GOVERNMENT OF MALAWI

Malawi Micronutrient Survey 2015-16

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Zomba, Malawi

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Lilongwe, Malawi

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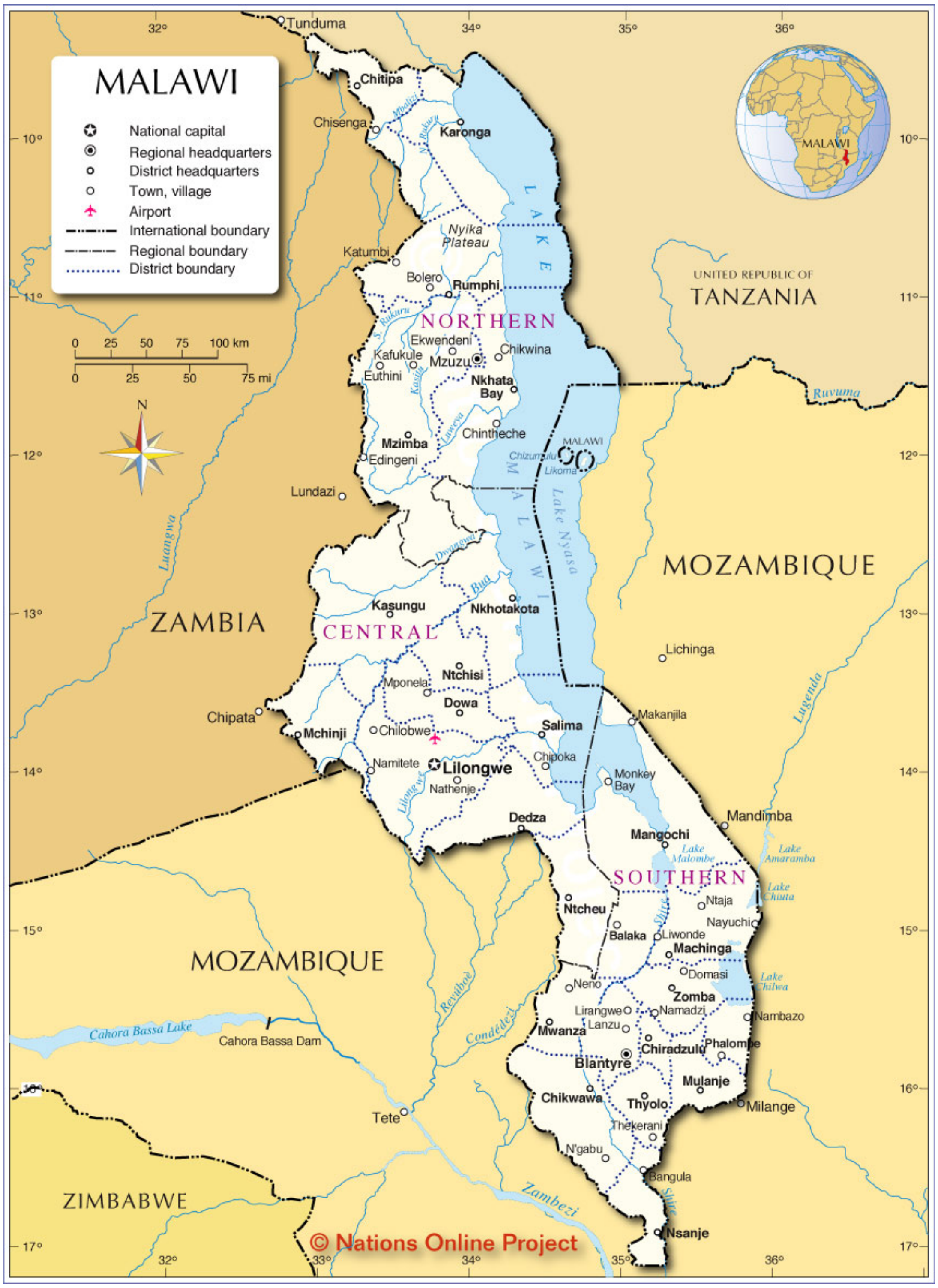
MALAWI
National capital
Regional headquarters
District headquarters
Town, village
Airport
International boundary
Regional boundary
District boundary
NORTHERN
CENTRAL
SOUTHERN
ZAMBIA
MOZAMBIQUE
UNITED REPUBLIC OF TANZANIA
ZIMBABWE
LAKE MALAWI
Lake Nyasa
Chitipa
Karonga
Chisenga
Tunduma
Nyika Plateau
Katumbi
Bolero
Rumphi
Ekwendeni
Mzuzu
Chikwina
Kafukule
Euthini
Nkhata Bay
Chintheche
Mzimba
Edingeni
Lundazi
Kasungu
Nkhotakota
Ntchisi
Mponela
Dowa
Salima
Chipata
Mchinji
Chilobwe
Namitete
Lilongwe
Nathenje
Chipoka
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EXECUTIVE SUMMARY

The 2015-16 Malawi Micronutrient Survey (2015-16 MNS) was conducted between December 2015 and February 2016, jointly as part of the 2015-16 Malawi Demographic and Health Survey (2015-16 MDHS). The National Statistical Office (NSO) implemented the 2015-16 MDHS at the request of the Ministry of Health. Through the DHS Program, a United States Agency for International Development (USAID) funded program, ICF International provided technical assistance in designing and implementing the 2015-16 MDHS. The Centers for Disease Control and Prevention (CDC) and Emory University, in collaboration with the Department of Nutrition, HIV and AIDS (DNHA) and the Community Health Sciences Unit (CHSU), provided technical assistance for designing and implementing the micronutrient component. Financial support for the 2015-16 MDHS and MNS was provided by the government of Malawi, USAID, United Nations Children's Fund (UNICEF), Malawi National AIDS Commission (NAC), United Nations Population Fund (UNFPA), UN WOMEN, Irish Aid, World Bank and Emory Global Health Institute.

The main purpose of the MNS was to provide program managers and policy makers with the data needed to plan, implement, monitor, and evaluate nutrition interventions for Malawi. The MNS determined the prevalence of micronutrient deficiencies (vitamin A, iron, iodine, zinc, vitamin B12, and folate) and anemia among a nationally and regionally-representative sample of preschool children (PSC), school-aged children (SAC), women of reproductive age (WRA), and men. The survey also assessed the coverage of nutrition and nutrition-related interventions (including micronutrient supplementation and food fortification) and evaluated the correlates of anemia (including micronutrient deficiencies, malaria, inflammation, inherited blood disorders, and urinary schistosomiasis).

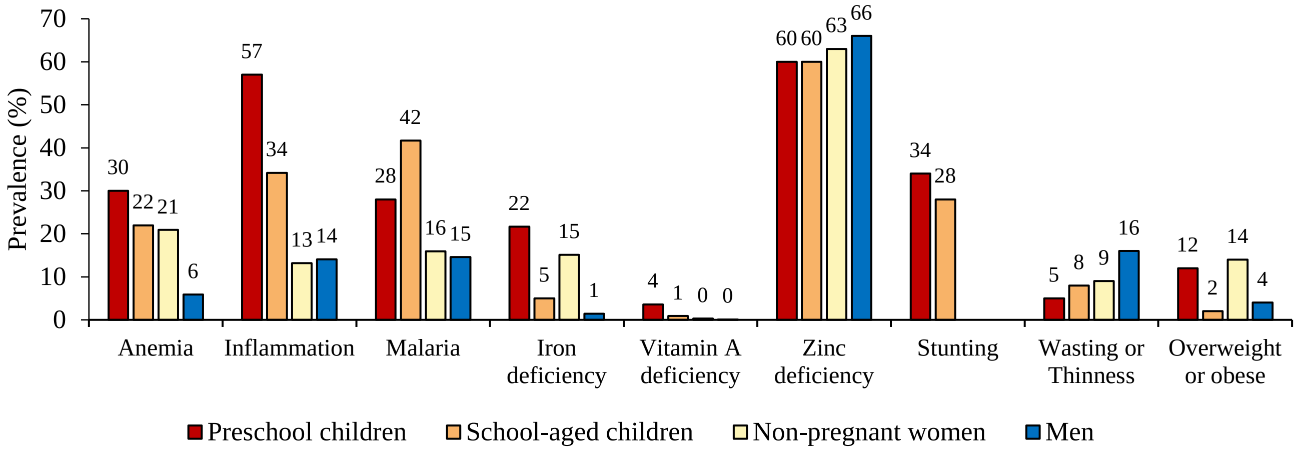
The 2015-16 MNS is the third national micronutrient survey conducted in Malawi. Data from prior surveys have shown that micronutrient deficiencies are major public health problems (MDHS 2000, 2004, and 2010 and national micronutrient surveys in 2001 and 2009). Thus, the government of Malawi and partners have implemented a range of interventions to combat micronutrient malnutrition. These interventions include targeted micronutrient supplementation (e.g., vitamin A supplementation for young children and iron-folic acid supplementation for pregnant women), nutrition education, and food fortification of staple foods (namely sugar and oil with vitamin A). Information on recent trends in micronutrient deficiencies among vulnerable populations in Malawi is lacking. The MNS findings will assess progress, evaluate existing programs, and provide a basis for policy direction and planning.

This MNS report follows the release of the Key Indicators report that was disseminated in March 2017 (1). The survey is based on a nationally representative sample that also provides estimates at the regional level and for urban and rural areas. The main findings from the 2015-16 MNS for all four target groups are presented in Figure 1.1. The overall survey response rate was 90% with an included sample size of 1233 PSC, 800 SAC, 812 WRA (34 pregnant and 778 non-pregnant), and 228 men from 2114 households.

Key findings include:

- Anemia was found in 30% of PSC, 22% of SAC, 21% of non-pregnant WRA, and 6% of men.
- Over a third (34%) of PSC were stunted, 18% were underweight, and nearly 5% were wasted; 12% of PSC were overweight. In SAC, the prevalence of stunting was 28%, 8% were thin, and only 2% were overweight. A total of 9% of non-pregnant WRA were thin, while 14% were overweight or obese.
- Inflammation, defined as either elevated C-reactive protein (CRP) or alpha-1-acid glycoprotein (AGP) was common and found in more than 1 in 2 PSC and 1 in 3 SAC.
- The prevalence of malaria was 28% in PSC, 42% in SAC, 16% in non-pregnant WRA, and 15% in men. Cases of malaria were much higher in rural areas, compared to urban areas.
- Iron deficiency was relatively uncommon in all groups except young children, with 22% of PSC, 5% of SAC, 15% of non-pregnant WRA, and 1% of men affected. A total of 9% of PSC had sickle cell trait, and 33% of PSC had alpha-thalassemia trait.
- Vitamin A deficiency was extremely low and found in approximately 4% of PSC, 1% of SAC, and less than 1% of non-pregnant WRA and men. Based on estimated liver reserves, there were no cases of vitamin A deficiency in any population group.
- Zinc deficiency was common in all subgroups, ranging from 60% to 66%.
- In non-pregnant WRA, folate insufficiency was 81% based on elevated risk of neural tube defects, and folate deficiency, determined by elevated risk of megaloblastic anemia, was 8%. Vitamin B12 deficiency in non-pregnant WRA was 13%.
- A total of 75% of household salt was iodized with 41% of samples appropriately iodized. The median urinary iodine concentrations were 268 µg/L for school-aged children and 271 µg/L for non-pregnant WRA.
- Coverage of oil fortified with vitamin A was low with only 12% of households with adequately fortified oil. A total of 58% of households had adequately fortified sugar with vitamin A.

Figure 1.1 Key Findings from 2015-16 Malawi Micronutrient Survey



CHAPTER 1. INTRODUCTION

The 2015-16 Malawi Micronutrient Survey (2015-16 MNS) was conducted jointly with the 2015-16 Malawi Demographic Health Survey (2015-16 MDHS). The Malawi National Statistical Office (NSO) implemented the 2015-16 MDHS in collaboration with other agencies and with technical assistance from ICF International through the USAID-funded DHS Program. The 2015-16 MNS was implemented by the NSO, Community Health Services Unit (CHSU) of the Ministry of Health, and Department of Nutrition, HIV and AIDS (DNHA) with funding from Irish Aid, World Bank and Emory Global Health Institute and coordination from UNICEF. Technical assistance for the survey was provided by the Centers for Disease Control and Prevention (CDC) and Emory University. This was the third MNS following the 2001 and 2009 national micronutrient surveys in Malawi.

This MNS report presents all the key nutrition-related findings from the 2015-16 MNS. The report does not make comparisons with the 2001 and 2009 Malawi national micronutrient surveys due to differences in methodology, which make interpretation of findings difficult.

1.1 SURVEY OBJECTIVES

The primary objective of the 2015-16 MNS was to provide up-to-date data to support the planning and monitoring and evaluation of nutrition interventions in Malawi. Specifically, the 2015-16 MNS aimed to estimate the prevalence of:

1) Anemia (including iron deficiency anemia),
2) Iron deficiency,
3) Vitamin A deficiency,
4) Iodine deficiency,
5) Zinc deficiency,
6) Vitamin B12 and folate deficiency,[1]
7) Inflammation,
8) Infection (malaria and urinary schistosomiasis),
9) Inherited blood disorders,
10) Wasting, stunting, underweight and overweight/obesity,
11) Households with adequately iodized salt,
12) Households with vitamin A fortified oil and sugar,

Another objective was to estimate the coverage of key nutrition interventions.

[1] Due to pending laboratory analysis, only results in women of reproductive age are included in the 2015-16 MNS report. Vitamin B12 and folate among preschool and school-aged children will be reported at a later date.

1.2 TARGET GROUPS

The target populations of the 2015-16 MNS included preschool children (PSC) 6-59 months, school-aged children (SAC) 6-14 years, pregnant and non-pregnant women of reproductive age (WRA) 15-49 years, and men 20-54 years. A total of 34 (4%) of enrolled WRA were pregnant. In this report, primary estimates for WRA are presented for non-pregnant WRA only. Results in pregnant WRA are presented in a separate chapter (Chapter 11). Data for 500 adolescents aged 10-19 were compiled from the SAC and WRA dataset, and results are presented in the Appendix.

Table 1.1 Comprehensive list of indicators measured in the 2015-16 Malawi Micronutrient Survey[1]

Indicator	**Household**	**Preschool children (6-59 months)**	**School-aged children (5-14 years)**	**Women of reproductive age (15-49 years)**	**Men (20-55 years)**
Hemoglobin	-	✓	✓	✓	✓
Vitamin A deficiency (RBP)	-	✓	✓	✓	✓
Vitamin A status (MRDR and serum retinol, in subsample)	-	✓	✓	✓	✓
Iron deficiency (serum ferritin)	-	✓	✓	✓	✓
Iron deficiency (serum transferrin receptor)	-	✓	✓	✓	✓
Inflammation (CRP, AGP)	-	✓	✓	✓	✓
Zinc deficiency (serum zinc)	-	✓	✓	✓	✓
Malaria (rapid diagnostic test)	-	✓	✓	✓	✓
Urinary schistosomiasis (Hematuria)	-	✓	✓	-	✓
Urinary iodine	-	-	✓	✓	-
Inherited blood disorders (sickle cell, alpha-thalassemia, G6PD deficiency)	-	✓	-	-	-
Folic acid and B12 status (serum folate, B12)	-	P	P	✓	-
Anthropometry	-	✓	✓	✓	✓
Iodized salt	✓	-	-	-	-
Vitamin A in sugar	✓	-	-	-	-
Vitamin A in oil	✓	-	-	-	-

[1] Cells with a "✓" indicate that results are presented in the 2015-16 MNS report, "P" indicates that laboratory analyses are still pending, "-" indicates not measured.

