Zambia National Malaria Indicator Survey

2006

Zambia Ministry of Health

Addendum

In May 2009, the Zambia Malaria Indicator Survey 2006 report was re-released in the current electronic format. This report includes the following updates:

- This report includes additional information from households surveyed in 2006. These households were not considered during the first analysis due to a programming error in matching household identification numbers.

- In the original report, an error was made in the definition of an insecticide-treated net (ITN). This affected all ITN tabulations. These have been updated and are consistent with the definitions recommended by the Roll Back Malaria Monitoring and Evaluation Reference Group (RBM-MERG) and are consistent between the 2006 and 2008 reports. This resulted in slightly lower treated-net coverage estimates than previously reported for 2006, but increased overall progress made by the malaria control program compared to the 2008 Malaria Indicator Survey report.

- Weights and response rates adjustments for all survey point estimates have been updated in consultation with the Central Statistical Office and other experts.

- In Table 11, columns 5 and 6 have been updated to reflect the latest standard tabulation plan by RBM-MERG and to make it consistent with the 2008 MIS report.

Zambia National Malaria Indicator Survey 2006

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This report summarizes the findings of the 2006 Zambia National Malaria Indicator Survey carried out by the Ministry of Health, Central Statistical Office, PATH MACEPA, US Centers for Disease Control and Prevention, the World Health Organization, and the University of Zambia in April – June 2006.

Support for the development of this document was provided by the Bill & Melinda Gates Foundation through an award to PATH.

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Acronyms

ACT	artemisinin-based combination therapy
ANC	antenatal clinic
ART-LUM	artemether-lumefantrine
CDC	US Centers for Disease Control and Prevention
CSA	Census Supervisory Areas
CSO	Central Statistical Office
DHS	Demographic and Health Surveys
GPS	global positioning system
IPT	intermittent preventive treatment
IRS	indoor residual spraying
ITN	insecticide-treated mosquito net
LLITN	long-lasting ITN
MACEPA	Malaria Control and Evaluation Partnership in Africa
M&E	monitoring and evaluation
MERG	Monitoring and Evaluation Reference Group
MIS	malaria indicator survey
MOH	Ministry of Health
NMCC	National Malaria Control Centre
NMSP	National Malaria Strategic Plan
PATH	Program for Appropriate Technology in Health
PDA	personal digital assistant
RBM	Roll Back Malaria
RDT	rapid diagnostic test
SEA	Statistical Enumeration Area
SP	sulfadoxine-pyrimethamine
SOP	standard operating procedures
UNZA	University of Zambia
WBC	white blood cell
WHO	World Health Organization

Acknowledgements

This report presents the results of the Zambia National Malaria Indicator Survey 2006, a comprehensive nationally-representative household survey designed to measure progress toward achieving the goals and targets set forth in the National Malaria Strategic Plan 2006 – 2011. It represents the efforts of several agencies and many individuals. The Ministry of Health, namely the National Malaria Control Centre, has the major responsibility for conducting the survey. Other agencies have been instrumental in this survey including the Central and Provincial Statistical Offices, the Malaria Control and Evaluation Partnership in Africa (MACEPA) at PATH, the US Centers for Disease Control and Preventions, the World Health Organization, and the University of Zambia.

At the National Malaria Control Centre, Naawa Sipilanyambe, Acting Coordinator, and Mercy Mwanza, M&E Officer, have taken primary responsibility for survey operations. Also within the Ministry of Health, various members have assisted with organization, community sensitization efforts, logistics, supply ordering, and training. With MACEPA, John Miller, Abdirahman Dirie Mohamed, Rick Steketee, Paul Libiszowski, and Msanide Phiri have provided leadership on coordination, logistics, survey organization, accounting, and support. Adam Wolkon, John Gimnig, and Anatoly Frolov of the US Centers for Disease Control and Prevention have taken responsibility for development of the personal digital assistants and programming the questionnaire, data tabulations, training for field work, and sampling framework and size determinations. The Central Statistical Office and Provincial Statistics Offices have developed the sampling frame and taken the sample from the 2000 census enumeration areas, and coordinated the retrieval of SEA maps of the selected clusters. Fred Masaninga, Nathan Bakyaita, Khoti Gausi, and Sampson Katikiti from the World Health Organization provided support for activities and training. The Roll Back Malaria Monitoring and Evaluation Reference Group (RBM MERG) developed the questionnaire and survey instruments used. The training materials, methodology, and questionnaires used in the survey are mostly drawn from the work of the RBM MERG, but especially the work of ORC Macro, which organizes the Demographic and Health Surveys (DHS).

A complete list of the field teams and individuals involved in the survey are presented in Appendix B.

Preface

Malaria continues to be a major public health problem in Zambia, exacting its largest toll on children and pregnant women. The Ministry of Health, in collaboration with Roll Back Malaria Partners, is engaged in accordance with the National Health Strategic Plan 2005 – 2009 and the National Malaria Strategic Plan 2006 – 2011. Specifically, we are striving for progress in scaling up malaria interventions including prompt effective antimalarial treatment, insecticide-treated nets, indoor residual spraying, and prevention of malaria in pregnancy.

We have set for ourselves high coverage targets of these interventions. By achieving high coverage, we are confident in our strategic goals of reducing malaria incidence and deaths, as well as reducing malaria parasite prevalence and malaria-related anaemia. Essential for understanding progress toward these goals is measurement. Without measurement, we can only speculate as to our progress.

The Zambia National Malaria Indicator Survey 2006 represents the first nationally representative assessment of the coverage of the key malaria interventions in combination with the measures of malaria-related burden using malaria parasite and anaemia prevalence testing among children under five years of age**.**

Progress in controlling malaria is happening. Of note, coverage of pregnant women with at least two doses of intermittent preventive treatment (IPT) has reached 60% in just three years of implementation. Insecticide-treated net availability, as measured through household possession, is also increasing. With planned procurement and distribution efforts, we expect this to increase even faster over the next two years. Changes in antimalarial drug policy and maintaining a funded and consistent supply of the nation's first-line antimalarial drug have provided challenges to increasing effective antimalarial treatment. Nevertheless, more children are receiving artemisinin-based combination therapy than ever before and we expect these figures to continue to increase.

Led by the Ministry of Health, these results represent the combined work of numerous agencies contributing to the overall scale-up of malaria interventions. Together we are building our evidence base for action. Together will we reach our targets.

Dr. S.K. Miti
Permanent Secretary
Ministry of Health

Executive Summary

Malaria is a major public health problem in Zambia. The National Malaria Strategic Plan 2006 – 2011 outlines an aggressive approach to reducing malaria and malaria-related burden through the massive scale-up of malaria control interventions. Evaluation of scale-up of key interventions is essential for understanding progress in the fight against malaria.

The Zambia National Malaria Indicator Survey (MIS) represents the first nationally representative household survey assessing coverage of key malaria interventions and malaria-related burden among children under five years of age. The survey was developed and conducted by the Ministry of Health and several key malaria partners including the Central Statistical Office, the Malaria Control and Evaluation Partnership in Africa (MACEPA) at PATH, WHO, the US Centers for Disease Control and Prevention (CDC), and the University of Zambia (UNZA).

The MIS was based on a nationally representative two-stage cluster sample of 3,000 households surveyed from 120 standard enumeration areas randomly selected from 58 of 72 districts from all nine provinces to provide representative national and urban and rural estimates, as well as the ten Roll Back Malaria (RBM) sentinel districts. Field work was conducted during May and June 2006 by 11 field teams using standardized questionnaires pre-programmed onto hand-held computers (called personal digital assistants or PDAs) to facilitate data entry, extraction, and analysis. Malaria parasite testing was done using Paracheck Pf® rapid diagnostic tests (RDTs) and both thick and thin blood smears. Anaemia testing was done using Hemocue® Hb 201 analyzers and microcuvettes.

Insecticide-treated nets (ITNs) and indoor residual spraying (IRS) are the primary control strategies for preventing malaria transmission in Zambia. Results from the MIS indicate 50% of Zambian households have at least one mosquito net and 38% of households have at least ITN. Thirty-three percent (33%) of children under five years of age slept under a mosquito net the night before the survey. IRS is currently conducted in 15 districts: From the households within the IRS target districts, those in Kabwe district (Central Province) reported the highest percentage (76%) of households sprayed within the previous 12 months. Among households sprayed within the previous 12 months, IRS activities were on average conducted within the past 4 months.

Malaria prevention in pregnancy relies on use of ITNs and use of intermittent preventive treatment (IPT) during pregnancy. Thirty percent (30%) of all women aged 15 – 49 slept under a mosquito net the night before the survey and 22% slept under an ITN. For pregnant women, the percentages sleeping under a mosquito net (32%) and ITNs (25%) were slightly higher than the percentages for all women (pregnant and non-pregnant). Eighty-five percent (85%) of mothers reported taking an antimalarial drug for prevention during their last pregnancy. Sixty-nine percent (69%) of mothers received the antimalarial drug during a routine antenatal clinic (ANC) visit. Of the mothers who took an antimalarial drug, 59% took the recommended two or more doses of IPT. Similarly, 57% of mothers received two doses of IPT, at least one of which was during an ANC visit.

Since 2004, the national first-line antimalarial treatment is artemether-lumefantrine (ART-LUM). Thirty-three percent (33%) of children had a fever in the last 2 weeks. Of these, 53% took an antimalarial drug, and 32% took the drug within 24 hours of symptom onset. Sulfadoxine-pyrimethamine (SP) is the most common antimalarial drug given for fever: 30% of children with fever in the last 2 weeks were treated with SP and only 10% with ART-LUM. Eighteen percent (18%) of the children with fever were given SP and 6% ART-LUM within 24 hours of symptom onset.

As a package of tools for conducting a national malaria indicator survey, the Zambia MIS 2006 was the first assessment in Africa that combined a standardized set of questionnaires and both anaemia and parasite prevalence testing using data collection and second stage household selection with PDAs. Lessons learned through this process have been documented for future survey efforts regarding the methods, use of PDAs, sample selection, procedures, logistics and analysis, and reporting.

This MIS provides a comprehensive assessment of the coverage of the key malaria interventions and a useful benchmark against which progress toward scale-up can be measured. Further it provides a nationally representative measure of both anaemia and malaria parasite prevalence among children under five years of age. For evaluating the overall success of malaria scale-up efforts, the MIS should be repeated at regular intervals.

Chapter 1: Introduction

Malaria is endemic throughout Zambia and continues to be a major public health problem. Efforts to control malaria are currently being scaled up through coordinated effort among Roll Back Malaria (RBM) partners. In order to assess national scale-up efforts, effective monitoring and evaluation is needed to measure progress toward select targets and goals.

The Zambian Government has identified malaria control as one of its main public health priorities. This is emphasized in both the National Development Plan 2006 – 2011 and the National Health Strategic Plan 2005 – 2009. In this respect, the Government, through the National Malaria Control Centre, has developed a detailed National Malaria Strategic Plan 2006 – 2011 (NMSP 2006), aimed at significantly scaling up malaria control interventions towards the achievement of the national vision of "a malaria free Zambia."

The Zambian Ministry of Health (MOH) National Malaria Control Centre (NMCC) in collaboration with multiple partners set high targets for coverage of interventions and reductions in malaria burden outlined in the NMSP. Evidence of progress in rolling out malaria interventions to affected communities has come from several partners and sources including the 2001 national Demographic and Health Survey (DHS) and smaller scale household surveys such as the RBM baseline and follow up surveys (2001 and 2004), Netmark evaluation surveys (2000 and 2004), and others. However, to date, no comprehensive national malaria survey has been conducted to link coverage of the core RBM interventions and malaria-related disease burden. Further, updates of coverage estimates are needed to assess progress toward national and regional targets.

Through the RBM Monitoring and Evaluation Reference Group (MERG), a global technical advisory group providing M&E guidance for malaria control programmes, a Malaria Indicator Survey (MIS) has been developed for assessing core household-level indicators for coverage of RBM-recommended interventions. The MIS was developed as a package of materials to promote standardized survey sampling methods, questionnaires, and results tabulations as well as to provide assistance with survey logistics, budgeting, and training of survey teams. The package includes standardized measurement of malaria parasite prevalence and anaemia among target populations to derive malaria-related burden at the community level.

At this juncture, the NMCC recognizes that measurement of both intervention coverage and burden (parasite infection and anaemia in young children) are critical for understanding progress in national-level scale-up efforts.

Objectives

This report presents the results of the Zambia National Malaria Indicator Survey (MIS) 2006, a comprehensive nationally-representative household survey designed to measure progress toward achieving the goals and targets set forth in the NMSP 2006 – 2011. The specific objectives of the Zambia National Malaria Indicator Survey 2006 were:

1. To collect up-to-date information on coverage of the core malaria interventions included in the National Malaria Strategic Plan 2006 – 2011.
2. To assess malaria parasite prevalence.
3. To assess the status of anaemia among the target populations (children 6 – 30 months).
4. To implement standardized, representative household survey methods.
5. To strengthen the capacity of the National Malaria Control Centre and local agencies involved in order to facilitate the implementation of surveys of this type in the future.

Sample design

The MIS covered household populations in Zambia. The design for the survey was a representative probability sample to produce estimates for the country as a whole, for rural and urban separately, and for the 10 intervention districts combined as one domain. These 10 districts are the RBM sentinel districts and include Chongwe, Chibombo, Kaputa, Chipata, Isoka, Samfya, Senanga, Mwinilunga, Chingola, and Kalomo. Overall a representative probability sample of 3,000 households was selected for the MIS.

Zambia is administratively divided into nine provinces and each province is in turn subdivided into districts. For statistical purposes each district is subdivided into Census Supervisory Areas (CSAs) and these are in turn subdivided into Standard Enumeration Areas (SEAs). The 1998 – 2000 mapping exercise, conducted in preparation for the 2000 census of population and housing, demarcated the CSAs within wards, wards within constituencies, and constituencies within districts. In total, Zambia has 72 districts; 150 constituencies; 1,289 wards; about 4,400 CSAs; and about 17,000 SEAs. The listing of SEAs has information on number of households and the population. The number of households was used as a measure of size for selecting primary sampling units. Therefore, the sample frame of this survey was the list of SEAs developed from the 2000 Population Census.

Sample sizes have been calculated with the assumption that future cross-sectional surveys will be conducted for comparison with these results. Sample size determination was based on an expected 33% reduction in anaemia level for children 6 – 30 months, in accordance with RBM recommendations for areas where malaria-related anaemia burden is concentrated in infancy and early childhood (Korenromp 2004).

Given the limited data available on anaemia prevalence in Zambia, the survey based its sample size calculations on the following related information and assumptions. In a 2003 household survey in neighbouring Malawi, the overall prevalence of severe anaemia (Hb <8g/dl) among 6 – 30 month old children was 17.1% (9.6% in urban areas and 26.1% in rural areas) (Manthanga 2004). If 70% of the SEAs selected for this survey are estimated to be rural (this is a conservative estimate using 1998 census data from the Central Statistical Office of Zambia), then 21% of all 6 – 30 month old children in the baseline survey would be expected to have severe anaemia. Based on this estimate, the specific sample size was determined using 95% confidence limits, 80% power, a design effect of 1.32, and 10% adjustment for non-response (from household refusals, or abandoned households). In addition, the sample size assumed that 37% of households have children 6 – 30 months of age (CSO 2003).

To achieve the sample's total household count of 3,000, 25 households were selected in 120 SEAs from 58 districts. A first-stage sampling of the 120 SEAs was conducted by the Central Statistical Office according to the specified domains. A second stage sampling was conducted at the time of field work using personal digital assistants (PDAs). All households within a SEA were mapped using PDAs fitted with geo-positioning units and a random sample of 25 households per SEA were selected from all households mapped.

Questionnaires

Two questionnaires were used for the Zambia National Malaria Indicator Survey 2006: the household questionnaire and the women's questionnaire. The content of each was based on model questionnaires developed by the MEASURE DHS+ programme and adopted and recommended for use by the RBM MERG Task Force on Household Surveys.

The household questionnaire was used to list all usual members and visitors of the selected households. Some basic characteristics of each person were collected including his or her age, sex, education, and relationship to the head of the household. The main purpose of the household questionnaire was to identify women who were eligible to answer the individual questionnaire. Eligible women were all women 15 – 49 years of age. Malaria-specific issues covered in the household questionnaire include:

a) Indoor residual spraying (IRS)
b) Insecticide treated mosquito nets (ITNs), including household possession, net treatment status, and use of nets among all household members

The women's questionnaire is used to collect information from all eligible women aged 15 – 49. The following topics are included:

a) Background characteristics (e.g., education level, asset-based wealth index)
b) Reproduction, birth history, pregnancy status
c) General malaria knowledge
d) Intermittent preventive treatment for pregnant women
e) Fever prevalence among children under five years of age and fever treatment with antimalarial drugs

Questionnaires were programmed into PDAs to eliminate the need for paper transcribing, to allow quicker data tabulation, and to facilitate faster interviewing from available skip patterns.

