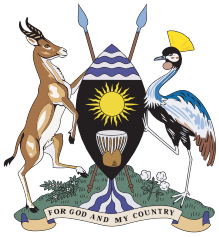
Uganda

Malaria Indicator Survey 2014-15

Key Indicators

MINISTRY OF HEALTH



THE REPUBLIC OF UGANDA

Uganda
Malaria Indicator Survey
2014-15

Key Indicators

Uganda Bureau of Statistics
Kampala, Uganda

National Malaria Control Programme
Uganda Ministry of Health
Kampala, Uganda

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The 2014-15 Uganda Malaria Indicator Survey (2014-15 UMIS) was implemented by the Uganda Bureau of Statistics (UBOS) and the National Malaria Control Programme (NMCP) of the Uganda Ministry of Health from December 2014 to January 2015. The funding for the UMIS was provided by the United States Agency for International Development (USAID) and the United Kingdom Department for International Development (DFID). ICF International provided technical assistance as well as funding to the project through The DHS Program, a USAID-funded project providing support and technical assistance in the implementation of population and health surveys in countries worldwide.

Additional information about the 2014-15 UMIS may be obtained from the Uganda Bureau of Statistics (UBOS), Plot 9 Coleville Street, P.O. Box 7186, Kampala, Uganda; Telephone: (256-41) 706000; Fax: (256-41) 237553/230370; Email: ubos@ubos.org; Internet: www.ubos.org.

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

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TABLES

1 INTRODUCTION

The 2014-15 Uganda Malaria Indicator Survey (2014-15 UMIS) was implemented by the Uganda Bureau of Statistics (UBOS) and the National Malaria Control Programme (NMCP) of the Uganda Ministry of Health from 1 December 2014 through the end of January 2015 on a nationally representative sample of more than 5,000 households. All women age 15-49 in these households were eligible for individual interviews if they were either usual residents of the households or visitors present in the household on the night before the survey. During the interviews, they were asked questions about their recent births, malaria prevention during pregnancy, treatment of childhood fevers, and knowledge of malaria. Children age 0-59 months who lived in the selected households or were visitors present in the households on the night before the survey were eligible to be tested for anaemia and malaria, using blood from a finger- or heel-prick blood sample. Results were immediately available and were provided to the children's parents or guardians. Using the same finger- or heel-prick sample, thick and thin blood smears were also made in the field and transported to the Molecular Research Laboratory at Mulago Hospital. Microscopy was performed to determine the presence of malaria parasites and to identify the parasite species.

Financial support for the survey was provided by the U.S. Agency for International Development (USAID) and the United Kingdom Department for International Development (DFID).

The main objective of the 2014-15 UMIS was to obtain population-based estimates on malaria indicators, including the prevalence of malaria and anaemia, to inform strategic planning and programme evaluation. Specific objectives are:

1. To obtain estimates of the magnitude and distribution of anaemia and malaria prevalence among children age 0-59 months

2. To estimate core malaria programme coverage indicators:

    - Measure the extent of ownership and use of mosquito bed nets
    - Assess coverage of the intermittent preventive treatment (IPT) programme for pregnant women
    - Identify practices used to treat malaria among children under age 5 and the use of specific antimalarial medications
    - Assess percentage of children under age 5 with fever for whom advice or treatment was sought
    - Determine the species of *Plasmodium* parasite most prevalent in children age 0-59 months

3. To measure indicators of knowledge, attitudes, and behaviour related to malaria control

4. To determine the factors associated with malaria parasitemia and anaemia

This Key Indicators Report presents a first look at selected results of the 2014-15 UMIS. A comprehensive analysis of the data will appear later in a final report.

2 SURVEY IMPLEMENTATION

2.1 SAMPLE DESIGN

The sample for the 2014-15 Uganda Malaria Indicator Survey (2014-15 UMIS) was designed to provide most of the key malaria indicators for the country as a whole, for urban and rural areas, and for 10 survey regions and 3 study domains. The 3 study domains were created to allow for the following:

- Comparability with two previous surveys: the 2009 UMIS and the 2011 Uganda Demographic and Health Survey (UDHS)
- Comparison of districts in which indoor residual spraying (IRS) programmes are, and are not, implemented
- Estimation of levels of malaria endemicity

Each of the 10 regions and the 3 study domains comprise multiple administrative districts that share a similar malaria burden or have specific malaria prevention efforts. The capital city, Kampala, comprises its own district and is entirely urban. The 3 study domains are arranged as follows: domain 1—covering ten districts in which IRS programmes are currently implemented, domain 2—covering 14 districts planned for future IRS programmes, and domain 3—covering ten high-altitude districts.

The 10 regions consist of the following districts:

Central 1	Butambala, Gomba, Mpigi, Bukomansimbi, Kalangala, Kalungu, Lwengo, Lyantonde, Masaka, Rakai, Sembabule, Wakiso
Central 2	Buikwe, Buvuma, Kayunga, Kiboga, Kyankwanzi, Luwero, Mityana, Mubende, Mukono, Nakaseke, Nakasongola
East Central	Bugiri, Namutumba, Buyende, Iganga, Jinja, Kaliro, Kamuli, Luuka, Mayuge, Namayingo
Kampala	Kampala
Mid-North	Alebtong, Amolatar, Dokolo, Lira, Otuke, Agago, Amuru, Apac, Gulu, Kitgum, Kole, Lamwo, Nwoya, Oyam, Pader
Mid-Western	Bundibugyo, Kabarole, Kasese, Ntoroko, Buliisa, Hoima, Kamwenge, Kibaale, Kiryandongo, Kyegegwa, Kyenjojo, Masindi
Mid-Eastern	Budaka, Butaleja, Kibuku, Pallisa, Tororo, Bukwo, Bulambuli, Kapchorwa, Kween, Bududa, Busia, Manafwa, Mbale, Sironko
North East	Abim, Amudat, Kaabong, Kotido, Moroto, Nakapiripirit, Napak, Amuria, Bukedea, Katakwi, Kumi, Ngora, Soroti, Kaberamaido, Serere
South Western	Kabale, Kisoro, Buhweju, Bushenyi, Ibanda, Isingiro, Kanungu, Kiruhura, Mbarara, Mitooma, Ntungamo, Rubirizi, Rukungiri, Sheema
West Nile	Adjumani, Arua, Koboko, Maracha, Moyo, Nebbi, Yumbe, Zombo

The 3 study domains consist of the following districts:

The 10 IRS districts	Agago, Amuru, Apac, Gulu, Kitgum, Kole, Lamwo, Nwoya, Oyam, Pader
The 14 future IRS districts	Bugiri, Namutumba, Alebtong, Amolatar, Dokolo, Lira, Otuke, Budaka, Butaleja, Kibuku, Pallisa, Tororo, Kaberamaido, Serere
The 10 high-altitude districts	Bundibugyo, Kabarole, Kasese, Ntoroko, Bukwo, Bulambuli, Kapchorwa, Kween, Kabale, Kisoro

The sampling frame used for the 2014-15 UMIS was the preparatory frame for the Uganda Population and Housing Census, which was conducted in August 2014. Provided by the Uganda Bureau of Statistics (UBOS), the sampling frame, excluded nomadic and institutional populations such as persons in hotels, barracks, and prisons.

The 2014-15 UMIS sample was selected using a stratified two-stage cluster design consisting of 210 clusters, with 44 in urban areas and 166 in rural areas. In the first stage, 20 sampling strata were created and clusters were selected independently from each stratum by a probability-proportional-to-size selection. In the selected clusters, a complete listing of households and a mapping exercise was conducted from 25 October to 20 November 2014, with the resulting list of households serving as the sampling frame for the selection of households in the second stage.

In the second stage of the selection process, 28 households were selected in each cluster by equal probability systematic sampling. Because of the nonproportional allocation of the sample to the different regions and study domains, the sample is not self-weighting. Weighting factors have been added to the data file so that the results will be representative at the national and regional level as well as the survey domain level.