CHAPTER 2. METHODS

2.1 SURVEY DESIGN AND SAMPLING

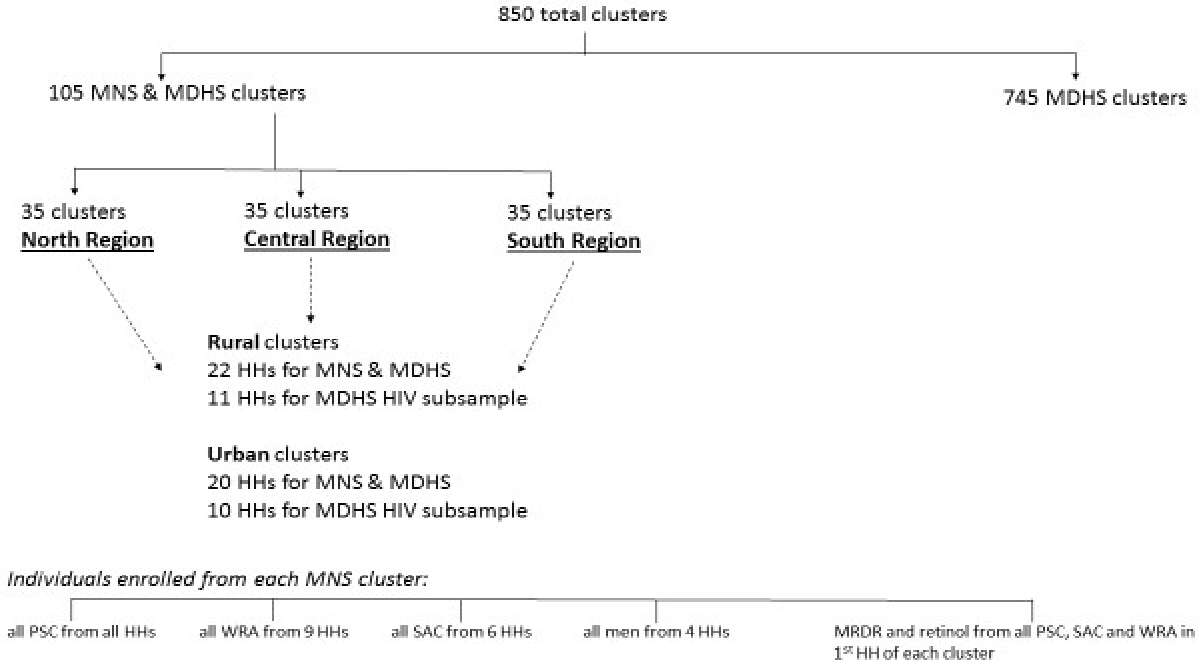
<u>MDHS sampling</u>

The 2015-16 MDHS was cross-sectional and employed a two-stage cluster sampling design to produce estimates for key indicators for the country as a whole, for urban and rural areas separately, and for each of the 28 districts in Malawi. The sampling frame utilized the Malawi Population and Housing Census conducted in 2008. The first stage of sampling involved selecting clusters (standard enumeration areas) probability proportional to population size. The second stage followed an updated household listing in each cluster carried out from August to October 2016; a fixed number of 30 households per urban cluster and 33 households per rural cluster were selected with an equal probability systematic selection from the newly created household listing. The 2015-16 MDHS selected a total of 850 clusters, reflecting 27,531 households to participate in the survey. All WRA who were usual members of the selected households and those who spent the night in the selected households before the survey were eligible to be interviewed. In a random subsample of one-third of these households per cluster, all men age 15-54 were eligible for individual interviews and HIV testing. In the same subsample, all eligible WRA and PSC were eligible for anthropometry measurements and anemia and HIV testing. Further information on the methodology for the 2015-16 MDHS is presented in the main MDHS report (2).

<u>MNS sampling</u>

The 2015-16 MNS was selected as a subsample of the MDHS to produce estimates of key indicators for the country as a whole, as well as results stratified by region (North, Central, South) and residence (urban, rural). A subsample of 105 clusters (35 clusters in each of the 3 regions) were randomly selected from the 850 MDHS clusters (see Figure 2.1). Among these selected clusters, the households selected for the MDHS HIV subsample of households (10 per urban cluster and 11 per rural cluster) described above were excluded from the MNS. The remaining households (20 per urban cluster and 22 per rural cluster) were included in the MNS. In each selected household, all eligible participants (defined as usual members of the household who spent the night in that household before the survey) were invited to participate according to the following schematic: PSC from all households, WRA from 9 households randomly selected from all households, SAC from 6 households randomly selected from the 9 WRA households, and men from 4 households randomly selected from the 6 SAC households. The first household in each cluster was randomly selected and approached first. In this same household, all eligible PSC, SAC, and WRA were invited to participate in the modified relative dose response (MRDR) subsample, which required administering a small challenge dose of a retinol analog along with a fatty snack, and collecting a venous blood sample 4 to 6 hours later.

Figure 2.1 2015-16 Malawi Micronutrient Survey sampling design



HHs, households; MNS, Malawi Micronutrient survey; MDHS, Malawi Demographic Health Survey PSC, preschool children; MRDR, modified relative dose response; SAC, school-aged children; WRA, women of reproductive age

Table 2.1 shows the allocation of selected clusters and households, according to region and residence.

Table 2.1 Micronutrient sample allocation of clusters by region and residence

	Number of clusters allocated			**Number of households allocated**		
	Urban	Rural	Total	Urban	Rural	Total
North	8	27	35	160	594	754
Central	8	27	35	160	594	754
South	8	27	35	160	594	754
Malawi	**24**	**81**	**105**	**480**	**1782**	**2262**

The sample allocations were derived using the following information obtained from the 2010 MDHS. The average number of women age 15-49 per household was 1.09 in urban areas and 0.94 in rural areas. The average number of men age 20-54 per household was 0.91 in urban areas and 0.68 in rural areas. The average number of children age 5-14 per household was 1.67 in urban areas and 1.42 in rural areas. The average number of children age 5-59 months per household was 0.91 in urban areas and 0.77 in rural areas.

2.2 SAMPLE SIZE DETERMINATION

Sample size estimates were based on a predicted change in the prevalence of vitamin A deficiency in PSC from 22% in 2009 to 16% in 2015-16. At a confidence level of 95%, power of 80%, design effect of 2.0, and 90% household and individual response rates, data had to be collected on a minimum of 1452 PSC. The final sample of 1452 PSC was more than adequate for estimating both the national and region-specific prevalence of all the key nutrition indicators for the 2015-16 MNS (e.g., anemia, iron deficiency, zinc deficiency, stunting) at 5% and 10% precision, respectively. Calculations assumed a 90% household-response rate, 90% individual-response rate, and an average household size of 4.3 persons. Estimates for the population proportion for each target group were obtained from NSO.

The 2015-16 MNS was conducted in 2262 residential households, including 480 households in urban areas and 1782 households in rural areas. The sample size calculated was expected to result in data collected from about 750 eligible WRA, 252 eligible men, 762 eligible SAC, and 1479 eligible PSC.

2.3 ETHICAL CONSIDERATIONS

To ensure the 2015-16 MDHS and MNS followed principles to prevent unethical risk to study participants, a joint proposal was submitted and approved by the National Health Sciences Research Committee.

Informed consent

Informed consent for the survey took place at several levels. First, community leaders from each cluster were informed about the MDHS and MNS, and communal consent was obtained prior to the arrival of the MDHS teams. Second, after completing the MDHS fieldwork, the MDHS enumerators asked each MNS-eligible household for permission to participate in the MNS. Consent for each household was recorded on the MNS paper questionnaire, which was subsequently handed off to the MNS team. Third, upon arrival to the consenting household, the MNS interviewer asked for informed consent from the head of household for collection of food samples. Finally, upon arrival to the field laboratory, the nurse asked for informed consent from each individual for anthropometry and biological testing (venous blood, urine). For children, informed consent was asked from parents or guardians of the child.

Confidentiality

The data collected by the MNS is protected and will be stored at NSO for three years from the time of data collection. De-identified data from the MNS will be available to the public after release of the 2015-16 MDHS and MNS main reports.

Identification of a health condition

The survey excluded those too ill to participate and those with a physical disability that would prevent accurate height and/or weight measurement. Survey participants identified as having severe anemia (hemoglobin <7 g/dL), malaria (based on positive results from a rapid diagnostic test), moderate or severe acute malnutrition [using age-appropriate mid-upper arm circumference (MUAC) cutoffs], hematuria (based on urine dipstick in all groups except WRA), or severe illness as identified by a team nurse were provided with a referral to a local hospital for evaluation.

2.4 SURVEY PERSONNEL AND TRAINING

Six teams were responsible for conducting the MNS. Each team consisted of one supervisor, one enumerator, two pediatric nurses, and two laboratory technicians. One national supervisor, one national laboratory supervisor, and three regional supervisors oversaw the entire data collection process.

MNS personnel received six days of intensive training on the survey objectives, anthropometry measurement, questionnaire administration, and procedures for food sample and biological specimen collection. After completing the training, they conducted a pretest, which involved carrying out the handover process between the MDHS and MNS teams and conducting all survey data collection in two of the 105 clusters. Specialists from CHSU, the Ministry of Health, NSO, DNHA, and CDC conducted the training and supervised the pretest and initial data collection period. Staff from CDC and Emory University provided in-country technical support throughout data collection and the close-out of the survey.

Nurses and laboratory personnel were recruited from government district hospitals and had prior experience in phlebotomy, including venous blood collection in children.

2.5 SURVEY IMPLEMENTATION

The 2015-16 MNS was conducted from mid-December 2015 to February 2016. The MDHS teams collected survey data electronically using tablet computers, and the MNS teams used a paper questionnaire pre-translated in Chichewa, Tumbuka, or English. MDHS teams completed data collection in each cluster prior to arrival by the MNS team. MNS participants were pre-selected by the MDHS teams through an algorithm pre-programmed into their tablets. After completing data collection in each selected household, the MDHS supervisor filled the cover sheet of the MNS questionnaire booklet with names and ages of eligible individuals selected for the MNS. For each eligible household, MDHS enumerators placed a household label with a unique barcode on the questionnaire and entered the barcode number into the tablet. The barcode number allowed the data collected separately by the MDHS and the MNS teams to be linked. The MDHS team lead then handed over the questionnaire booklets to the MNS team supervisors, who cross-checked the information on the tablets with the questionnaire booklet.

On arrival in the cluster, the nurses and laboratory technicians set up the mobile laboratory, and the team lead and enumerator began visiting the selected households. Only households that had agreed to allow the MNS team to visit (as indicated on the cover sheet) were approached. No replacement was done for households that were not enrolled for any reason. On arrival at a household, the enumerator proceeded with the consent process, conducted the household interview, and collected available food specimens of salt, sugar, and oil (see Section 2.8). The enumerator also placed an identification bracelet with a unique barcode label on all household members who were eligible. A corresponding barcode label was placed on the questionnaire booklet. The remaining labels with the same ID were stapled to the back of the questionnaire booklet so that the nurses responsible for interviewing that person at the mobile laboratory could match the number on the bracelet with the number on the questionnaire and then use the remaining corresponding barcode labels for labeling the biological specimens.

Following the household interview, the enumerator escorted the selected household members with bracelets to the mobile laboratory. There, the nurse consented each individual and if they agreed, completed the remaining sections of the questionnaire, collected the biological specimens, and conducted anthropometry (see sections 2.7 and 2.8). The nurse confirmed that the ID on the bracelet label, questionnaire labels, and specimen labels matched. After the specimens were collected, the questionnaire, remaining labels, and blood specimens were transferred to the laboratory technicians for processing. Hemoglobin, malaria, and hematuria were assessed in the mobile laboratory, and the results were provided to the individuals while they were at the laboratory; referrals were made if necessary. Each participant was offered a beverage after biological samples were collected.

2.6 FOOD SPECIMEN COLLECTION

The minimum amounts of food samples that were collected in each household for analysis are listed in Table 2.2. Sugar and salt were collected in a plastic, sealable bag and then placed in a paper bag. Cooking oil was collected in a tube and was wrapped with foil to prevent light deteriorating the retinol content. Each food type collected was replaced by the MNS team.

All food items were analyzed at CHSU and the laboratory followed standard procedure for quality control and assurance. The iCheck FLUORO was used to measure vitamin A in sugar, providing µg of retinol equivalents per liter, which were converted to mg/kg. The concentration range limit for the iCheck FLUORO, is 50-3000 µg retinol equivalents/L. The iCheck CHROMA was used to measure vitamin A in oil, providing the mg of retinol equivalents per kilogram of oil. The concentration range limit for the iCheck CHROMA is 3-30 mg retinol equivalents/kg. Salt was measured using the titration method (3).

Table 2.2 Minimum food specimen sample required for analysis

Food	Weight (g)	Measure
Sugar	10	1 tablespoon
Salt	10	1 tablespoon
Cooking oil	-	~1mL

2.7 ANTHROPOMETRY

Anthropometric measurements [length or height, weight, mid-upper arm circumference (MUAC)] were taken from all consenting individuals at the mobile laboratory. Standard procedures using the World Health Organization methodology were utilized (4).

For children less than 24 months old, recumbent length was measured to the nearest 0.1 cm using a wooden length board (ShorrBoard brand). The same device was used to measure standing height to the nearest 0.l cm for children 2 years and older, women and men. All length/height measurements were taken with the participant not wearing shoes. Electronic scales (SECA brand) were used to measure the weight of participants to the nearest 0.1 kg. Children not yet able to stand on their own were weighed while being held by an adult (typically their mother) using the mother-child tare function on the scale. All weight measurements were taken with minimal clothing and with the participant not wearing shoes.

MUAC and the presence of bi-lateral pitting oedema were used for screening severe acute malnutrition, and participants were referred to clinics according to the criteria outlined in appendix A.1.

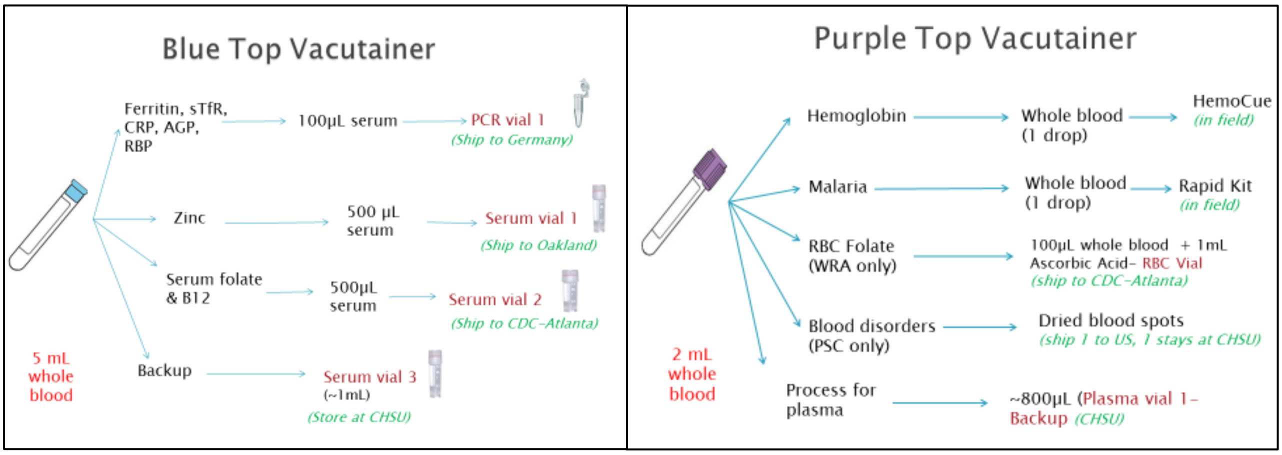
Child age was calculated using date of birth subtracted from the date of interview to calculate age in days, months and years for both PSC and SAC. Age in days was used in the WHO macro to calculate age-appropriate z-scores (e.g., length/height-for-age and weight-for-age). Verification of birth date was done using health cards, when possible. Age of adults (men and women) in years was extracted from the DHS questionnaire.

Anthropometric indices used for evaluating the nutritional status of children included length/height-for-age, weight-for-age, weight-for-length/height, and BMI-for-age. These indices were interpreted using classifications based on Z-scores (standard deviation units from the reference median) calculated from the WHO growth standards. Chronic malnutrition or stunting (length or height-for-age z-score < -2) was reported in PSC and SAC. Acute malnutrition was defined using wasting (weight-for-height z-score < -2) in PSC, and using thinness (BMI-for-age z-score < -2 or BMI < 18 kg.m^2) in SAC, WRA and men. Overweight (BMI-for-age z-score >1) and obesity (BMI-for-age z-score >2) were reported for PSC aged 2 years and older and SAC; overweight (BMI between 25-29.9 kg/m^2) and obesity (BMI≥30 kg/m^2) were also reported for WRA and men. For PSC < 2 years of age, weight-for-height z-score > 1 and 2 were used to define overweight and obesity, respectively.

2.8 HUMAN SPECIMEN COLLECTION AND PROCESSING

In each cluster, nurses and laboratory technicians were located at a central site in a temporary field laboratory. Nurses collected blood samples through venipuncture from participants with a bracelet labelled with a barcode and who consented to having blood specimens taken. Blood samples (approximately 7mL total) were collected into one trace element free (Royal Blue Top) and one EDTA (Purple Top) vacutainer per participant. See Figure 2.2 below and Appendix A.2 for details on specimen volume and laboratory testing.

Figure 2.2 Specimen volume and testing



Whole blood from the Purple Top vacutainer was used to test for malaria using a rapid diagnostic test and hemoglobin using the HemoCue 301. In PSC, 100µL of whole blood was also transferred onto dried blood spot (DBS) cards, which were dried, stored, and subsequently used to test for inherited blood disorders. In WRA, 100µL of whole blood was mixed with ascorbic acid for laboratory analysis of RBC folate. The remaining blood in the Purple Top was centrifuged, and plasma was aliquoted and stored at CHSU. The serum derived from the Royal Blue Top was used for various micronutrient biochemical analyses as shown in Figure 2.2.

In a subset of participants, an additional blood sample (~3 mL) was collected in a third EDTA (Purple Top) Vacutainer for MRDR and retinol laboratory testing using high performance liquid chromatography (HPLC). This assessment required participants to consume a small challenge dose of a retinol analog followed by a fatty snack (granola bar). After 4 to 6 hours, an additional venous blood sample was collected from those participants and centrifuged for plasma, which was aliquoted into two sterile cryovials (see Table A.2 in Appendix for details on biological indicators).

Centrifuged serum and plasma specimens were all labeled, maintained in portable freezers in the field, and transported to the nearest district laboratory for temporary storage (at -20^{o} C). The samples were accompanied by sample tracking forms and thermometers to monitor the temperatures from the field laboratory to the district laboratory and finally to the central laboratory at CHSU, where they were stored at -70^{o} C until shipment for analysis.

Casual collection methods (single samples, not 24-hour collection) of urine were used to obtain samples (~10 mL) of urine that were collected in sterile collection cups from all eligible participants. The urine samples were tested for the presence of hematuria (as a proxy diagnosis for urinary schistosomiasis) using urine dipsticks in PSC, SAC, and men. WRA were excluded from hematuria testing given potential confounding from menstruation. For both SAC and WRA, an aliquot (2 mL) of urine was transferred into iodine-free storage vials (in duplicate) and sent to CHSU laboratory for testing of urinary iodine.