Malaria parasite and anaemia testing

All health professionals used for household interviewing were trained to conduct anaemia and malaria parasite testing. They performed finger prick blood sample collection for children under six years of age, as identified from the household listing and for which consent was provided. Three tests were performed from a single finger prick including 1) anaemia test using Hemocue Hb 201 microcuvettes and analyzers, and 2) malaria parasite testing using both Paracheck Pf rapid diagnostic tests (RDTs) and 3) parasite microscopy using thick and thin blood smears (Sharmanov 2000). Results from the anaemia testing and RDTs were available immediately. Thick smears were fixed after drying and both smears were stained the same day with Giemsa stain. All stained slides were read by two independent microscopists masked from RDT results after field work was completed. Slides with discrepant RDT results were reanalyzed by a third microscopist for final validation.

Because the National Malaria Control Centre in Zambia has a policy of expanding the use of RDTs for malaria in conjunction with the use of Coartem® (a fixed dose combination antimalarial treatment of artemether-lumefantrine) for primary treatment of malaria, the Zambian-approved Paracheck Pf RDT was used to guide treatment of parasitemic children during the survey.

Haemoglobin results were shared with the parent/guardian. For children with haemoglobin levels <8g/dl, the parent/guardian was given written results, and the children were given an artemisinin-based combination antimalarial treatment according to Zambia national treatment guidelines (currently Coartem®), albendazole (if older than 24 months of age per Integrated Management of Childhood Illness guidelines), an appropriate two-week dosage of daily iron, and referred to a health centre. Children with a positive RDT received immediate treatment for malaria using an artemisinin-containing combination antimalarial treatment, according to Zambia national treatment guidelines (currently Coartem®). Children already treated with Coartem within the past two weeks were referred for treatment with quinine.

Children who were found to be seriously ill, as determined by the survey nurses, were provided transportation to the nearest health facility.

Hemocue and RDT testing was done according to manufacturer recommendations. Blood smears were stained with Giemsa stain prepared in advance of the field work by the NMCC. Parasite densities were calculated by counting the number of asexual stage parasites/200 white blood cells (WBCs), assuming 6,000 WBCs/dl of blood. Blood smears will be considered negative if no parasites are found after counting 200 fields.

Personal digital assistants (PDAs)

PDAs were used for the second-stage sampling and recording of questionnaires and for malaria parasite and anaemia testing results. Two types of PDAs were used: Dell Axim 50 and Dell Axim 51. Programming of the questionnaire was done for the Windows Mobile 5.0 operating system using Visual Basic by the Centers for Disease Control and Prevention, Atlanta, USA. A further program was developed for second-stage household sampling and included a navigation component to facilitate field staff returning to selected households for interviewing.

Community sensitization

To prepare surveyed communities for impending field work including a finger stick for anaemia and parasite testing, a series of community sensitization measures were undertaken. These included a general informational letter and accompanying flyer for districts and local communities. These documents included information about the purpose, the procedures, and the importance of household participation. Further, a series of radio spots were developed in seven languages and aired on both national and local community radio stations with service areas matching the selected SEAs. The radio spot contained a 45-second message from the Ministry of Health introducing the survey and encouraging participation.

Training, pretest activities, and field work

Data collection for the MIS took place from 1 May – 9 June 2006. Eleven interviewing teams carried out the field work. Each team comprised at least three health professionals and an officer from the Central Statistical Office. Health professionals were selected by district health management teams from 30 of 58 districts represented within the sampling frame. These health professionals were primarily registered female nurses and were responsible for conducting household interviews. Additional health professionals were selected from the Masters of Public Health (MPH) program of the University of Zambia (UNZA). Teams were assigned to each of the nine provinces with an additional team allocated for Copperbelt and Lusaka Provinces due to the high number of selected SEAs.

Training was conducted at the National Malarial Control Centre during the week of 24 – 29 April 2006. The training was coordinated by NMCC, MACEPA, WHO, and UNZA. The training schedule included sessions on survey background, questioning methods, the questionnaire, testing procedures, and the second-stage cluster-level sampling of households. PDAs were introduced on the first day of training and were used through all the training sessions to familiarize participants with each procedure. A select group of field staff were chosen to perform nightly staining of blood slides. Central and Provincial Statistical Officers were also provided detailed instructions on the use and maintenance of the PDAs, including procedures for daily backing up of data and battery charging.

A field pretest of all survey procedures was programmed for the end of the training week in Chongwe. All participants in the training exercise were pre-arranged into groups corresponding to their field work assignments. During the pretest, a full enumeration area (an SEA not otherwise included in the survey sample) was listed and interviewed. Each team practiced performing the household listing, joining listed households from distinct PDAs, and conducting interviews and testing procedures.

Ethical approval

This study was approved by the research ethics and human subjects review boards of the Centers for Disease Control and Prevention, PATH, and University of Zambia Research Ethics Committee.

Chapter 2: Characteristics of households and women respondents

Characteristics of households

The Zambia National Malaria Indicator Survey 2006 collected basic demographic and socio-economic characteristics of the population in the sampled households as well as basic housing facilities and conditions. This information is used in constructing an asset-based wealth index for interpretation of survey results. The criteria used to form the wealth index are based on work done previously by the World Bank and ORC Macro.

For this survey, a household was defined as a person or group of persons, related or unrelated, who live together in the same dwelling unit (under one household head) and share a common source of food. The Household Questionnaire collected information on all usual residents and visitors who spent the night preceding the survey in the household.

Table 1 presents the de facto household population by five-year age groups according to gender and residence. The data show there are slightly more women in Zambia than men, comprising 52% and 48% of the population, respectively. The population under age 15 makes up about 47% of the total population. One important result is the gap between the percentage of males and females at the 20 – 24 and the 25 – 29 age groups (Figure 1). The gap indicates there are more women than men in both of these age groups.

Table 1. Household population by age, sex, and residence

Percent distribution of the de facto household population by five-year age groups, according to gender and residence, Zambia 2006

	Urban			Rural			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0 – 4	15.8	14.4	15.0	21.4	18.8	20.1	19.4	17.2	18.3
5 – 9	14.5	13.6	14.0	17.2	16.1	16.6	16.2	15.2	15.7
10 – 14	12.8	13.6	13.2	12.0	13.6	12.8	12.3	13.6	12.9
15 – 19	11.2	11.2	11.2	9.3	9.4	9.3	9.9	10.0	10.0
20 – 24	9.0	11.4	10.2	7.6	9.0	8.3	8.1	9.8	9.0
25 – 29	8.4	9.9	9.2	6.4	6.9	6.6	7.1	7.9	7.5
30 – 34	7.9	7.6	7.8	6.6	6.1	6.4	7.1	6.7	6.9
35 – 39	6.5	5.0	5.7	4.3	4.0	4.1	5.1	4.3	4.7
40 – 44	3.2	3.4	3.3	3.4	3.4	3.1	3.4	3.4	3.4
45 – 49	3.5	2.7	3.1	3.1	2.6	2.8	3.2	2.6	2.9
50 – 54	2.7	2.5	2.6	1.8	2.4	2.1	2.1	2.4	2.3
55 – 59	1.4	2.0	1.7	1.8	2.8	2.3	1.6	2.5	2.1
60 – 64	1.3	1.3	1.3	1.5	1.8	1.7	1.4	1.6	1.5
65 – 69	1.0	0.6	0.8	1.5	1.5	1.5	1.3	1.2	1.3
70 – 74	0.5	0.3	0.4	1.1	1.0	1.1	0.9	0.7	0.8
75 – 79	0.4	0.4	0.4	0.8	0.4	0.6	0.7	0.4	1.5
80+	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	2,366	2,587	4,953	4,438	4,655	9,093	6,804	7,242	14,046

Figure 1. Distribution of de facto household population by five-year age groups and gender

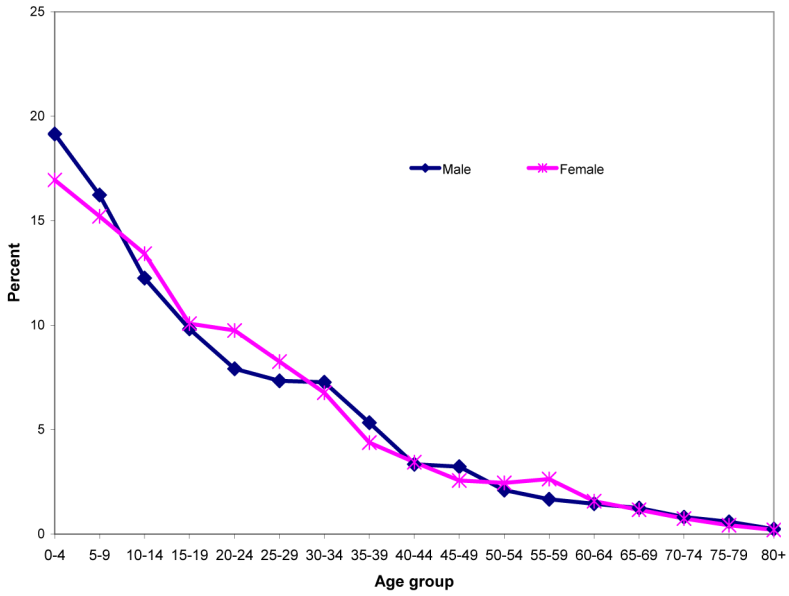


Table 2 presents the household composition among those surveyed. The percent of households headed by men and women were similar for both rural and urban areas. By the distribution of the number of usual household members, rural and urban areas are also very similar.

Table 2. Household composition

Percent distribution by sex of head of household and by household size, according to residence, Zambia 2006			
	Residence		
Characteristic	Urban	Rural	Total
Sex of head of household			
Male	74.5	76.1	75.6
Female	25.5	23.9	24.4
Number of usual members			
1	4.2	5.0	4.7
2	8.7	12.7	11.3
3	15.6	15.8	15.7
4	18.9	15.7	16.8
5	16.4	16.3	16.4
6	12.6	12.2	12.4
7	9.6	9.4	9.5
8	5.3	5.4	5.4
9+	8.7	7.5	7.9
Total	100.0	100.0	100.0
Number of households	991	1,890	2,881

Table 3 presents the physical characteristics of the houses surveyed. Of all houses surveyed, 80% indicated they had no electricity. In rural areas, this rose to 97%. Slightly more than half of urban households (52%) have electricity.

The most common sources of drinking water reported in Zambia were unprotected wells (19%) followed by tube well or boreholes (18%) and surface water (18%). These were also the most commonly reported sources of drinking water for rural areas with 25%, 25% and 27% reported, respectively. Urban areas had significantly more piped drinking water and public taps.

Pit latrine without slab/open pit represents the largest percentage of sanitation facilities used in Zambia with 42% of households reporting this type of facility. Twenty-seven percent (27%) of households reported no facility. Over half of urban households reported using some form of pit latrine and 31% of urban households reported sanitation facilities that flushed to a piped sewer system.

Household flooring material in Zambia is overwhelmingly either earth/sand 60%) or cement (38%).

Table 3. Household characteristics

Percent distribution of households by household characteristics, according to residence, Zambia 2006			
	Residence		
Household characteristic	Urban	Rural	Total
	(1)	(2)	(3)
Electricity			
Yes	51.6	3.5	20.0
No	48.4	96.5	80.0
Total	100.0	100.0	100.0
Source of drinking water			
Piped into dwelling	13.1	0.7	5.0
Piped into yard/plot	37.6	1.7	14.1
Public tap/stand pipe	33.5	2.9	13.4
Tube well or borehole	4.4	25.0	17.9
Protected well	2.4	11.1	8.1
Unprotected well	6.9	25.3	19.0
Protected spring	0.0	1.1	0.7
Unprotected spring	0.9	5.2	3.7
Rainwater	0.0	0.1	0.1
Surface water (river/dam/ lake/spring/pond)	0.7	26.6	17.7
Bottled water	0.0	0.1	0.0
Other	0.5	0.2	0.3
Total	100.0	100.0	100.0
Sanitation facilities			
Flushed to pipe sewer system	31.3	0.6	11.2
Flushed to septic tank	4.5	1.0	2.2
Flushed to pit latrine	2.1	0.0	0.7

Table 3. Household characteristics (continued)

	Residence		
Household characteristics	Urban	Rural	Total
Sanitation facilities (continued)			
Flushed to somewhere else	0.2	0.0	0.1
Ventilated improved pit latrine	0.9	1.6	1.4
Pit latrine with slab	26.7	9.1	15.2
Pit latrine without slab/ open pit	28.8	48.4	41.7
Hanging toilet/hanging latrine	0.8	0.7	0.7
No facility/bush/field	4.8	38.3	26.8
Other	0.0	0.2	0.2
Total	100.0	100.0	100.0
Flooring material			
Earth/sand/dung	16.1	83.4	60.2
Wood planks	0.0	0.0	0.0
Parquet or polished wood	0.2	0.0	0.1
Vinyl or asphalt strips	0.0	0.0	0.0
Ceramic tiles	0.4	0.2	0.2
Cement	81.3	15.8	38.3
Carpet	1.9	0.1	0.7
Other	0.1	0.5	0.3
Total	100.0	100.0	100.0
Number of households	991	1890	2881

Table 4 presents the availability of basic durable consumer goods. Over half of households in rural and urban areas reported having a radio. Nearly a third of urban households now report having a telephone or cell phone, compared to 4% of rural households.

Table 4. Household durable goods

Percent of households possessing various durable consumer goods, by residence, Zambia 2006			
	Residence		
Household characteristic	Urban	Rural	Total
Radio	70.6	51.8	58.2
Television	48.7	6.6	21.1
Telephone or cell phone	33.0	3.8	13.8
Refrigerator	9.7	1.3	11.0
Bicycle	23.1	46.0	38.1
Motorcycle	1.4	0.6	0.9
Car/truck	7.3	1.0	3.1
None of the above	19.9	35.4	30.0
Number of households	991	1890	2881

Characteristics of women respondents

Table 5 presents the background characteristics of eligible women respondents aged 15 – 49 interviewed during the survey with the women's questionnaire. Sixty percent (60%) of women were between the ages of 15 – 29 and 57% were living in rural areas. Sixty-five percent (65%) of women reported a primary education or less. Most women reported their religion as either Protestant (61%) or Catholic (22%).

Table 5. Background characteristics of women respondents

Percent distribution of women aged 15-49 by background characteristics, Zambia 2006		
Household characteristic	Percent	Number
Age		
15-19	17.5	460
20-24	23.2	612
25-29	19.2	506
30-34	16.2	426
35-39	10.5	277
40-44	8.2	217
45-49	5.3	139
Residence		
Rural	57.0	1504
Urban	43.0	1133
Province		
Central	8.8	233
Copperbelt	19.3	509
Eastern	12.2	322
Luapula	8.1	213
Lusaka	14.4	380
Northern	12.3	324
Northwestern	4.9	129
Southern	11.2	294
Western	8.8	233
Education		
No education	15.1	399
Primary	49.4	1301
Secondary	31.9	840
Higher	3.7	97
Religion		
Catholic	22.0	581
Protestant	60.8	1604
Muslim	0.2	6
Other	16.9	446

Table 5. Background characteristics of women respondents (continued)

Household Characteristic	Percent	Number
Ethnic Group		
Bemba	32.2	596
Kaonda	3.4	90
Lozi	8.7	231
Lunda	3.3	88
Luvale	3.4	91
Nyanja	19.4	513
Tonga	11.8	317
Other	17.6	464
Number of women	100.0	2637

Chapter 3: Coverage of key malaria interventions

Malaria control efforts in Zambia are focused around selected interventions for rapid scale-up. These include providing prompt, effective treatment with artemether-lumefantrine (ART-LUM) within 24 hours of symptom onset. In addition, malaria transmission is prevented through two primary means: 1) the use of insecticide-treated mosquito nets (ITNs, targeted primarily in rural areas), and 2) indoor residual spraying (IRS, targeted primarily in urban or peri-urban areas in 15 districts). These efforts are complemented by specific interventions for pregnant women—namely provision of low-cost ITNs at antenatal clinics and provision of intermittent preventive treatment (IPT) with sulfadoxine-pyrimethamine (SP).

Ownership of mosquito nets and ITNs

The ownership and use of mosquito nets, both treated and untreated, is the primary prevention strategy for reducing malaria transmission in areas of Zambia where IRS is not targeted. Table 6 shows that 50% of households in Zambia currently have a mosquito net, with 47% of households having a net that has been treated with insecticide at some time. More importantly, 38% of households have an ITN. Among the 50% of households possessing a net, nearly half have more than one net.