All women age 15-49 who were either permanent residents of the households in the 2014-15 UMIS sample or visitors present in the households on the night before the survey were eligible to be interviewed. In addition, all children age 0-59 months who were either permanent residents of the households in the sample or visitors present in the households on the night before the survey were eligible to be tested for malaria and anaemia.

2.2 QUESTIONNAIRES

Two questionnaires were used for the 2014-15 UMIS: the Household Questionnaire and the Woman's Questionnaire. These questionnaires, which are based on The DHS Program's standard Malaria Indicator Survey questionnaires, were adapted to reflect the population and health issues relevant to malaria in Uganda at a series of meetings with stakeholders from the Ministry of Health and other government offices, nongovernmental organisations, and international donors. The questionnaires were translated from English into six major Ugandan languages: Ateso-Karamojong, Luganda, Lugbara, Luo, Runyankole-Rukiga, and Runyoro-Rutoro.

The Household Questionnaire was used to list all the usual members and visitors who stayed in selected households the night before the survey. Some basic information was collected on the characteristics of each person listed, including his or her age, sex, and relationship to the head of the household. The data on the age and sex of household members was used to identify women who were eligible for the individual interview. Additionally, the Household Questionnaire collected information on characteristics of the household's dwelling unit, such as the source of water, type of toilet facilities, materials used for the floor and roof of the

house, ownership of various durable goods, and ownership and use of mosquito nets. The Household Questionnaire was also used to record the results of the anaemia and malaria testing.

The Woman's Questionnaire was used to collect information from women age 15-49 who were either usual residents of the households in the 2014-15 UMIS sample or visitors present in the households on the night before the survey. Women were asked questions on the following topics:

- Background characteristics (age, education, media exposure, etc.)
- Partial birth history and number of children ever born and surviving
- Antenatal care and malaria prevention for their most recent pregnancy within the past five years that ended in a live birth
- Prevention and treatment of fever among children under age 5
- Malaria knowledge (causes and means of prevention)

2.3 ANAEMIA AND MALARIA TESTING

The 2014-15 UMIS collected finger- (or heel-) prick blood samples from children age 0-59[1] months to perform on-the-spot testing for anaemia and malaria and to prepare thick and thin blood smears to be read in the laboratory to detect the presence of *Plasmodium* parasites and to determine the parasite species. Each field team included two health technicians who carried out the anaemia and malaria testing and prepared the blood smears, and a nurse who provided malaria medications for children who tested positive for malaria in accordance with the appropriate treatment protocols. Verbal informed consent for each test was granted by the child's parent or guardian before tests were conducted. The survey protocol, including blood specimen collection and analysis, was approved by ICF International's institutional review board, the Makerere University School of Biomedical Sciences Higher Degrees Research and Ethics Committee (SBS-HDREC), and the Uganda National Council for Science and Technology (UNCST).

Anaemia testing. Because of the strong correlation between malaria infection and anaemia, the 2014-15 UMIS included anaemia testing for children age 0-59 months. Blood samples were drawn using a single-use, retractable, spring-loaded, sterile lancet to make a finger- or heel-prick. Health technicians then collected blood in a microcuvette from the finger- or heel-prick. Haemoglobin analysis was carried out on site using a battery-operated portable HemoCue analyser, which produces a result in less than one minute. Results were given to the child's parent or guardian verbally and in writing. Parents of children with a haemoglobin level under 8 g/dl were urged to take the child to a health facility for follow-up care and were given a referral letter with the haemoglobin reading to show staff at the health facility. Results of the anaemia test were recorded on the Household Questionnaire as well as in a brochure explaining the causes and prevention of anaemia that was left in the household.

Malaria testing using rapid diagnostic testing (RDT). Another major objective of the UMIS was to provide information about the extent of malaria infection among children age 0-59 months. Using the same finger (or heel) prick used for anaemia testing, a drop of blood was tested immediately using the SD Bioline Ag P.f rapid diagnostic test (RDT) which is a qualitative test for the detection of histidine-rich protein II (HRP-II) antigen of malaria *Plasmodium falciparum* in human whole blood. *Plasmodium falciparum* (Pf) is

[1] The approved 2014-15 UMIS survey protocol is for anaemia and malaria testing of children age 0-59 months rather than the standard age cohort of 6-59 months. According to the 2009 UMIS, malaria parasite prevalence was 16 percent among children 0-5 months, and 53 percent of children 0-5 months had some form of anaemia. These findings are of concern to the Ministry of Health and government of Uganda, who therefore specifically requested that the 2014-15 UMIS obtain estimates of the magnitude and distribution of anaemia and malaria prevalence among children age 0-59 months.

the major cause of malaria in Uganda. The test includes a disposable sample applicator that comes in a standard package. A tiny volume of blood is captured on an applicator and placed in the well of the testing device. All field technicians were trained to perform the RDT in the field according to manufacturers' instructions. Technicians read, interpreted, and recorded RDT results after 15 minutes. RDT results were recorded as either positive or negative, with faint test lines being considered positive. As with the anaemia testing, malaria RDT results were provided to the child's parent or guardian in oral and written form and were recorded on the Household Questionnaire. Children who tested positive for malaria using the RDT were offered a full course of treatment according to standard procedures for treating malaria in Uganda, provided they were not currently on treatment and had not completed a full course of ACT during the preceding two weeks. To ascertain the correct dose, nurses on each field team were instructed to ask about signs of severe malaria and about any medications the child might already be taking. The nurses then provided the age-appropriate dose of ACT along with instructions on how to administer the medicine to the child.[2,3]

Malaria testing using blood smears. In addition to the RDT, separate thick and thin blood smears were made in the field. Each blood smear slide was given a bar code label, with a duplicate affixed to the Household Questionnaire. A fourth copy of the bar code label was affixed to a Blood Sample Transmittal Form in order to track the blood samples from the field to the laboratory. The slides were dried in a dust-free environment and stored in slide boxes. Technicians fixed the thin smears in the field at the end of each day by dipping the slide in absolute methanol. The thick and thin smear slides were collected regularly from the field, along with the completed questionnaires, and transported to UBOS headquarters in Kampala for logging, after which they were taken to the UMSP Molecular Research Laboratory at Mulago Hospital in Kampala for staining and microscopic reading. Thick smears were first examined to determine presence of *Plasmodium* infection. Thin smears of all positive thick smears were then read to determine the species of *Plasmodium* parasite.

2.4 TRAINING OF FIELD STAFF

UBOS and NMCP recruited and trained 88 people to serve as interviewers and supervisors for the fieldwork. The training was conducted during a two-week period in November 2014. The training course consisted of instruction regarding interviewing techniques and field procedures, a detailed review of questionnaire content, instruction for administering and obtaining informed consent, mock interviews between trainees in the classroom, and practice interviews with real respondents in areas outside the 2014-15 UMIS sample. Thirty-eight health technicians underwent two weeks of instruction and practice in obtaining informed consent and collecting blood samples from children age 0-59 months. Seventeen nurses who were trained as interviewers were also trained to offer and administer treatment to children with positive RDTs. Seventeen team supervisors underwent additional training in field editing, data quality control procedures, and fieldwork coordination. Seventeen supervisors, 51 interviewers (of whom 17 were nurses), and 34 health technicians were selected for the 17 field teams.

2.5 FIELDWORK

Seventeen interviewing teams carried out data collection for the 2014-15 UMIS. Each team consisted of one supervisor, three interviewers (one of whom was a nurse), two health technicians, and one driver. Senior

[2] Dosage of ACT was based on the age of the recipient. The proper dosage for a child age 4 months to 3 years is one tablet of artemether-lumefantrine (co-formulated tablets containing 20 mg artemether and 120 mg lumefantrine) to be taken twice daily for three days, while the dosage for a child age 3-7 is two tablets of artemether-lumefantrine to be taken twice daily for three days.