2.9 DATA MANAGEMENT AND ANALYSIS

Data management was conducted jointly by NSO, ICF, and CDC, and Emory University. During the survey, questionnaires were collected, reviewed for completion by the team lead at the end of each day, edited and transported weekly to the NSO where the data were double-entered by NSO staff using CSPro. Discrepancies were reconciled by a data management supervisor, and secondary editing was done if necessary. De-identified and cluster scrambled files were shared with CDC and Emory University for further data cleaning as well as data analysis. The data from the MNS questionnaire were linked at the individual and household level to the MDHS data, and laboratory data received from various laboratories were appended to the existing data file. These data manipulations and any data cleaning of the MNS set were performed in SAS version 9.4 at CDC and Emory University.

Data cleaning for anthropometry followed pre-specified criteria of the WHO (4) and included exclusion of values outside of the following bounds for PSC and SAC:

- Weight-for-Height Z-score (WHZ) <-5.0 or >5.0
- Weight-for-Age Z-score (WAZ) <-6.0 or >5.0
- Height-for-age Z-score (HAZ) <-6.0 or >6.0

Z-scores were not calculated for the adult populations; therefore, implausible values of height (< 101.6 cm or > 219.9 cm) or weight (< 22.7 kg or > 226.7 kg) were set to missing before calculating BMI for men and women.

The standard deviation (SD) of the Z-score provides information on the spread of the distribution and the quality of the anthropometric measurements performed for a survey. A Z-score SD that is lower than 0.9 indicates that the distribution is more homogeneous with less variation compared to the reference distribution. A Z-score SD >1.0 and <1.2 indicates that the distribution has a wider spread than the reference, and a Z-score SD >1.3 is suggestive of inaccurate anthropometric measurements and/or inaccurate age information (4). Z-score standard deviations for PSC and SAC can be found in appendix A.8.

Frequency tables were generated in SAS 9.4 using Proc SurveyFreq to account for the complex sampling design. For statistical comparisons of categorical variables, the Rao Scott modified Chi Square test was used, which accounted for the complex survey design. All p-values reported for Chi Square tests represent overall comparison between row and column variables (e.g., stunting and wealth category), not a pairwise comparison (e.g., stunting at low wealth compared to stunting at highest wealth within the five categories for wealth).

Serum ferritin concentrations were adjusted for CRP and AGP concentrations using the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) internal (country-specific) regression-correction approach (5, 6). Unadjusted prevalence estimates of iron deficiency are provided in the appendix A.4-A.6. Hemoglobin concentrations were adjusted based on altitude of the cluster in all individuals and smoking in WRA. Smoking data was not available for men. Vitamin A status was assessed using retinol binding protein (RBP) as a surrogate measure for serum retinol (7). Since the molar ratio of RBP and retinol is not always 1:1, a subsample of serum from each target group except men was also analyzed for serum retinol to adjust the RBP cut-points, as was done in the 2009 Malawi national micronutrient survey and as reported in the literature (8, 9). The correlation of RBP:retinol and the regression equation used to calculate the RBP cut point for this survey is provided in appendix A7. Although inflammation is known to affect biomarkers of vitamin A status (10), recommendations from WHO on adjustments have not yet been developed (7). Thus for this report, RBP, retinol, and modified relative dose response ratio concentrations were not adjusted for inflammation. Serum zinc concentrations may be affected by physiologic factors, including fasting status, time of blood collection, and inflammation; thus, available cutoffs based on age, time of day and fasting status were used (11). Zinc concentrations were not adjusted for inflammation, as there are no current recommendations for adjustment.

We report two main measurements for folate status. First, folate insufficiency, defined as red blood cell folate < 748 nmol/L, is associated with risk of increased incidence of neural tube defects. The 2015 WHO published cutoff for folate insufficiency contingent on *L. casei* and folic acid as a calibrator is < 906 nmol/L (12). The CDC laboratory measured red blood cell folate and used *L. rhamnosus* and 5 methyl-TFR as the calibrator, which changes the red blood cell folate insufficiency cutoff to < 748 nmol/L (13). Second, folate deficiency, defined as serum folate < 6.8 nmol/L, is associated with risk of megaloblastic anemia (12). In the appendix, we report additional cutoffs for folate status that pertain to the elevated risk of metabolic dysfunction. High homocysteine is a functional indicator of folate deficiency metabolism; thus, the serum folate cutoff to detect increased risk in metabolic outcomes (rising homocysteine) is < 14 nmol/L (13).

The cutoffs for vitamin B-12 deficiency and insufficiency were < 150 pmol/L and <220 pmol/L, respectively (14). Standard thresholds for abnormal biomarker concentrations by target group were used and are summarized in Table 2.4. Additional details on biological indicator assessment are described in Appendix A2.

Table 2.3 Individual-level cutoffs used for key biomarkers

Biomarker	Indicator	Preschool children	School-aged children	Women of reproductive age	Men
Hemoglobin[1]	Anemia	< 11.0 g/dL	5-11 y: < 11.5 g/dL 12-14 y: < 12.0 g/dL	Pregnant: < 11.0 g/dL Non-pregnant: < 12.0 g/dL	< 13.0 g/dL
CRP	Inflammation	> 5 mg/L	> 5 mg/L	> 5 mg/L	> 5 mg/L
AGP	Inflammation	> 1 g/L	> 1 g/L	> 1 g/L	> 1 g/L
Ferritin[2]	Iron deficiency	< 12 µg/L	< 15 µg/L	< 15 µg/L	< 15 µg/L
RBP[3]	Low RBP	< 0.46 µmol/L	< 0.46 µmol/L	< 0.46 µmol/L	< 0.46 µmol/L
Serum zinc[4]	Zinc deficiency	Morning, non-fasting: < 65 µg/dL Afternoon, non-fasting: < 57 µg/dL	5-10 y: same as PSC 11-14 girls: same as WRA 11-14 boys: same as men	Morning, non-fasting: < 66 µg/dL Afternoon, non-fasting: < 59 µg/dL Morning, fasting: < 70 µg/dL	Morning, non-fasting: < 70 µg/dL Afternoon, non-fasting: < 61 µg/dL Morning, fasting: < 74 g/dL
Modified relative dose response (MRDR) ratio	Vitamin A deficient	$\geq$ 0.060	$\geq$ 0.060	$\geq$ 0.060	--
Vitamin B12	Vitamin B12 depletion *(risk for B12 deficiency)*	<220 pmol/L	<220 pmol/L	<220 pmol/L	--
Vitamin B12	Vitamin B12 deficiency *(risk of megaloblastic anemia)*	<150 pmol/L	<150 pmol/L	<150 pmol/L	--
Serum Folate[5]	Folate deficiency *(risk of megaloblastic anemia):*	<6.8 nmol/L	<6.8 nmol/L	<6.8 nmol/L	--
Serum Folate[5]	Folate deficiency *(risk of elevated homocysteine)*	<14 nmol/L	<14 nmol/L	<14 nmol/L	--
Red Blood Cell Folate[5]	Folate insufficiency *(risk of neural tube defects)*	--	--	<748 nmol/L	--

[1] Hb was altitude-adjusted in all groups and adjusted for smoking in WRA. [2] Ferritin concentrations were adjusted for inflammation (6). [3] Vitamin A deficiency was estimated using Retinol Binding Protein calibrated to a serum retinol concentration of 0.7 µmol/L (9). [4] Zinc cutoffs based on age, fasting status, and time of blood collection (11). [5] Folate was measured using the microbiologic assay (12, 13, 15).

Table 2.4 Cutoffs used for household (food specimens) and population (urinary iodine) measures

Indicator	Cutoff
Median Urinary Iodine Concentration	Moderate to severe deficiency: < 50µg/L; Any deficiency: < 100µg/L; No deficiency: 100-299 µg/L; Excess: > 300µg/L
Fortified household salt	>=15 ppm considered adequately fortified[1]
Fortified household sugar	>= 4 mg/kg considered adequately fortified[1]
Fortified household cooking oil	>= 20 mg/kg considered adequately fortified[1]

[1]Based on internal Malawi standards

The 2015-16 MNS sample clusters were randomly selected from the 2015-16 MDHS survey sample clusters, which were selected according to a non-proportional allocation of sample to different districts and to their urban and rural areas, and due to the possible differences in response rates. Thus, household-level sampling weights, derived by the MDHS, were used in the analyses presented in this report. These household weights are also available in the publicly available dataset on the DHS website. Individual weights were not calculated because a fixed sampling fraction was used for each population group within households. Women were sampled from 9 of 20 or 22 households per cluster; school age children were sampled from 6 of the 9 households where women were sampled; and men were sampled from 4 of the 6 households where school age children were sampled. Since the household weight is a relative measure, multiplying the design selection probability by the household weight would not result in differences in the final weight or survey indicators; hence estimates are representative at the subgroup level using the household weights. The household weights will be required for any future analysis using the 2015-16 MNS data to ensure the survey results are representative at the national and regional levels. Standard errors were calculated taking into account clustering within and between households. Table A.3 in the appendix lists the design effects for the primary micronutrient outcomes.

CHAPTER 3. RESPONSE RATES AND BACKGROUND CHARACTERISTICS

This chapter reports the overall survey response rates and background characteristics of included households and individuals. Of the 2277 households targeted, 2250 were eligible and 94% agreed to participate (n=2114). Table 3.1 summarizes the target sample size and actual data collected by target group. Individual response rates were > 90% for PSC and SAC, 86% for WRA, and 72% for men. A total of 34 WRA were found to be pregnant (4.1 % of total WRA). Anthropometry was completed on nearly all individuals, and venous blood was collected on approximately 90% of those who agreed to participate in the survey.

Table 3.1 Target sample size and participation by target group, Malawi 2016

	Household	**Preschool children**	**School-aged children**	**Non-pregnant women of reproductive age**	**Pregnant women**	**Men**
Target sample size	2277	1500	700	780	--	200
Number of eligible subjects / households invited	2250	1279	878	900	--	315
Actual participation	2114 (94%)[1]	1233 (96%)[1]	800 (91%)[1]	778 (86%)[1]	34	228 (72%)[1]
Anthropometry	--	1230 (99.8%)	797 (99.6%)	775 (99.6%)	34	227 (99.6%)
Venipuncture blood collection	--	1102 (89%)	758 (94%)	752 (90%)	31 (91%)	219 (96%)
Modified relative dose response (MRDR) and retinol subsample	--	76	85	91	5	--

Results reported as n (%)
[1] Overall survey response rate

Data were collected on the demographic, social, and economic characteristics of participants and their households, as these factors can influence nutritional status and nutrition risk factors. The background characteristics of households stratified by region and residence (urban/rural) are summarized in Table 3.2. Average household size was 4.5 individuals. The background characteristics of individuals stratified by region and residence are summarized in Table 3.3.

Table 3.2 Background characteristics of households, Malawi 2016

Background characteristic		Region			Residence		Total % (95% CI)
		North % (95% CI)	Central % (95% CI)	South % (95% CI)	Urban % (95% CI)	Rural % (95% CI)	
	N	687	704	699	320	1770	2090
Household head sex							
Male	1507	75.1 (70.4, 79.7)	73.8 (68.3, 79.2)	69.7 (64.0, 75.5)	83.0 (76.2, 89.7)	70.4 (66.9, 74.0)	72.1 (68.4, 75.7)
Female	583	24.9 (20.3, 29.6)	26.2 (20.8, 31.7)	30.3 (24.5, 36.0)	17.0 (10.3, 23.7)	29.6 (26.0, 33.1)	27.9 (24.3, 31.6)
Mean household size							
	2090	5.1 (4.8, 5.4)	4.5 (4.1, 4.8)	4.5 (4.2, 4.8)	3.9 (3.2, 4.7)	4.6 (4.4, 4.8)	4.5 (4.3, 4.7)
Source of drinking water							
Improved	1779	84.4 (76.6, 92.2)	88.1 (79.9, 96.3)	82.5 (72.1, 93.0)	98.5 (96.3,100.0)	83.1 (76.4, 89.8)	85.1 (79.0, 91.2)
Unimproved	306	15.0 (7.4, 22.6)	11.9 (3.7, 20.1)	17.5 (7.0, 27.9)	1.5 (0.0, 3.7)	16.8 (10.1, 23.5)	14.8 (8.7, 20.9)
Other	5	0.6 (0.0, 1.8)	--	--	--	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)
Toilet facility							
Improved	1726	79.3 (75.0, 83.6)	82.1 (76.7, 87.5)	84.3 (76.2, 92.3)	95.2 (91.8, 98.7)	80.9 (76.2, 85.6)	82.8 (78.3, 87.2)
Unimproved	247	12.8 (8.4, 17.3)	13.3 (7.5, 19.0)	8.5 (1.5, 15.5)	2.5 (0.0, 5.9)	12.3 (7.8, 16.7)	11.0 (6.9, 15.1)
Other	4	--	0.1 (0.0, 0.4)	0.3 (0.0, 0.9)	--	0.2 (0.0, 0.6)	0.2 (0.0, 0.5)
Open Defecation	113	7.9 (4.3, 11.4)	4.5 (2.6, 6.3)	7.0 (2.7, 11.3)	2.3 (0.0, 5.1)	6.6 (4.1, 9.0)	6.0 (3.8, 8.2)
Has electricity							
No	1906	90.2 (83.4, 96.9)	96.3 (91.7,100.0)	94.6 (90.0, 99.1)	70.1* (61.8, 78.4)	98.5* (97.6, 99.3)	94.8 (91.9, 97.7)
Yes	184	9.8 (3.1, 16.6)	3.7 (0.0, 8.3)	5.4 (0.9, 10.0)	29.8* (21.6, 38.2)	1.5* (0.7, 2.4)	5.2 (2.3, 8.1)
Wealth quintile							
Lowest	426	19.6 (9.8, 29.3)	29.2 (21.1, 37.3)	17.7 (12.2, 23.2)	0.7* (0, 1.6)	26.1* (22.7, 29.5)	22.8 (18.6, 27.1)
Second	414	15.2 (11.6, 18.8)	25.0 (20.7, 29.3)	21.2 (15.6, 26.8)	4.7* (0, 10.3)	24.7* (22.0, 27.4)	22.1 (18.9, 25.3)
Middle	433	16.9 (13.6, 20.2)	18.6 (13.2, 23.9)	22.8 (17.6, 27.9)	6.2* (2.8, 9.6)	22.4* (19.3, 25.5)	20.3 (17.0, 23.7)
Fourth	423	25.9 (21.6, 30.2)	16.4 (12.5, 20.3)	24.1 (17.8, 30.6)	23.5* (19.8, 27.1)	20.7* (17.0, 24.5)	21.1 (17.7, 24.5)
Highest	397	22.4 (12.2, 32.7)	10.8 (0, 21.9)	14.1 (3.6, 24.7)	65.0* (55.6, 74.3)	6.1* (3.8, 8.3)	13.8 (6.9, 20.5)

Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 3.3 Background characteristics of individuals, Malawi 2016

Background characteristic		Region			Residence		Total % (95% CI)
		North % (95% CI)	Central % (95% CI)	South % (95% CI)	Urban % (95% CI)	Rural % (95% CI)	
PRESCHOOL CHILDREN							
	N	395	448	390	148	1085	1233
Age in months							
6-23	393	32.7 (27.6, 37.9)	33.2 (25.6, 40.9)	32.8 (27.8, 37.8)	41.9 (33.4, 50.4)	32.0 (27.9, 36.2)	33.0 (28.9, 37.1)
24-59	840	67.3 (62.1, 72.4)	66.8 (59.1, 74.4)	67.2 (62.2, 72.2)	58.1 (49.6, 66.6)	68.0 (63.8, 72.1)	67.0 (62.9, 71.1)
Sex							
Male	625	49.7 (43.8, 55.7)	50.8 (46.2, 55.5)	49.4 (45.8, 53.0)	50.0 (46.3, 53.7)	50.1 (47.1, 53.0)	50.1 (47.4, 52.8)
Female	608	50.3 (44.3, 56.2)	49.2 (44.5, 53.8)	50.6 (47.0, 54.2)	50.0 (46.3, 53.7)	49.9 (47.0, 52.9)	49.9 (47.2, 52.6)
Background characteristic		**Region**			**Residence**		**Total % (95% CI)**
		North % (95% CI)	**Central % (95% CI)**	**South % (95% CI)**	**Urban % (95% CI)**	**Rural % (95% CI)**	
SCHOOL-AGED CHILDREN							
	N	261	293	246	96	704	800
Age in years							
5-10	534	64.3 (58.6, 70.1)	68.3 (63.5, 73.2)	65.4 (59.2, 71.5)	60.3 (31.5, 89.2)	66.9 (63.7, 70.2)	66.5 (62.9, 70.1)
11-14	266	35.7 (29.9, 41.1)	31.7 (26.8, 36.5)	34.6 (28.5, 40.8)	39.7 (10.8, 68.5)	33.1 (29.8, 36.3)	33.5 (29.9, 37.1)
Sex							
Male	413	46.6 (40.7, 52.5)	50.2 (41.9, 58.5)	51.1 (45.2, 57.0)	33.4 (8.9, 58.0)	51.2 (46.8, 55.6)	50.1 (45.6, 54.7)
Female	387	53.4 (47.5, 59.3)	49.8 (41.5, 58.1)	48.9 (43.0, 54.8)	66.6 (42.0, 91.1)	48.8 (44.4, 53.2)	49.9 (45.3, 54.4)
Background characteristic		**Region**			**Residence**		**Total % (95% CI)**
		North % (95% CI)	**Central % (95% CI)**	**South % (95% CI)**	**Urban % (95% CI)**	**Rural % (95% CI)**	
NON-PREGNANT WOMEN OF REPRODUCTIVE AGE							
	N	244	270	264	124	654	778
Age in years							
15-19	163	20.2 (16.3, 24.2)	21.9 (17.4, 26.3)	18.4 (11.8, 24.9)	13.0 (6.3, 19.6)	20.8 (17.0, 24.6)	20.1 (16.4, 23.7)
20-29	283	38.0 (31.5, 44.5)	36.1 (28.6, 43.7)	40.4 (30.2, 50.6)	56.6 (32.1, 81.1)	36.5 (30.8, 42.1)	38.3 (32.5, 44.1)
30-49	332	41.7 (35.3, 48.1)	42.0 (35.1, 48.9)	41.3 (34.7, 47.9)	30.5 (10.3, 50.6)	42.7 (38.4, 47.1)	41.6 (37.3, 45.9)