In Western Province, 80% of households reported having at least one mosquito net, and 67% of households reported owning at least one ITN. This is the highest percentage of mosquito net and ITN ownership reported among the nine provinces, owing partly to recent mass distribution efforts targeting all districts in Western Province in early 2006. Lusaka, Northern, and Copperbelt Provinces reported the lowest household ownership of at least one mosquito net (41%, 40%, and 46%, respectively) and ownership of at least one ITN (27%, 25%, and 30%, respectively). The large urban and peri-urban areas of Lusaka and Copperbelt are primarily targeted with IRS for reduction in malaria transmission as opposed to ITNs, offering a partial explanation for the lower ITN coverage in these provinces. The percentage of ownership of mosquito nets, treated or untreated, did not differ greatly between households in urban or rural areas. However, ownership did differ by wealth status—68% of households in the highest quintile own at least one net, compared to 43% of the lowest quintile. A similar gap was seen for ITNs, where 53% of households in the highest quintile owned at least one ITN, while only 35% of the poorest households in the lowest quintile did.

Table 6. Ownership of mosquito nets

Percentage of households with at least one and more than one mosquito net (treated or untreated), ever-treated mosquito net, and insecticide treated net (ITN), and average number of nets by each type per household, by background characteristics, Zambia 2006.

Background characteristic	Percentage of households that have at least one net	Percentage of households that have more than one net	Average number of nets per household	Percentage of households that have at least one ever-treated nets	Percentage of households that have more than one ever-treated nets	Average number of ever-treated nets per household	Percentage of households that have at least one ITN[1]	Percentage of households that have more than one ITN	Average number of ITNs per household	Number of households
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Residence										
Urban	51.7	24.3	0.95	47.8	21.9	0.87	38.0	15.5	0.65	991
Rural	48.3	20.4	0.82	46.9	19.7	0.79	37.7	13.8	0.60	1890
Region										
Central	53.5	23.4	0.95	53.5	23.4	0.95	48.4	17.1	0.77	280
Copperbelt	46.2	19.5	0.78	42.2	17.6	0.70	30.4	12.3	0.4	458
Eastern	49.7	27.0	0.92	49.0	25.9	0.90	33.5	12.1	0.53	379
Luapula	45.6	20.1	0.78	45.6	20.1	0.78	40.4	16.6	0.67	243
Lusaka	40.6	17.0	0.66	36.7	14.6	0.58	26.7	8.1	0.40	384
Northern	39.5	13.0	0.62	39.5	12.8	0.62	25.4	8.0	0.38	427
North-Western	54.1	9.9	0.73	47.9	9.1	0.66	42.3	9.1	0.59	147
Southern	51.2	23.2	0.92	50.4	22.9	0.90	46.9	18.7	0.80	305
Western	79.1	44.2	1.62	72.5	39.6	1.46	67.0	34.4	1.26	258
Wealth index										
Lowest	42.8	16.1	0.67	40.2	15.6	0.64	34.7	11.9	0.53	608
Second	38.1	12.1	0.54	36.7	11.3	0.51	28.1	7.3	0.38	603
Middle	49.6	16.4	0.73	48.0	15.6	0.70	36.7	9.7	0.50	588
Fourth	50.8	25.1	0.92	48.4	23.5	1.86	38.6	16.6	0.64	543
Highest	68.3	41.3	1.53	64.9	38.5	1.44	52.5	28.1	1.08	540
Total	49.5	21.7	0.86	47.2	20.4	0.82	37.8	14.4	0.62	2881

[1] An insecticide treated net (ITN) is 1) a factory-treated net that does not require any treatment, 2) a pretreated net obtained within the last 12 months, or 3) a net that has been soaked with insecticide within the past 12 months.

Use of mosquito nets and ITNs by children and pregnant women

Use of ITNs, especially among the target populations of children under five years of age and pregnant women, has been demonstrated to reduce the occurrence of malaria episodes, all-cause child mortality, and complications associated with malaria during pregnancy. The National Malaria Strategic Plan 2006 –2010 has set out targets of 80% coverage of ITNs, defined as use among these target populations. Attaining and maintaining high usage of ITNs is essential for reducing malaria transmission and contributing to overall reductions in malaria and malaria-related burden in Zambia.

In the MIS 2006, use of ITNs was identified in each household through the use of a complete net roster, in which each net in the household was identified, its current treatment status was determined, and individuals sleeping under each net the night before the survey were recorded.

Table 7 presents information on the use of mosquito nets by children. Thirty-three percent (33%) of children under age five years were reported to have slept under a mosquito net the night before the survey and 24% of the children were reported to have slept under an ITN. Usage of nets was higher for children in urban areas (35%) than in rural areas (32%). Male children under age five were more likely to sleep under an ITN than females (26% versus 23%, respectively). According to the wealth quintiles, children living in poorer households were less likely to sleep under nets (lowest 25% versus highest 53%) and ITNs (lowest 20% versus highest 41%) as those in the richest households.

Western Province reported the highest percentage of children sleeping under an ITN at 44%, followed by Central at 30%. Lusaka Province reported the lowest percentage of ITN use among children at 11%, followed by Northern at 15%. Western Province, with highest overall household level possession of mosquito nets, reported 53% of children under five sleeping under nets the night before the survey.

Table 7. Use of mosquito nets by children

Percentage of children under age five who slept under a mosquito net the night before the survey and percentage who slept under an insecticide treated net (ITN), by background characteristics, Zambia 2006

Background characteristic	Percentage of children under age five years who slept under a net last night	Percentage of children under age five years who slept under an ever-treated net last night	Percentage of children under age five years who slept under an ITN[1] last night	Number of children under age five years
	(1)	(2)	(3)	(4)
Age (in years)				
<1	36.4	34.7	28.1	574
1	33.4	31.5	23.6	516
2	36.0	35.2	27.3	532
3	28.3	27.7	21.4	476
4	26.5	25.8	19.9	441
Sex				
Male	33.8	32.4	25.6	1306
Female	31.1	30.2	23.0	1234
Residence				
Urban	34.5	32.0	25.2	733
Rural	31.6	31.0	24.0	1806
Region				
Central	36.1	36.1	30.1	222
Copperbelt	26.9	24.5	20.1	316
Eastern	41.8	41.0	26.9	355
Luapula	34.3	34.3	28.3	208
Lusaka	20.5	18.5	11.3	262
Northern	23.5	23.5	14.5	423
North-Western	27.6	24.5	21.5	193
Southern	33.0	32.6	29.7	322
Western	53.1	50.3	44.0	238
Wealth index				
Lowest	24.7	23.6	19.6	763
Second	24.6	23.9	17.7	488
Middle	36.5	35.8	26.8	515
Fourth	33.8	32.8	23.8	418
Highest	52.6	49.7	40.7	355
Total	32.5	31.3	24.3	2539

[1] An insecticide treated net (ITN) is 1) a factory-treated net that does not require any treatment, 2) a pretreated net obtained within the last 12 months, or 3) a net that has been soaked with insecticide within the past 12 months.

Table 8 presents the percentage of all women aged 15 – 49 and pregnant women who reported sleeping under mosquito nets the night before the survey. Thirty percent (30%) of all women aged 15 – 49 slept under a mosquito net the night before of the survey, and 22% slept under an ITN. For pregnant women, the percentages sleeping under a mosquito net (32%) and ITNs (25%) were higher than the percentages for all women (pregnant and non-pregnant).

More rural women aged 15 – 49 reported sleeping under a net or an ITN (31% and 24%, respectively) than urban women (28% and 21%). Pregnant women in rural areas were more likely to sleep under a net than those in urban areas (35% rural, 25% urban). In addition, rural pregnant women were more likely to sleep under an ITN than their urban counterparts (27% rural, 18% urban).

Table 8. Use of mosquito nets by women

Percentage of all women age 15-49 and pregnant women who slept under a mosquito net (treated or untreated), an ever-treated mosquito net, or an insecticide-treated net (ITN) the night before the survey, by background characteristics, Zambia 2006

	Percentage of women who slept under a net last night	Percentage of women who slept under an ever-treated net last night	Percentage of women who slept under an ITN[1] last night	Number of women	Percentage of pregnant women who slept under a net last night	Percentage of pregnant women who slept under an ever-treated net last night	Percentage of pregnant women who slept under an ITN last night	Number of pregnant women
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Residence								
Rural	30.8	30.1	23.7	1870	34.7	34.1	27.1	222
Urban	28.0	26.0	20.6	1294	25.1	22.9	18.4	95
Region								
Central	27.8	27.8	23.5	254	37.7	37.7	33.5	29
Copperbelt	22.6	20.8	15.9	608	26.2	26.2	23.8	41
Eastern	40.0	39.4	27.7	383	53.8	53.8	37.4	47
Luapula	34.1	34.1	27.7	235	23.0	23.0	14.9	30
Lusaka	16.2	14.9	10.6	463	14.1	14.1	10.8	42
Northern	22.6	22.6	15.4	422	20.7	20.7	14.7	48
North-Western	35.6	31.7	26.7	163	37.6	31.9	24.5	17
Southern	33.7	33.4	29.8	360	43.2	40.3	35.2	38
Western	53.0	49.0	42.5	276	33.1	28.0	28.0	25
Wealth Index								
Lowest	24.4	23.0	19.2	682	24.2	22.5	18.9	77
Second	23.4	22.8	17.9	517	30.0	28.6	23.8	75
Middle	32.9	32.1	24.8	576	41.1	39.5	28.5	64
Fourth	27.0	25.7	20.3	624	29.8	29.8	23.5	57
Highest	38.2	36.5	28.3	765	37.2	37.2	30.9	45
Total	29.6	28.4	22.4	3164	31.8	30.8	24.5	317

[1] An insecticide treated net (ITN) is 1) a factory-treated net that does not require any treatment, 2) a pretreated net obtained within the last 12 months, or 3) a net that has been soaked with insecticide within the past 12 months.
* An asterisk indicates that a figure is based on fewer than 25 cases and has been suppressed.

Indoor residual spraying (IRS)

Indoor residual spraying is one of the primary malaria prevention strategies in Zambia and is carried out in 15 target districts, representing mainly urban and peri-urban areas. These districts include Kabwe (Central Province); Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Mufurila, Ndola (Copperbelt Province); Chongwe, Kafue, Lusaka (Lusaka Province); Solwezi (North-Western Province); Kazungula, Livingstone, and Mazabuka (Southern Province).

Table 9 presents the results for IRS reported by households in these target districts. The results indicate urban areas are receiving IRS and rural areas are not. From the households within the IRS target districts, those in Kabwe district (Central Province) reported the highest percentage (76%) of households sprayed within the previous 12 months. Ninety-five percent (95%) of this spraying was conducted by the government IRS programme. Copperbelt Province reported the second highest percentage of households sprayed (38%), followed by Southern Province (26%). IRS target districts in the Copperbelt Province have the highest percentage (26%) of private agents conducting IRS activities.

Based on the wealth quintiles, poorer households have a lower percentage of IRS coverage than richer households. Poorer households are more likely to get their IRS through the government programmes than richer houses. The opposite trend is seen among households who receive their IRS through private agents.

Among households sprayed within the previous 12 months, IRS activities were on average conducted within the past 4 months. Since the survey was conducted during May/June 2006, most houses were reportedly sprayed since the beginning of 2006. Ideally, IRS should be administered prior to the malaria transmission season, which begins after the rains in November and December in Zambia.

Essential for understanding and interpreting IRS coverage results from household surveys is an understanding of whether clusters and households surveyed fall within targeted IRS areas. In Zambia a clear understanding of household level placement within spray areas is not well understood for all targeted spray districts. For the purposes of this analysis, the results from Table 9 are tabulated based on all households within districts if the district is known to conduct IRS campaigns. These percentages do not necessarily represent operational coverage rates.

Table 9. Indoor residual spraying (IRS)

Among all households in IRA targeted districts, the percentage of households reporting spraying was conducted by government and private agents and the average number of months ago spraying was conducted, by background characteristics, Zambia 2006.

Background characteristic	Percentage of households sprayed in the previous 12 months	Number of households	Percentage sprayed by government	Percentage sprayed by private agents	Average number of months ago house sprayed	Number of sprayed houses
	(1)	(2)	(3)	(4)	(5)	(6)
Residence						
Rural	0.8	249	*	*	*	*
Urban	34.4	725	78.0	18.2	4.0	249
Region						
Central	76.1	39	94.5	2.4	2.7	30
Copperbelt	38.3	408	72.7	25.7	4.5	156
Lusaka	11.3	384	74.0	10.1	4.0	43
North-Western	0.0	48	*	*	*	*
Southern	25.8	94	*	*	*	*
Wealth index						
Lowest	9.8	42	*	*	*	4
Second	12.2	73	*	*	*	9
Middle	21.2	132	97.2	2.7	3.1	28
Fourth	24.5	344	82.1	15.5	3.6	84
Highest	32.9	383	68.7	26.0	4.5	126
Total	25.8	974	77.4	18.5	4.0	251

* An asterisk indicates that a figure is based on fewer than 25 cases and has been suppressed.

Use of intermittent preventive treatment (IPT) by pregnant women

The strategy of IPT for prevention of malaria during pregnancy has been implemented in Zambia since 2003. IPT is currently defined as having taken at least two treatment doses of an effective antimalarial drug during routine antenatal care visits. In Zambia, sulfadoxine-pyrimethamine (SP), also known as Fansidar, is currently the drug used for IPT.

Table 10 presents the results for the use of IPT by pregnant women during the last birth in the five years preceding the survey. Eighty-five percent (85%) of mothers reported taking an antimalarial drug for prevention during their last pregnancy. Sixty-nine percent (69%) of mothers received the antimalarial drug during a routine ANC visit. Of the mothers who took an antimalarial drug, 59% took the recommended 2 or more doses of IPT. Fifty-seven percent (57)% of mothers who received IPT during an ANC visit took 2 or more doses of the medication.

Responses varied among populations. For example, urban women were slightly more likely to take an antimalarial drug during their last pregnancy than rural women (86% vs. 85% respectively). However, they were much more likely to receive IPT during an ANC visit (75% vs. 66%).

Regional variations were also seen. Women in Luapula Province were less likely to take an antimalarial drug, women in North-Western more likely (80% vs. 93% respectively). North-Western Province mothers were also more likely to complete 2 doses (70% of these mothers

took the complete course versus a national average of 59%). Women in Lusaka Province were more likely to receive IPT at an ANC visit than those in Central Province (77% and 51% respectively), but equally likely to take two or more doses of IPT (both 61%).

Women in the second wealth quintile had the highest rates of antimalarial drug use (87% vs. 82% in the poorest quintile, 86% in the wealthiest). The gap was greater for mothers taking two or more doses of IPT (65% for the highest quintile, compared to 49% for the lowest and 58% for the middle).

Table 10. Use of intermittent preventive treatment (IPT) by pregnant women

For the last birth in the five years preceding the survey, percentage for which the mother took antimalarial drugs for prevention during the pregnancy and percentage for which the mother received IPT during an antenatal visit, by background characteristics, Zambia 2006.

Background characteristics	Percentage of mothers who took any antimalarial drug for prevention during their last pregnancy	Percentage of mothers who took any IPT	Percentage of mothers who took 2+ doses of IPT	Percentage of mothers who received any IPT during an ANC visit	Percentage of mothers who received 2+ doses of IPT at least one of which was during an ANC visit	Number of mothers
	(1)	(2)	(3)	(4)	(5)	(6)
Residence						
Rural	84.8	68.1	54.8	65.7	52.5	979
Urban	86.2	77.4	65.7	74.8	63.3	593
Region						
Central	81.8	75.8	61.3	50.7	37.4	134
Copperbelt	82.6	73.1	66.2	72.2	65.3	238
Eastern	89.6	60.5	48.7	60.5	48.7	223
Luapula	80.3	74.8	62.6	74.8	62.6	135
Lusaka	81.6	77.3	61.5	77.3	61.5	225
Northern	85.2	72.6	61.4	71.2	59.9	233
North-Western	93.2	79.3	69.8	79.3	69.8	91
Southern	87.8	77.4	57.7	77.5	57.7	188
Western	90.4	50.2	38.0	50.2	38.0	104
Wealth index						
Lowest	81.5	62.1	48.7	60.3	46.9	391
Second	87.1	72.4	61.2	69.7	58.5	279
Middle	86.5	72.0	58.2	68.8	55.4	306
Fourth	86.5	79.6	64.3	76.5	61.3	319
Highest	86.2	74.5	65.5	72.9	63.9	277
Mother's education						
None	85.6	67.1	56.7	65.5	55.2	258
Primary	83.3	69.9	56.8	67.2	54.2	849
Secondary	88.6	76.7	63.3	73.9	60.7	424
Higher	91.3	81.6	71.1	81.6	71.1	41
Total	85.3	71.6	58.9	69.1	56.5	1572

[1] Intermittent preventive treatment (IPT) is intermittent preventive treatment with Fansidar/SP during an antenatal clinic (ANC) visit.