[3] Children less than 4 months who tested positive by the malaria RDT and those who exhibited signs of severe malaria were referred to the nearest facility for treatment.

staff members from UBOS, NMCP, and the UMSP Laboratory coordinated and supervised fieldwork activities. Two ICF International staff also monitored fieldwork. Data collection took place from 1 December 2014 through the end of January 2015.

2.6 DATA PROCESSING

All questionnaires for the 2014-15 UMIS were returned to the data processing centre at the UBOS headquarters in Kampala. Activities performed included office editing, data entry, and editing of computer-identified inconsistencies. The data were processed by a team of one data entry supervisor, one assistant supervisor, 24 data entry operators, and 7 staff who performed tasks related to questionnaire administration, office editing, and secondary editing. Data entry and editing were accomplished using CSPro software. The process of office editing and data processing was initiated in January 2015 and completed in mid-February 2015.

3 RESULTS

3.1 RESPONSE RATES

The household and individual response rates for the 2014-15 UMIS are shown in Table 1. A total of 5,802 households were selected for the sample, of which 5,494 were occupied. Of the occupied households, 5,345 were successfully interviewed, yielding a response rate of 97 percent. The response rate among households in rural areas was slightly higher (98 percent) than in urban areas (96 percent).

In the interviewed households, 5,494 women were identified as eligible for individual interview; interviews were completed with 5,322 women, yielding a response rate of 97 percent. The eligible women's response rate does not differ by urban or rural residence. The principal reason for non-response among eligible women was the failure to find individuals at home despite repeated visits to the household.

Table 1 Results of the household and individual interviews

Number of households, number of interviews, and response rates, according to residence (unweighted), Uganda 2014-15

Result	Residence		Total
	Urban	Rural	
Household interviews			
Households selected	1,232	4,570	5,802
Households occupied	1,159	4,335	5,494
Households interviewed	1,115	4,230	5,345
Household response rate[1]	96.2	97.6	97.3
Interviews with women age 15-49			
Number of eligible women	1,214	4,280	5,494
Number of eligible women interviewed	1,171	4,151	5,322
Eligible women response rate[2]	96.5	97.0	96.9

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

3.2 HOUSEHOLD COMPOSITION

Information on the composition of households, including the sex of the head of the household and the size of the household, is presented in Table 2. Slightly more than one-quarter (27 percent) of Ugandan households are headed by females; female headship is slightly higher in urban areas than rural areas (31 percent and 26 percent, respectively). The overall household size in Uganda is 4.9 persons, which is similar to what was reported in the 2009 UMIS (4.7). Rural households are larger than urban households; the mean household size is 4.1 in urban areas and 5.2 in rural areas.

Table 2 Household composition

Percent distribution of households by sex of head of household and by household size, and mean size of household, according to residence, Uganda 2014-15

Background characteristic	Residence		Total
	Urban	Rural	
Household headship			
Male	68.6	74.3	73.1
Female	31.4	25.7	26.9
Total	100.0	100.0	100.0
Number of usual members			
1	17.5	9.8	11.5
2	13.3	8.3	9.4
3	15.5	13.0	13.5
4	16.2	14.0	14.4
5	11.2	13.2	12.8
6	9.3	13.1	12.3
7	6.9	9.4	8.8
8	3.5	7.4	6.5
9+	6.6	11.9	10.7
Total	100.0	100.0	100.0
Mean size of households	4.1	5.2	4.9
Number of households	1,187	4,158	5,345

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

3.3 CHARACTERISTICS OF THE RESPONDENTS

Table 3 shows the weighted and unweighted numbers and the weighted percent distributions of women age 15-49 interviewed in the 2014-15 UMIS by age, urban-rural residence, region, education, and wealth quintile. More than half of respondents age 15-49 were under age 30, reflecting the young age structure of the Ugandan population.

Table 3 Background characteristics of respondents

Percent distribution of women age 15-49 by selected background characteristics, Uganda 2014-15

Background characteristic	Weighted percent	Number of women	
		Weighted number	Unweighted number
Age			
15-19	23.1	1,228	1,250
20-24	21.3	1,132	1,112
25-29	18.0	957	981
30-34	13.9	741	715
35-39	10.3	547	531
40-44	8.0	425	426
45-49	5.5	292	307
Residence			
Urban	23.1	1,227	1,171
Rural	76.9	4,095	4,151
Region			
Central 1	12.7	674	402
Central 2	9.8	521	369
East Central	10.5	559	394
Kampala	6.5	344	489
Mid-North	10.6	566	779
Mid-Western	10.5	556	488
Mid-Eastern	9.6	511	505
North East	9.1	486	864
South Western	13.3	708	602
West Nile	7.5	397	430
Education			
No education	14.9	792	976
Primary	54.3	2,892	2,824
Secondary	25.0	1,329	1,205
More than secondary	5.4	285	291
Missing	0.4	23	26
Wealth quintile			
Lowest	18.2	968	1,364
Second	18.6	992	1,006
Middle	18.6	991	894
Fourth	19.8	1,052	884
Highest	24.8	1,320	1,174
Total 15-49	100.0	5,322	5,322

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

Three-quarters of respondents (77 percent) live in rural areas. With respect to educational status, 15 percent of women reported that they had never attended school. Fifty-four percent of women have attended primary school without continuing to secondary education. Twenty-five percent of women have attended secondary school. Five percent of women attended a level of education higher than secondary school.

The results of the 2014-15 UMIS indicate that educational attainment among women has improved since the 2009 UMIS: for example, the percentage of women with no education decreased from 19 percent in 2009 to 15 percent in 2011, and the percentage of women who attended secondary school increased from 20 percent in 2009 to 25 percent in 2014-15.

3.4 MALARIA

An estimated 3.3 billion people worldwide are at risk for malaria, a preventable and treatable mosquito-borne illness (WHO, 2014).

This section presents data that are useful for assessing the implementation of malaria control strategies including the availability, source, and use of mosquito nets by household members, the use of indoor residual spraying (IRS) against mosquitoes, and the prophylactic use of antimalarial drugs by pregnant women. Data

presented show the percentage of households owning mosquito nets, the percent distribution of mosquito nets by source of net, the percentage of households that received IRS, and the percentages of household members, of pregnant women, and of children under 5 who slept under a net the night before the survey. For women who gave birth in the two years preceding the survey, data also present the percentage who took one or more preventive doses of antimalarial drugs during pregnancy, at least one of which was obtained as part of antenatal care from a health facility (referred to as intermittent preventive treatment). Additionally, among children under age 5, information is provided on the percentage of children who experienced an episode of fever in the two weeks preceding the survey, whether advice or treatment was sought, the percentage who had blood taken for testing, whether they were treated with antimalarial drugs, and the timeliness with which they received drug treatment (the same day or next day following onset of fever). Information on exposure to messages on malaria and knowledge of malaria are also presented.

3.5 OWNERSHIP OF MOSQUITO NETS

Table 4 presents information on the percentage of households that have at least one insecticide-treated net (ITN) and the average number of ITNs per household, by background characteristics. Table 4 shows that 90 percent of households own at least one insecticide-treated net (ITN) and, on average, households own 2.5 ITNs. This is a dramatic increase since 2009 when just 47 percent of households owned at least one ITN, and the average number of nets owned was 0.8.