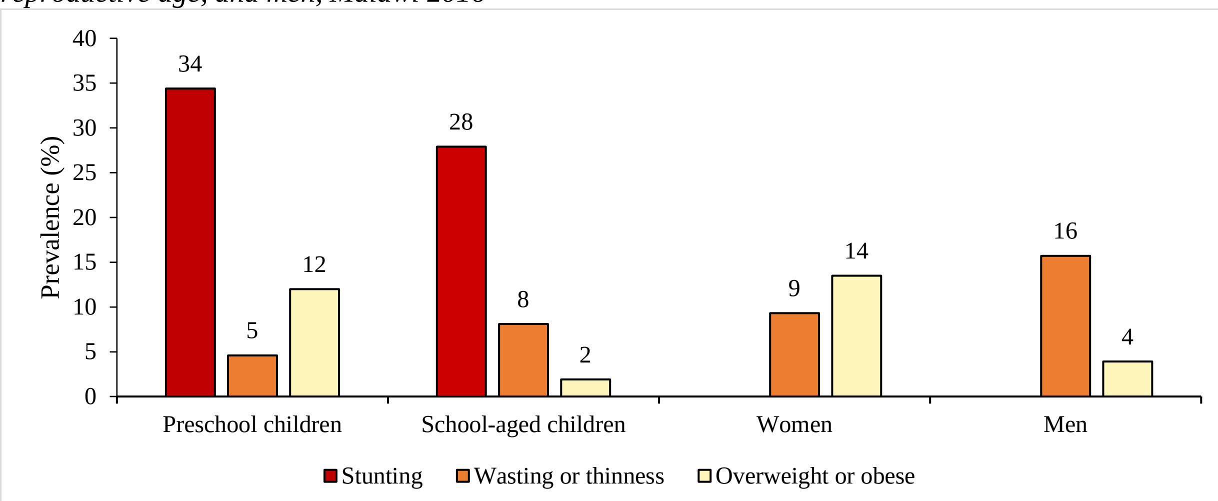
Education completed							
No education, Primary	585	73.8 (67.2, 80.5)	80.8 (71.9, 89.7)	80.0 (70.2, 89.8)	32.4 (16.1, 48.7)	84.4 (80.3, 88.5)	79.6 (73.7, 85.6)
Secondary	176	23.9 (18.2, 29.7)	18.1 (9.9, 26.2)	18.5 (9.6, 27.4)	60.1 (44.9, 75.2)	14.8 (11.2, 18.4)	18.9 (13.5, 24.4)
Higher	16	2.2 (0.0, 5.2)	1.1 (0.0, 2.7)	1.5 (0.0, 3.5)	7.5 (0.0, 17.7)	0.8 (0.0, 1.7)	1.4 (0.2, 2.6)
Marital status							
Married/living together	503	74.4 (68.0, 80.7)	61.6 (54.5, 71.9)	66.8 (58.6, 75.1)	69.5 (57.2, 81.7)	65.3 (59.7, 70.9)	65.7 (60.4, 70.9)
Divorced/ separated	83	6.6 (3.2, 10.0)	12.0 (6.5, 17.4)	10.1 (6.5, 13.6)	2.4 (0.0, 5.3)	11.3 (8.3, 14.3)	10.5 (7.6, 13.4)
Widowed	22	4.2 (1.4, 6.6)	2.5 (0.1, 4.3)	3.3 (1.4, 6.0)	5.8 (0.0, 11.6)	2.8 (1.3, 4.3)	3.1 (1.6, 4.5)
Never married and never lived together	170	14.8 (10.1, 19.4)	23.8 (16.7, 26.4)	19.5 (12.1, 26.9)	22.3 (13.1, 31.5)	20.7 (16.3, 25.0)	20.8 (16.8, 24.9)
Background characteristic		**Region**			**Residence**		**Total % (95% CI)**
		North % (95% CI)	**Central % (95% CI)**	**South % (95% CI)**	**Urban % (95% CI)**	**Rural % (95% CI)**	
MEN							
	N	73	89	66	30	198	228
Age in years							
15-29	81	35.1 (25.3, 44.9)	38.2 (26.0, 50.4)	33.9 (20.4, 47.5)	53.1 (39.2, 67.0)	33.2 (25.8, 40.5)	36.3 (27.8, 44.9)
30-54	147	64.9 (55.1, 74.7)	61.8 (49.6, 74.0)	66.1 (52.5, 79.6)	49.9 (33.0, 60.8)	66.8 (59.5, 74.2)	63.7 (55.1, 72.2)

Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups (p<0.05) using Chi-square test.

CHAPTER 4. ANTHROPOMETRY

This chapter will report the anthropometric status of all population groups. Chronic malnutrition or stunting (length or height-for-age z-score < -2) was reported in PSC and SAC. Acute malnutrition was defined using wasting (weight-for-height z-score < -2) in PSC, and using thinness (BMI-for-age z-score < -2 or BMI < 18 $kg.m^2$) in SAC, WRA and men. Underweight was defined as weight-for-age z-score < -2 for PSC. Overweight (BMI-for-age z-score >1) and obesity (BMI-for-age z-score >2) were reported for PSC aged 2 years and older and SAC; for PSC < 2 years of age, weight-for-height z-score > 1 and 2 were used to define overweight and obesity, respectively. Overweight (BMI between 25-29.9 kg/m^2) and obesity (BMI ≥ 30 kg/m^2) were also reported for WRA and men. The overall prevalence of stunting, wasting or thinness, and overweight/obesity using anthropometric measurements for PSC, SAC, WRA and men is summarized in Figure 4.1.

Figure 4.1 Anthropometric status of preschool children, school-aged children, non-pregnant women of reproductive age, and men, Malawi 2016



Sample size for pre-school children (n=1184), school-aged children (n=784), women (n=763), and men (n=223).
Data are weighted to account for survey design.

4.1 ANTHROPOMETRIC STATUS OF PRESCHOOL CHILDREN

In PSC, stunting prevalence was approximately 34%, wasting was 5%, and underweight was 18%. There was nearly a two-fold higher prevalence of stunting in PSC aged 24-59 mo, compared to PSC aged 6-23 mo ($p<0.05$). There was a higher prevalence of stunting in rural compared to urban households ($p<0.05$). The prevalence of stunting varied by socioeconomic status (SES) quintile, ranging from 42% to 18% at the lowest compared to highest wealth quintile ($p<0.05$). There were no differences in the prevalence of wasting by age, sex, residence, region, or wealth quintile. The prevalence of underweight was lower in the North region, compared to the Central and South region ($p<0.05$).

The prevalence of overweight in PSC was 12%, and the prevalence of obesity was 4%. There was a higher prevalence of overweight and obesity in girls, compared to boys ($p<0.05$). The prevalence of obesity varied by SES quintile, ranging from 2% to 12% at the lowest compared to highest wealth quintile (p<0.05)

Table 4.1 Prevalence of stunting, wasting, underweight, and overweight among preschool children, Malawi 2016

Background characteristic	Stunting[1]		Wasting[1]		Underweight[1]		Overweight[1]		Obesity[1]
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	% (95% CI)
Age category									
6 – 23 mo	369	22.8 (16.5, 29.2)*	369	6.2 (2.9, 9.4)	389	12.3 (8.5, 16.2)*	369	11.5 (7.3, 15.8)	5.0 (1.6, 8.4)
24 – 59 mo	815	39.9 (36.0, 43.7)*	815	3.8 (2.1, 5.6)	830	20.6 (16.3, 25.0)*	815	12.2 (9.1, 15.4)	3.2 (1.7, 4.7)
Sex									
Male	586	33.5 (28.2, 38.8)	586	5.3 (2.6, 8.1)	603	18.3 (13.7, 22.8)	586	9.4 (6.1, 12.7)*	2.0 (0.7, 3.2)*
Female	598	35.3 (30.6, 39.9)	598	3.8 (2.1, 5.5)	616	17.5 (12.8, 22.3)	598	14.7 (10.9, 18.6)*	5.7 (2.5, 8.9)*
Residence									
Urban	140	25.6 (20.0, 31.2)*	140	8.4 (3.8, 13.1)	145	24.6 (7.6, 41.7)	145	13.2 (0, 30.0)	11.0 (2.9, 19.1)
Rural	1044	35.4 (31.6, 39.1)*	1044	4.2 (2.7, 5.6)	1074	17.2 (14.5, 19.8)	1074	11.9 (9.2, 14.5)	3.0 (1.7, 4.2)
Region									
North	377	28.7 (23.1, 34.3)	377	3.2 (1.7, 4.5)	377	7.4 (4.2, 10.6)*	377	18.0 (9.2, 26.7)	5.6 (1.3, 9.9)
Central	429	33.5 (28.5, 38.5)	429	5.0 (2.4, 7.5)	444	16.9 (11.1, 22.8)*	429	12.0 (7.6, 16.3)	3.7 (1.6, 5.8)
South	378	36.8 (30.9, 42.6)	378	4.6 (2.4, 6.7)	385	21.7 (17.3, 26.2)*	378	10.4 (6.6, 14.2)	3.4 (0.6, 6.2)
Wealth quintile									
Lowest	268	42.4 (35.9, 48.8)*	268	3.1 (0.4, 5.7)	279	18.3 (13.4, 23.3)	268	12.2 (7.1, 17.3)	2.1 (0.3, 3.9)*
Second	249	35.5 (27.4, 43.6)*	249	5.9 (2.8, 9.0)	256	19.5 (12.0, 26.9)	249	11.7 (5.6, 17.8)	2.5 (0.5, 4.6)*
Middle	265	31.7 (24.3, 39.2)*	265	6.6 (1.6, 11.6)	273	17.9 (12.2, 23.5)	265	8.6 (3.9, 13.3)	3.0 (0.6, 5.4)*
Fourth	226	33.6 (24.4, 42.8)*	226	2.4 (0.0, 4.7)	228	15.7 (9.9, 21.6)	226	13.0 (8.2, 17.9)	4.7 (0.9, 8.5)*
Highest	174	18.3 (7.7, 28.9)*	174	4.7 (0.0, 10.6)	181	17.2 (8.7, 25.6)	174	18.7 (8.4, 29.0)	12.0 (4.3, 19.7)*
Total	**1184**	**34.4 (30.9, 37.9)**	**1184**	**4.6 (3.1, 6.1)**	**1219**	**17.9 (14.6, 21.2)**	**1184**	**12.0 (9.2, 14.8)**	**3.8 (2.2, 5.4)**

[1]Stunting defined as HAZ <-2, wasting defined as WHZ < -2, underweight defined as WAZ < -2, overweight defined as WHZ > 1 in children < 24 mo and BAZ >1 in children ≥ 24 mo, obesity defined as WHZ > 2 in children < 24 mo and BAZ >2 in children ≥ 24 mo using 2006 WHO growth standards
Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups (p<0.05) using Chi-square test.

4.2 ANTHROPOMETRIC STATUS OF SCHOOL-AGED CHILDREN

In SAC, underweight prevalence was approximately 21%, and stunting prevalence was 28%. There was a higher prevalence of underweight among females compared to males. The prevalence of stunting was higher among SAC aged 11-14 years compared to SAC aged 5-10 years. Nationally, the prevalence of thinness among SAC was 8%, with significant differences in prevalence by age, sex, and residence ($p<0.05$). The prevalence of overweight and obesity among SAC was 2% and 0.4%, respectively. SAC aged 5-10 years had a higher prevalence of overweight than SAC aged 11-14 years. There was also a difference in the prevalence of overweight by region ($p<0.05$).

Table 4.2 Prevalence of underweight, stunting, thinness, overweight, and obesity among school-aged children, Malawi 2016

Background characteristic	Underweight[1]		Stunting[2]		Thin[3]		Overweight[3]		Obese[3]
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)	% (95% CI)
Age category									
5 – 10 y	431	21.2 (15.4, 27.0)	518	23.2 (18.4, 28.2)*	517	6.1 (3.0, 9.1)*	517	2.8 (1.2, 4.4)*	0.5 (0.0, 1.2)
11 – 14 y	-	-	266	36.7 (28.6, 44.8)*	266	12.1 (6.9, 17.2)*	266	0.0 (0.0, 0.1)*	0.0
Sex									
Female	214	27.8 (18.6, 37.0)*	402	31.0 (24.5, 37.4)	401	11.0 (6.2, 15.7)*	401	1.8 (0.6, 3.0)	0.6 (0.0, 1.5)
Male	217	15.0 (8.5, 21.5)*	382	24.9 (19.1, 30.8)	382	5.4 (2.6, 8.1)*	382	1.9 (0.6, 3.3)	0.1 (0.0, 0.3)
Residence									
Urban	48	1.8 (0.0, 4.9)	94	18.7 (0.0, 45.4)	94	0.2 (0.0, 0.5)*	94	1.4 (0.0, 3.4)	0.0
Rural	383	22.4 (16.5, 28.4)	690	28.6 (24.1, 33.0)	689	8.7 (5.7, 11.6)*	689	1.9 (0.8, 3.0)	0.4 (0.0, 0.9)
Region									
North	133	13.5 (8.9, 18.1)	255	26.5 (21.3, 31.7)	255	7.2 (0.6, 13.8)	255	5.5 (2.5, 8.5)*	0.4 (0.0, 1.3)
Central	161	20.3 (12.3, 28.3)	289	28.5 (22.8, 34.2)	288	7.8 (3.3, 12.2)	288	1.8 (0.0, 3.6)*	0.7 (0.0, 1.7)
South	137	24.1 (13.9, 34.3)	240	27.7 (19.2, 36.3)	240	8.7 (4.7, 12.8)	240	0.9 (0.0, 1.7)*	0.0
Wealth quintile									
Lowest	87	30.8 (15.4, 46.1)	150	36.2 (27.0, 45.4)	149	8.1 (2.5, 13.7)	149	4.2 (1.0, 7.3)	0.0
Second	84	17.7 (9.8, 25.6)	146	31.4 (21.8, 41.0)	146	7.2 (0.9, 13.5)	146	1.2 (0.0, 3.1)	1.5 (0.0, 3.8)
Middle	109	21.7 (10.4, 33.0)	191	23.8 (16.1, 31.5)	191	9.6 (2.7, 16.6)	191	0.9 (0.0, 1.9)	0.2 (0.0, 0.7)
Fourth	84	18.7 (7.2, 30.1)	165	22.3 (13.0, 31.6)	165	10.0 (4.5, 15.3)	165	1.3 (0.1, 2.5)	0.0
Highest	67	10.2 (0.3, 20.1)	132	24.7 (7.8, 41.7)	132	2.0 (0.0, 5.1)	132	1.5 (0.0, 3.1)	0.0
Total	**431**	**21.2 (15.4, 27.0)**	**784**	**27.9 (23.3, 32.5)**	**783**	**8.1 (5.3, 10.9)**	**783**	**1.9 (0.8, 2.9)**	**0.4 (0.0, 0.8)**

Data are weighted to account for survey design. CI, Confidence Interval.

[1] Underweight was defined as WAZ < -2 for children 5-10 y using WHO growth standards. WAZ is not calculated for older children.; [2]Stunting was defined as HAZ < -2 using WHO growth standards; [3]Thin was defined as BAZ < -2, overweight was defined as BAZ > 1, obese was defined as BAZ > 2 using WHO growth standards for children 5-14 y
*signifies variable differs across groups (p<0.05) using Chi-square test.

4.3 ANTHROPOMETRIC STATUS OF NON-PREGNANT WOMEN OF CHILDBEARING AGE

Most non-pregnant WRA (77%) were of normal weight. The prevalence of thinness was approximately 9%, the prevalence of overweight was 10%, and prevalence of obesity was 4%. Older women were more likely to be overweight, compared to younger women (p<0.05). There was a significant association between wealth quintile and anthropometric status with both increasing overweight and obesity prevalence associated with increasing wealth quintile (p<0.05). Less than 1% of WRA had obesity in the lowest wealth quintile, compared to 14% in the highest wealth quintile (p<0.05).

