2,85.3)	770	65.3	(58.8,71.2)	319		
<i>Lake endemic</i>	20.4	(14.6,27.9)	234	71.8	(64.0,78.4)	1562	51.7	(46.6,56.7)	791		
*Integrated Management of Childhood Illness (IMCI), **Child was given oral rehydration or recommended home solution.											

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Immunization coverage*</b>											
BCG	87.4	(84.3,90.0)	1003	95.8	(94.1,97.0)	1015	97.1	(96.3,97.7)	3762	9.7 (6.5, 12.8)	<0.001
<i>Low risk</i>	98.4	(96.3,99.3)	259	95	(90.3,97.5)	194	98.6	(96.1,99.5)	648		
<i>Seasonal</i>	79.5	(72.7,85.0)	235	96.8	(93.5,98.5)	267	94.7	(92.9,96.1)	1288		
<i>Highland epidemic</i>	88.2	(77.5,94.2)	183	98.2	(94.8,99.4)	167	97.9	(96.4,98.8)	774		
<i>Coast endemic</i>	89.6	(82.8,93.9)	129	96.5	(90.7,98.8)	22	97.4	(94.2,98.9)	342		
<i>Lake endemic</i>	81.6	(73.5,87.7)	197	93	(88.3,95.9)	265	96.1	(93.9,97.5)	710		
DPT3	72.8	(68.9,76.3)	1003	86.7	(83.4,89.4)	1015	90.6	(89.2,91.9)	3762	17.9 (13.6, 22.1)	<0.001
<i>Low risk</i>	76.4	(70.0,81.9)	259	93.1	(86.7,96.6)	194	92.9	(89.8,95.1)	648		
<i>Seasonal</i>	76.8	(68.9,83.2)	235	85.9	(78.8,90.9)	267	87.2	(83.8,90.0)	1288		
<i>Highland epidemic</i>	75.3	(65.8,82.9)	183	90.1	(83.9,94.1)	167	90.6	(87.5,93.0)	774		
<i>Coast endemic</i>	78.8	(67.4,87.0)	129	86.5	(73.4,93.7)	22	92.8	(89.1,95.3)	342		
<i>Lake endemic</i>	58.1	(49.7,66.1)	197	77.1	(69.0,83.6)	265	89.5	(86.0,92.3)	710		
Polio3	72.8	(69.0,76.4)	1003	86.7	(83.4,89.4)	1015	90.6	(89.2,91.9)	3762	17.8 (13.5, 22.1)	<0.001
<i>Low risk</i>	76.7	(70.2,82.2)	259	93.1	(86.7,96.6)	194	93	(89.9,95.1)	648		
<i>Seasonal</i>	76.8	(68.9,83.2)	235	85.9	(78.8,90.9)	267	87.2	(83.8,90.0)	1288		
<i>Highland epidemic</i>	75.3	(65.8,82.9)	183	90.1	(83.9,94.1)	167	90.6	(87.5,93.0)	774		
<i>Coast endemic</i>	78.8	(67.4,87.0)	129	86.5	(73.4,93.7)	22	92.8	(89.1,95.3)	342		
<i>Lake endemic</i>	58.1	(49.7,66.1)	197	77.1	(69.0,83.6)	265	89.5	(86.0,92.3)	710		
Measles	72.4	(68.5,75.9)	1003	84.7	(81.4,87.5)	1015	87	(85.6,88.3)	3762	14.6 (10.5, 18.8)	<0.001
<i>Low risk</i>	86.2	(80.2,90.6)	259	90.6	(83.6,94.8)	194	93.4	(90.6,95.4)	648		
<i>Seasonal</i>	67.9	(59.8,75.0)	235	83.5	(76.6,88.6)	267	80.6	(77.2,83.5)	1288		
<i>Highland epidemic</i>	72.5	(63.7,79.9)	183	88.3	(82.0,92.7)	167	86.1	(83.3,88.5)	774		
<i>Coast endemic</i>	80.8	(67.7,89.4)	129	85	(75.2,91.4)	22	86.9	(82.2,90.6)	342		
<i>Lake endemic</i>	57.1	(48.0,65.8)	197	75.5	(67.0,82.4)	265	84.5	(80.4,87.8)	710		
Fully vaccinated	59.9	(56.1,63.6)	1003	78.9	(75.2,82.2)	1015	81.7	(80.0,83.3)	3762	21.9 (17.3 26.3)	<0.001
<i>Low risk</i>	68.7	(62.7,74.2)	259	87	(78.9,92.2)	194	87.8	(84.6,90.5)	648		
<i>Seasonal</i>	59	(51.6,66.0)	235	77.1	(69.5,83.3)	267	74.5	(70.4,78.3)	1288		
<i>Highland epidemic</i>	63.1	(53.3,72.0)	183	83.5	(76.9,88.6)	167	82.1	(79.0,84.9)	774		
<i>Coast endemic</i>	67.9	(56.5,77.5)	129	76.8	(68.5,83.5)	22	81.6	(76.0,86.1)	342		
<i>Lake endemic</i>	43.4	(35.6,51.5)	197	67.7	(58.9,75.4)	265	79.2	(74.7,83.0)	710		