Prevalence and prompt treatment of fever

The treatment component of Zambia's malaria control program focuses on prompt provision of effective drugs. In the face of increasing resistance to chloroquine and SP, the Ministry of Health designated artemether-lumefantrine (ART-LUM, or Coartem®) as first-line therapy for all Zambians over 10 kg in 2003. The specific guidelines, as outlined in the Central Board of Health's Guidelines for the Diagnosis and Treatment of Malaria in Zambia, recommend Coartem as first-line therapy for uncomplicated malaria in children over 10 kg, and SP for uncomplicated malaria in children under 10 kg. Quinine is designated as the lead drug for complicated malaria.

According to the current malaria control strategy, Zambia hopes to treat 80% of patients within 24 hours of symptom onset by December 2008. Prompt presentation of febrile children to health facilities is essential to meeting this target.

Table 11 presents results for prevalence of fever among children under five and treatment-seeking behaviour for these children. Thirty-three percent (33%) of children had a fever in the last two weeks. Of these, 53% took an antimalarial drug, and 32% took the drug within 24 hours of symptom onset. Sixty percent (60%) sought treatment from a health facility/provider within that time period. The highest prevalence of fever was seen in children aged 12 – 23 months (41%).

Children in rural areas were more likely to suffer from fever (37% rural vs. 19% in urban areas), and less likely to seek treatment from a health facility/provider within 24 hours (59% rural vs. 70% urban). They were also less likely to take an antimalarial drug (52% rural vs. 61% urban), and less likely to take one within 24 hours (31% rural vs. 40% urban).

In the lowest quintile, 44% of children suffered from fever in the last two weeks, and 43% of those were treated with an antimalarial drug. Twenty-two percent (22%) were treated promptly within 24 hours and 56% were seen by a health provider/facility in that time period.

Table 11. Prevalence and prompt treatment of fever

Percentage of children under age five with fever in the two weeks preceding the survey, and among children with fever, percentag†e who took antimalarial drugs and who took the drugs the same/next day, by background characteristics, Zambia 2006.

Background characteristic	Percentage of children with fever in last two weeks	Number of children under age five	Percentage of children with fever who took antimalarial drugs†	Percentage of children with fever who took antimalarial drugs same day/next day†	Percentage of children with fever who sought treatment from a facility/ provider same day/next day†	Number of children with fever†
	(1)	(2)	(3)	(4)	(5)	(6)
Age (in months)						
<12	30.3	309	43.7	26.2	57.6	88
12-23	40.9	286	61.4	33.4	58.4	99
24-35	33.9	267	48.8	31.0	64.7	72
36-47	30.7	198	53.2	37.1	60.1	60
48-59	27.4	173	58.1	34.0	62.5	44
Sex						
Male	33.5	623	52.6	32.0	65.2	185
Female	32.9	611	53.1	31.7	57.9	178
Residence						
Urban	19.3	286	60.6	40.0	70.4	50
Rural	37.4	949	51.6	30.5	58.6	313
Region						
Central	17.0	75	*	*	*	11
Copperbelt	18.2	40	*	*	*	5
Eastern	30.8	280	77.3	65.9	61.9	74
Luapula	51.2	161	33.1	23.2	59.8	74
Lusaka	17.9	79	*	*	*	11
Northern	59.5	130	48.5	26.3	58.6	61
North-Western	32.3	86	*	*	*	23
Southern	22.6	208	59.5	14.0	52.6	46
Western	33.9	185	34.5	19.2	75.7	58
Wealth index						
Lowest	44.2	406	42.5	22.2	55.6	158
Second	38.1	239	56.6	37.0	59.3	80
Middle	29.6	264	63.2	40.6	65.2	69
Fourth	17.6	196	63.0	38.3	66.9	31
Highest	20.2	129	65.3	44.2	71.0	25
Total	33.2	1,234	52.8	31.8	60.2	363

† Excludes children whose fever started less than two days before the interview.
* An asterisk indicates that a figure is based on fewer than 25 cases and has been suppressed.

Table 12 represents drugs taken for fever and drugs taken within 24 hours of symptom onset. According to the survey results, SP is the most common antimalarial drug given for fever: 30% of children with fever in the last two weeks were treated with SP, 10% with Coartem, and 3% with quinine (for severe malaria according to the treatment guidelines). Coartem use in children less than 12 months was 2%, versus an average of 10%. Eighteen percent (18%) of the children with fever were given SP and 6% ART-LUM within 24 hours of symptom onset.

Table 12. Type and timing of antimalarial drugs

Among children under age five who took antimalarial drugs for fever and/or convulsions in the two weeks preceding the survey, percentage who took first-line drug, second-line drug, or other antimalarial drugs and percentage who took each type of drug the same/next day after developing fever and/or convulsions, by background characteristics, Zambia 2006

	Percentage of children who took drug				Percentage of children who took drug same/next day				
Background characteristic	Coartem[1]	SP[1]	Quinine	Other anti-malarial	Coartem	SP	Quinine	Other antimalarial	Number of children with fever
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age (in months)									
<12	2.2	28.3	3.9	9.2	2.2	15.4	1.7	7.0	88
12-23	15.5	27.4	4.5	13.9	8.3	16.6	2.1	6.3	99
24-35	8.0	25.8	1.8	13.2	2.7	16.4	0.8	11.1	72
36-47	14.3	25.6	3.1	10.1	11.3	16.4	3.1	6.1	60
48-59	7.6	46.3	2.6	1.6	4.8	26.8	2.6	0.0	44
Residence									
Urban	9.6	33.5	4.9	12.6	4.6	23.5	2.3	9.6	50
Rural	9.6	28.7	3.1	10.2	6.0	16.5	1.9	6.2	313
Region									
Central	*	*	*	*	*	*	*	*	11
Copperbelt	*	*	*	*	*	*	*	*	5
Eastern	16.5	22.7	6.5	31.6	13.1	22.0	6.6	24.7	74
Luapula	9.6	22.0	0.0	1.5	7.1	16.0	0.0	0.0	74
Lusaka	*	*	*	*	*	*	*	*	11
Northern	8.5	36.6	1.9	1.5	5.2	17.8	1.9	1.5	61
Northwestern	*	*	*	*	*	*	*	*	23
Southern	9.5	27.2	8.7	14.1	0.0	11.5	0.0	2.5	46
Western	5.1	26.8	0.0	2.6	5.1	14.2	0.0	0.0	58
Total	9.6	29.3	3.4	10.5	5.8	17.5	2.0	6.6	363

Note: Table excludes children whose fever started less than two days before the interview.
1. Coartem is artemether-lumefantrine; SP is sulfadoxine-pyrimethamine.
* An asterisk indicates that a figure is based on fewer than 25 cases and has been suppressed.

Children in urban areas were more likely to take SP than those in rural areas (34% urban vs. 29% rural for general use, 24% urban vs. 17% rural for use within 24 hours). Coartem use was similar across these settings (10% for both urban and rural general use).

Table 13 represents the source of antimalarial drugs given to children under five years of age with fever in the two weeks preceding the survey. The majority of drugs (87%) were obtained from a government facility/health facility. Respondents also reported using medications already present in the home (6%) or purchased at a shop (4%). Eighty-eight percent (88%) of SP treatment was obtained through a government health facility, as was 97% of Coartem (although sample size for this latter value is small at 39 children).

Table 13: Source of antimalarial drugs

Percent distribution of antimalarial drugs given to children under five years of age with fever in the two weeks preceding the survey, by source of the drugs, Zambia 2006.

	Already had drug at home	Govern-ment health facility/ worker	Private health facility/ worker	Shop	Other	Don't know	Percent of children who took drug	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Antimalarial drug								
Coartem	3.2	96.8	0.0	0.0	0.0	0.0	100.0	39
SP/Fansidar	4.6	88.1	1.1	3.9	0.0	0.0	100.0	114
Chloroquine	*	*	*	*	*	*	*	2
Quinine	*	*	*	*	*	*	*	13
Other antimalarial	10.3	73.5	5.1	8.2	2.9	0.0	100.0	41
All antimalarial drugs	6.2	87.0	2.0	3.7	1.1	0.0	100.0	209

Note: Table excludes children whose fever started less than two days before the interview. SP is sulfadoxine-pyrimethamine.
* An asterisk indicates that a figure is based on fewer than 25 cases and has been suppressed.

Chapter 4: Malaria parasite and anaemia prevalence

Table 14 represents prevalence of malaria and anaemia in children under five. For the purposes of the survey, “severe anaemia” is defined as a haemoglobin level less than 8 grams/decilitre (g/dl).

Twenty-two percent (22%) of Zambian children under five had malaria parasites. Malaria parasitemia levels were highest in children between 24 and 47 months of age (25% for children aged 24 – 35 months and 26% for children aged 36 – 47 months). Percentages were higher in rural areas than urban areas (28% vs. 6% respectively). In addition, malaria parasitemia was highest in the lowest wealth quintile (30%) and decreased to 6% for the highest quintile. The two provinces with the highest levels of malaria parasitemia prevalence were Luapula (33%) and Northern (35%) Provinces.

The mean haemoglobin level across Zambia was 9.97 g/dl with a standard deviation of 0.09. Levels varied somewhat by age: children aged 12 – 23 months had the lowest haemoglobin levels (9.59 g/dl) vs. children aged 48 – 59 months, who had the highest levels (10.58 g/dl). This drop in haemoglobin after the first year of life might be explained by cessation of breast-feeding (according to the 2001 – 2002 Demographic and Health Survey, the median breast-feeding duration for Zambia is 21 months nationwide). Haemoglobin levels are lower in rural areas than urban (9.81 g/dl rural vs. 10.39 g/dl urban). They are lowest for the poorest wealth quintile (9.67 g/dl vs. 10.50 g/dl for the highest quintile).

Across Zambia, 14% of children are severely anaemic. Levels peak in the 12 – 23 month age range, in which 19% of children are severely anaemic. Males are more likely to be severely anaemic than females (15% male vs. 13% female), and children in rural areas are more likely to be severely anaemic than those in urban areas (16% rural vs. 7% urban). Anaemia levels also increase as wealth status decreases, as 17% of children in the lowest quintile are severely anaemic, vs. 6% in the highest quintile. Across regions, Luapula has the highest level of severe anaemia (22%).

Table 14. Malaria parasite prevalence and anaemia

Among children under five, percentage with malaria parasites, mean haemoglobin values, standard deviation of haemoglobin values, and percentage with severe anaemia (less than 8 grams/decilitre), by background characteristics, Zambia 2006.

Background characteristic	Percentage with malaria parasites	Mean haemoglobin value	Standard deviation of haemoglobin	Percentage of children with severe anaemia	Number of children
	(1)	(2)	(3)	(4)	(5)
Age (in months)					
<12	12.6	9.72	0.13	17.3	416
12-23	22.8	9.59	0.16	19.4	396
24-35	25.3	9.96	0.13	12.8	428
36-47	26.3	10.12	0.10	10.6	366
48-59	24.4	10.58	0.11	7.6	321
Sex					
Male	21.9	9.93	0.09	14.8	991
Female	21.8	10.01	0.10	12.8	936
Residence					
Urban	6.4	10.39	0.09	7.2	516
Rural	27.8	9.81	0.11	16.3	1411
Region					
Central	27.7	9.84	0.25	13.4	165
Copperbelt	12.4	10.19	0.23	13.1	218
Eastern	21.0	9.94	0.16	14.1	287
Luapula	32.9	9.33	0.14	22.0	185
Lusaka	0.8	10.06	0.11	7.5	92
Northern	35.3	10.04	0.30	17.0	389
North-Western	24.3	9.54	0.21	18.8	168
Southern	13.7	10.10	0.19	7.6	240
Western	11.1	10.52	0.17	6.7	185
Wealth index					
Lowest	30.4	9.67	0.12	17.2	625
Second	27.6	9.72	0.20	20.1	385
Middle	23.4	10.06	0.13	13.2	399
Fourth	7.5	10.38	0.10	5.3	279
Highest	6.2	10.50	0.12	6.2	239
Total	22.1	9.97	0.09	13.8	1,927

Chapter 5: General malaria knowledge

Among eligible women aged 15 – 49 years, a general knowledge of malaria, symptom recognition, and methods of prevention are necessary to ensure appropriate treatment and prevention behaviour. Table 15 presents data on respondents' awareness of malaria, its primary symptom (fever), its route of transmission, and nets as a tool for prevention.

Table 15. General malaria knowledge

Among eligible women aged 15-49, the percentage who reported having heard of malaria, recognize fever as a symptom of malaria, reported mosquito bites as a cause of malaria, reported mosquito nets (treated or untreated) as a prevention method for malaria, by background characteristics, Zambia 2006.

Background characteristic	Percentage who have heard of malaria	Percentage who recognize fever as a symptom of malaria	Percentage who reported mosquito bites as a cause of malaria	Percentage who reported mosquito nets (treated or untreated) as a prevention method	Number of women
	(1)	(2)	(3)	(4)	(5)
Residence					
Urban	99.6	69.8	90.1	86.5	1133
Rural	98.2	61.8	73.1	71.1	1502
Region					
Central	98.9	54.6	83.2	81.9	233
Copperbelt	100.0	79.3	94.9	91.6	509
Eastern	99.2	52.7	67.9	64.9	321
Luapula	97.2	55.5	79.4	76.2	213
Lusaka	99.5	66.3	89.1	85.8	380
Northern	98.1	58.0	57.9	57.4	324
North-Western	97.7	62.6	71.9	71.1	129
Southern	99.6	75.8	90.8	85.6	294
Westen	96.1	67.7	72.5	71.0	233
Wealth index					
Lowest	96.5	60.7	67.2	62.4	546
Second	99.1	59.3	69.7	69.2	428
Middle	99.2	63.6	78.1	76.2	484
Fourth	99.5	64.4	87.6	84.0	547
Highest	99.6	75.1	94.6	92.4	632
Education					
None	96.9	62.8	63.3	62.0	399
Primary	98.8	60.6	76.4	73.3	1300
Secondary	99.6	70.8	92.8	90.0	840
Higher	98.8	88.8	97.6	95.2	97
Total	98.8	65.2	80.4	77.7	2636

Figure 2 presents the responses most often reported as methods of prevention of malaria. Women aged 15-49 reported use of a mosquito net for malaria prevention most often, followed by use of a treated mosquito net. Use of ITNs and house spraying as malaria prevention methods were reported more often in urban areas than rural areas.

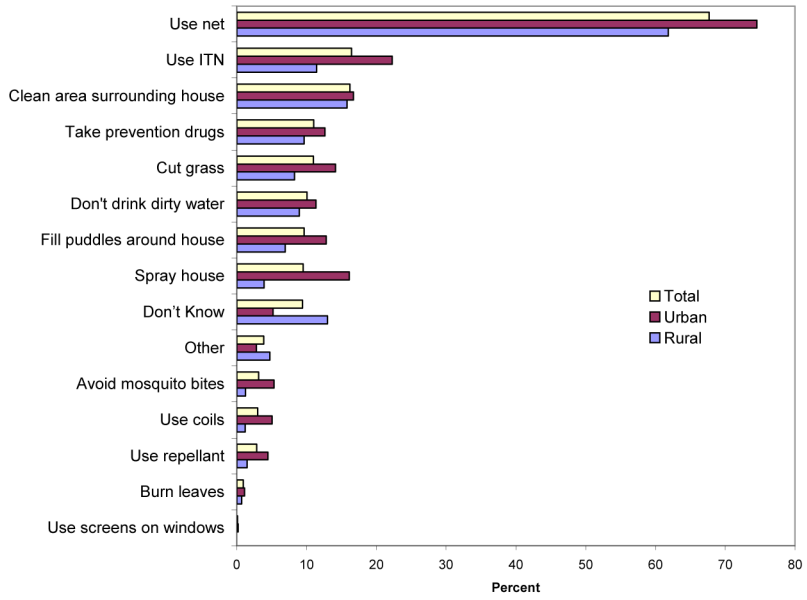
The majority of women had heard of malaria (99%) with little variance across regions, urban/rural divide, wealth index, or education.

Overall, 65% of women recognized fever as a symptom of malaria. Those in urban areas were more likely to report this knowledge (70% urban vs. 62% of women in rural areas). Knowledge also increased with wealth level (61% for the lowest quintile, 75% for the highest), and education level (63% for women with no education, 89% for those with higher education). Regional variability was observed, with 55% of women in Central Province recognizing this symptom, and 79% in Copperbelt Province.