Table 4 Household ownership of insecticide-treated mosquito nets

Percentage of households with at least one insecticide-treated mosquito net (ITN) and average number of ITNs per household, by background characteristics, Uganda 2014-15

Background characteristic	Percentage of households with at least one insecticide-treated mosquito net (ITN)[1]	Average number of insecticide-treated mosquito nets (ITN)[1] per household	Number of households
Residence			
Urban	83.9	2.2	1,187
Rural	92.0	2.6	4,158
Region			
Central 1	80.8	2.1	660
Central 2	81.6	2.1	593
East Central	82.1	2.1	536
Kampala	86.3	2.3	299
Mid-North	94.3	2.7	569
Mid-Western	93.6	2.4	612
Mid-Eastern	94.6	2.6	571
North East	97.0	2.9	444
South Western	96.9	2.9	691
West Nile	96.3	3.0	370
Wealth quintile			
Lowest	91.5	2.2	1,109
Second	94.0	2.5	1,073
Middle	93.0	2.7	961
Fourth	88.4	2.6	1,014
Highest	84.9	2.4	1,189
Total	90.2	2.5	5,345

[1] An insecticide-treated mosquito net (ITN) is a factory-treated net that does not require any further treatment (LLIN) or a net that has been soaked with insecticide within the past 12 months.

Ownership of at least one ITN is higher in rural areas (92 percent) than urban areas (84 percent). Ownership of at least one ITN decreases from 92 percent in the lowest wealth quintile to 85 percent in the highest wealth quintile. The average number of ITNs does not have a clear relationship with wealth quintile.

3.6 SOURCE OF MOSQUITO NETS

There are several ways to procure or obtain a mosquito net in Uganda. A pregnant woman may receive a mosquito net during a routine antenatal care visit. Parents of children under age 5 may receive them during routine immunisation visits to health facilities. Mosquito nets can also be obtained during mass distribution campaigns, and they can be purchased directly at shops or markets, or from hawkers.

Table 5 shows the percent distribution of nets by source of net, according to background characteristic. Eighty-seven percent of mosquito nets in the 2014-15 UMIS came from a campaign, 8 percent came from a pharmacy, shop, or market, and 3 percent came from a health facility (government or non-government).

Table 5 Source of nets

Percent distribution of mosquito nets by source of the net, according to background characteristics, Uganda 2014-15

Background characteristic	Government health facility	Non-government health facility[1]	Pharmacy/ shop/open market	Hawker	Church	Campaign	Other	Don't know/ missing	Total	Number of mosquito nets
Residence										
Urban	1.8	0.9	21.2	2.1	1.1	71.1	1.5	0.4	100.0	2,894
Rural	2.3	0.4	5.0	0.2	0.3	90.6	0.6	0.7	100.0	11,077
Region										
Central 1	4.1	0.5	18.6	0.6	0.9	74.0	0.6	0.8	100.0	1,611
Central 2	1.7	0.9	7.5	0.8	1.6	85.8	1.0	0.7	100.0	1,336
East Central	2.8	1.4	8.8	0.1	0.4	85.7	0.3	0.7	100.0	1,174
Kampala	1.8	0.6	36.5	6.2	0.0	52.8	1.1	1.0	100.0	758
Mid-North	1.7	0.5	2.6	0.2	0.4	92.7	1.3	0.6	100.0	1,565
Mid-Western	1.2	0.0	3.5	0.0	0.0	94.7	0.1	0.5	100.0	1,528
Mid-Eastern	1.7	0.4	2.8	0.0	1.1	92.5	1.3	0.2	100.0	1,475
North East	5.6	0.4	8.4	0.0	0.1	84.5	0.1	0.9	100.0	1,303
South Western	0.6	0.2	5.3	0.3	0.0	91.8	1.3	0.5	100.0	2,070
West Nile	1.2	0.3	2.5	0.6	0.0	93.8	0.7	0.9	100.0	1,151
Wealth quintile										
Lowest	2.1	0.3	2.1	0.3	0.6	93.3	0.7	0.7	100.0	2,534
Second	2.0	0.3	2.4	0.1	0.1	93.8	0.8	0.6	100.0	2,690
Middle	2.0	0.3	2.9	0.3	0.3	93.2	0.5	0.4	100.0	2,697
Fourth	3.1	0.2	6.1	0.3	0.5	88.4	0.6	0.8	100.0	2,800
Highest	1.7	1.2	24.6	1.7	0.7	68.0	1.3	0.8	100.0	3,249
Total	2.2	0.5	8.3	0.6	0.5	86.5	0.8	0.6	100.0	13,971

[1] Includes nongovernmental organizations (NGOs), private not-for-profit health facilities, private for-profit hospitals, and other health facilities.

The source of mosquito nets varies by residence. In rural areas, 91 percent of nets come from a campaign, and 5 percent come from a pharmacy, shop, or market. In urban areas, by contrast, 71 percent of nets come from a campaign and 21 percent come from a pharmacy, shop, or market. Net source also varies by region and wealth. In Kampala, 53 percent of nets were obtained through a campaign and 37 percent were obtained through a pharmacy, shop, or market. In West Nile, 94 percent of nets were obtained through a campaign and just 3 percent were obtained through a pharmacy, shop, or market. Nets in the lower three wealth quintiles are more likely to come from campaign (93-94 percent) than nets in the fourth (88 percent) and highest (68 percent) wealth quintiles. In the highest wealth quintile, one in four nets came from a pharmacy, shop, or market compared with less than 6 percent in the lower wealth quintiles.

Since 2009, there has been a major shift in source of mosquito nets. The 2009 UMIS found that 33 percent of nets came from a pharmacy, shop, or market, 26 percent came from a project, church, or nongovernmental organisation (NGO), 25 percent came from a health facility, and just 5 percent came from a campaign. Uganda has had two major distribution campaigns since the 2009 UMIS, one in 2010 and a second one in 2013-14.

3.7 INDOOR RESIDUAL SPRAYING AGAINST MOSQUITOS

Indoor residual spraying (IRS) is the spraying of the interior walls and ceilings of a dwelling with long-lasting insecticide. IRS has a significant impact on mosquito densities and therefore leads to a rapid reduction of malaria transmission and mortality. Repeated spraying is essential to maintain effectiveness against mosquitoes. The frequency of spraying is determined by the insecticide used. At the time of the 2009 UMIS, IRS was implemented with the chemical dichlorodiphenyltrichloroethane (DDT). Because DDT has a residual effect of 12 months, spraying took place annually. By the time of the 2014-15 UMIS, however, IRS was performed with a carbamate insecticide, which has a residual effect of 6 months; spraying with carbamate, therefore, takes place twice each year. Recent IRS operations in Uganda began in 2006. Currently, ten districts are targeted for IRS—Agago, Amuru, Apac, Gulu, Kitgum, Kole, Lamwo, Nwoya, Oyam, and Pader—all are located in the Mid-North region.

The 2014-15 UMIS included questions on whether the dwelling had been sprayed within the previous 6 months, how long ago it was sprayed, who sprayed the household, and whether or not the household paid to have the dwelling sprayed. Table 6 presents information on IRS coverage as well as the percentage of households covered by either IRS or ITNs.

Overall, 5 percent of households in Uganda report having been sprayed in the previous six months, 44 percent in the Mid-North Region. In the Mid-North Region 97 percent of households have at least one ITN and/or have been sprayed in the previous six months. Among households reporting having received IRS, 91 percent received IRS through a government worker or government programme (data not shown).

From 2009 to 2014-15, there has been no change in IRS coverage at the national level, however, there has been an increase in IRS coverage in the Mid-North, the target area for IRS activities. In 2009, 32 percent of households in the Mid-North received IRS (in the 12 months preceding the survey). In 2014-15, 44 percent of households in the Mid-North received IRS (in the 6 months preceding the survey).