Table 4.3 Prevalence of thinness, normal weight, overweight, and obesity among non-pregnant women of reproductive age, Malawi 2016

Background characteristic		**Thin[1]**	**Normal weight[1]**	**Overweight[1]**	**Obese[1]**
	N	**% (95% CI)**	**% (95% CI)**	**% (95% CI)**	**% (95% CI)**
Age category					
15 – 19 y	161	13.8 (8.5, 19.1)	80.9 (74.7, 87.2)	5.2 (1.5, 8.9)*	0.0
20 – 29 y	277	8.5 (4.7, 12.2)	78.5 (70.9, 86.2)	9.1 (3.6, 14.6)*	3.8 (0.3, 7.3)
30 – 49 y	329	7.8 (4.3, 11.4)	74.1 (69.2, 78.9)	13.1 (9.0, 17.2)*	4.9 (2.1, 7.8)
Residence					
Urban	123	12.3 (4.7, 20.0)	56.4 (475, 65.3)*	18.7 (5.8, 31.5)	12.6 (4.7, 20.5)
Rural	644	9.0 (6.7, 11.2)	79.2 (75.1, 83.4)*	9.1 (6.1, 12.2)	2.6 (1.1, 4.1)
Region					
North	240	5.2 (2.3, 8.1)	72.5 (65.0, 80.0)	19.5 (11.3, 27.8)	2.7 (0, 5.7)
Central	266	8.9 (5.4, 12.3)	80.7 (74.9, 86.5)	8.1 (3.2, 12.9)	2.3 (0, 4.7)
South	261	10.6 (7.2, 13.9)	75.1 (68.1, 82.0)	9.5 (5.2, 13.7)	4.9 (2.1, 7.7)
Wealth quintile					
Lowest	145	8.7 (3.2, 14.2)	84.7 (77.7, 91.8)*	5.8 (1.5, 10.0)*	0.8 (0, 1.9)*
Second	138	8.8 (3.5, 14.2)	83.3 (75.8, 90.8)*	6.3 (2.2, 10.3)*	1.6 (0, 3.2)*
Middle	148	12.0 (6.0, 18.0)	78.6 (72.3, 84.9)*	6.6 (2.6, 10.6)*	2.7 (0, 5.8)*
Fourth	174	6.2 (2.1, 10.3)	72.5 (63.5, 81.5)*	18.5 (10.4, 26.7)*	2.8 (0, 6.1)*
Highest	162	12.4 (6.4, 18.4)	61.4 (50.5, 72.3)*	12.2 (0,24.5)*	13.9 (7.5, 20.4)*
Total	**767**	**9.3 (7.1, 11.5)**	**77.2 (73.0, 81.4)**	**10.0 (6.9, 13.2)**	**3.5 (1.8, 5.3)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Thin defined as BMI < 18.5 kg/m^2, normal weight defined as BMI 18.5-24.9 kg/m^2, overweight defined as BMI 25-29.9 kg/m^2, obesity defined as BMI $\geq$ 30 kg/m^2
*signifies variable differs across groups (p<0.05) using Chi-square test.

4.4 ANTHROPOMETRIC STATUS OF MEN

Approximately 8 out of 10 men were of normal weight. Approximately 16% of men overall were thin, while only 3% and 1% were overweight and had obesity, respectively. There were no significant subgroup differences in anthropometric status of men.

Table 4.4 Prevalence of thinness, normal weight, overweight, and obesity among men, Malawi 2016

Background characteristic		Thin[1]	Normal weight[1]	Overweight[1]	Obese[1]
	N	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Age category					
15 – 29 y	79	13.8 (2.6, 25.0)	84.6 (73.0, 96.1)	1.6 (0, 4.0)	0.0
30 – 54 y	144	16.9 (7.6, 26.2)	77.8 (67.7, 87.9)	3.6 (0.9, 6.3)	1.8 (0, 4.3)
Residence					
Urban	28	11.6 (0, 35.6)	86.7 (60.8, 100)	1.7 (0, 5.6)	0.0
Rural	195	16.4 (9.1, 23.7)	79.3 (71.5, 87.1)	3.0 (0.9, 5.1)	1.3 (0, 3.1)
Region					
North	71	11.2 (1.8, 20.6)	76.5 (65.4, 87.7)	12.3 (4.4, 20.1)	0.0
Central	86	14.6 (4.5, 24.7)	81.6 (69.9, 93.3)	3.0 (0, 6.2)	0.8 (0, 2.3)
South	66	18.5 (5.7, 31.4)	79.6 (66.8, 92.4)	0.0	1.9 (0, 5.4)
Wealth quintile					
Lowest	35	20.1 (3.1, 37.1)	77.9 (60.6, 95.2)	2.0 (0, 5.9)	0.0
Second	56	14.9 (3.4, 26.5)	82.2 (69.7, 94.9)	2.8 (0, 6.7)	0.0
Middle	44	12.6 (0, 25.7)	79.0 (63.9, 94.1)	3.4 (0, 8.6)	5.0 (0, 14.2)
Fourth	45	23.4 (9.9, 37.0)	75.9 (62.3, 89.4)	0.7 (0, 2.1)	0.0
Highest	43	3.9 (0, 10.4)	87.2 (72.7, 100)	6.4 (0, 14.8)	2.4 (0, 7.6)
Total	**223**	**15.7 (8.3, 23.1)**	**80.3 (72.2, 88.4)**	**2.8 (0.9, 4.8)**	**1.1 (0, 2.7)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Thin defined as BMI < 18.5 kg/m^2, normal weight defined as BMI 18.5-24.9 kg/m^2, overweight defined as BMI 25-29.9 kg/m^2, obesity defined as BMI ≥ 30 kg/m^2
*signifies variable differs across groups (p<0.05) using Chi-square test.

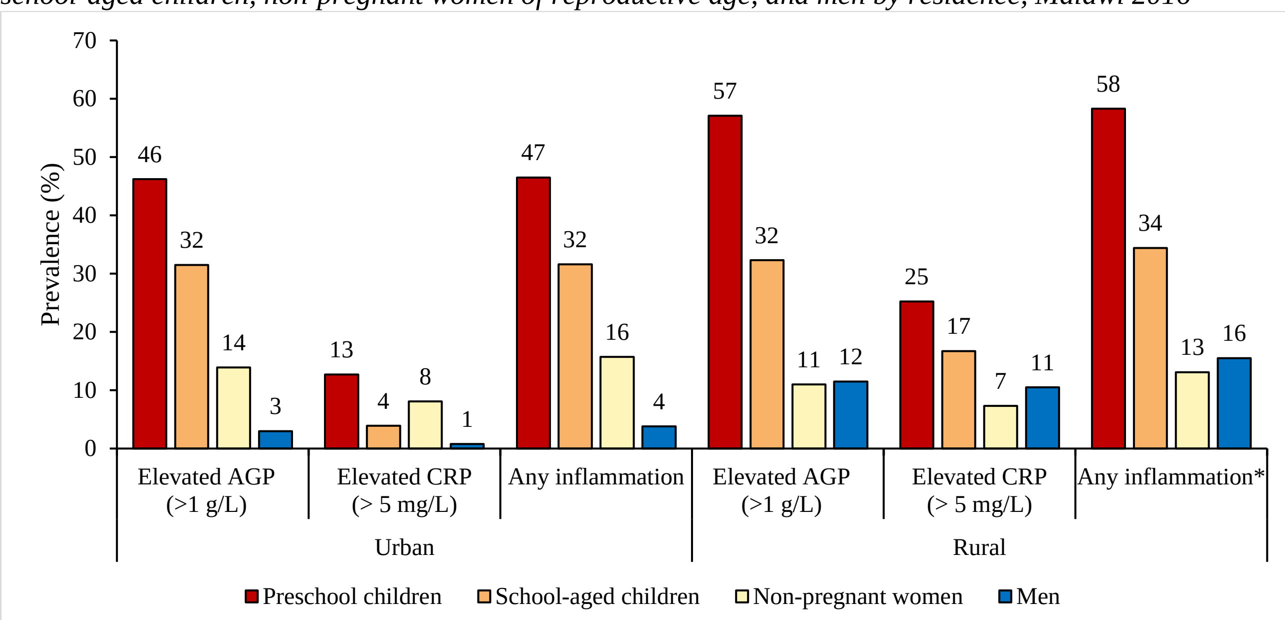
CHAPTER 5. INFLAMMATION AND INFECTIOUS MORBIDITY

Inflammation, malaria, and schistosomiasis were assessed to evaluate common causes of infection and subclinical inflammation that may be associated with nutritional status and influence the interpretation of biomarkers. Inflammation is commonly assessed using C-reactive protein (CRP), which measures acute inflammation, and α–1 acid glycoprotein (AGP), which measures chronic inflammation. Concentrations of CRP and AGP were also used to adjust estimates of iron deficiency using serum ferritin as described in the Methods section (6). *Plasmodium falciparum* is the most common cause of malaria infection in Malawi and contributes the highest rates of morbidity and mortality (16). Urinary schistosomiasis is common in Malawi due to the infestation of water snails, particularly in the southern part of Lake Malawi (17). Self-reported morbidity was also assessed from the questionnaire for all population groups.

5.1 PREVALENCE OF INFLAMMATION

Among PSC, the overall national prevalence of elevated AGP was 56%, and the prevalence of elevated CRP was 24%. PSC had a 57% prevalence of any inflammation (elevated CRP or AGP), compared to 34% in SAC and 13% in WRA, and 14% in men. Among PSC and SAC, the prevalence of elevated AGP was almost double the prevalence of CRP. Among non-pregnant WRA and men, the prevalence of elevated AGP and CRP was low (<12%) (Table 5.1). Figure 5.1 presents the prevalence of inflammation in PSC, SAC, non-pregnant WRA, and men by residence.

Figure 5.1 Prevalence of elevated AGP, elevated CRP, and any inflammation among preschool children, school-aged children, non-pregnant women of reproductive age, and men by residence, Malawi 2016



[*] Elevated alpha-1-acid glycoprotein (AGP) defined as AGP > 1 g/L; elevated C-reactive protein (CRP) defined as CRP > 5mg/L; any inflammation defined as elevated AGP or CRP. Data are weighted to account for survey design.
Sample size for preschool children: North (n=383); Central (n=395); South (n=324); Total (n=1102); Sample size for school-aged children: North (n=256); Central (n=279); South (n=223); Total (n=758); Sample size for women: North (n=250); Central (n=261); South (n=251); Total (n=752); Sample size for men: North (n=72); (Central (n=84); South (n=63); Total (n=219)

Tables 5.1 and 5.2 report the prevalence of inflammation stratified by age, sex, residence, region and wealth quintile in PSC and SAC. A total of 1102 PSC and 758 SAC had results for CRP and AGP. For PSC, there were significant differences in elevated AGP and elevated CRP by wealth quintile, with a higher prevalence of inflammation in poorer compared to richer households ($p<0.05$). There were no other significant subgroup differences. In SAC, the prevalence of elevated AGP was higher in younger children aged 5-10 y, compared to children aged 11-14 y ($p<0.05$). The prevalence of elevated CRP was approximately 4 times higher in rural vs. urban areas ($p<0.05$). There were no differences in inflammation in SAC by wealth quintile.

Table 5.1 Prevalence of inflammation among preschool children, Malawi 2016

Background characteristic		**Elevated AGP**[1]	**Elevated CRP**[2]	**Any inflammation**[3]
	N	% (95% CI)	% (95% CI)	% (95% CI)
Age category				
6 – 23 mo	332	54.0 (43.9, 64.1)	25.9 (18.0, 33.7)	56.0 (45.6, 66.4)
24 – 59 mo	770	56.9 (51.1, 63.0)	23.1 (18.5, 27.6)	57.5 (51.7, 63.3)
Sex				
Female	563	55.2 (48.0, 62.4)	24.4 (18.4, 30.4)	56.2 (48.9, 63.5)
Male	539	56.8 (50.8, 62.8)	23.5 (17.7, 29.3)	57.9 (51.7, 63.9)
Residence				
Urban	128	46.2 (34.0, 58.3)	12.7 (5.8, 19.5)	46.5 (34.4, 58.6)
Rural	974	57.1 (51.3, 63.0)	25.2 (20.6, 29.9)	58.3 (52.3, 64.2)
Region				
North	383	55.3 (46.6, 64.0)	23.5 (17.3, 29.7)	56.9 (48.2, 65.6)
Central	395	59.0 (51.4, 66.5)	25.2 (17.3, 33.2)	59.5 (51.8, 67.1)
South	324	53.2 (43.5, 62.9)	22.8 (16.2, 29.3)	54.6 (44.6, 64.5)
Wealth quintile				
Lowest	252	62.0 (54.1, 69.9)*	30.1 (23.0, 37.2)*	63.7 (55.6, 71.8)*
Second	220	56.5 (45.3, 67.7)*	29.0 (20.5, 37.5)*	56.9 (45.7, 68.1)*
Middle	258	54.1 (45.4, 62.7)*	25.2 (17.1, 33.3)*	55.9 (46.9, 65.0)*
Fourth	207	58.4 (47.9, 68.9)*	14.1 (8.1, 20.0)*	58.6 (48.1, 69.0)*
Highest	163	38.8 (27.6, 50.1)*	11.3 (3.0, 19.7)*	39.2 (27.9, 50.4)*
Total	**1102**	**56.0 (50.5, 61.4)**	**23.9 (19.3, 28.5)**	**57.0 (51.5, 62.6)**

Data are weighted to account for survey design. CI, Confidence Interval; AGP, alpha-1-acid glycoprotein; CRP, C-reactive protein.
[1]AGP > 1 g/L, [2]CRP > 5mg/L, [3]elevated AGP or CRP
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

Table 5.2 Prevalence of inflammation among school-aged children, Malawi 2016

Background characteristic		Elevated AGP[1]	Elevated CRP[2]	Any inflammation[3]
	N	% (95% CI)	% (95% CI)	% (95% CI)
Age category				
5 – 10 y	502	37.9 (32.0, 43.7)*	17.6 (13.1, 22.1)	39.5 (33.6, 45.5)*
11 – 14 y	256	20.0 (13.7, 26.3)*	12.8 (7.1, 18.4)	22.6 (15.3, 30.0)*
Sex				
Female	386	33.5 (27.7, 39.2)	18.0 (13.0, 23.0)	36.2 (30.1, 42.4)
Male	372	30.1 (24.2, 35.9)	14.0 (9.4, 18.4)	31.3 (25.2, 37.4)
Residence				
Urban	93	31.5 (13.9, 49.2)	3.9 (0.0, 7.9)*	31.6 (14.0, 49.3)
Rural	665	31.8 (27.0, 36.6)	16.7 (12.4, 20.9)*	33.9 (28.7, 39.1)
Region				
North	256	36.1 (29.6, 42.5)	17.9 (10.2, 25.6)	37.2 (30.0, 44.4)
Central	279	30.4 (22.8, 38.0)	13.1 (7.6, 18.7)	31.3 (23.6, 39.1)
South	223	31.8 (24.9, 38.7)	18.1 (11.6, 24.6)	35.0 (27.1, 42.8)
Wealth quintile				
Lowest	147	36.4 (29.3, 43.6)	17.0 (9.3, 24.7)	38.0 (30.1, 45.8)
Second	137	36.9 (23.3, 50.4)	23.5 (12.4 34.7)	36.9 (23.3, 50.4)
Middle	187	24.2 (15.3, 33.2)	8.3 (3.6, 13.0)	25.3 (15.4, 35.2)
Fourth	157	33.7 (22.5, 44.8)	17.8 (8.0, 27.5)	38.0 (25.8, 50.2)
Highest	130	25.1 (14.8, 35.4)	13.3 (2.7, 24.0)	29.0 (17.1, 40.9)
Total	**758**	**32.2 (28.0-36.4)**	**15.9 (11.9-19.9)**	**33.8 (28.7, 38.8)**

Data are weighted to account for survey design. CI, Confidence Interval; AGP, alpha-1-acid glycoprotein; CRP, C-reactive protein.
[1]AGP > 1 g/L, [2]CRP > 5mg/L, [3]elevated AGP or CRP
*signifies variable differs across groups (p<0.05) using Chi-square test.

Tables 5.3 and 5.4 report the prevalence of inflammation stratified by age, residence, region and wealth quintile in non-pregnant WRA and men. A total of 752 WRA and 219 men had results for CRP and AGP. There were no significant differences in the prevalence of CRP and AGP by age category, residence, region, or wealth quintile in both WRA and men.