Recognition of mosquitoes as the vector for malaria transmission is essential for consistent and successful use of prevention tools. Across Zambia, 80% of women reported that mosquito bites cause malaria. Women in urban areas were more likely to recognize this than those in rural areas (90% urban vs. 73% rural). Women in the lowest wealth quintile were least likely to be aware of mosquito transmission (67%); women in the highest quintile were the most likely to be aware of this fact (95%). Knowledge rose with education level, with 63% of women with no education recognizing the transmission source and 98% of women with a higher education recognizing it. Regional differences were also seen—women in Lusaka, Southern, and Copperbelt Provinces were more likely to note mosquito transmission (89%, 91%, and 95% respectively). Women in Northern Province showed the lowest knowledge of transmission source (58%).

Specific knowledge of prevention methods is also key to effective control. Overall, 78% of women reported that use of mosquito nets could prevent malaria. Urban women were more likely to note this than rural women (87% urban vs. 71% rural). Recognition of nets as a prevention tool also rose with wealth (only 63% of the lowest quintile recognized the net as a tool vs. 92% of the wealthiest women), and education level (62% of women with no education vs. 95% of women with higher education). Regional variances mirrored those seen for transmission knowledge, with the highest knowledge levels in Lusaka, Southern, and Copperbelt (86%, 86%, and 92%), and the lowest in Northern Province (57%).

Figure 2. Among women 15–49, methods reported that can be used for prevention



Chapter 6: Lessons learned

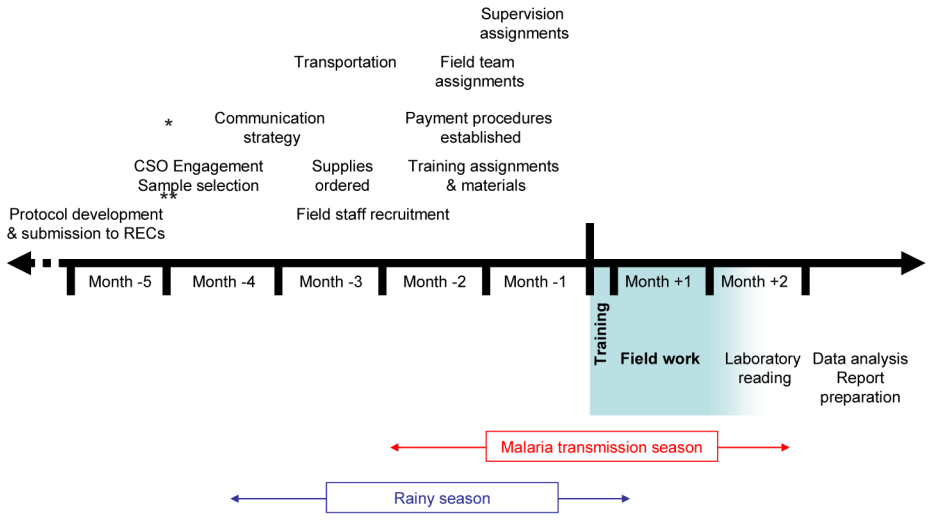
While the questionnaire and many of the survey methods have been conducted previously through Demographic and Health Surveys in several countries, the Zambia National Malaria Indicator Survey represents the first time a stand-alone malaria indicator survey using the recommended RBM MERG methods in combination with PDAs and anaemia and malaria parasite testing has been carried out. Because of greater need for Africa-wide evaluations of malaria control programs following the RBM MERG recommended methods, and in order to further document the collective efforts to carry out this survey, a comprehensive list of lessons learned from the experience in Zambia is provided below. The lessons learned related to all aspects of the survey process including: planning and scheduling of activities, training, equipment used, logistics, and field work.

Survey planning and time frame

Planning for the survey activities must begin several months before field work. While procurement and supply delivery is better managed from one organization, survey planning and adequate participation with governmental ministries is time consuming and often subject to delays. Especially with sample selection, statistical offices may be occupied with other surveys that may result in delays. Their participation is critical at an early stage for planning and coordinating logistics later. We would suggest statistical offices be engaged at least five to six months before the survey field work is scheduled to begin. See figure 3 for the planning time line below.

Authorization of activities under ministries of health and central statistical offices requires high level commitment and connections to avoid delays. Coordinating survey efforts through a national malaria control programme often requires at least three additional levels of ministerial approval to facilitate action. Decisions can only be taken after approval from the highest level, in the case of Zambia, from the Permanent Secretary. The formal process of approvals, usually in the form of cascade letters must be done for every action related to staffing within the Ministry of Health, for example, requesting staff for training, formal notification of survey, and contact with provincial or district health offices. The same set of procedures must be repeated for engagement of the central statistical office staff. Examples of the cascade letters and general notification letters are available upon request. This directly affects the time frame for planned actions and suggests adding additional planning time to activities.

Figure 3. Time line for Malaria Indicator Survey



*CSO = Central Statistical Offices, **REC = Research Ethics Committee

Questionnaire design

Programming the RBM MERG questionnaire was very time consuming. During the course of the survey, many errors and programming glitches were discovered. These were handled as they arose, but software patches were loaded nightly to every PDA. The program is adequate as written but with more time, we could have done a better job of working out the bugs in the system and making the questionnaire flow better.

For easier manoeuvrability during PDA-based questioning, we would recommend changing the flow of the survey. As currently programmed, the interviewer can skip around from one section to another. We would recommend programming it so that the interviewer has the option of returning to the main screen at any time but that he/she would otherwise continue straight through the entire questionnaire.

Although a "general malaria knowledge" question is not currently included in the standard MIS package, countries with behavioural change components in the national strategic plans will benefit from this type of assessment. We would recommend standardizing these with the help of a behavioural scientist. Also in the women's questionnaire, we would ask specifically about whether any children under age six had died in the last year in addition to whether any had died in the last six years.

Under the "House Social Info" section, we would add a few more questions on the house construction that are directly related to the transmission and/or prevention of malaria. Roof and wall construction would be helpful to know, particularly in homes that are sprayed, as the construction of the walls in particular may indicate the insecticide used for spraying. The presence of open eaves or windows without screens may act as entryways for mosquitoes into the household.

Personal digital assistant (PDA) issues

Although this was the first time this survey was fielded using PDAs, adequate testing of the program should be done prior to the training week. During the MIS 2006, significant programming errors were still being corrected up until the teams dispersed for field work, preventing participants from practicing after the formal training sessions had ended. During the training week, participants should be allowed to take their assigned PDAs with them after training hours to practice and become more familiar with the equipment and questionnaire. Future survey efforts that choose to use the same questionnaire and programming can benefit from the current state of software development to avoid this problem.

Screening of field staff for some computer familiarity is preferable. This is especially important for the nurses conducting the full interviews.

Global positioning system (GPS) problems

The Dell Axim 50 had only a few problems with the GPS functionality, mainly with the initial acquisition of signal from the satellite. This was usually solved by simply letting the PDA sit for several minutes until a signal was acquired.

The Dell Axim 51, on the other hand, would acquire a signal fairly quickly but often lost it and failed to reacquire it after going to power save mode. This problem was unexpected and the units should have been tested more extensively before use to find and correct the problem.

Training

Training should be facilitated by local staff with knowledge of field conditions and languages. The various sections of the questionnaire should be shared out among the facilitators in such a way that there is an "expert" on each section. Involving NMCC focal points for key interventions to handle relevant sections of the questionnaires is also recommended.

With PDA-based questionnaires and training, matching the number of PDAs with those participating in the training is necessary to ensure maximum familiarity with the PDAs during the training week. For this exercise, it was felt that too many people were invited to participate in training, the excess coming from too many students from curricula other than the MPH program. While it is good to maintain good relations with the University of Zambia and some of the students actually participated in the survey, allowing over 20 additional individuals to participate in the training slowed things down considerably. Better pre-screening of potential field staff will reduce the number of training participants necessary to ensure adequate team numbers. In addition to students using PDAs that should have been reserved for nurses and enumerators, the large number of people necessitated long breaks for tea and lunch. They also created problems with space on buses during the field day. In sum, we would recommend including no more trainees than PDAs.

Among the facilitators, we have different opinions on the appropriate length of the training. Some suggested six days was enough and that we could have been more efficient with the time. Others suggested we add at least one additional day for the field-testing exercise. The one-day field testing exercise was not sufficient for each field staffer to complete the full set of procedures necessary for the field work. The lessons learned from the field include:

- During the field-testing exercise in Chongwe, we attempted to simulate the procedures for listing and interviewing in one SEA (an SEA that was not included in the survey sample). As a part of this process, we needed to merge data from all individual PDAs onto a single machine, and then retransmit the culled data back to individual PDAs. This way, all team members were viewing the same complete set of merged data. While the data collection was essential to the training, the process of "beaming" the data between machines was a bit cumbersome. We made the mistake of beaming all the field staff listings together in two separate groups (35 – 40 people in each group). This was very time consuming. We recommend not beaming all data together, but sending smaller sets from each team.

- We would suggest adequate time be allowed during the field-testing exercise for all aspects of the field procedures, especially allocating necessary supplies for a day's field work, household listing, beaming in/out captured data on other PDAs, navigating back to houses, interviewing, testing procedures, and staining of slides. A follow-up session is recommended where each step is discussed and analysed by the group. One topic that is particularly important to emphasize during this follow-up session is appropriate labelling of slides.

Standard operating procedures (SOP) were developed for laboratory procedures, interviewers, and supervisors. However, there was no SOP on the operation of the PDA-based questionnaire. This would have gone a long way in alleviating some of the problems encountered with the PDAs in the field.

Logistics

Although we were all aware that Zambia is a large country with a dispersed population, we do not think anyone was quite prepared for the challenges that these realities posed. The

survey method used follows closely with the Demographic and Health Survey (DHS) and is meant to provide comparable methods and estimates. We recommend planning for two to three days per SEA. This includes time for introductions for provincial and district health offices, engaging community and often health facility workers for participation, identifying boundaries and mapping the enumeration area, interviewing, and call backs.
One option to reduce the amount of time needed to complete the field work is to investigate alternative sampling schemes to reduce the time spent in each SEA and/or travelling between SEAs. Some potential suggestions:

- Limit sampling to two or three randomly selected districts within each province. In theory, this might allow for the teams to use more central locations for planning each visit. It might also limit the amount of time travelling from one SEA to another.

- Sample at the village level rather than the SEA level. Although this is contrary to the DHS sampling method, using the village as the unit of sampling has a number of potential advantages. First, villages are usually smaller than SEAs and therefore easier to map. Second, the local population is usually aware of village boundaries but not administrative boundaries determined by the central government. This would also aid in mapping as it would be easier to define the borders of the selected villages.

- Provide either bicycles or motorbikes to allow people to move more easily between houses that are quite far apart. During the field work, bicycles were rented from local villages to expedite field work.

Field staff for this survey were recruited through the Ministry of Health and from the Central Statistical Office. Screening of field staff is important to reduce potential problems that can arise, such as male participants for interviewing women about reproductive issues, personality conflicts and inexperience with this type of survey work or with PDAs. Despite requests for field staff that met specific criteria, we received a number of inappropriate personnel. A better time frame and more rigorous screening would help prevent this.

Support from community health workers and others with local knowledge of the clusters is essential to reduce interview refusals. Community mobilization and sensitization prior to survey commencement could allow the team to anticipate and mitigate common reasons for refusal.

Budgeting for at least one community health worker for each pair of interviewers in each cluster is recommended. Additional community liaisons to assist the teams during the mapping would also be advised. In addition to knowing their villages well, employment of community liaisons would generate goodwill with the chiefs and would increase the acceptability of the survey among people in the villages.

With a large number of teams out in the field, day-to-day supervision becomes problematic. We would recommend having the teams begin in easy-to-access SEAs where regular phone contact is feasible (at least in the evening). The survey supervisors could then call the team supervisors each night to assess any problems and recommend solutions (or the team supervisors could call as problems arise).

Most communities did not have prior notice of the survey, and hence did not easily consent to interviews. Community members were reluctant to participate in studies involving blood collection and testing because they had heard rumours that blood collected could be used for occult practices or for HIV-testing without their consent. Also, the survey was held during the harvest period, hence some household members were not easily accessible

for interviews. With the cooperation of community leaders and gentle persuasion, these problems were eventually overcome.

Vehicles should all be equipped with roof racks as there were normally five to six people in one vehicle.

The person coordinating the survey field team should not also be tasked with handling the financial arrangements with the teams and field staff. Financial matters should be handled by a separate survey coordinator/facilitator for objectivity in dealing with survey methods, data, and field procedures

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Appendix A: Sample design

Introduction

The Malaria Indicator Survey (MIS) covered household population in Zambia. The design for the survey calls for a representative probability sample to produce estimates for the country as a whole, rural and urban separately, and for the ten intervention districts combined as one domain. Overall a representative probability sample of about 3,000 households was selected for the MIS.

Sampling frame and stratification

Zambia is administratively divided into nine provinces, and each province is in turn subdivided into districts. For statistical purposes each district is subdivided into Census Supervisory Areas (CSAs) and these are in turn subdivided into Standard Enumeration Areas (SEAs). The 1998 – 2000 mapping exercise in preparation for the 2000 census of population and housing demarcated the CSAs within wards, wards within constituencies, and constituencies within districts. In total, Zambia has 72 districts; 150 constituencies; 1,289 wards; about 4,400 CSAs; and about 17,000 SEAs. The listing of SEAs has information on number of households and the population. The number of households was used as a measure of size for selecting primary sampling units. Therefore, the sample frame of this survey is the list of SEAs developed from the 2000 Population Census.

The SEAs are also stratified by urban and rural designations.

Sample allocation and selection

The total sample of 3,000 households was allocated between rural, urban, and the 10 sentinel district domains in proportion to the population of each domain according to the 2000 census results. Adjustments to the proportional distribution were made when reasonable comparison could not be achieved between strata or domains.

The distribution is given in table 16 below:

Table 16. Sample allocation using proportional allocation and the square root method

Domain	Proportion of households based on 2000 census frame	Proportional allocation of sample households	Disproportional allocation (using square root method)	Number of clusters based on disproportional allocation
Project districts combined	0.16	491	720	29
Rural	0.52	1,560	1,280	51
Urban	0.32	949	1,000	40
Total	1	3,000	3,000	120

The proportional allocation does not, however, allow for reliable estimates for district domain. For this reason, it was desired that disproportional allocation be adopted, for the purpose of maximizing the precision of survey estimates. This was also done in order to facilitate reasonable comparison between stratum estimates. The disproportional allocation was based on the square root method designed by Leslie Kish (Kish 1965).

The MIS sample was selected using a stratified two-stage cluster design. Once the households were allocated to the different strata, the number of clusters (SEAs) to be selected were calculated based on an average cluster take of 25 completed interviews of all respondents. Clusters were selected systematically with probability proportional to the number of households.

Table 17. Distribution of sample of clusters by province

Province	Total clusters
Central	12
Copperbelt	20
Eastern	16
Luapula	11
Lusaka	18
Northern	16
Northwestern	7
Southern	11
Western	9
Total	120

Table 18. Distribution of sample clusters by project districts

District	Total clusters
Chibombo	4
Chingola	3
Chipata	6
Samfya	4
Chongwe	2
Kaputa	2
Isoka	2
Mwinilunga	2
Kalomo	2
Senanga	2
Total	29

Selection of clusters

The following steps were used to select the clusters (SEAs) in each stratum:

(i) Calculate the sampling interval, *I*, for each stratum

$$I_h = \frac{\sum_{i=1}^{N_h} M_{hi}}{a_h}$$

where M_{hi} is the number of households in SEA (or cluster) *i* and stratum *h,*

$\sum_{i=1}^{N_h} M_{hi}$ is the size of the stratum (total number of households in the stratum according to the 2000 census) and *a* is the number of clusters (SEAs) to be selected in the stratum.

(ii) Calculate the cumulated size of each SEA.

(iii) Calculate the sampling numbers

$$R, R+I, R+2I, ..., R + (a-1)I,$$

where R is a random number between 1 and *I*.

(iv) Compare each sampling number with the cumulated sizes of the SEAs.

The first SEA (or cluster) whose cumulated size is equal to or greater than the random number generated in (iii) was selected. The next SEA to be selected was the one with cumulated size equal to or greater than *R+I.* Each of the rest of the SEAs were selected using the same procedure, making sure to add *I* at each subsequent selection.

Selection of households

A frame of households was determined by listing all the households in all the selected SEAs. Upon completion of household listing, the household lists were given new household numbers, which were sampling serial numbers assigned to each household in the cluster. The sampling numbers were assigned sequentially within each SEA starting from 1. The total number of households in the SEA was equal to the last serial number assigned.

In summary, the following steps were used to select the households:

1. Calculate the sampling interval for each category

$$I = \frac{B}{b}$$

   where B is the number of households listed in the selected SEA and b is the number of households to be selected in that SEA.