Table 6 Indoor residual spraying against mosquitoes

Percentage of households in which someone has come into the dwelling to spray the interior walls against mosquitoes (IRS) in the past 6 months, the percentage of households with at least one ITN and/or IRS in the past 6 months, and, and, among households with IRS in the past 6 months, percentage of households paying for IRS, by background characteristics, Uganda 2014-15

	Among all households:			Among households with IRS in the past 6 months:	
Background characteristic	Percentage of households with IRS[1] in the past 6 months	Percentage of households with at least one ITN[2] and/or IRS in the past 6 months	Number of households	Percentage of households paying for IRS	Number of households with IRS in the past 6 months
Residence					
Urban	2.9	84.2	1,187	10.5	35
Rural	5.4	92.3	4,158	3.2	226
Region					
Central 1	0.0	80.8	660	*	0
Central 2	0.4	81.9	593	*	3
East Central	0.0	82.1	536	*	0
Kampala	1.0	86.3	299	*	3
Mid-North	43.9	97.0	569	1.8	249
Mid-Western	0.2	93.6	612	*	1
Mid-Eastern	0.3	94.6	571	*	2
North East	0.1	97.0	444	*	0
South Western	0.0	96.9	691	*	0
West Nile	0.6	96.3	370	*	2
Wealth quintile					
Lowest	12.3	92.3	1,109	2.4	137
Second	5.8	94.5	1,073	1.9	62
Middle	2.3	93.1	961	(10.0)	22
Fourth	2.3	88.4	1,014	(5.2)	24
Highest	1.3	85.0	1,189	*	16
Total	4.9	90.5	5,345	4.2	261

Note: Figures in parentheses are based on 25-49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[1] Indoor residual spraying (IRS) is limited to spraying conducted by a government, private, or non-governmental organization.

[2] An insecticide-treated mosquito net (ITN) is a factory-treated net that does not require any further treatment (LLIN) or a net that has been soaked with insecticide within the past 12 months.

3.8 USE OF MOSQUITO NETS

Table 7.1 shows use of mosquito nets by persons in the household. Overall, 72 percent of the household population slept under a mosquito net the night before the survey; 69 percent slept under an ITN the night before the survey. Seventy percent of the household population slept under an ITN the previous night or in a dwelling sprayed with IRS in the past 6 months. In households that own at least one ITN, 74 percent of the household population slept under an ITN the night before the survey.

The percentage of the household population that slept under an ITN varies little by residence. By region, however, ITN use varies widely; for example, 59 percent of the household population in Central 1 and Central 2 slept under an ITN compared with 81 percent in the North East. ITN use generally decreases with increasing wealth quintile.

Table 7.1 Use of mosquito nets by persons in the household

Percentage of the de facto household population who, the night before the survey, slept under any mosquito net (treated or untreated), under an insecticide-treated mosquito net (ITN), and under an ITN or in a dwelling in which the interior walls have been sprayed against mosquitoes (IRS) in the past 6 months; and among the de facto household population with at least one ITN, the percentage who slept under an ITN the night before the survey, by background characteristics, Uganda 2014-15

	Household population				Household population in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any net last night	Percentage who slept under an ITN[1] last night	Percentage who slept under an ITN[1] last night or in a dwelling sprayed with IRS[2] in the past 6 months	Number	Percentage who slept under an ITN[1] last night	Number
Residence						
Urban	72.2	65.4	66.6	4,886	73.2	4,369
Rural	71.5	69.3	70.7	21,336	73.9	19,999
Region						
Central 1	68.0	59.0	59.0	2,985	68.6	2,567
Central 2	64.6	59.2	59.3	2,663	67.2	2,348
East Central	63.9	61.9	61.9	2,764	71.5	2,394
Kampala	78.6	70.6	71.0	1,165	79.0	1,041
Mid-North	77.0	75.2	87.6	2,833	78.8	2,704
Mid-Western	77.3	75.9	75.9	3,006	80.2	2,842
Mid-Eastern	71.6	71.1	71.1	2,971	74.3	2,844
North East	81.2	80.7	80.7	2,586	83.1	2,511
South Western	65.7	63.0	63.0	3,283	64.1	3,229
West Nile	74.5	72.4	72.5	1,967	75.5	1,887
Wealth quintile						
Lowest	73.2	72.3	76.1	5,177	78.7	4,756
Second	74.4	73.0	74.6	5,213	76.1	5,004
Middle	71.9	69.8	70.4	5,235	74.0	4,940
Fourth	67.1	64.0	64.6	5,264	68.7	4,903
Highest	71.8	63.8	64.2	5,333	71.4	4,765
Total	71.6	68.6	69.9	26,222	73.8	24,368

[1] An insecticide-treated mosquito net (ITN) is a factory-treated net that does not require any further treatment (LLIN) or a net that has been soaked with insecticide within the past 12 months.
[2] Indoor residual spraying (IRS) is limited to spraying conducted by a government, private, or nongovernmental organization.

Table 7.2 provides information on the percentage of children under age 5 who slept under a mosquito net the night before the survey. Seventy-eight percent of children slept under a mosquito net and 74 percent slept under an ITN. Overall, 76 percent slept under an ITN or in a dwelling that received IRS in the past six months. Among children under age 5 in households with at least one ITN, 80 percent slept under an ITN. The proportion of children under 5 who slept under an ITN the night before the survey is higher than the proportion of the household population that slept under an ITN (74 percent and 69 percent, respectively).

The percentage of children under age 5 who slept under an ITN the night before the survey in the 2014-15 UMIS is much higher than that reported in the 2009 UMIS (74 and 33 percent, respectively). Similarly, among households with at least one ITN, the percentage of children who slept under an ITN has increased from 59 percent in 2009 to 80 percent in 2014-15.

Pregnant women are one of the population groups most vulnerable to malaria. The disease adversely affects birth outcomes and can lead to spontaneous abortion, pre-term labour, low birth weight, and stillbirth. This has prompted many advocacy campaigns to educate not only pregnant women but also the general public on the importance of preventing malaria during pregnancy. In Uganda, two key malaria preventive methods employed during pregnancy are the use of ITNs and the provision of intermittent preventive treatment (IPTp).

Table 7.2 Use of mosquito nets by children

Percentage of children under age 5 who, the night before the survey, slept under any mosquito net (treated or untreated), under an insecticide-treated mosquito net (ITN), and under an ITN or in a dwelling in which the interior walls have been sprayed against mosquitoes (IRS) in the past 6 months; and among children under age 5 in households with at least one ITN, the percentage who slept under an ITN the night before the survey, Uganda 2014-15

	Children under age 5 in all households				Children under age 5 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any net last night	Percentage who slept under an ITN[1] last night	Percentage who slept under an ITN[1] last night or in a dwelling sprayed with IRS[2] in the past 6 months	Number of children	Percentage who slept under an ITN[1] last night	Number of children
Residence						
Urban	78.8	71.5	72.5	817	78.9	740
Rural	77.4	75.0	76.2	4,243	79.7	3,992
Region						
Central 1	78.6	66.6	66.6	598	76.1	524
Central 2	70.4	65.6	65.6	526	73.6	469
East Central	70.4	68.3	68.3	577	78.2	504
Kampala	83.4	75.8	75.8	195	83.4	177
Mid-North	80.8	79.4	90.1	557	83.4	531
Mid-Western	82.8	82.2	82.2	634	86.4	603
Mid-Eastern	78.3	78.2	78.2	564	80.0	551
North East	87.3	87.1	87.1	507	89.9	491
South Western	67.1	64.7	64.7	530	64.7	530
West Nile	82.0	78.4	78.4	372	82.8	352
Wealth quintile						
Lowest	79.5	78.5	82.1	1,120	85.5	1,029
Second	79.9	78.5	79.5	1,089	81.3	1,050
Middle	76.6	74.2	74.5	1,023	78.8	964
Fourth	71.9	68.3	68.6	938	72.9	878
Highest	79.9	71.0	71.3	891	78.0	811
Total	77.6	74.4	75.6	5,060	79.6	4,733

Note: Table is based on children who stayed in the household the night before the interview.
[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment (LLIN) or a net that has been soaked with insecticide within the past 12 months.
[2] Indoor residual spraying (IRS) is limited to spraying conducted by a government, private, or nongovernmental organization.