Table 5.3 Prevalence of inflammation among non-pregnant women of reproductive age, Malawi 2016

Background characteristic		**Elevated AGP[1]**	**Elevated CRP[2]**	**Any inflammation[3]**
	N	% (95% CI)	% (95% CI)	% (95% CI)
Age category				
15 – 19 y	159	13.3 (7.7, 18.9)	9.1 (3.7, 14.4)	16.1 (10.2, 22.0)
20 – 29 y	270	11.6 (6.9, 16.3)	7.1 (3.5, 10.6)	13.4 (8.5, 18.2)
30 – 49 y	323	9.6 (4.9, 14.3)	6.7 (3.6, 9.9)	11.7 (6.9, 16.6)
Residence				
Urban	121	13.8 (5.8, 21.9)	8.2 (0, 18.8)	15.8 (7.7, 24.0)
Rural	631	10.9 (7.5, 14.2)	7.3 (4.9, 9.6)	13.0 (9.4. 16.6)
Region				
North	240	10.0 (4.7, 15.3)	8.8 (6.0, 11.6)	14.8 (10.0, 19.1)
Central	261	9.0 (4.6, 13.3)	5.8 (2.5, 9.2)	10.4 (5.5, 15.2)
South	251	13.4 (8.5, 18.3)	8.3 (4.6, 12.0)	15.5 (10.2, 10.7)
Wealth quintile				
Lowest	141	12.8 (6.9, 18.7)	9.5 (4.5, 14.5)	13.2 (7.4, 19.1)
Second	136	5.7 (2.1, 9.3)	3.5 (0.4, 6.6)	7.6 (3.6, 11.7)
Middle	144	10.6 (6.0, 15.1)	5.8 (2.1, 9.4)	13.6 (8.6, 18.6)
Fourth	171	12.7 (7.1, 18.3)	8.4 (3.7, 13.1)	17.9 (10.4, 25.5)
Highest	160	14.2 (5.8, 22.7)	9.7 (2.1, 17.2)	16.4 (8.8, 24.0)
Total	**752**	**11.1 (8.0-14.2)**	**7.3 (5.0, 9.6)**	**13.2 (9.9, 16.6)**

Data are weighted to account for survey design. CI, Confidence Interval; AGP, alpha-1-acid glycoprotein; CRP, C-reactive protein.
[1]AGP > 1 g/L, [2]CRP > 5mg/L, [3]elevated AGP or CRP
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 5.4 Prevalence of inflammation among men, Malawi 2016

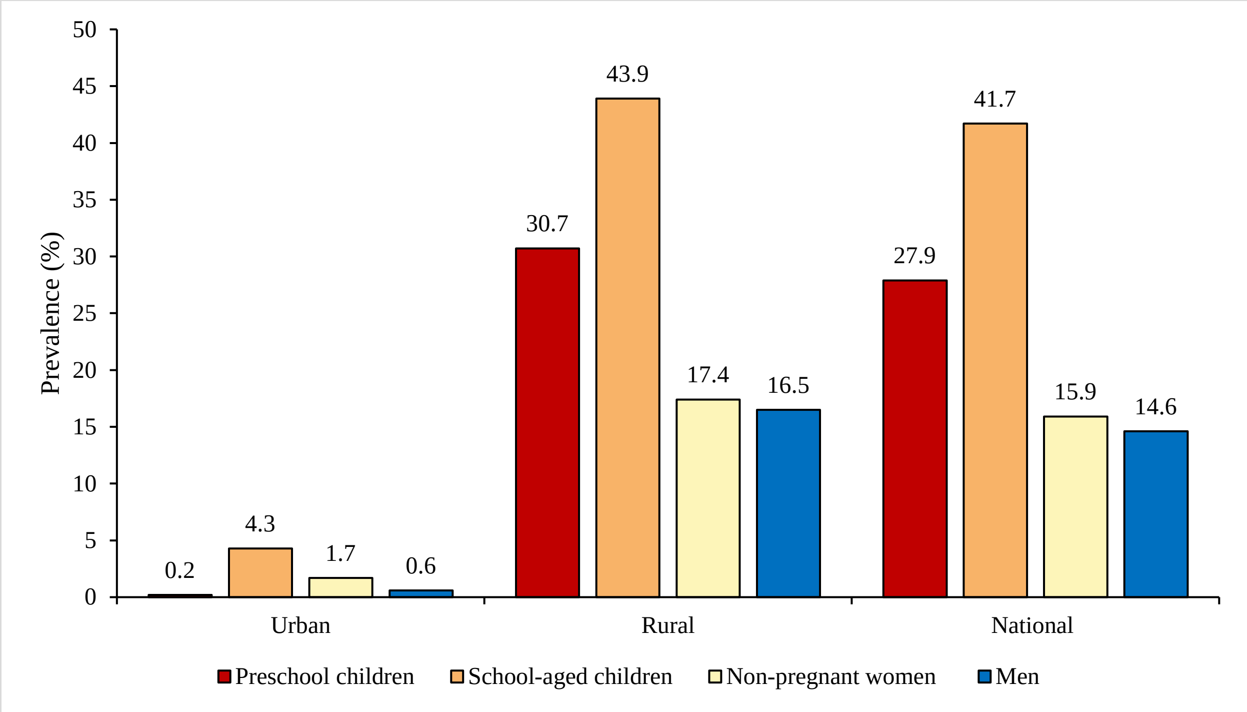
Background characteristic		**Elevated AGP[1]**	**Elevated CRP[2]**	**Any inflammation[3]**
	N	% (95% CI)	% (95% CI)	% (95% CI)
Age category				
15 – 29 y	75	18.6 (5.5, 31.7)	15.1 (2.7, 27.5)	21.4 (7.8, 35.1)
30 – 54 y	144	6.4 (2.1, 10.7)	6.3 (2.2, 10.4)	10.4 (5.1, 15.6)
Residence				
Urban	27	3.0 (0.0, 8.6)	0.8 (0.0, 2.7)	3.8 (0.0, 10.3)
Rural	192	11.5 (5.9, 17.2)	10.5 (4.6, 16.3)	15.5 (8.9, 22.1)
Region				
North	72	13.4 (4.1, 22.8)	11.8 (3.7, 19.8)	21.3 (11.5, 31.2)
Central	84	7.2 (1.7, 12.6)	7.4 (0.6, 14.2)	10.6 (2.6, 18.5)
South	63	14.2 (4.2, 24.2)	11.2 (1.5, 20.8)	16.8 (6.7, 26.9)
Wealth quintile				
Lowest	35	14.4 (2.2, 26.6)	4.9 (0, 11.7)	16.7 (4.0, 29.4)
Second	55	8.5 (1.5, 15.4)	9.2 (1.7, 16.7)	13.8 (4.9, 22.7)
Middle	44	13.2 (0.6, 25.8)	11.9 (0, 24.5)	13.2 (0.6, 25.8)
Fourth	43	13.1 (0, 27.8)	12.9 (0, 27.7)	16.0 (0.9, 31.0)
Highest	42	2.4 (0, 6.0)	7.1 (0, 17.3)	9.4 (0, 20.7)
Total	**219**	**10.5 (5.3-15.6)**	**9.3 (3.9-14.6)**	**14.1 (8.0-20.2)**

Data are weighted to account for survey design. CI, Confidence Interval; AGP, alpha-1-acid glycoprotein; CRP, C-reactive protein.
[1]AGP > 1 g/L, [2]CRP > 5mg/L, [3]elevated AGP or CRP
*signifies variable differs across groups (p<0.05) using Chi-square test.

5.2 PREVALENCE OF MALARIA

Figure 5.2 presents the prevalence of malaria in PSC, SAC, non-pregnant WRA, and men. The national prevalence of malaria was 28%, 42%, 16%, and 15% in PSC, SAC, non-pregnant WRA, and men, respectively. In all groups except men, there was a statistically significant higher prevalence of malaria in rural areas compared to urban areas.

Figure 5.2 Prevalence of malaria[1] among preschool children, school-aged children, non-pregnant women of reproductive age, and men by residence, Malawi 2016



[1] Measured by rapid malaria test kit. Data are weighted to account for survey design.
Sample size for preschool children: North (n=382); Central (n=434); South (n=347); Total (n=1163)
Sample size for school-aged children: North (n=257); Central (n=286); South (n=240); Total (n=783)
Sample size for women: North (n=235); Central (n=265); South (n=257); Total (n=757)
Sample size for men: North (n=68); Central (n=81); South (n=62); Total (n=211)

The prevalence of malaria in PSC and SAC stratified by age, sex, residence, region, and wealth quintile is shown in Table 5.5. The prevalence of malaria was much higher in rural vs. urban areas in both PSC and SAC ($p<0.05$). In SAC, girls had a higher prevalence of malaria than boys ($p<0.05$), and younger children aged 5-10 y had a higher prevalence of malaria than those aged 11-14 y ($p<0.05$). In both PSC and SAC, the prevalence of malaria decreased with higher wealth quintile ($p<0.05$); the prevalence of malaria was 8-times lower in PSC in the highest, compared to the lowest wealth quintile (5% vs 40%, $p<0.05$).

Table 5.5 Prevalence of malaria among preschool children and school-aged children, Malawi 2016

Background characteristic	**Malaria parasitemia[1]**			
	N	% (95% CI)	N	% (95% CI)
	PRESCHOOL CHILDREN		**SCHOOL AGED CHILDREN**	
Age category				
6 – 23 mo / 5-10 y	359	25.1 (16.4, 33.8)	520	45.3 (37.6, 53.0)*
24 – 59 mo / 11-14 y	804	29.3 (21.6, 36.9)	263	35.0 (26.7, 43.4)*
Sex				
Male	575	25.6 (18.3, 33.0)	379	35.1 (26.9, 43.3)*
Female	588	30.3 (21.5, 39.1)	404	48.4 (40.7, 56.1)*
Residence				
Urban	135	0.2 (0.0, 0.7)*	93	4.3 (0.1, 8.5)*
Rural	1028	30.7 (23.1, 38.4)*	690	43.9 (36.7, 51.0)*
Region				
North	382	20.4 (11.9, 28.9)	257	32.5 (17.4, 47.6)
Central	434	28.2 (14.5, 41.9)	286	40.5 (33.1, 47.9)
South	347	29.9 (20.2, 39.7)	240	45.7 (32.6, 58.7)
Wealth quintile				
Lowest	266	40.1 (29.4, 50.7)*	151	52.9 (43.3, 62.6)*
Second	239	32.7 (20.9, 44.4)*	147	54.6 (43.2, 66.0)*
Middle	268	26.7 (17.4, 36.1)*	190	34.9 (21.0, 48.8)*
Fourth	217	17.8 (11.1, 24.5)*	163	35.9 (21.6, 50.1)*
Highest	171	5.0 (0.0, 10.3)*	132	17.6 (5.3, 29.9)*
Total	**1163**	**27.9 (20.4, 35.5)**	**783**	**41.7 (34.7, 48.8)**

[1] Measured by rapid malaria test kit. Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

The prevalence of malaria in WRA and men stratified by age, residence, region, and wealth quintile is shown in Table 5.6. In WRA, the prevalence of malaria was higher in rural vs. urban areas and higher in younger vs. older age ($p<0.05$). The prevalence of malaria in WRA decreased with higher wealth quintile ($p<0.05$); the prevalence of malaria was approximately 6-times lower in WRA in the highest, compared to the lowest wealth quintile (4% vs 26%, $p<0.05$). In men, the only significant subgroup difference was that younger men aged 15-29 y had a higher prevalence of malaria than men aged 30-54 y ($p<0.05$).

Table 5.6 Prevalence of malaria among non-pregnant women of reproductive age and men, Malawi 2016

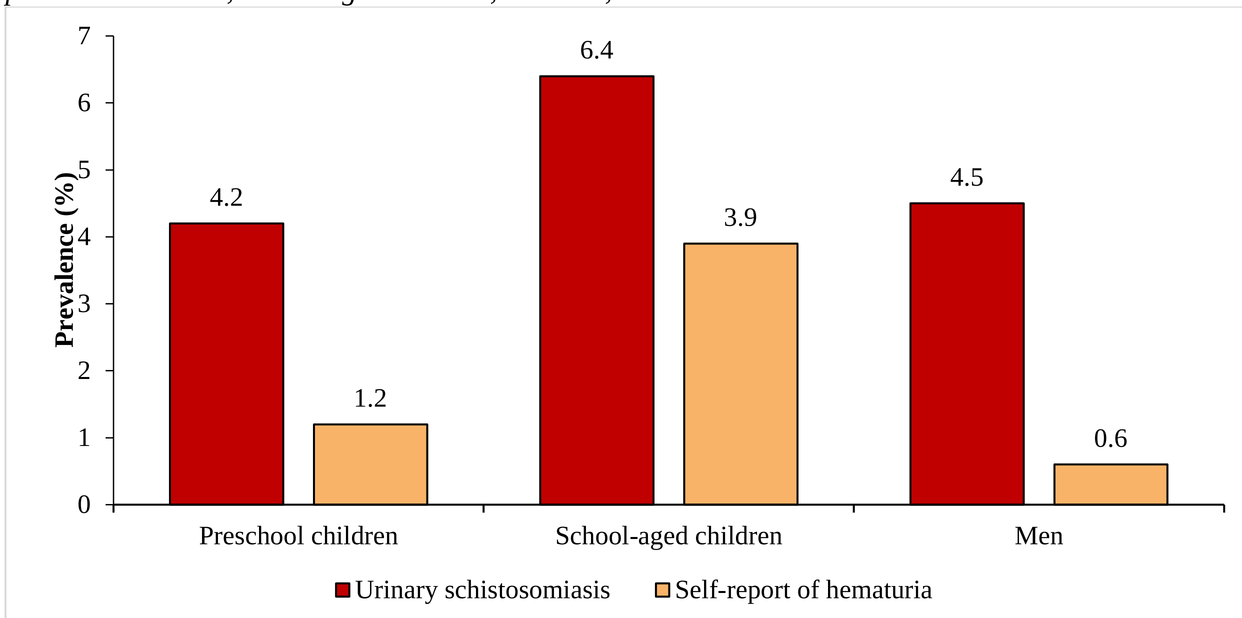
Background characteristic	**Malaria parasitemia[1]**			
	N	% (95% CI)	N	% (95% CI)
	WOMEN		**MEN**	
Age category				
15 – 19 y / 15-29 y	158	32.3 (23.6, 41.0)*	72	25.9 (8.3, 43.6)*
20 – 29 y / 30-54 y	275	16.7 (10.1, 23.3)*	128	8.1 (1.9, 14.3)*
30 – 49 y	324	7.2 (3.3, 11.1)*	-	-
Residence				
Urban	120	1.7 (0.0, 4.1)*	25	0.6 (0.0, 2.0)
Rural	637	17.4 (12.9, 21.9)*	186	16.5 (8.4, 24.7)
Region				
North	235	9.6 (4.1, 15.1)	68	7.9 (1.5, 14.2)
Central	265	14.6 (9.1, 20.2)	81	15.7 (3.5, 27.8)
South	257	18.7 (11.0, 26.4)	62	15.1 (3.5, 26.6)
Wealth quintile				
Lowest	141	25.9 (18.5, 33.4)*	33	21.9 (0.8, 43.1)
Second	140	17.3 (8.9, 25.7)*	54	14.3 (3.3, 25.2)
Middle	147	17.8 (9.2, 26.3)*	40	14.4 (1.2, 27.5)
Fourth	173	10.8 (4.7, 16.9)*	44	16.4 (0.0, 35.4)
Highest	156	4.0 (0.4, 7.6)*	40	3.1 (0.0, 8.0)
Total	**757**	**15.9 (11.6, 20.2)**	**211**	**14.6 (6.8, 22.3)**

[1] Measured by rapid malaria test kit. Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

5.3 PREVALENCE OF URINARY SCHISTOSOMIASIS

Figure 5.3 presents the prevalence of urinary schistosomiasis in PSC, SAC, and men. Urine samples were tested for hematuria using urine dipsticks as a proxy diagnosis for urinary schistosomiasis. The prevalence of urinary schistosomiasis was low for all three groups, approximately 4% in PSC, 6% in SAC, and 5% in men.

Figure 5.3 Prevalence of urinary schistosomiasis based on self-reported and measured hematuria among preschool children, school-aged children, and men, Malawi 2016



Data are weighted to account for survey design. Sample size for urinary schistosomiases: preschool children (n=977); school-aged children (n=758); men (n=214); Sample size for self-report of hematuria: preschool children (n=1220); school-aged children (n=748); men (n=224)

Table 5.7 summarizes the prevalence of urinary schistosomiasis in PSC, SAC, and men stratified by age, residence, region, and wealth quintile. There were no differences in urinary schistosomiasis by subgroups for any of the population groups; however, in SAC, more girls self-reported hematuria compared to boys ($p<0.05$).