\* Percentage of children ages 12–23 months with the recommended immunizations.

Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Micronutrients</b>											
Vitamin A supplementation	33.3	(31.0,35.7)	3972	43.4	(40.2,46.6)	4082	71.4	(70.2,72.5)	18221	38.0 (35.3, 40.8)	<0.001
<i>Low risk</i>	38.4	(34.6,42.3)	1166	37.7	(33.5,42.1)	924	77.4	(74.8,79.7)	3143		
<i>Seasonal</i>	22.2	(18.2,26.8)	870	43.6	(36.4,51.2)	1005	65.4	(63.0,67.8)	6144		
<i>Highland epidemic</i>	36.4	(31.0,42.2)	676	47.5	(39.9,55.3)	629	66.4	(64.0,68.7)	3835		
<i>Coast endemic</i>	33.2	(26.2,40.9)	467	51.8	(43.5,60.0)	523	68.5	(64.7,72.1)	1674		
<i>Lake endemic</i>	35.9	(30.9,41.1)	793	42.1	(35.5,49.0)	1001	74.6	(72.4,76.6)	3425		
Zinc				0.2	(0.1,0.8)	946	8.1	(6.8,9.8)	2942		
<i>Low risk</i>				0		135	8.4	(5.3,13.2)	409		
<i>Seasonal</i>				1	(0.3,3.9)	237	5.1	(3.3,7.9)	868		
<i>Highland epidemic</i>				0		122	7.3	(4.9,10.6)	551		
<i>Coast endemic</i>				0		161	12.2	(7.5,19.1)	319		
<i>Lake endemic</i>				0		291	8.7	(6.4,11.6)	795		
<b>Nutritional status</b>											
Stunting	29.4	(27.7,31.1)	5949	35.3	(33.1,37.5)	5096	25.8	(24.8,26.8)	18656	-3.6 (-5.5, -1.6)	<0.001
<i>Low risk</i>	26.2	(23.1,29.4)	1574	34	(29.1,39.4)	1011	21.1	(19.0,23.4)	3223		
<i>Seasonal</i>	31	(27.9,34.3)	1352	36.8	(33.1,40.6)	1327	28.4	(26.6,30.3)	6270		
<i>Highland epidemic</i>	31.4	(28.4,34.5)	1057	37.7	(33.1,42.6)	794	31.3	(29.3,33.3)	3905		
<i>Coast endemic</i>	33.1	(27.2,39.6)	699	40.5	(33.7,47.7)	673	30.2	(27.2,33.4)	1741		
<i>Lake endemic</i>	28.1	(24.3,32.2)	1267	31.4	(27.5,35.5)	1291	22.6	(20.9,24.5)	3517		
Underweight	13.7	(12.4,15.1)	5949	16	(14.1,18.1)	5096	10.6	(10.0,11.4)	18656	-3.1 (-4.6, -1.5)	<0.001
<i>Low risk</i>	9.2	(7.2,11.5)	1574	13	(9.3,17.8)	1011	6.2	(5.1,7.5)	3223		
<i>Seasonal</i>	18.4	(16.3,20.7)	1352	25.4	(21.2,30.1)	1327	18	(16.1,20.2)	6270		
<i>Highland epidemic</i>	16	(12.6,20.1)	1057	15.7	(11.9,20.5)	794	12.7	(11.3,14.2)	3905		
<i>Coast endemic</i>	16.2	(12.5,20.8)	699	23.4	(18.0,29.8)	673	12.3	(10.3,14.7)	1741		
<i>Lake endemic</i>	11.1	(8.6,14.2)	1267	9.2	(7.2,11.6)	1291	7.3	(6.3,8.4)	3517		
Wasting	5.1	(4.3,6.0)	5949	6.5	(5.6,7.6)	5096	4.1	(3.6,4.5)	18656	-1.0 (-2.0, -0.0)	0.047
<i>Low risk</i>	3.4	(2.3,5.0)	1574	4.5	(3.2,6.3)	1011	3.1	(2.5,4.0)	3223		
<i>Seasonal</i>	7.3	(5.7,9.3)	1352	12.3	(9.9,15.1)	1327	8.2	(6.8,9.8)	6270		
<i>Highland epidemic</i>	6.2	(3.9,9.8)	1057	6.8	(5.1,9.0)	794	3.4	(2.7,4.3)	3905		
<i>Coast endemic</i>	4.5	(3.0,6.5)	699	9.4	(6.5,13.3)	673	4.3	(3.1,5.8)	1741		
<i>Lake endemic</i>	3.9	(2.8,5.4)	1267	2.8	(1.8,4.5)	1291	2.1	(1.6,2.7)	3517		