Table 7.3 shows the percentage of pregnant women age 15-49 who slept under a mosquito net the night before the survey. Seventy-nine percent of pregnant women slept under a mosquito net and 75 percent slept under an ITN. Overall, 77 percent slept under an ITN or in a dwelling that received IRS in the past 6 months. Among pregnant women in households with at least one ITN, 84 percent slept under an ITN.

The percentage of pregnant women who slept under an ITN the night before the survey in the 2014-15 UMIS is markedly higher than that reported in the 2009 UMIS (75 percent and 44 percent, respectively). Among households with at least one ITN, the percentage of pregnant women who slept under an ITN has increased from 77 percent in 2009 to 84 percent in 2014-15.

Table 7.3 Use of mosquito nets by pregnant women

Percentage of pregnant women age 15-49 who, the night before the survey, slept under any net (treated or untreated), under an ITN, and under an ITN or in a dwelling in which the interior walls have been sprayed against mosquitoes (IRS) in the past 6 months; and among pregnant women age 15-49 in households with at least one ITN, the percentage who slept under an ITN the night before the survey, by background characteristics, Uganda 2014-15

	Among pregnant women age 15-49 in all households				Among pregnant women age 15-49 in households with at least one ITN[1]	
Background characteristic	Percentage who slept under any net last night	Percentage who slept under an ITN[1] last night	Percentage who slept under an ITN[1] last night or in a dwelling sprayed with IRS[2] in the past 6 months	Number of pregnant women	Percentage who slept under an ITN[1] last night	Number of pregnant women
Residence						
Urban	78.6	73.9	74.6	78	86.8	66
Rural	79.0	75.6	77.0	401	83.8	362
Region						
Central 1	(73.2)	(67.4)	(67.4)	48	(80.4)	40
Central 2	(76.8)	(70.2)	(70.2)	59	(78.6)	53
East Central	(58.8)	(55.2)	(55.2)	60	(82.6)	40
Kampala	*	*	*	16	*	14
Mid-North	82.0	79.9	92.9	47	86.4	44
Mid-Western	(89.2)	(83.3)	(83.3)	36	(92.4)	32
Mid-Eastern	(88.1)	(88.1)	(88.1)	46	(91.7)	44
North East	87.2	87.2	87.2	61	90.3	59
South Western	81.2	75.7	75.7	58	(77.1)	57
West Nile	(78.0)	(76.0)	(76.0)	46	(81.4)	43
Wealth quintile						
Lowest	80.2	79.8	84.2	117	86.1	108
Second	86.2	82.2	82.6	120	87.9	112
Middle	78.3	76.8	76.8	67	82.9	62
Fourth	65.5	63.1	63.7	89	74.4	75
Highest	81.3	71.3	71.3	85	87.3	69
Total	78.9	75.4	76.7	478	84.2	428

Note: Table is based on pregnant women age 15-49 who stayed in the household the night before the interview. Figures in parentheses are based on 25-49 unweighted cases. An asterisk indicates that a figure is based on fewer than 25 unweighted cases and has been suppressed.

[1] An insecticide-treated net (ITN) is a factory-treated net that does not require any further treatment (LLIN) or a net that has been soaked with insecticide within the past 12 months

[2] Indoor residual spraying (IRS) is limited to spraying conducted by a government, private, or nongovernmental organization.

3.9 USE OF INTERMITTENT PREVENTIVE TREATMENT (IPTP) BY WOMEN DURING PREGNANCY

The 2014-15 UMIS also collected information on malaria chemo-prevention during pregnancy. WHO recommendations to prevent malaria during pregnancy include intermittent preventive treatment (IPTp) with sulphadoxine-pyrimethamine (SP/Fansidar) at each routine antenatal (ANC) clinic visit (at least one month apart) after the first trimester (WHO, 2014). Uganda MOH adopted this recommendation and, to reduce the risks of pregnant women getting malaria, the current policy under the National Malaria Control Programme calls for all pregnant women to receive at least three doses of SP/Fansidar, at a minimum of one month apart after quickening.[4] Women receive SP/Fansidar during their antenatal care visits under directly observed therapy. It is also possible that pregnant women obtain SP/Fansidar from sources outside of antenatal care visits.

Table 8 shows the percentage of women age 15-49 with a live birth in the two years preceding the survey, who during the pregnancy preceding their last birth, received a specific number of doses of

[4] Quickening occurs when the pregnant woman begins to experience foetal movement.

SP/Fansidar, at least one of which was received during an ANC visit. Fifty-nine percent of women received one or more doses of SP/Fansidar during an ANC visit for the pregnancy preceding their most recent birth, 45 percent received two or more doses, and 25 percent received three or more doses.

The proportion of women in urban areas who received one or more doses of SP/Fansidar was greater than the proportion of rural women (65 percent and 58 percent, respectively); however, no difference by residence is observed for women receiving three or more doses of SP/Fansidar (26 percent of urban women and 25 percent of rural women). By region, the percentage of women receiving one or more doses of SP/Fansidar ranges from 43 percent in East Central to 73 percent in Kampala. The differences by region in the percentage of women receiving three or more doses of SP/Fansidar is reduced and ranges from 20 percent in West Nile to 36 percent in North East.

Use of IPTp to prevent malaria in pregnancy has increased since 2009. According to the 2009 UMIS, 45 percent of women received one or more doses of SP/Fansidar, at least one of which was received during an ANC visit, and 32 percent received two or more doses. By 2014-15, these proportions increased to 59 percent and 45 percent, respectively.

Table 8 Use of intermittent preventive treatment (IPTp) by women during pregnancy

Percentage of women age 15-49 with a live birth in the two years preceding the survey who, during the pregnancy preceding the last birth, received one or more doses of SP/Fansidar, at least one of which was received during an ANC visit, received two or more doses of SP/Fansidar, at least one of which was received during an ANC visit, and received three or more doses of SP/Fansidar, at least one of which was received during an ANC visit, by background characteristics, Uganda 2014-15

Background characteristic	Percentage who received one or more doses of SP/Fansidar[1]	Percentage who received two or more doses of SP/Fansidar[1]	Percentage who received three or more doses of SP/Fansidar[1]	Number of women with a live birth in the two years preceding the survey
Residence				
Urban	64.9	50.3	25.8	313
Rural	58.1	44.1	25.1	1,507
Region				
Central 1	57.1	44.1	23.3	235
Central 2	57.9	40.3	25.5	174
East Central	43.0	35.7	23.2	215
Kampala	72.8	57.4	28.1	84
Mid-North	70.8	50.0	26.2	193
Mid-Western	65.9	51.0	28.1	212
Mid-Eastern	53.8	40.0	22.4	189
North East	68.1	55.2	35.7	178
South Western	64.1	48.2	20.9	194
West Nile	45.8	35.1	20.4	146
Wealth quintile				
Lowest	54.6	40.4	23.0	413
Second	58.6	45.2	27.1	405
Middle	57.7	40.9	24.0	350
Fourth	60.4	46.0	25.3	323
Highest	66.5	54.8	26.8	330
Total	59.3	45.2	25.2	1,820

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

3.10 MEDIA EXPOSURE TO MALARIA MESSAGES

A crucial element in the fight to eliminate malaria is the ability to reach the population at risk with information and educational materials. In an effort to assess the coverage of communication programmes,

women interviewed in the UMIS were asked if they had seen or heard any messages about malaria in the six months before the survey.

Table 9 shows that nearly two-thirds (64 percent) of women saw or heard a message about malaria in the six months preceding the survey. Exposure to media messages about malaria is more common in urban areas (72 percent) than in rural areas (62 percent). Whereas 81 percent of women in Kampala and 71 percent of women in the North East region saw or heard messages on malaria, only 56 percent of women in Mid-Western and Mid-Eastern did. The proportion of women exposed to malaria messages increases with educational attainment and with wealth.