2. Generate a random number (R) between 1 and the interval I; the first selection will hence be R.
3. Add the interval to the random number to get the next selection.
4. Add the interval repeatedly until you get your desired sample size.

Estimation procedure

Weights

Due to the disproportional allocation of the sample to the different strata, sampling weights were required to ensure that the sample was representative at the national level. The sampling probabilities at first-stage selection of SEAs and probabilities of selecting the households were used to calculate the weights. The weights of the sample were equal to the inverse of the probability of selection.

The probability of selecting cluster i was calculated as

$$P_{hi} = \frac{a_h M_{hi}}{\sum_{i=1}^{N_h} M_{hi}} .$$

The weight or boosting factor is, thus, given as

$$w_{hi} = \frac{1}{P_{hi}}$$

where: P_{hi} is the first-stage sampling probability of (SEA), a_h is the number of SEAs selected in stratum h, M_{hi} is the size (households according to the census frame) of the i^{th} SEA in stratum h, and ΣM_{hi} is the total size of stratum h.

The selection probability of the household was calculated as:

$$p_h = \frac{n_h}{N_h}$$

where n_h is the number of households selected from stratum h and N_h is the total number of households in stratum h.

Let y_{hij} be an observation on variable y for the j^{th} household in the i^{th} SEA of the h^{th} stratum. Then the estimated total for the h^{-th} stratum is:

$$y_h = \sum_{i=1}^{a_h} \sum_{j=1}^{n_h} w_{hi}\, y_{hij}$$

where, y_h is the estimated total for the h^{th} stratum., w_{hi} is the weight for the j^{th} household in the I^{th} SEA of the h^{th} stratum, i=1-a_h is the number of selected clusters in the stratum, and j=1-n_h is the number of sample households in the stratum. The national estimate is given by:

$$y = \sum_{h=1}^{H} y_h$$

where y is the national estimate, h=1, …, H is the total number of strata. For this survey, H = 3 (the rural/urban and the intervention districts taken as a separate domain)

Appendix B: Survey personnel

Survey management

Dr. Simon K. Miti	Ministry of Health
Dr. Buleti Nsemukila	Central Statistical Office
Dr. Victor Mukonka	Ministry of Health
Dr. Naawa Sipilanyambe	Ministry of Health
Ms. Mercy Mwanza	Ministry of Health
Mr. John Miller	MACEPA at PATH
Dr. Abdirahman Dirie Mohamed	MACEPA at PATH
Dr. Richard Steketee	MACEPA at PATH
Dr. John Gimnig	Centers for Disease Control and Prevention, USA
Mr. Adam Wolkon	Centers for Disease Control and Prevention, USA
Dr. Sri Baboo	University of Zambia
Dr. Fred Masaninga	World Health Organization
Dr. Nathan Bakyaita	World Health Organization
Mr. Khoti Gausi	World Health Organization
Mr. Samson Katikiti	World Health Organization

Field work teams

Central Province

Joyce Kabangafyela	nurse/supervisor
Joseph Zgambo	nurse
Pamela Sakala	nurse
Ignatius Sishau	enumerator
Mulo Jere	driver

Copperbelt Province

Maureen Nyirenda Kaelela	nurse/supervisor
Veronica Lungo Mulala	nurse/supervisor
Gladys Yanduli Chinunda	nurse
Grace M. Kazimoto	nurse
Sibeso Nalumino	nurse
Charity Chongo Chishimba	nurse
Aaron Phiri	enumerator
Mubita Sitwala	enumerator
Banda Graham	driver
Charles Banda	driver

Eastern Province

Banda Evelyn Kasukumya	nurse/supervisor
Christine Kabula Chinyama	nurse
Doris Nkowani Mwanza	nurse
Evalyn Mwale Phiri	nurse
Dick Phiri	enumerator
Billy Zuhn	driver

Luapula Province

Melody P. Chisopo Shawa	nurse/supervisor
Beatrice Kangwa Chirwa	nurse
Josephine Chatama Mumbi	nurse
Mary Chonganya	enumerator
Mike Chewe	driver

Lusaka Province

Veronica Mulenga	nurse/supervisor
Chibesa Wamulume	nurse/supervisor
Anne Banda	nurse
Fred Mulenga	nurse
Ireen Mubita	nurse
Israel Ndayambanje	nurse
Linda Malulu	nurse
Remy Mulenga	nurse
Gershom Musenge	enumerator
John Botha	driver

Northern Province

Pauline Namposya	nurse/supervisor
Mable Mwaba	nurse
Victoria Mulenga	nurse
Chanda Stephen	enumerator
Collin Sichoul	driver

Northwestern Province

Valerie Mambwe Mhango C.	nurse/supervisor
Esther Mukokomena Masebe	nurse
Sylvia Kaluwaji Kanema	nurse
Kabungo Mbao	enumerator
Muloyi Tembo	driver

Southern Province

Ireen Bubala Miyanda	nurse/supervisor
Maureen I. Mainza	nurse
Olive Samazaka	nurse
Phidias Munsaka Chikonga	nurse
Clymore Kalyangile	enumerator
Mweemba G.	driver

Western Province

Julia Muyunda Shachakanza	nurse/supervisor
Akabondo Akalilwa	nurse
Chaze Kamuwanga	nurse
Kennedy Chibinda Katota	nurse
Pelebo Hambula	enumerator
Pethias Chitawo	driver

Laboratory training and analysis staff

Moonga Hawela	Ministry of Health

Personal digital assistant (PDA) programming and data tabulations

Anatoly Frolov	Centers for Disease Control and Prevention, USA
Adam Wolkon	Centers for Disease Control and Prevention, USA
John Gimnig	Centers for Disease Control and Prevention, USA

Sample Design

Nchimunya Nkombo	Central Statistical Office
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Communication

Pauline Wamalume	Ministry of Health
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Members of the Roll Back Malaria IEC Working Group

Editing, Layout and Publication

Cristina Herdman	MACEPA at PATH
Catherine Seneviratne	MACEPA at PATH
David Simpson	PATH

Appendix C. Budget

The National Malaria Indicator Survey (MIS) budget is presented below. The categories for expenditure are general, but this budget can be used as a template for future survey planning efforts. Of note, the largest cost drivers for the MIS are daily allowances and transportation costs, including the vehicle hire and fuel. Not included in these figures are technical support from MACEPA, CDC and WHO. Expenses and staff time for the technical support from WHO was supported by WHO; technical support from the CDC was supported through a separate agreement between PATH MACEPA and CDC.

Summary of MIS expenditures:

Item	Expenditure (US$)
Training costs	38,156
Communication and community sensitization	6,603
Stationery and other supplies	5,775
Vehicle hire and travel	75,680
Fuel and daily allowances	165,846
Lab supplies	8,935
TOTAL EXPENDITURE	**300,994**

Appendix D. Questionnaires

Household Questionnaire

ORC Macro
National Malaria Control Centre
MACEPA

MALARIA INDICATOR SURVEY
MODEL HOUSEHOLD QUESTIONNAIRE

[Zambia]
[Ministry of Health]

IDENTIFICATION[1]

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER .....

HOUSEHOLD NUMBER .....

REGION .....

URBAN/RURAL (URBAN=1, RURAL=2) .....

LARGE CITY/SMALL CITY/TOWN/COUNTRYSIDE[2] .....
(LARGE CITY=1, SMALL CITY=2, TOWN=3, COUNTRYSIDE=4)

INTERVIEWER VISITS

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

*RESULT CODES:

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

TOTAL PERSONS IN HOUSEHOLD

TOTAL ELIGIBLE WOMEN

LINE NUMBER OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE

SUPERVISOR	OFFICE EDITOR	KEYED BY
NAME _____		
DATE _____		

[1] This section should be adapted for country-specific survey design.

[2] The following guidelines should be used to categorize urban sample points: "Large cities" are national capitals and places with over 1 million population; "small cities" are places with between 50,000 and 1 million population; the remaining urban sample points are "towns."

HOUSEHOLD LISTING

Now we would like some information about the people who usually live in your household or who are staying with you now.

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBLE WOMEN	CURRENTLY PREGNANT?
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.	What is the relationship of (NAME) to the head of the household?*	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)?	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	FOR ELIGIBLE WOMEN, ASK: Is (NAME) currently pregnant?
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			M F	YES NO	YES NO	IN YEARS		YES NO/DK
01			1 2	1 2	1 2		01	1 2
02			1 2	1 2	1 2		02	1 2
03			1 2	1 2	1 2		03	1 2
04			1 2	1 2	1 2		04	1 2
05			1 2	1 2	1 2		05	1 2
06			1 2	1 2	1 2		06	1 2
07			1 2	1 2	1 2		07	1 2
08			1 2	1 2	1 2		08	1 2
09			1 2	1 2	1 2		09	1 2
10			1 2	1 2	1 2		10	1 2

* CODES FOR Q.3 RELATIONSHIP TO HEAD OF HOUSEHOLD:
01 = HEAD
02 = WIFE/HUSBAND
03 = SON OR DAUGHTER
04 = SON-IN-LAW OR DAUGHTER-IN-LAW
05 = GRANDCHILD
06 = PARENT
07 = PARENT-IN-LAW
08 = BROTHER OR SISTER
09 = OTHER RELATIVE
10 = ADOPTED/FOSTER/ STEPCHILD
11 = NOT RELATED
98 = DON'T KNOW

LINE NO.	USUAL RESIDENTS AND VISITORS	RELATIONSHIP TO HEAD OF HOUSEHOLD	SEX	RESIDENCE		AGE	ELIGIBLE WOMEN	CURRENTLY PREGNANT?
	Please give me the names of the persons who usually live in your household and guests of the household who stayed here last night, starting with the head of the household.	What is the relationship of (NAME) to the head of the household?*	Is (NAME) male or female?	Does (NAME) usually live here?	Did (NAME) stay here last night?	How old is (NAME)?	CIRCLE LINE NUMBER OF ALL WOMEN AGE 15-49	FOR ELIGIBLE WOMEN, ASK: Is (NAME) currently pregnant?
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			M F	YES NO	YES NO	IN YEARS		YES NO/DK
11			1 2	1 2	1 2		11	1 2
12			1 2	1 2	1 2		12	1 2
13			1 2	1 2	1 2		13	1 2
14			1 2	1 2	1 2		14	1 2
15			1 2	1 2	1 2		15	1 2
16			1 2	1 2	1 2		16	1 2
17			1 2	1 2	1 2		17	1 2
18			1 2	1 2	1 2		18	1 2
19			1 2	1 2	1 2		19	1 2
20			1 2	1 2	1 2		20	1 2

TICK HERE IF CONTINUATION SHEET USED ☐

Just to make sure that I have a complete listing:

1) Are there any other persons such as small children or infants that we have not listed? YES ☐ -> ENTER EACH IN TABLE NO ☐

2) In addition, are there any other people who may not be members of your family, such as domestic servants, lodgers or friends who usually live here? YES ☐ -> ENTER EACH IN TABLE NO ☐

3) Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed? YES ☐ -> ENTER EACH IN TABLE NO ☐

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
10	What is the main source of drinking water for members of your household?[1]	PIPED WATER PIPED INTO DWELLING ..... 11 PIPED INTO YARD/PLOT ..... 12 PUBLIC TAP/STANDPIPE ..... 13 TUBE WELL OR BOREHOLE ..... 21 DUG WELL PROTECTED WELL ..... 31 UNPROTECTED WELL ..... 32 WATER FROM SPRING PROTECTED SPRING ..... 41 UNPROTECTED SPRING ..... 42 RAINWATER ..... 51 TANKER TRUCK ..... 61 CART WITH SMALL TANK ..... 71 SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/ IRRIGATION CHANNEL ..... 81 BOTTLED WATER ..... 91 OTHER _____ 96 (SPECIFY)	
11	What kind of toilet facility do your household use?[1]	FLUSH OR POUR FLUSH TOILET FLUSH TO PIPED SEWER SYSTEM ..... 11 FLUSH TO SEPTIC TANK ..... 12 FLUSH TO PIT LATRINE ..... 13 FLUSH TO SOMEWHERE ELSE ..... 14 FLUSH, DON'T KNOW WHERE ..... 15 PIT LATRINE VENTILATED IMPROVED PIT LATRINE (VIP) ..... 21 PIT LATRINE WITH SLAB ..... 22 PIT LATRINE WITHOUT SLAB/ OPEN PIT ..... 23 COMPOSTING TOILET ..... 31 BUCKET TOILET ..... 41 HANGING TOILET/HANGING LATRINE ..... 51 NO FACILITY/BUSH/FIELD ..... 61 OTHER _____ 96 (SPECIFY)	
12	Does your household have:[2] Electricity? A radio? A television? A telephone? A refrigerator?	YES NO ELECTRICITY ..... 1 2 RADIO ..... 1 2 TELEVISION ..... 1 2 TELEPHONE ..... 1 2 REFRIGERATOR 1 2	
13	What type of fuel does your household mainly use for cooking?	ELECTRICITY ..... 01 LPG/NATURAL GAS ..... 02 BIOGAS ..... 03 KEROSENE ..... 04 COAL/LIGNITE ..... 05 CHARCOAL ..... 06 FIREWOOD/STRAW ..... 07 DUNG ..... 08 OTHER _____ 96 (SPECIFY)	

[1] Coding categories to be developed locally and revised based on the pretest; however, the broad categories must be maintained.
[2] Additional indicators of socioeconomic status should be added, especially to distinguish among lower socioeconomic classes.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
14	MAIN MATERIAL OF THE FLOOR.[1] RECORD OBSERVATION.	NATURAL FLOOR EARTH/SAND ..... 11 DUNG ..... 12 RUDIMENTARY FLOOR WOOD PLANKS ..... 21 PALM/BAMBOO ..... 22 FINISHED FLOOR PARQUET OR POLISHED WOOD ..... 31 VINYL OR ASPHALT STRIPS ..... 32 CERAMIC TILES ..... 33 CEMENT ..... 34 CARPET ..... 35 OTHER _____ 96 (SPECIFY)	
15	Does any member of your household own: A bicycle? A motorcycle or motor scooter? A car or truck?	YES NO BICYCLE ..... 1 2 MOTORCYCLE/SCOOTER ..... 1 2 CAR/TRUCK 1 2	
15A	At any time in the past 12 months, has anyone sprayed the interior walls of your dwelling against mosquitoes?[2]	YES ..... 1 NO ..... 2 DON'T KNOW 8	<16
15B	How many months ago was the house sprayed?[2] IF LESS THAN ONE MONTH, RECORD '00' MONTHS AGO.	MONTHS AGO ..... ☐☐	
15C	Who sprayed the house?[2]	GOVERNMENT WORKER/PROGRAM ... 1 PRIVATE COMPANY ..... 2 HOUSEHOLD MEMBER ..... 3 OTHER _____ 6 (SPECIFY) DON'T KNOW 8	
16	Does your household have any mosquito nets that can be used while sleeping?	YES ..... 1 NO 2	→ 27
17	How many mosquito nets does your household have? IF 7 OR MORE NETS, RECORD '7'.	NUMBER OF NETS ..... ☐☐	

[1] Categories to be developed locally and revised based on the pretest; however, the broad categories must be maintained. In some countries, it may be desirable to ask an additional question on the material of walls or ceilings.

[2] This question should be deleted in countries that do not have an indoor residual spraying program for mosquitoes.