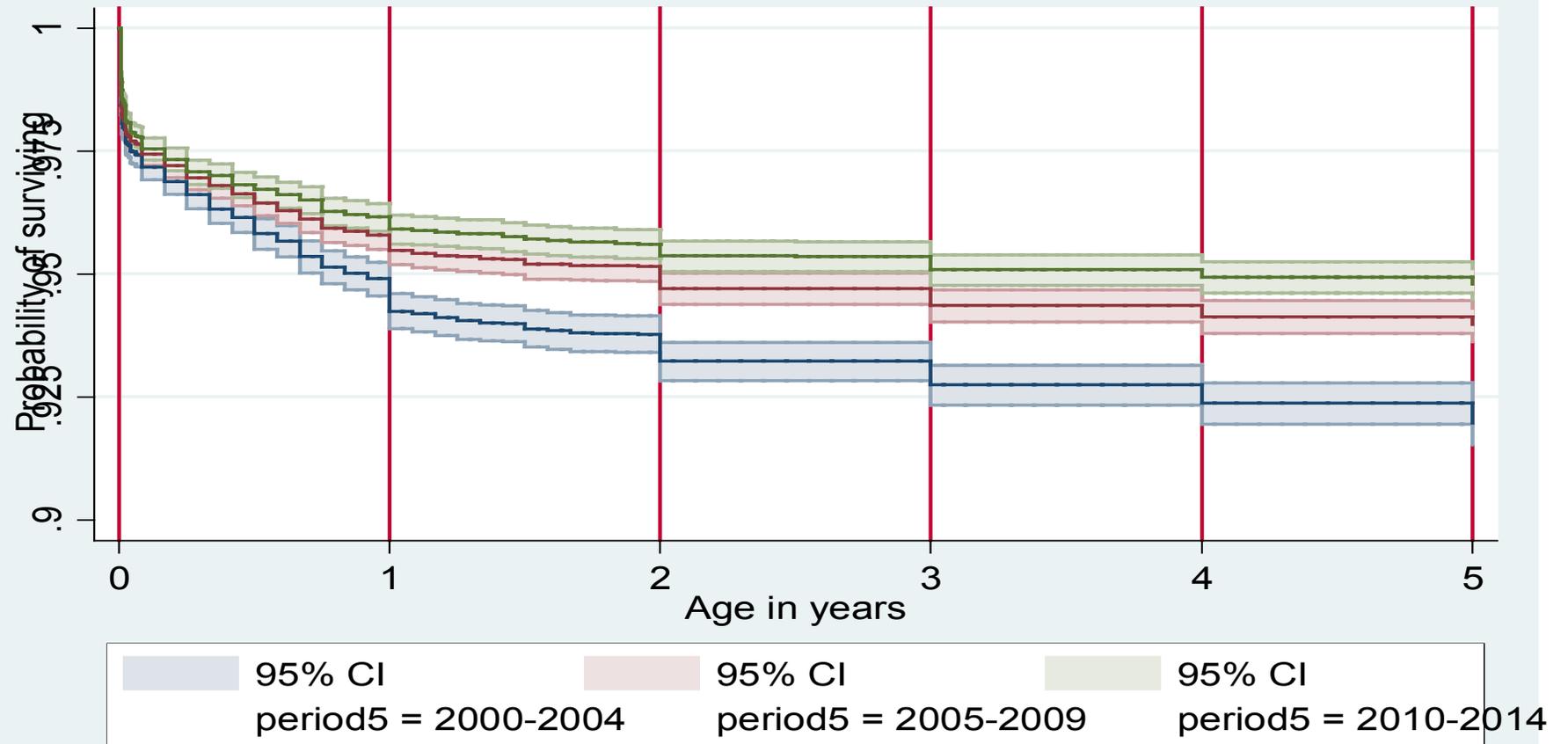
Background characteristic	KDHS 2003			KDHS 2008–2009			KDHS 2014			Percentage point change (95% CI)	p-value
	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n		
<b>Breastfeeding</b>											
Early initiation of breastfeeding (within 1 hour of birth)	51.3	(48.3,54.2)	2195	57.3	(53.3,61.3)	2223	63.1	(60.9,65.4)	3652	11.9 (8.1, 15.6)	<0.001
<i>Low risk</i>	59.6	(54.1,64.9)	572	57.4	(50.5,64.1)	425	60.5	(55.2,65.5)	616		
<i>Seasonal</i>	63.3	(58.1,68.3)	507	72.5	(64.1,79.6)	582	71.2	(67.5,74.6)	1254		
<i>Highland epidemic</i>	56	(48.6,63.2)	393	62.3	(52.1,71.6)	345	67.5	(62.6,72.0)	776		
<i>Coast endemic</i>	20.2	(13.7,28.7)	271	37	(24.5,51.6)	297	62.4	(53.4,70.7)	338		
<i>Lake endemic</i>	36.5	(30.6,42.8)	452	48	(42.7,53.3)	574	55.4	(51.3,59.4)	668		
Exclusive breastfeeding <6 months	12.7	(9.5,16.8)	597	32.2	(26.8,38.2)	580	61.7	(57.5,65.8)	852	49.0 (43.4, 54.6)	<0.001
<i>Low risk</i>	10.2	(6.0,16.9)	155	41.9	(30.5,54.2)	114	69.3	(58.4,78.5)	131		
<i>Seasonal</i>	11.7	(5.5,23.2)	131	32.1	(22.0,44.3)	159	52.4	(44.5,60.2)	297		
<i>Highland epidemic</i>	12.8	(6.3,24.3)	107	34.3	(22.3,48.7)	85	55.6	(46.1,64.8)	174		