Among respondents who have been exposed to a malaria messages, radio is by far the most common channel by which the message was heard (82 percent), followed by a community health worker (34 percent), a poster or billboard (21 percent), or television (19 percent). One in four women (25 percent) had been exposed to malaria messages through another source.

Table 9 Media exposure to malaria messages

Among women age 15-49, the percentage who have seen or heard a message about malaria in the past 6 months, and among women who have heard or seen any message about malaria, the percentage exposed to a message about malaria through specific media, by background characteristics, Uganda 2014-15

	All women age 15-49		Among women age 15-49 who have seen or heard any message about malaria in the past 6 months, the percentage exposed to a message about malaria through specific media:						
Background characteristic	Percentage who have seen or heard a message about malaria in the past 6 months	Number of women	Radio	Television	Poster/ Billboard	Community health worker	Community event	Any other source	Number of women exposed to a message about malaria in the past 6 months
Age									
15-19	60.1	1,228	82.5	18.8	20.5	29.4	14.9	29.5	738
20-24	65.1	1,132	83.5	21.9	26.5	32.4	15.4	22.6	737
25-29	66.5	957	77.5	20.6	21.1	34.6	15.7	26.5	636
30-34	64.4	741	81.0	17.2	20.3	35.6	19.0	24.6	477
35-39	63.4	547	82.0	19.6	20.4	37.0	22.6	20.4	347
40-44	66.4	425	85.0	13.4	16.8	36.1	16.8	21.8	282
45-49	60.7	292	87.2	9.5	15.8	40.2	18.9	20.5	177
Residence									
Urban	71.6	1,227	84.8	50.1	35.4	23.6	13.7	25.2	878
Rural	61.5	4,095	81.0	7.8	16.4	37.3	18.0	24.6	2,517
Region									
Central 1	69.6	674	85.0	32.0	35.8	15.2	7.1	6.1	469
Central 2	69.5	521	90.3	20.3	30.3	21.9	4.1	2.3	362
East Central	58.2	559	87.2	11.6	9.1	21.1	9.0	14.1	325
Kampala	81.2	344	86.0	83.8	48.6	16.7	10.7	39.0	279
Mid-North	62.8	566	76.7	4.5	5.6	38.8	22.2	26.6	355
Mid-Western	56.0	556	81.4	7.0	15.9	47.1	21.2	27.3	312
Mid-Eastern	56.0	511	82.4	9.0	21.1	49.3	21.1	35.1	286
North East	71.3	486	66.6	4.0	4.2	50.1	13.9	65.7	347
South Western	59.2	708	90.6	11.1	18.4	33.5	26.4	15.9	419
West Nile	60.9	397	67.1	6.8	24.4	58.3	42.4	30.2	242
Education									
No education	53.8	792	65.3	3.5	6.8	42.9	16.8	31.5	426
Primary	59.8	2,892	81.5	8.5	16.0	35.2	18.2	24.1	1,731
Secondary	74.0	1,329	89.2	31.8	28.5	28.5	14.7	21.2	983
More than secondary	83.8	285	85.4	67.2	57.2	29.3	17.3	32.2	239
Wealth quintile									
Lowest	59.7	968	63.5	1.7	7.5	45.0	18.5	40.2	578
Second	55.2	992	78.7	1.5	7.5	40.9	17.7	25.9	547
Middle	59.8	991	86.2	3.5	20.0	35.1	23.4	22.3	592
Fourth	64.8	1,052	89.6	7.2	23.0	30.2	16.6	17.6	681
Highest	75.5	1,320	86.8	54.9	36.5	25.0	11.8	21.3	996
Total	63.8	5,322	82.0	18.7	21.3	33.8	16.9	24.7	3,395

Note: Percentages may add up to more than 100.0 since multiple responses were allowed.
Total includes women with missing information on education.

Exposure to malaria messages through radio ranks highest by all background characteristics. The proportion of women who were exposed to malaria messages by other media exhibits more complex patterns. For example, women in urban areas (50 percent) and Kampala (84 percent) were much more likely to be exposed to malaria messages by television than rural women (8 percent) or women from other regions (4-32 percent). In regions were exposure to malaria message by television was low, exposure to messages from a community health worker was high. For example, only 4 percent of women in North East saw a malaria message through television, whereas 50 percent were exposed to a malaria message through a community health worker. Exposure to malaria messages through television is positively correlated with education and wealth quintile whereas exposure via a community health worker is negatively correlated with education and wealth.

3.11 MANAGEMENT OF FEVER IN CHILDREN

Fever is a major symptom of malaria in young children. Because malaria is endemic in Uganda, it is very important that children with fever be tested for malaria and, if positive, be treated promptly. In the 2014-15 UMIS, for each child under age 5, mothers were asked if the child had experienced an episode of fever in the two weeks preceding the survey, and if so, whether treatment and advice was sought and whether blood testing was performed. Information was also collected about the type and timing of the treatment given. For children with uncomplicated malaria, the first-line of treatment is artemisinin-based combination therapy (ACT).

Table 10 shows that overall, 31 percent of children had a fever in the two weeks preceding the survey. Prevalence of fever differed by residence, region, and wealth quintile. Children in rural areas (32 percent), in West Nile (49 percent), and in the lowest wealth quintile (40 percent) are more likely than other children to have had recent fever. It should be noted that the data collected on fever are subjective because they are based on a mother's perception of illness and are not necessarily validated by medical personnel.

Among children with fever, advice or treatment was sought for 82 percent. The percentage of children in urban areas for whom advice or treatment was sought was higher than the percentage in rural areas (90 percent compared with 81 percent). By region, treatment seeking is lowest in North East (61 percent) and highest in Central 2 (93 percent). Treatment seeking increases with wealth, ranging from 76 percent in the lowest wealth quintile to 93 percent in the highest wealth quintile. Treatment-seeking behaviour has not changed since 2009, when it also was 82 percent.[5]

Among children with fever, 36 percent had blood taken from a finger or heel for testing, two in three were given an ACT (67 percent), and 49 percent received an ACT the same day or the next day the fever was detected. Among children with fever who took antimalarial medication, 87 percent took an ACT. The percentage of children who had blood taken from a finger or heel for testing was highest in Kampala (48 percent) and lowest in East Central (21 percent). The percentage of children who received an ACT ranged from 73 percent in North East to 52 percent in Kampala. Among children who received any antimalarial, ACT use is more common in rural areas (88 percent) than urban areas (81 percent). ACT use generally decreases with wealth, ranging from 91 percent in the lowest wealth quintile to 73 percent in the highest wealth quintile.

[5] The indicator presented in the 2009 UMIS final report excludes those for whom advice or treatment was sought from a pharmacy, shop, or traditional practitioner, while in 2014-15 only the traditional practitioner is excluded. For comparison purposes, therefore, data on fever treatment-seeking behaviour from the 2009 survey were recalculated to exclude only the traditional practitioner.

Since 2009, there have been large increases in the proportion of children with fever who had blood taken for testing and among those with fever who took an antimalarial, the proportion who took ACT. Specifically, the percentage of children who had blood taken for testing has more than doubled, from 17 percent in 2009 to 36 percent in 2014-15. The proportion of children with fever who took ACT has nearly tripled, from 23 in 2009 percent to 67 percent in 2014-15. Among children who were treated with any antimalarial, 39 percent were treated with ACT in 2009 compared with 87 percent in 2014-15.