Table 5.7 Prevalence of urinary schistosomiasis and self-reported hematuria among preschool children, school-aged children, and men, Malawi 2016

Background characteristic	Urinary schistosomiasis[1]		Self-report of hematuria	
	N	% (95% CI)	N	% (95% CI)
PRESCHOOL CHILDREN				
Age category				
6 – 23 mo	227	4.3 (0.0, 8.9)	393	1.1 (0.0, 2.4)
24 – 59 mo	750	4.1 (2.0, 6.3)	827	1.3 (0.3, 2.2)
Sex				
Male	480	4.7 (2.2, 7.2)	600	0.7 (0.0, 1.4)
Female	497	3.6 (0.6, 6.7)	620	1.7 (0.2, 3.2)
Residence				
Urban	113	6.2 (1.5, 11.0)	145	0
Rural	864	3.9 (1.8, 6.0)	1063	1.4 (0.4, 2.3)
Region				
North	343	0.8 (0.0, 1.6)	389	0
Central	328	4.6 (2.1, 7.2)	447	0.7 (0.0, 1.5)
South	306	4.7 (1.1, 8.4)	384	2.1 (0.3, 3.9)
Wealth quintile				
Lowest	214	3.9 (0.7, 7.1)	280	1.2 (0.0, 2.6)
Second	209	4.8 (0.8, 8.8)	258	1.1 (0.0, 2.5)
Middle	216	3.3 (0.0, 7.1)	270	1.2 (0.0, 2.6)
Fourth	188	3.4 (0.4, 6.3)	229	1.2 (0.0, 3.0)
Highest	148	6.9 (0.0, 15.9)	181	1.6 (0.0, 4.9)
Total	**977**	**4.2 (2.2, 6.2)**	**1220**	**1.2 (0.3, 2.1)**
SCHOOL-AGED CHILDREN				
Age category				
5 – 10 y	501	7.2 (2.7, 11.7)	485	4.1 (0.7, 7.4)
11 – 14 y	257	5.0 (1.0, 8.9)	263	3.7 (0.2, 7.2)
Sex				
Male	369	6.1 (2.1, 10.2)	356	1.4 (0.0, 3.3)*
Female	389	6.7 (2.5, 11.1)	392	6.4 (1.6, 11.2)*
Residence				
Urban	90	2.1 (0.0, 5.2)	95	0
Rural	668	6.7 (3.3, 10.1)	635	4.2 (1.3, 7.1)
Region				
North	255	3.2 (0.5, 5.9)	242	4.9 (0.0, 12.3)
Central	274	8.0 (3.3, 12.8)	277	0.5 (0.0, 1.4)
South	229	5.8 (0.3, 11.4)	229	7.1 (1.7, 12.6)
Wealth quintile				
Lowest	142	4.5 (0.9, 8.0)	139	2.3 (0.0, 5.7)*
Second	143	2.7 (0.0, 6.1)	144	1.0 (0.0, 2.9)*
Middle	185	7.2 (2.3, 12.1)	176	10.1 (0.7, 19.4)*
Fourth	160	10.4 (1.8, 18.9)	158	3.6 (0.0, 8.0)*
Highest	128	7.6 (0.0, 17.3)	131	0.6 (0.0, 1.7)*
Total	**758**	**6.4 (3.2, 9.6)**	**748**	**3.9 (1.2, 6.7)**

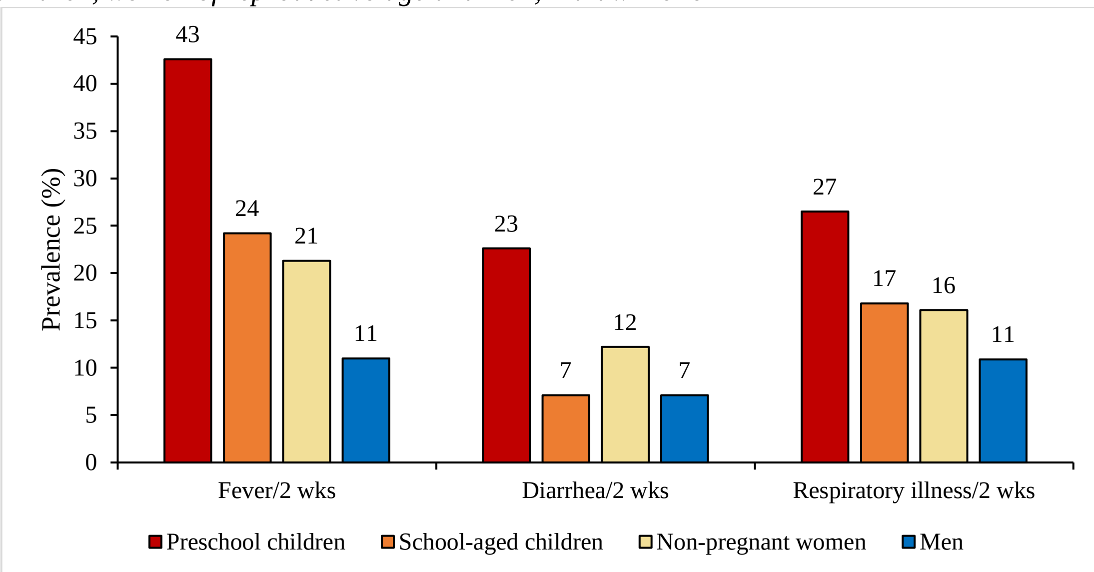
MEN				
Age category				
15 – 29 y	74	2.8 (0.0, 7.0)	78	0
30 – 54 y	140	5.4 (0.8, 10.0)	146	0.9 (0.0, 2.1)
Residence				
Urban	28	0	29	0
Rural	186	5.3 (1.5, 9.2)	195	0.7 (0.0, 1.6)
Region				
North	68	0.9 (0.0, 2.6)	72	5.4 (0.0, 12.1)
Central	83	2.4 (0.0, 5.2)	86	0
South	63	8.5 (1.1, 15.9)	66	0
Wealth quintile				
Lowest	35	0	35	0
Second	53	6.4 (0.0, 13.4)	56	0
Middle	41	14.4 (0.0, 30.2)	44	0
Fourth	44	4.0 (0.0, 11.2)	45	2.4 (0.0, 5.8)
Highest	41	0	44	0
Total	**214**	**4.5 (1.1, 7.8)**	**224**	**0.6 (0.0, 1.4)**

[1] Measured by urine dipstick for hematuria. Data are weighted to account for survey design. CI, Confidence Interval.
*signifies variable differs across groups (p<0.05) using Chi-square test.

5.4 SELF-REPORTED MORDITY PREVALENCE

Figure 5.4 reports the overall prevalence of fever, diarrhea, and respiratory illness in the last 2 weeks for PSC, SAC, WRA and men. Among PSC, 43% of their caregivers reported fever, 23% reported diarrhea, and 27% reported respiratory illness. Among SAC, the prevalence of fever, diarrhea respiratory illness was 24%, 7% and 17%, respectively. Among non-pregnant WRA, the prevalence of fever, diarrhea respiratory illness was 21%, 12% and 16%, respectively. The prevalence of fever, diarrhea respiratory illness was 11%, 7% and 11%, respectively in men.

Figure 5.4 Prevalence of self-reported illness in the last two weeks in preschool children, school-aged children, women of reproductive age and men, Malawi 2016



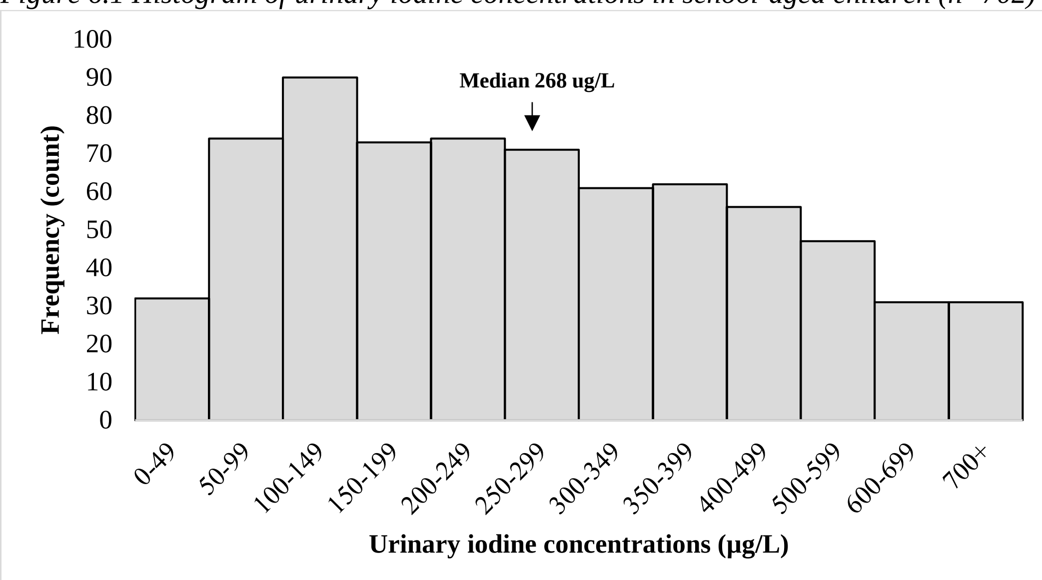
Data are weighted to account for survey design. Sample size for self-reported illness: preschool children (n=1220); school-aged children (n=780); women of reproductive age (n=778); men (n=226)

CHAPTER 6. IODINE STATUS

This chapter provides estimates of population iodine status based on median urinary iodine concentration using casual urine sample collection in SAC and WRA. The coverage of iodized salt in households can be found in chapter 13. Median urinary iodine concentration is used as an indicator to monitor and evaluate the impact of salt iodization on the target population. SAC are commonly assessed for iodine status because they are generally easier to survey in schools and serve as a proxy indication of iodine status for the general population. WRA are the most vulnerable population because iodine deficiency directly affects the mental and physical development of the fetus when a woman is pregnant. The goals for intervention programs are that the median iodine concentration of SAC and non-pregnant WRA be in the range of 100µg/L – 199 µg/L to represent adequate iodine nutrition, and concentrations in the range of 200µg/L – 299 µg/L represent high adequate levels. Levels ≥ to 300 µg/L represent an excess of iodine.

Urinary iodine levels were measured in 702 SAC. The distribution of urinary iodine concentrations in SAC is shown in Figure 6.1.

Figure 6.1 Histogram of urinary iodine concentrations in school-aged children (n=702)



The median urinary iodine concentration among SAC was 268 µg/L (Table 6.1). The urinary iodine levels in the survey population were within WHO recommendations indicating intake that may be higher than adequate for iodine nutrition.

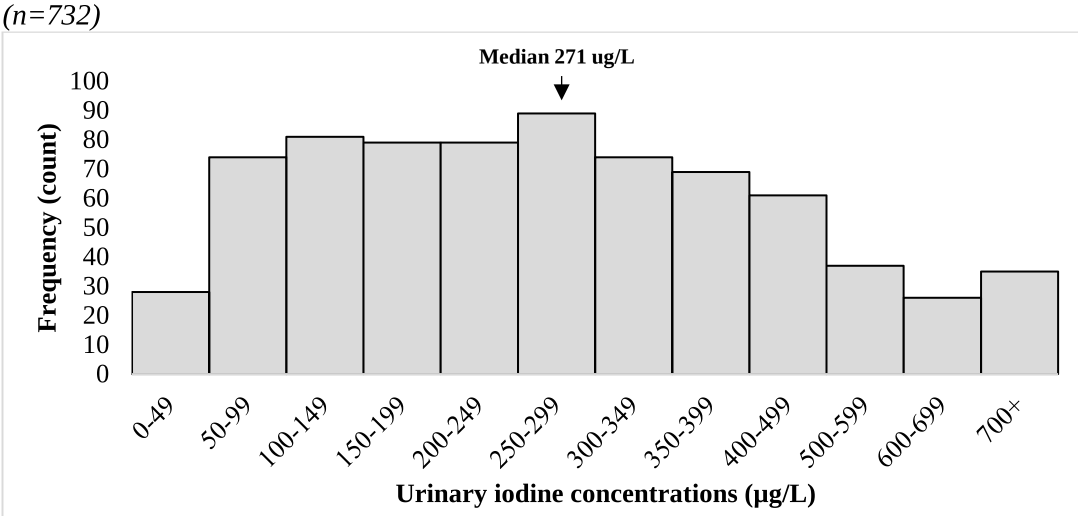
Table 6.1 Urinary iodine levels among school-aged children, Malawi 2016

Background characteristic	N	Median (IQR) levels of urinary iodine (µg/L)
Age category		
5 – 10 y	455	269.4 (137.2, 427.1)
11 – 14 y	247	267.5 (148.2, 390.0)
Gender		
Male	339	227.2 (121.2, 405.7)
Female	363	300.6 (173.1, 418.7)
Residence		
Urban	90	200.4 (145.1, 483.3)
Rural	612	269.9 (141.4, 415.1)
Region		
North	241	211.9 (113.0, 303.9)
Central	257	235.7 (121.5, 383.4)
South	204	329.9 (180.2, 493.1)
Wealth quintile		
Lowest	127	244.4 (143.2, 391.9)
Second	135	283.6 (131.1, 429.9)
Middle	168	305.9 (158.7, 508.2)
Fourth	147	240.0 (126.5, 391.0)
Highest	125	235.1 (148.9, 413.1)
Total	**702**	**267.7 (144.3, 415.4)**

Data are weighted to account for survey design, CI-Confidence Interval, IQR- interquartile range.

Data on urinary iodine were available for 732 non-pregnant WRA (Figure 6.2).

Figure 6.2 Histogram of urinary iodine concentrations in non-pregnant women of reproductive age (n=732)



Among non-pregnant WRA the median urinary iodine level was 271 µg/L (IQR 158-384). The urinary iodine levels in the survey population were within WHO recommendations indicating intake that may be higher than adequate for iodine nutrition. There was no significant difference noted in the median urinary iodine concentrations by age, residence, region, or wealth (Table 6.2).

Table 6.2 Median urinary iodine concentrations among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	N	Median (IQR) levels of urinary iodine (µg/L)
Age category		
15 – 19 y	157	307.2 (201.0, 434.9)
20 – 29 y	261	271.7 (158.3, 383.6)
30 – 49 y	314	251.4 (142.3, 367.1)
Residence		
Urban	124	274.3 (179.5, 369.4)
Rural	654	271.4 (157.3, 384.6)
Region		
North	238	230.4 (131.4, 340.9)
Central	252	270.9 (151.5, 379.2)
South	242	281.4 (175.8, 399.3)
Wealth quintile		
Lowest	140	251.2 (134.6, 360.4)
Second	130	229.7 (145.4, 374.6)
Middle	141	276.3 (172.3, 405.5)
Fourth	166	278.3 (160.1, 399.6)
Highest	155	310.4 (208.0, 387.2)
Total	**732**	**271.4 (158.3, 384.4)**

Data are weighted to account for survey design, CI-Confidence Interval, IQR- interquartile range.
*p <.05 signifies variable differs across groups.

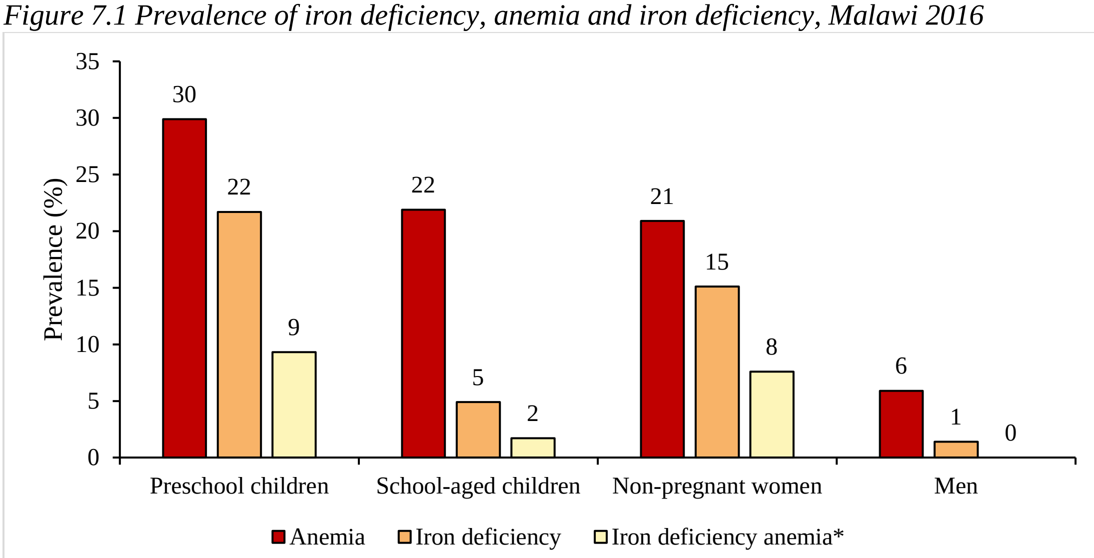
CHAPTER 7. ANEMIA, BLOOD DISORDERS, AND IRON DEFICIENCY

Globally, iron deficiency is one of the most widespread micronutrient deficiencies (18, 19). Pregnant and postpartum women and young children are particularly vulnerable because of the high iron requirements for growth and pregnancy. Iron status can be assessed by measuring serum ferritin. However, ferritin is an acute phase protein and increases as part of the inflammatory response. Thus, adjusting for inflammation leads to an increase in the estimated prevalence of iron deficiency using ferritin concentrations. Prevalence estimates of inflammation-corrected iron deficiency are thought to be more accurate and are reported here (5).

Anemia is characterized by low levels of hemoglobin (the protein in red blood cells responsible for carrying oxygen) in the blood. Iron is an important component of hemoglobin, and iron deficiency is estimated to contribute to approximately one-half of anemia cases worldwide (20). Other micronutrient deficiencies (including vitamin B12, folate, and vitamin A deficiencies) and non-nutritional causes (such as blood disorders, malaria, schistosomiasis, and helminthic infections) also can cause anemia. Anemia impairs children's physical and cognitive development, increases susceptibility to infections, and results in fatigue and reduced work capacity among adults. Anemia also increases risk of child and maternal mortality (20).

Figure 7.1 summarizes the national prevalence of iron deficiency, anemia, and iron deficiency for each population group. Due to a computational error in the creation of the Key Indicators Report in adjusting hemoglobin concentrations for altitude, the anemia results presented here are 1.1 to 1.7 percentage points higher compared to the Key Indicators Report (1). The overall prevalence of anemia was 30% in PSC, 22% in SAC, 21% in WRA, and 6% in men. Iron deficiency prevalence was 22% in PSC, 5% in SAC, 15% in WRA and only 1% in men.

Figure 7.1 Prevalence of iron deficiency, anemia and iron deficiency, Malawi 2016



*Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia. Data are weighted to account for survey design. Sample size for anemia in preschool children (n=1227), school-aged children (798), non-pregnant women (n=776), and men (n=225); sample size for iron deficiency in preschool children (n=1102), school-aged children (758), non-pregnant women (n=752), and men (n=219)

Tables 7.1 and 7.2 presents inflammation-corrected iron deficiency, anemia, and iron deficiency anemia for PSC and SAC. In PSC, the prevalence of both iron deficiency and iron deficiency anemia was higher in females than in males (26% vs. 18% and 12% vs 7%, respectively, p<0.05). Iron deficiency, anemia and iron deficiency anemia were much more common in younger children aged 6-23 mo, compared to those aged 24-59 mo (p<0.05). There were no differences in iron deficiency, anemia, or iron deficiency anemia by region or wealth quintile.