		NET #1	NET #2	NET #3
18	ASK RESPONDENT TO SHOW YOU THE NET(S) IN THE HOUSEHOLD. IF MORE THAN THREE NETS, USE ADDITIONAL QUESTIONNAIRE(S).	OBSERVED ....1 NOT OBSERVED 2	OBSERVED ....1 NOT OBSERVED 2	OBSERVED ....1 NOT OBSERVED 2
19	How long ago did your household obtain the mosquito net?	MOS AGO [|] MORE THAN 3 YEARS AGO 95	MOS AGO [|] MORE THAN 3 YEARS AGO............95	MOS AGO [|] MORE THAN 3 YEARS AGO 95
20	OBSERVE OR ASK THE BRAND OF MOSQUITO NET. IF BRAND IS UNKNOWN, AND YOU CANNOT OBSERVE THE NET, SHOW PICTURES OF TYPICAL NET TYPES/BRANDS TO RESPONDENT.	'PERMANENT' NET[1] Permanet…………11 Olyset…………12 Other/Don't Know……16 (SKIP TO 24) 'PRETREATED' NET[2] Iconet . ………...21 Fennet………...22 KO Net………...23 Safinet………..24 Other/Don't Know….. 26 (SKIP TO 22) OTHER……………….31 DON'T KNOW BRAND……………..98	'PERMANENT' NET[1] Permanet ..... …11 Olyset .... 12 Other/Don'tKnow…16 (SKIP TO 24) 'PRETREATED' NET[2] Iconet…………..21 Fennet………...22 KO Net………...23 Safinet………...24 Other/Don't Know..26 (SKIP TO 22) OTHER....................31 DON'T KNOW BRAND.................98	'PERMANENT' NET[1] Permanet……….11 Olyset……….12 Other/Don't Know16 (SKIP TO 24) 'PRETREATED' NET[2] Iconet . ………...21 Fennet………...22 KO Net………...23 Safinet………...24 Other/Don't Know….26 (SKIP TO 22) OTHER……………….31 DON'T KNOW BRAND……………..98
	Where did you obtain the net?	GOVERNMENT CLINIC/HOSPITAL NEIGHBORHOOD HEALTH COMMITTEE COMMUNITY HEALTH WORKER AGENT RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)__________ DON'T KNOW	GOVERNMENT CLINIC/HOSPITAL NEIGHBORHOOD HEALTH COMMITTEE COMMUNITY HEALTH WORKER AGENT RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)_______ DON'T KNOW	GOVERNMENT CLINIC/HOSPITAL NEIGHBORHOOD HEALTH COMMITTEE COMMUNITY HEALTH WORKER AGENT RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)__________ DON'T KNOW
	Did you purchase the net?	YES..............................1 NO.(skip to 21).............2 NOT SURE..................8	YES...........................1 NO.(skip to 21)..........2 NOT SURE................8	YES..............................1 NO.(skip to 21).............2 NOT SURE..................8
	How much did you pay for the net when it was purchased?	In Kwacha [|]	In Kwacha [|]	In Kwacha [|]
21	When you got the net, was it already factory-treated with an insecticide to kill or repel mosquitoes?	YES..............................1 NO................................2 NOT SURE...................8	YES .... 1 NO .... 2 NOT SURE 8	YES..............................1 NO................................2 NOT SURE...................8
22	Since you got the mosquito net, was it ever soaked or dipped in a liquid to kill or repel mosquitoes or bugs?	YES..............................1 NO................................2 (SKIP TO 24) NOT SURE...................8	YES .... 1 NO .... 2 (SKIP TO 24) NOT SURE 8	YES..............................1 NO................................2 (SKIP TO 24) NOT SURE...................8
23	How long ago was the net last soaked or dipped?	MOS AGO [|]	MOS AGO [|]	MOS AGO [|]

	IF LESS THAN 1 MONTH AGO, RECORD >00' MONTHS. IF LESS THAN 2 YEARS AGO, RECORD MONTHS AGO. IF '12 MONTHS AGO' OR '1 YEAR AGO,' PROBE FOR EXACT NUMBER OF MONTHS.	MORE THAN 2 YEARS AGO..... 95 NOT SURE 98	MORE THAN 2 YEARS AGO .....95 NOT SURE..... 98	MORE THAN 2 YEARS AGO..... 95 NOT SURE 98
	Where was the net soaked or dipped?	HOME GOVERNMENT CLINIC/HOSPITAL RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)_____ DON'T KNOW	HOME GOVERNMENT CLINIC/HOSPITAL RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)_____ DON'T KNOW	HOME GOVERNMENT CLINIC/HOSPITAL RETAIL SHOP PHARMACY WORKPLACE OTHER (SPECIFY)_____ DON'T KNOW
	Did you pay to soak or dip the net?	YES.....1 NO.(skip to 24).....2 NOT SURE.....8	YES.....1 NO.(skip to 24).....2 NOT SURE.....8	YES.....1 NO.(skip to 24).....2 NOT SURE.....8
	How much did you pay to soak or dip the net?	In Kwacha ┌┬┬┐ └┴┴┘	In Kwacha ┌┬┬┐ └┴┴┘	In Kwacha ┌┬┬┐ └┴┴┘
24	Did anyone sleep under this mosquito net last night?	YES.....1 NO.....2 (SKIP TO 26) =——┤ NOT SURE.....8	YES .....1 NO .....2 (SKIP TO 26) =——┤ NOT SURE.....8	YES.....1 NO.....2 (SKIP TO 26) =——┤ NOT SURE.....8

[1] "Permanent" is a factory treated net that does not require any further treatment.
[2] "Pretreated" is a net that has been pretreated, but requires further treatment after 6-12 months.

		NET #1	NET #2	NET #3
25	Who slept under this mosquito net last night? RECORD THE RESPECTIVE LINE NUMBER FROM THE HOUSEHOLD SCHEDULE.	NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___	NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___	NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___ NAME _____ LINE NO ___
26		GO BACK TO 18 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 27.	GO BACK TO 18 FOR NEXT NET; OR, IF NO MORE NETS, GO TO 27.	GO BACK TO 18 IN THE FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE NETS, GO TO 27.

HAEMOGLOBIN MEASUREMENT

CHECK COLUMN (7) OF HOUSEHOLD LISTING: RECORD THE LINE NUMBER, NAME AND AGE OF ALL CHILDREN UNDER AGE 6. THEN ASK THE DATE OF BIRTH.

CHILDREN UNDER AGE 6 YEARS				HAEMOGLOBIN MEASUREMENT OF CHILDREN BORN IN 2000[1] OR LATER			
LINE NUMBER FROM COL. (1)	NAME FROM COL. (2)	AGE FROM COL. (7)	What is (NAME's) date of birth? COPY MONTH AND YEAR OF BIRTH FROM 215 IN MOTHER'S BIRTH HISTORY AND ASK DAY. FOR CHILDREN NOT INCLUDED IN ANY BIRTH HISTORY, ASK DAY, MONTH AND YEAR.	LINE NUMBER OF PARENT/ADULT RESPONSIBLE FOR THE CHILD RECORD '00' IF NOT LISTED IN HOUSEHOLD SCHEDULE	READ CONSENT STATEMENT TO PARENT/ADULT RESPONSIBLE FOR THE CHILD CIRCLE CODE AND SIGN	HAEMOGLOBIN LEVEL (G/DL)	RESULT 1 MEASURED 2 NOT PRESENT 3 REFUSED 4 OTHER
(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)
			DAY MONTH YEAR		GRANTED REFUSED		
					1 SIGN__________ NEXT LINE← 2	.	
					1 SIGN__________ NEXT LINE← 2	.	
					1 SIGN__________ NEXT LINE← 2	.	
					1 SIGN__________ NEXT LINE← 2	.	
					1 SIGN__________ NEXT LINE← 2	.	
					1 SIGN__________ NEXT LINE← 2	.	

[1] For fieldwork beginning in 2006, 2007 or 2008, the year should be 2001, 2002 or 2003, respectively.

TICK HERE IF CONTINUATION SHEET USED ☐

CONSENT STATEMENT: As part of this survey, we are studying anaemia among children. Anaemia is a serious health problem that results from poor nutrition or diseases such as malaria. This survey will assist the government to develop programs to prevent and treat these important health problems.

We request that all children born in 2000[1] or later participate in the anaemia testing part of this survey and give a few drops of blood from a finger. The test uses disposable sterile instruments that are clean and completely safe. The blood will be analyzed with new equipment and the results of the test will be given to you right after the blood is taken. The results will be kept confidential.

May I now ask that (NAME OF CHILD[REN]) participate in the anaemia test. However, if you decide not to have him/her/them tested, it is your right and we will respect your decision. Now please tell me if you agree to have the test(s) done.

NOTE:
In countries where some enumeration areas are higher than 1,000 meters, altitude information should be collected in a separate form for each enumeration area higher than 1,000 meters so that the anaemia estimates can be adjusted appropriately.

35	CHECK 33: NUMBER OF CHILDREN WITH HAEMOGLOBIN LEVEL BELOW 7 G/DL ONE OR MORE ☐ → GIVE EACH PARENT/ADULT RESPONSIBLE FOR THE CHILD THE RESULT OF THE HAEMOGLOBIN MEASUREMENT, AND CONTINUE WITH 36.[1] NONE ☐ → GIVE EACH PARENT/ADULT RESPONSIBLE FOR THE CHILD THE RESULT OF THE HAEMOGLOBIN MEASUREMENT AND END THE HOUSEHOLD INTERVIEW.
36	We detected a low level of haemoglobin in the blood of [NAME OF CHILD(REN)]. This indicates that (NAME OF CHILD(REN) has/have developed severe anaemia, which is a serious health problem. We would like to inform the doctor at _____ about the condition of [NAME OF CHILD(REN)]. This will assist you in obtaining appropriate treatment for the condition. Do you agree that the information about the level of haemoglobin in the blood of [NAME OF CHILD(REN)] may be given to the doctor?

NAME OF CHILD WITH HAEMOGLOBIN BELOW 7 G/DL	NAME OF PARENT/RESPONSIBLE ADULT	AGREES TO REFERRAL?
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2
		YES.....1 NO.....2

[1] If more than one child is below 7 g/dl, read statement in Q.36 to each parent/adult responsible for a child who is below the cutoff point.

Women's Questionnaire

ORC Macro

Calverton, Maryland

MALARIA INDICATOR SURVEY
MODEL WOMEN'S QUESTIONNAIRE

[Zambia]
[Ministry of Health]

IDENTIFICATION[1]

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER .....

HOUSEHOLD NUMBER .....

REGION .....

URBAN/RURAL (URBAN=1, RURAL=2) .....

LARGE CITY/SMALL CITY/TOWN/COUNTRYSIDE[2] .....
(LARGE CITY=1, SMALL CITY=2, TOWN=3, COUNTRYSIDE=4)

NAME AND LINE NUMBER OF WOMAN _____

INTERVIEWER VISITS

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

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

COUNTRY-SPECIFIC INFORMATION: LANGUAGE OF QUESTIONNAIRE, LANGUAGE OF INTERVIEW, NATIVE LANGUAGE OF RESPONDENT, AND WHETHER TRANSLATOR USED

SUPERVISOR	OFFICE EDITOR	KEYED BY
NAME _____		
DATE _____		

[1] This section should be adapted for country-specific survey design.
[2] The following guidelines should be used to categorize urban sample points: "Large cities" are national capitals and places with over 1 million population; "small cities" are places with between 50,000 and 1 million population; and the remaining urban sample points are "towns".

SECTION 1. RESPONDENT'S BACKGROUND

INTRODUCTION AND CONSENT

INFORMED CONSENT

Hello. My name is _____ and I am working with Ministry of Health. We are conducting a national survey about malaria. We would very much appreciate your participation in this survey. The information you provide will help the government to plan health services. The survey usually takes between 10 and 20 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be shown to other persons.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?
May I begin the interview now?

Signature of interviewer: _____ Date: _____

RESPONDENT AGREES TO BE INTERVIEWED..... 1 ↓ RESPONDENT DOES NOT AGREE TO BE INTERVIEWED.... 2 —<END

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR ..... ☐☐ MINUTES ..... ☐☐	
102	In what month and year were you born?	MONTH ..... ☐☐ DON'T KNOW MONTH ..... 98 YEAR ..... ☐☐☐☐ DON'T KNOW YEAR 9998	
103	How old were you at your last birthday? COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT.	AGE IN COMPLETED YEARS ☐☐	
104	Have you ever attended school?	YES ..... 1 NO 2	—<108
105	What is the highest level of school you attended: primary, secondary, or higher?[1]	PRIMARY ..... 1 SECONDARY ..... 2 HIGHER 3	
106	What is the highest (grade/form/year) you completed at that level?[1]	GRADE ..... ☐☐	
107	CHECK 105: PRIMARY ☐ ↓ SECONDARY OR HIGHER ☐		—<109

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

[1] Revise according to the local education system.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
108	Now I would like you to read this sentence to me. SHOW CARD TO RESPONDENT.[1] IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?	CANNOT READ AT ALL ..... 1 ABLE TO READ ONLY PARTS OF SENTENCE ..... 2 ABLE TO READ WHOLE SENTENCE ..... 3 NO CARD WITH REQUIRED LANGUAGE_____ 4 (SPECIFY LANGUAGE) BLIND/VISUALLY IMPAIRED……..5	
109	COUNTRY-SPECIFIC QUESTION ON RELIGION.		
110	COUNTRY-SPECIFIC QUESTION ON ETHNICITY.		

[1]Each card should have four simple sentences appropriate to the country (e.g., “Parents love their children”, “Farming is hard work”, “The child is reading a book”, “Children work hard at school”). Cards should be prepared for every language in which respondents are likely to be literate.

Section 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES .....1 NO 2	—<206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES .....1 NO 2	—<204
203	How many sons live with you? And how many daughters live with you? IF NONE, RECORD '00'.	SONS AT HOME..... ☐☐ DAUGHTERS AT HOME..... ☐☐	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES .....1 NO 2	—<206
205	How many sons are alive but do not live with you? And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	SONS ELSEWHERE..... ☐☐ DAUGHTERS ELSEWHERE... ☐☐	
206	Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried or showed signs of life but did not survive?	YES .....1 NO 2	—<208
207	How many boys have died? And how many girls have died? IF NONE, RECORD '00'.	BOYS DEAD ..... ☐☐ GIRLS DEAD ..... ☐☐	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL.	NONE.....00 TOTAL..... ☐☐	—<345
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL _____ births during your life. Is that correct? YES ☐ ↓ NO ☐ < PROBE AND CORRECT 201-208 AS NECESSARY.		
210	CHECK 208: ONE BIRTH ☐ ↓ Was this child born in the last six years? IF NO, CIRCLE '00.' TWO OR MORE BIRTHS ☐ ↓ How many of these children were born in the last six years?	NONE.....00 TOTAL IN LAST SIX YEARS..... ☐☐	—<345

211 Now I would like to record the names of all your births in the last six years, whether still alive or not, starting with the most recent one you had.
RECORD NAMES OF ALL BIRTHS IN THE LAST 6 YEARS IN 212. RECORD TWINS AND TRIPLETS ON SEPARATE LINES.

212 What name was given to your (most recent/previous) birth? (NAME)	213 Were any of these births twins?	214 Is (NAME) a boy or a girl?	215 In what month and year was (NAME) born? PROBE: What is his/her birthday?	216 Is (NAME) still alive?	217 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS.	218 IF ALIVE Is (NAME) living with you?	219 IF ALIVE: RECORD HOUSEHOLD LINE NUMBER OF CHILD (RECORD '00' IF CHILD NOT LISTED IN HOUSEHOLD).	220 Were there any other live births between (NAME) and (NAME OF BIRTH ON PREVIOUS LINE)?
01	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (NEXT BIRTH)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐ → (NEXT BIRTH)	
02	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2
03	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2
04	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2
05	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2
06	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2
07	SING .. 1 MULT . 2	BOY .. 1 GIRL . 2	MONTH ☐☐ YEAR ☐☐☐☐	YES .....1 NO.....2 → (GO TO 220)	AGE IN YEARS ☐☐	YES.....1 NO.....2	LINE NUMBER ☐☐	YES .....1 NO 2

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
221	Have you had any live births since the birth of (NAME OF MOST RECENT BIRTH)? IF YES, RECORD BIRTH(S) IN BIRTH TABLE.	YES.....1 NO.....2	
222	COMPARE 210 WITH NUMBER OF BIRTHS IN HISTORY ABOVE AND MARK: NUMBERS ARE SAME ☐ NUMBERS ARE DIFFERENT ☐ < (PROBE AND RECONCILE) CHECK: FOR EACH BIRTH: YEAR OF BIRTH IS RECORDED. FOR EACH LIVING CHILD: CURRENT AGE IS RECORDED.		☐☐
223	CHECK 215 AND ENTER THE NUMBER OF BIRTHS IN 2000[1] OR LATER. IF NONE, RECORD '0'.		☐☐
224	Are you pregnant now?	YES.....1 NO.....2 UNSURE.....8	<226
225	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS.	MONTHS..... ☐☐	
226	CHECK 223: ONE OR MORE BIRTHS IN 2000[1] OR LATER ☐ NO BIRTHS IN 2000 OR LATER ☐		<345

[1]For fieldwork beginning in 2006, 2007, or 2008, the year should be 2001, 2002, or 2003, respectively.