Table 10 Prevalence, diagnosis, and prompt treatment of children with fever

Percentage of children under age 5 with fever in the two weeks preceding the survey; among children under age 5 with fever, percentage for whom advice or treatment was sought, percentage who had blood taken from a finger or heel, percentage who took any artemisinin-based combination therapy (ACT), and percentage who took any ACT the same or next day following the onset of fever; and among children under age 5 with fever who took any antimalarial drug, percentage who took any ACT, by background characteristics, Uganda 2014-15

	Children under age 5		Children under age 5 with fever					Children under age 5 with fever who took any antimalarial drug	
Background characteristic	Percentage with fever in the two weeks preceding the survey	Number of children	Percentage for whom advice or treatment was sought[1]	Percentage who had blood taken from a finger or heel for testing	Percentage who took any ACT	Percentage who took any ACT same or next day	Number of children	Percentage who took any ACT	Number of children
Residence									
Urban	23.0	783	90.1	42.1	56.9	40.2	180	80.7	127
Rural	32.3	3,776	80.8	34.8	68.1	50.2	1,221	87.5	951
Region									
Central 1	18.0	556	89.3	40.1	55.2	31.6	100	(73.3)	75
Central 2	31.4	453	93.3	38.1	71.7	48.3	142	82.0	124
East Central	47.3	538	90.9	21.3	71.1	46.1	254	91.6	197
Kampala	24.7	191	77.5	47.9	51.5	36.8	47	(86.6)	28
Mid-North	33.4	487	75.5	44.8	69.0	64.6	163	95.9	117
Mid-Western	28.4	552	83.4	30.0	61.1	29.6	157	81.5	118
Mid-Eastern	19.6	485	83.9	43.5	68.0	57.7	95	85.8	76
North East	45.2	464	61.3	31.5	72.9	62.3	210	88.7	172
South Western	13.5	488	92.0	44.4	53.3	19.2	66	(76.4)	46
West Nile	48.5	343	81.9	44.0	66.4	60.0	166	89.2	124
Wealth quintile									
Lowest	39.9	1,039	75.7	34.1	68.4	56.7	415	90.8	313
Second	33.9	989	80.6	35.2	68.9	48.6	335	88.4	261
Middle	29.1	881	84.5	39.6	68.8	47.5	256	86.2	204
Fourth	26.8	824	84.9	32.5	65.0	43.1	221	88.3	162
Highest	21.1	826	92.6	39.5	57.4	40.2	174	72.8	138
Total	30.7	4,558	82.0	35.8	66.7	48.9	1,401	86.7	1,078

Note: Figures in parentheses are based on 25-49 unweighted cases.
[1] Excludes advice or treatment from a traditional practitioner.

3.12 ANAEMIA AND MALARIA PREVALENCE AMONG CHILDREN

All children age 0-59 months living in the households selected for the 2014-15 UMIS were eligible for malaria testing. Malaria testing in the field was done using a rapid diagnostic test (RDT) and in the laboratory was done by microscopic examination of thick and thin blood smears. The RDT used for detecting malaria in the 2014-15 UMIS was the SD Bioline Ag P.f device. Ninety-seven percent of eligible children were tested for anaemia, 96 percent were tested for malaria with RDTs, and 97 percent were tested for malaria with microscopy (data not shown).

Table 11 shows the percentage of children age 0-59 months with haemoglobin lower than 8.0 g/dl, by background characteristics[6]. A haemoglobin concentration less than 8.0 g/dl is considered low and may indicate that an individual has malaria (Korenromp et al., 2004).

Table 11 Haemoglobin <8.0 g/dl in children

Percentage of children age 0-59 months with haemoglobin lower than 8.0 g/dl, by background characteristics, Uganda 2014-15

Background characteristic	Haemoglobin <8.0 g/dl	Number of children
Residence		
Urban	3.5	776
Rural	4.8	4,121
Study domain		
Current IRS districts	3.1	346
Future IRS districts	8.3	630
High altitude districts	5.3	377
Special zones		
Greater Kampala	2.9	491
Karamoja	12.4	125
Region		
Central 1	3.7	536
Central 2	4.4	528
East Central	8.0	564
Kampala	2.9	181
Mid-North	4.9	549
Mid-Western	5.2	626
Mid-Eastern	4.0	534
North East	5.7	496
South Western	1.3	517
West Nile	4.0	367
Wealth quintile		
Lowest	5.5	1,100
Second	5.5	1,070
Middle	6.1	995
Fourth	2.8	902
Highest	2.4	832
Total	4.6	4,898

Overall, 5 percent of children age 0-59 months have a haemoglobin level less than 8.0 g/dl. In the future IRS districts 8 percent of children have a haemoglobin level less than 8.0 g/dl compared with 3 percent in the current IRS districts and 5 percent in the high-altitude districts. Severe anaemia is most prevalent in Karamoja where 12 percent of children age 0-59 months have a haemoglobin level less than 8.0 g/dl. By geographic region, anaemia prevalence is highest in East Central at 8 percent. Anaemia decreases with increasing wealth from 6 percent in the three lowest wealth quintiles to 2 percent in the highest wealth quintile.

Prevalence of severe anaemia has decreased considerably since the 2009 UMIS when 10 percent of children age 0-59 months had a haemoglobin level less than 8.0 g/dl.

Table 12 shows the results of malaria testing for children age 0-59 months according to both RDT and microscopy, by background characteristics.

Survey results show that the prevalence of malaria is higher using RDTs than the prevalence is using microscopy. This is expected because of the possibility of false-positive RDT test results in a few percent of the tests (Wongsrichanalai et al., 2007). The overall prevalence of malaria in young children in Uganda as measured by RDT is 30 percent. Using microscopy malaria prevalence is 19 percent. This represents a substantial decrease since 2009 when 52 percent of children 0-59 months tested positive for malaria by RDT (the 2009 UMIS used the Paracheck Pf™ rapid diagnostic test, which tests for *Plasmodium falciparum*) and 42 percent tested positive for malaria by microscopy.

According to microscopy, prevalence is higher in rural areas than in urban areas (22 percent and 6 percent, respectively), and by region prevalence is highest in the East Central region (37 percent) followed by West Nile (28 percent) and North East (27 percent). In the special zone Karamoja, nearly half of the tested children (49 percent) tested positive for malaria by microscopy. In the future IRS districts, malaria prevalence is 36 percent, four times higher than in current IRS districts (7 percent) and high-altitude districts (9 percent). Malaria prevalence decreases with wealth, ranging from 28 percent of children in the lowest wealth quintile to 4 percent in the highest.

[6] Given that haemoglobin requirements differ substantially depending on altitude, anaemia data are normally adjusted for altitude using the formulas recommended by the U.S. Centers for Disease Control and Prevention (CDC, 1998).

Table 12 Prevalence of malaria in children

Percentage of children age 0-59 months classified as having malaria according to RDT and according to microscopy, by background characteristics, Uganda 2014-15

Background characteristic	Malaria prevalence according to RDT		Malaria prevalence according to microscopy	
	RDT positive	Number of children	Microscopy positive	Number of children
Residence				
Urban	10.1	768	6.3	787
Rural	33.6	4,088	21.5	4,101
Study domain				
Current IRS districts	15.1	342	7.2	338
Future IRS districts	62.7	622	36.0	627
High altitude districts	9.9	375	8.8	368
Special zones				
Greater Kampala	5.5	487	3.3	510
Karamoja	68.5	125	48.6	126
Region				
Central 1	13.0	531	10.5	574
Central 2	33.1	522	23.6	512
East Central	49.2	556	36.5	563
Kampala	3.7	178	0.4	188
Mid-North	34.2	544	20.0	536
Mid-Western	17.6	620	17.8	612
Mid-Eastern	26.6	526	13.4	543
North East	55.7	496	27.3	487
South Western	5.7	516	4.1	511
West Nile	51.3	366	27.5	359
Wealth quintile				
Lowest	47.1	1,085	28.1	1,085
Second	37.0	1,064	22.9	1,054
Middle	29.8	987	22.7	989
Fourth	20.1	898	13.7	911
Highest	8.7	822	3.9	849
Total	29.9	4,856	19.0	4,888

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