<i>Coast endemic</i>	12.8	(4.1,33.7)	68	18.4	(10.1,31.2)	72	70.3	(59.7,79.1)	96		
<i>Lake endemic</i>	16	(10.2,24.3)	136	23.4	(16.8,31.6)	150	62.7	(55.2,69.5)	154		
% of 6-9 months breastfeeding and consuming complementary foods	87.2	(81.4,91.4)	393	84.6	(79.3,88.7)	436	82.1	(78.4,85.3)	639	-5.1 (-10.8, 0.68)	0.084
<i>Low risk</i>	86.3	(76.2,92.5)	97	84.8	(68.5,93.5)	80	87.8	(78.7,93.4)	111		
<i>Seasonal</i>	79.3	(61.5,90.2)	99	70.7	(59.6,79.7)	114	71.4	(64.6,77.4)	228		
<i>Highland epidemic</i>	93.9	(84.3,97.8)	69	83.6	(67.2,92.7)	55	92.4	(86.5,95.9)	130		
<i>Coast endemic</i>	89.8	(71.8,96.8)	57	98.7	(95.7,99.6)	70	87.8	(72.9,95.0)	48		
<i>Lake endemic</i>	90.1	(76.4,96.3)	71	89.8	(79.2,95.3)	117	74.2	(63.9,82.3)	122		
Source: DHS 2003, DHS 2008–2009 and DHS 2014.											

### **Annex 5. Kaplan Meir Survival Estimates**

Probability of surviving between ages 0 and 5 are then presented by 5-year period. There is clear improvement of child survival during the period as the probability of surviving is higher during the period 2010-2014 as compared with the periods 2005-2009 and 2000-2004.

## Probability of surviving between ages 0 and 5

Period 2000-2014



*By endemicity zone*