GENERAL MALARIA KNOWLEDGE

	Have you ever heard of an illness called malaria?	YES.....1 NO.....2	If 2, skip to 301
	Can you tell me the main signs or symptoms of malaria? MULTIPLE RESPONSES PROBE ONCE (Anything else?)	FEVER FEELING COLD HEADACHE NAUSEA AND VOMITING DIARRHEA DIZZINESS LOSS OF APPETITE BODY ACHE OR JOINT PAIN PALE EYES SALTY TASTING PALMS BODY WEAKNESS REFUSING TO EAT OR DRINK OTHER (SPECIFY)_____ _____ DON'T KNOW	
	In your opinion, what causes malaria? MULTIPLE RESPONSES PROBE ONCE (Anything else?)	MOSQUITO BITES EATING IMMATURE SUGARCANE EATING COLD NSHIMA EATING OTHER DIRTY FOOD DRINKING DIRTY WATER GETTING SOAKED WITH RAIN COLD OR CHANGING WEATHER WITCHCRAFT OTHER (SPECIFY)_____ _____ DON'T KNOW.....	
	How can someone protect themselves against malaria? MULTIPLE RESPONSES PROBE ONCE (Anything else?)	SLEEP UNDER A MOSQUITO NET SLEEP UNDER A INSECTICIDE TREATED MOSQUITO NET USE MOSQUITO REPELLANT AVOID MOSQUITO BITES TAKE PREVENTIVE MEDICATION SPRAY HOUSE WITH INSECTICIDE USE MOSQUITO COILS CUT THE GRASS AROUND THE HOUSE FILL IN PUDDLES (STAGNANT WATER) KEEP HOUSE SURROUNDINGS CLEAN BURN LEAVES DON'T DRINK DIRTY WATER DON'T EAT BAD FOOD (IMMATURE SUGARCANE/LEFTOVER FOOD) PUT MOSQUITO SCREENS ON THE WINDOWS DON'T GET SOAKED WITH RAIN OTHER (SPECIFY)_____ _____ DON'T KNOW.....	
	What are the danger signs and symptoms of malaria? MULTIPLE RESPONSES PROBE ONCE (Anything else?)	SEIZURE / CONVULSIONS GOES UNCONSCIOUS ANY FEVER VERY HIGH FEVER STIFF NECK WEAKNESS NOT ACTIVE CHILLS/SHIVERING NOT ABLE TO EAT	

		VOMITING FAINTING CRYING ALL THE TIME RESTLESS, WON'T STAY STILL DIARRHOEA OTHER (SPECIFY:_____) DON'T KNOW.....	

Section 3A. PREGNANCY AND INTERMITTENT PREVENTIVE TREATMENT

301	ENTER IN 302 THE NAME AND SURVIVAL STATUS OF THE MOST RECENT BIRTH. Now I would like to ask you some questions about your last pregnancy that ended in a live birth, in the last 6 years.		
302	FROM QUESTIONS 212 AND 216 (LINE 01)	LAST BIRTH NAME _____ LIVING ☐ DEAD ☐	
303	When you were pregnant with (NAME), did you see anyone for antenatal care?[1] IF YES: Whom did you see? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS SEEN.	HEALTH PROFESSIONAL DOCTOR.....A NURSE/MIDWIFE.....B AUXILIARY MIDWIFE.....C OTHER PERSON TRADITIONAL BIRTH ATTENDANT.....D COMMUNITY/VILLAGE HEALTH WORKER.....E OTHER _____ X (SPECIFY) NO ONE.....Y	
304	During this pregnancy, did you take any drugs in order to prevent you from getting malaria?	YES.....1 NO.....2 DON'T KNOW.....8	☐ →310
305	Which drugs did you take to prevent malaria?[2] RECORD ALL MENTIONED. IF TYPE OF DRUG IS NOT DETERMINED, SHOW TYPICAL ANTIMALARIAL DRUGS TO RESPONDENT.	SP/FANSIDAR.....A CHLOROQUINE.....B OTHER_____ X (SPECIFY) DON'T KNOW.....Z	
306	CHECK 305: DRUGS TAKEN FOR MALARIA PREVENTION	CODE 'A' CIRCLED ☐ CODE 'A' NOT CIRCLED ☐	→310
307	How many times did you take SP/Fansidar during this pregnancy?	TIMES..... ☐☐	

[1]Coding categories to be developed locally and revised based on the pretest; however, the broad categories must be maintained. Include all drugs or drug combinations that are commonly given as separate categories.

[2] Add response categories for additional drugs used to prevent malaria during pregnancy, if any. Repeat Questions 306-309 for any other recommended IPT drugs.

		LAST BIRTH NAME _____	
308	CHECK 303: ANTENATAL CARE FROM A HEALTH PROFESSIONAL RECEIVED DURING THIS PREGNANCY?	CODE 'A', 'B', OR 'C' CIRCLED ☐ → OTHER ☐_____	→310
309	Did you get the SP/Fansidar during an antenatal visit, during another visit to a health facility, or from some other source?	ANTENATAL VISIT .....1 ANOTHER FACILITY VISIT .....2 OTHER SOURCE _____ 6 (SPECIFY)	
	Did you purchase the SP/Fansidar?	YES .....1 NO .....2 DON'T KNOW 8	→310
	How much did you pay for the SP/Fansidar?	In Kwacha ☐☐☐	
310	CHECK 215 AND 216: ONE OR MORE LIVING CHILDREN BORN IN 2000[1] OR LATER ☐ → NO LIVING CHILDREN BORN IN 2000[1] OR LATER ☐_____		→345

[1] For fieldwork beginning in 2006, 2007, or 2008, the year should be 2001, 2002, or 2003, respectively.

SECTION 3B. FEVER IN CHILDREN

311	ENTER IN THE TABLE THE LINE NUMBER AND NAME OF EACH LIVING CHILD BORN IN 2000[1] OR LATER. (IF THERE ARE MORE THAN 2 LIVING CHILDREN BORN IN 2000[1] OR LATER, USE ADDITIONAL QUESTIONNAIRES). Now I would like to ask you some questions about the health of all your children less than 5 years old. (We will talk about each one separately.)		
312	NAME AND LINE NUMBER FROM 212	YOUNGEST CHILD LINE NUMBER ..... ☐☐ NAME _____	NEXT-TO-YOUNGEST CHILD LINE NUMBER ..... ☐☐ NAME _____
313	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES ..... 1 NO ..... 2 (GO TO 313 FOR NEXT CHILD OR, IF NO MORE CHILDREN, SKIP TO 345) DON'T KNOW 8	YES ..... 1 NO ..... 2 (GO BACK TO 313 FOR NEXT CHILD OR, IF NO MORE CHILDREN, SKIP TO 345) DON'T KNOW 8
314	How many days ago did the fever start? IF LESS THAN ONE DAY, RECORD '00'.	DAYS AGO ..... ☐☐☐ DON'T KNOW 98	DAYS AGO ..... ☐☐☐ DON'T KNOW 98
315	Did you seek advice or treatment for the fever from any source?	YES ..... 1 NO ..... 2 (SKIP TO 317)	YES ..... 1 NO ..... 2 (SKIP TO 317)
316	Where did you seek advice or treatment?[2] Anywhere else? RECORD ALL SOURCES MENTIONED.	PUBLIC SECTOR GOVT. HOSPITAL ..... A GOVT. HEALTH CENTER ..... B GOVT. HEALTH POST ..... C MOBILE CLINIC ..... D FIELD WORKER ..... E OTHER PUBLIC _____ F (SPECIFY) PRIVATE MEDICAL SECTOR PVT. HOSPITAL/CLINIC ..... G PHARMACY ..... H PRIVATE DOCTOR ..... I MOBILE CLINIC ..... J FIELD WORKER ..... K OTHER PVT. MEDICAL _____ L (SPECIFY) OTHER SOURCE SHOP ..... M TRAD. PRACTITIONER ..... N OTHER _____ X (SPECIFY)	PUBLIC SECTOR GOVT. HOSPITAL ..... A GOVT. HEALTH CENTER ..... B GOVT. HEALTH POST ..... C MOBILE CLINIC ..... D FIELD WORKER ..... E OTHER PUBLIC _____ F (SPECIFY) PRIVATE MEDICAL SECTOR PVT. HOSPITAL/CLINIC ..... G PHARMACY ..... H PRIVATE DOCTOR ..... I MOBILE CLINIC ..... J FIELD WORKER ..... K OTHER PVT. MEDICAL _____ L (SPECIFY) OTHER SOURCE SHOP ..... M TRAD. PRACTITIONER ..... N OTHER _____ X (SPECIFY)
316 A	How many days after the fever began did you first seek advice or treatment for (NAME)? IF THE SAME DAY, RECORD '00'.	DAYS ..... ☐☐	DAYS ..... ☐☐

[1] For fieldwork beginning in 2006, 2007, or 2008, the year should be 2001, 2002, or 2003, respectively.
[2] Coding categories to be developed locally and revised based on the pretest; however, the broad categories must be maintained.

		YOUNGEST CHILD NAME _____	NEXT-TO-YOUNGEST CHILD NAME _____
317	Is (NAME) still sick with a fever?	YES ..... 1 NO ..... 2 DON'T KNOW 8	YES ..... 1 NO ..... 2 DON'T KNOW 8
318	At any time during the illness, did (NAME) take any drugs for the fever?	YES ..... 1 NO ..... 2 (SKIP 344) =——| DON'T KNOW 8	YES ..... 1 NO ..... 2 (SKIP 344) =——| DON'T KNOW 8
319	What drugs did (NAME) take?[1] Any other drugs? RECORD ALL MENTIONED. ASK TO SEE DRUG(S) IF TYPE OF DRUG IS NOT KNOWN. IF TYPE OF DRUG IS STILL NOT DETERMINED, SHOW TYPICAL ANTIMALARIAL DRUGS TO RESPONDENT.	ANTIMALARIAL SP/FANSIDAR ..... A CHLOROQUINE ..... B AMODIAQUINE ..... C QUININE ..... D ACT ..... E OTHER ANTIMALARIAL_____ F (SPECIFY) OTHER DRUGS ASPIRIN ..... G ACETAMINOPHEN/ PARACETAMOL ..... H IBUPROFEN ..... I OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	ANTIMALARIAL SP/FANSIDAR ..... A CHLOROQUINE ..... B AMODIAQUINE ..... C QUININE ..... D ACT ..... E OTHER ANTIMALARIAL_____ F (SPECIFY) OTHER DRUGS ASPIRIN ..... G ACETAMINOPHEN/ PARACETAMOL ..... H IBUPROFEN ..... I OTHER _____ X (SPECIFY) DON'T KNOW ..... Z
320	CHECK 319: ANY CODE A-F CIRCLED?	YES ☐ NO ☐ (GO BACK TO 313 IN NEXT COLUMN; OR IF NO MORE BIRTHS, SKIP TO 344)	YES ☐ NO ☐ (GO BACK TO 313 IN NEXT COLUMN; OR IF NO MORE BIRTHS, SKIP TO 344)
320A	CHECK 319: SP/FANSIDAR ('A') GIVEN?	CODE 'A' CIRCLED ☐ CODE 'A' NOT CIRCLED ☐ (SKIP TO 324)	CODE 'A' CIRCLED ☐ CODE 'A' NOT CIRCLED ☐ (SKIP TO 324)
321	How long after the fever started did (NAME) first take SP/Fansidar?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8

[1] Revise list of drugs as appropriate; however, the broad categories must be maintained. Include all drugs or drug combinations that are commonly given as separate categories.

		YOUNGEST CHILD NAME _____	NEXT-TO-YOUNGEST CHILD NAME _____
322	For how many days did (NAME) take the SP/Fansidar? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ⌜⌝ DON'T KNOW 8	DAYS..... ⌜⌝ DON'T KNOW 8
323	Did you have the SP/Fansidar at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get the SP/Fansidar first?	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8
	Did you purchase the SP/Fansidar?	YES ..... 1 NO ..... 2 If NO, Skip to 324	YES ..... 1 NO ..... 2 If NO, Skip to 324
	How much did you pay for the SP/Fansidar?	In Kwacha ⌜⌝	In Kwacha ⌜⌝
324	CHECK 319: WHICH MEDICINES?	CODE 'B' CIRCLED ☐ CODE 'B' NOT CIRCLED ☐ (SKIP TO 328)	CODE 'B' CIRCLED ☐ CODE 'B' NOT CIRCLED ☐ (SKIP TO 328)
325	How long after the fever started did (NAME) first take chloroquine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8
326	For how many days did (NAME) take chloroquine? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ⌜⌝ DON'T KNOW 8	DAYS..... ⌜⌝ DON'T KNOW 8
327	Did you have the chloroquine at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get the chloroquine first?	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY)	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY)

		DON'T KNOW 8	DON'T KNOW 8
328	CHECK 319: WHICH MEDICINES?	CODE 'C' CIRCLED ☐ CODE 'C' NOT CIRCLED ☐ (SKIP TO 332)	CODE 'C' CIRCLED ☐ CODE 'C' NOT CIRCLED ☐ (SKIP TO 332)
329	How long after the fever started did (NAME) first take Amodiaquine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8

		YOUNGEST CHILD NAME _____	NEXT-TO-YOUNGEST CHILD NAME _____
330	For how many days did (NAME) take Amodiaquine? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ☐☐ DON'T KNOW 8	DAYS ..... ☐☐ DON'T KNOW 8
331	Did you have the Amodiaquine at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get the Amodiaquine first?	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8
332	CHECK 319: WHICH MEDICINES?	CODE 'D' CIRCLED ☐ CODE 'D' NOT CIRCLED ☐ (SKIP TO 336)	CODE 'D' CIRCLED ☐ CODE 'D' NOT CIRCLED ☐ (SKIP TO 336)
333	How long after the fever started did (NAME) first take Quinine?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8
334	For how many days did (NAME) take Quinine? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ☐☐ DON'T KNOW 8	DAYS ..... ☐☐ DON'T KNOW 8
335	Did you have the Quinine at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK:	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6

	Where did you get the Quinine first?	(SPECIFY) DON'T KNOW 8	(SPECIFY) DON'T KNOW 8
	Did you purchase the SP/Fansidar?	YES ..... 1 NO ..... 2 If NO, Skip to 336	YES ..... 1 NO ..... 2 If NO, Skip to 336
	How much did you pay for the SP/Fansidar?	In Kwacha ☐☐☐	In Kwacha ☐☐☐
336	CHECK 319: WHICH MEDICINES?	CODE 'E' CIRCLED ☐ CODE 'E' NOT CIRCLED ☐ (SKIP TO 340)	CODE 'E' CIRCLED ☐ CODE 'E' NOT CIRCLED ☐ (SKIP TO 340)
337	How long after the fever started did (NAME) first take ACT?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8
		YOUNGEST CHILD NAME _____	NEXT-TO-YOUNGEST CHILD NAME _____
338	For how many days did (NAME) take ACT? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ☐☐ DON'T KNOW 8	DAYS ..... ☐☐ DON'T KNOW 8
339	Did you have the ACT at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get the ACT first?	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8
	Did you purchase the SP/Fansidar?	YES ..... 1 NO ..... 2 If NO, Skip to 340	YES ..... 1 NO ..... 2 If NO, Skip to 340

	How much did you pay for the SP/Fansidar?	In Kwacha ┌┬┬┐ ├┼┼┤ └┴┴┘	In Kwacha ┌┬┬┐ ├┼┼┤ └┴┴┘
340	CHECK 319: WHICH MEDICINES?	CODE 'F' CIRCLED ☐ CODE 'F' NOT CIRCLED ☐ (SKIP TO 344)	CODE 'F' CIRCLED ☐ CODE 'F' NOT CIRCLED ☐ (SKIP TO 344)
341	How long after the fever started did (NAME) first take (NAME OF OTHER ANTIMALARIAL)?	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8	SAME DAY ..... 0 NEXT DAY ..... 1 TWO DAYS AFTER THE FEVER ..... 2 THREE DAYS AFTER THE FEVER . 3 FOUR OR MORE DAYS AFTER THE FEVER ..... 4 DON'T KNOW 8
342	For how many days did (NAME) take (NAME OF OTHER ANTIMALARIAL)? IF 7 OR MORE DAYS, RECORD '7'.	DAYS ..... ┌┬┐ └┴┘ DON'T KNOW 8	DAYS ..... ┌┬┐ └┴┘ DON'T KNOW 8
343	Did you have the (NAME OF OTHER ANTIMALARIAL) at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get the (NAME OF OTHER ANTIMALARIAL) first?	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8	AT HOME ..... 1 GOVERNMENT HEALTH FACILITY/WORKER ..... 2 PRIVATE HEALTH FACILITY/WORKER ..... 3 SHOP ..... 4 OTHER_____ 6 (SPECIFY) DON'T KNOW 8
	Did you purchase the SP/Fansidar?	YES ..... 1 NO ..... 2 If NO, Skip to 344	YES ..... 1 NO ..... 2 If NO, Skip to 344
	How much did you pay for the SP/Fansidar?	In Kwacha ┌┬┬┐ ├┼┼┤ └┴┴┘	In Kwacha ┌┬┬┐ ├┼┼┤ └┴┴┘
344		GO BACK TO 313 IN NEXT COLUMN, OR, IF NO MORE CHILDREN, GO TO 345.	GO BACK TO 313 IN FIRST COLUMN OF NEW QUESTIONNAIRE, OR, IF NO MORE CHILDREN, GO TO 345.

345	RECORD THE TIME.	HOUR ..... ☐☐ MINUTES..... ☐☐

INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT RESPONDENT:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

NAME OF THE SUPERVISOR:_____ DATE: _____