Table 7.1 Prevalence of iron deficiency, anemia, and iron deficiency anemia among preschool children, Malawi 2016

Background characteristic	**Iron deficiency**[1]		**Anemia**[2]		**Iron deficiency anemia**[3]	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Age category						
6 – 23 mo	332	43.0 (34.4, 51.6)*	392	44.9 (37.6, 52.2)*	332	24.9 (16.8, 32.9)*
24 – 59 mo	770	12.0 (7.0, 17.0)*	835	22.5 (18.2, 26.9)*	767	2.0 (0.8, 3.2)*
Sex						
Male	539	17.5 (11.4, 23.5)*	624	27.8 (22.2, 33.3)	537	6.6 (2.3, 10.9)*
Female	563	25.9 (20.0, 31.9)*	603	32.1 (27.9, 36.3)	562	11.7 (8.6, 14.9)*
Residence						
Urban	128	49.3 (37.1, 61.5)	147	32.3 (23.9, 40.7)	127	23.4 (16.0, 31.5)
Rural	974	18.5 (15.0, 22.0)	1080	29.7 (25.9, 33.4)	972	7.5 (5.8, 9.6)
Region						
North	383	22.1 (17.1, 27.2)	391	28.8 (19.9, 37.6)	382	9.7 (6.4, 13.1)
Central	395	18.5 (7.3, 29.9)	447	30.0 (24.6, 35.4)	394	8.1 (2.1, 14.1)
South	324	24.8 (19.2, 30.5)	389	30.2 (24.9, 35.5)	323	10.0 (7.0, 13.1)
Wealth quintile						
Lowest	252	16.7 (12.4, 21.0)	281	33.2 (26.6, 39.8)	250	7.0 (3.0, 10.9)
Second	220	20.0 (11.5, 28.6)	258	29.6 (22.3, 36.8)	220	7.7 (3.2, 12.1)
Middle	258	20.4 (13.9, 27.0)	275	30.0 (22.2, 37.8)	258	4.5 (1.7, 7.2)
Fourth	207	26.5 (17.1, 36.0)	230	26.9 (17.6, 36.1)	207	14.9 (6.9, 22.9)
Highest	163	31.5 (20.5, 42.5)	181	28.3 (15.4, 41.3)	162	19.4 (4.2, 34.6)
Total	**1102**	**21.7 (16.2, 27.2)**	**1227**	**29.9 (26.4, 33.5)**	**1099**	**9.2 (6.2, 12.0)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Iron deficiency defined as serum ferritin < 12 μg/L corrected for inflammation.
[2] Anemia defined as Hb < 11.0 g/dL. Hemoglobin levels were adjusted for altitude.
[3] Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia.
*signifies variable differs across groups (p<0.05) using Chi-square test.

In SAC, the prevalence of iron deficiency and iron deficiency anemia were low (5% and 2%, respectively). A total of 22% of SAC were anemic. The prevalence of anemia was higher in SAC aged 5-10 y, compared to those aged 11-14 y (p<0.05). The prevalence of iron deficiency anemia varied significantly by region, ranging from 3% in the south to nearly 0% in the central and north regions (p<0.05).

Table 7.2 Prevalence of iron deficiency, anemia, and iron deficiency anemia among school-aged children, Malawi 2016

Background characteristic	**Iron deficiency[1]**		**Anemia[2]**		**Iron deficiency anemia[3]**	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Age category						
5 – 10 y	502	4.7 (2.2, 7.2)	532	26.3 (21.2, 31.4)*	500	2.3 (0.2, 4.4)
11 – 14 y	256	5.2 (1.2, 9.2)	266	13.1 (7.1, 19.1)*	256	0.5 (0, 1.2)
Sex						
Male	386	4.8 (1.7, 7.7)	386	20.0 (14.1, 25.9P	371	0.7 (0.0, 1.5)
Female	372	4.8 (2.1, 7.7)	402	23.8 (17.7, 29.9)	385	2.7 (0.0, 5.4)
Residence						
Urban	93	1.7 (0.0, 4.1)	96	15.9 (0.0, 35.3)	93	0.2 (0.0, 0.6)
Rural	665	5.1 (3.0, 7.2)	702	22.2 (17.8, 26.8)	663	1.7 (0.3, 3.2)
Region						
North	256	2.8 (0.6, 5.0)	260	20.2 (11.1, 29.3)	255	0.3 (0.0, 0.7)*
Central	279	3.9 (1.3, 6.4)	292	21.3 (15.8, 26.8)	278	0.4 (0.0, 1.3)*
South	223	6.4 (2.9, 10.0)	246	22.9 (15.1, 30.8)	223	3.4 (0.3, 6.4)*
Wealth quintile						
Lowest	147	4.6 (0.5, 8.8)	152	27.9 (21.5, 34.2)	146	2.1 (0, 5.0)
Second	137	6.8 (1.5, 12.1)	151	22.6 (12.8, 32.3)	137	3.2 (0, 7.6)
Middle	187	5.2 (0.2, 10.2)	193	18.5 (10.5, 26.6)	187	1.0 (0, 2.7)
Fourth	157	2.7 (0.0, 5.5)	167	21.2 (11.6, 30.7)	156	1.4 (0, 3.3)
Highest	130	5.6 (0.0, 11.1)	135	16.1 (0.04, 32.1)	130	0.1 (0, 0.4)
Total	**758**	**4.9 (2.9, 6.8)**	**798**	**21.9 (17.5, 26.3)**	**756**	**1.7 (0.3, 3.0)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Iron deficiency defined as serum ferritin < 15 μg/L corrected for inflammation.
[2] Anemia defined as < 11.5 g/dL for children 5 – 11 years of age, and < 12.0 g/dL for children 12 – 14 years of age. Hemoglobin levels were adjusted for altitude.
[3] Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Tables 7.3 and 7.4 presents inflammation-corrected iron deficiency, anemia, and iron deficiency anemia for non-pregnant WRA and men. The prevalence of iron deficiency among WRA was 15%, with a higher prevalence in the Northern region, compared to Central and South ($p<0.05$). Approximately one in five WRA were anemic, and the prevalence of anemia was highest in the Southern region, compared to the North and Central ($p<0.05$). The prevalence of iron deficiency anemia in WRA was 8% overall and increased by wealth quintile ($p<0.05$).

Table 7.3 Prevalence of iron deficiency, anemia, and iron deficiency anemia among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	Iron deficiency[1]		Anemia[2]		Iron deficiency anemia[3]	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Age category						
15 – 19 y	159	14.4 (8.9, 20.0)	163	21.6 (13.0, 30.2)	159	6.6 (1.9, 11.2)
20 – 29 y	270	15.5 (10.0, 21.2)	281	17.8 (11.6, 23.9)	269	6.3 (2.3, 10.4)
30 – 49 y	323	15.1 (10.1, 20.0)	332	23.4 (17.6, 29.0)	323	9.3 (5.0, 13.6)
Residence						
Urban	121	15.8 (6.7, 24.9)	123	20.9 (5.1, 36.7)	120	10.8 (4.2, 16.6)
Rural	631	15.1 (11.5, 18.7)	653	20.9 (17.3, 24.5)	631	7.3 (4.8, 9.8)
Region						
North	240	25.4 (16.8, 34.4)*	243	17.7 (13.2, 22.1)*	218	10.8 (4.8, 16.2)
Central	261	10.2 (6.7, 13.9)*	270	15.5 (10.2, 20.8)*	261	3.7 (0.7, 5.8)
South	251	17.0 (11.3, 22.6)*	263	26.5 (20.7, 32.2)*	250	10.4 (6.4, 14.4)
Wealth quintile						
Lowest	141	13.7 (6.3, 21.1)	153	23.6 (13.5, 33.8)	147	3.6 (0, 7.5)*
Second	136	14.9 (8.4, 21.4)	152	15.4 (9.1, 21.7)	144	5.9 (2.1, 9.7)*
Middle	144	11.5 (5.9, 17.1)	154	19.8 (13.2, 26.4)	148	7.5 (3.0, 11.9)*
Fourth	171	17.9 (10.8, 25.0)	179	28.2 (18.8, 37.7)	176	10.8 (5.4, 16.2)*
Highest	160	18.1 (11.0, 25.3)	172	22.6 (11.3, 33.8)	167	16.3 (6.8, 25.8)*
Total	**752**	**15.1 (11.8, 18.5)**	**776**	**20.9 (17.3, 24.4)**	**751**	**7.6 (5.3, 9.9)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Iron deficiency defined inflammation-corrected ferritin < 15 μg/L
[2] Anemia defined as Hb < 12.0 g/dL. Hemoglobin levels were adjusted for altitude and smoking.
[3] Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia.
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

The prevalence of iron deficiency and anemia among men was low (1% and 6%, respectively). There were no cases of iron deficiency anemia in men.

Table 7.4 Prevalence of iron deficiency, anemia, and iron deficiency anemia among men, Malawi 2016

Background characteristic	Iron deficiency[1]		Anemia[2]		Iron deficiency anemia[3]	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Age category						
15 – 29 y	75	4.8 (0.0, 12.3)	76	4.8 (0, 12.3)	75	0.0
30 – 54 y	144	6.5 (1.0, 12.1)	146	6.5 (1.0, 12.0)	144	0.0
Residence						
Urban	27	0.0	28	0.0	27	0.0
Rural	192	0.6 (0.0, 3.9)	197	6.9 (2.4, 11.4)	192	0.0
Region						
North	72	0.0	72	2.7 (0.0, 5.9)	72	0.0
Central	84	0.0	88	8.2 (1.2, 15.1)	84	0.0
South	63	3.8 (0.0, 9.0)	65	3.6 (0.0, 8.0)	63	0.0
Wealth quintile						
Lowest	35	3.6 (0.0, 10.7)	36	9.3 (0, 23.4)	35	0.0
Second	55	0.0	56	2.0 (0, 5.3)	55	0.0
Middle	44	0.0	44	7.4 (0, 15.7)	44	0.0
Fourth	43	3.1 (0.0, 8.8)	46	10.8 (0, 26.1)	43	0.0
Highest	42	0.0	43	0.0	42	0.0
Total	**219**	**1.4 (0.0, 3.4)**	**225**	**5.9 (1.7, 10.1)**	**219**	**0.0**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Iron deficiency defined inflammation-corrected ferritin < 15 µg/L
[2] Anemia defined as Hb < 13.0 g/dL. Hemoglobin levels were adjusted for altitude (smoking data not available for men). [3] Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 7.5 compares the different indicators of iron status that were measured in the MNS. The single preferred indicator used in this report to identify iron deficiency was inflammation-adjusted low ferritin, as it is a measure of iron stores and the recommended WHO indictor to assess population iron status (21). The prevalence of elevated sTfR was overall higher than the prevalence of low ferritin in each population group. This difference is expected and may be due to other factors that can elevate sTfR concentrations or erythropoiesis, including malaria and other infections or blood disorders (22-24). Total body iron stores, the log ratio of sTfR to ferritin concentrations, can be used to also assess population iron status (25).

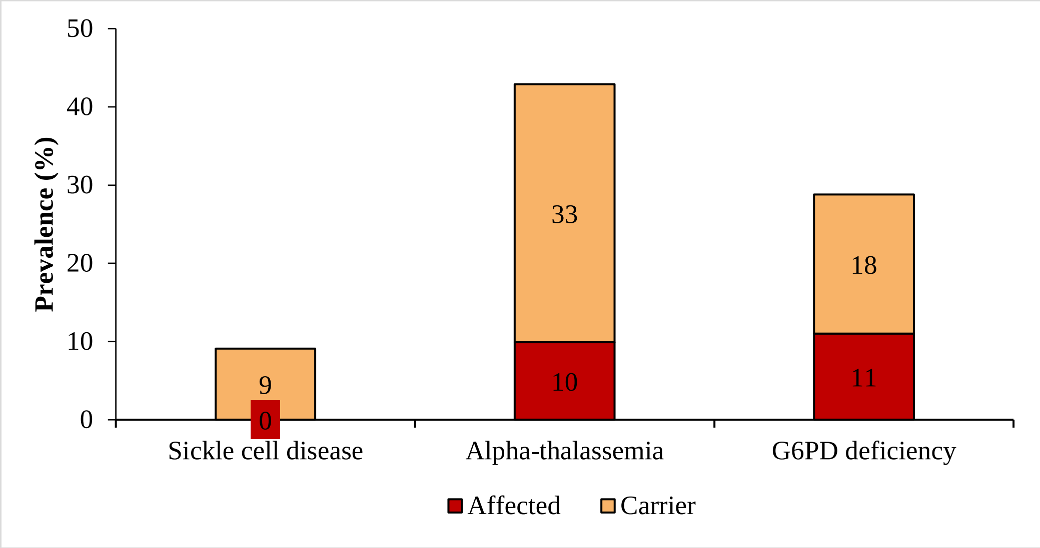
Table 7.5 Comparison of iron deficiency indicators in preschool children, school-aged children, non-pregnant women of reproductive age, and men.

	Low ferritin[1]		**Elevated sTfR**[2]		**Low Total Body Iron**[3]	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Preschool children	1102	21.7 (16.2, 27.2)	1102	55.2 (49.0, 61.4)	1102	17.7 (14.1, 21.4)
School-aged children	758	4.9 (2.9, 6.8)	758	30.9 (25.3, 36.4)	758	1.2 (0.4, 2.0)
Women	752	15.1 (11.8, 18.5)	752	24.6 (20.5, 28.7)	752	10.6 (7.8, 13.4)
Men	219	1.4 (0.0, 3.4)	219	19.4 (8.0, 30.8)	219	1.4 (0.0, 3.4)

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Defined as inflammation-corrected ferritin < 12 µg/L in preschool children and < 15 µg/Lin all other groups
[2] Defined as sTfR>8.3 mg/L in all groups
[3]Defined as total body iron < 0 mg/kg in all groups

Inherited blood disorders, such as alpha-thalassemia, sickle cell disease, and glucose-6-phosphate dehydrogenase (G6PD) deficiency, are common among children in many parts of Africa (26); however, the prevalence of these disorders and their relationship to anemia have not previously been reported in Malawi. The prevalence of inherited blood disorders among PSC are summarized in Figure 8.2. Overall, approximately 9% of PSC were carriers for sickle cell, or had sickle cell trait (HbAS), 11% were affected by G6PD (G6PD deficiency), and 33% were carriers for alpha-thalassemia.

Figure 7.2 Prevalence of inherited blood disorders among preschool children, Malawi 2016



Sample size for sickle cell testing (n=1074), G6PD (n=1075) and alpha-thalassemia (n=1070)

Table 7.6 summarizes the prevalence of inherited blood disorders by age category, sex, residence and region. The prevalence of G6PD deficiency was higher in males than females ($p<0.05$). This finding is expected since G6PD is a sex-linked trait carried on the X chromosome. There was a lower prevalence of sickle cell trait and G6PD deficiency in the Southern region ($p<0.05$), but a higher prevalence of alpha-thalassemia in this region, compared to the Northern and Central regions ($p<0.05$).

Table 7.6 Prevalence of blood disorders among preschool children, Malawi 2016

	Sickle cell disease (HbSS)			G6PD deficiency			Alpha-thalassemia		
	Affected[1]	**Unaffected[2]**	**Carrier[3]**	**Affected[1]**	**Unaffected[2]**	**Carrier[3]**	**Affected[1]**	**Unaffected [2]**	**Carrier[3]**
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Age category									
6 – 23 mo	0.1 (0.0, 0.4)	94.6 (91.3, 97.8)*	5.3 (2.0, 8.6)*	12.7 (8.0, 17.3)	75.3 (68.6, 82.0)	12.0 (7.9, 16.2)*	11.5 (7.1, 15.9)	54.0 (46.9, 61.1)	34.5 (28.1, 40.8)
24 – 59 mo	--	89.4 (85.6, 93.2)*	10.6 (6.8, 14.4)*	10.4 (7.4, 13.4)	69.4 (65.1, 73.7)	20.2 (16.8, 23.6)*	9.3 (6.6, 11.9)	58.3 (52.5, 64.2)	32.4 (27.3, 37.6)
Sex									
Male	--	90.5 (87.4, 95.6)	9.5 (6.4, 12.6)	19.4 (14.7, 24.2)*	79.3 (74.3, 84.3)*	n/a[4]	9.7 (6.4, 12.9)	59.1 (53.9, 64.2)	31.3 (26.3, 36.3)
Female	0.1 (0.0, 0.2)	91.3 (87.3, 95.2)	8.7 (4.8, 12.6)	3.0 (1.2, 4.8)*	63.5 (58.2, 68.7)*	33.5 (28.7, 38.3)	10.2 (6.5, 13.8)	55.1 (47.5, 62.6)	34.7 (28.4, 41.0)
Residence									
Urban	0.0	98.1 (95.4, 100.0)	1.9 (0.0,4.7)	13.9 (5.3, 22.5)	66.1 (57.1, 75.2)	20.0 (16.9, 23.0)	13.1 (8.3, 17.9)	53.2 (43.2, 63.1)	33.7 (20.8, 46.7)
Rural	0.04 (0.0, 0.1)	90.1 (0.0, 4.6)	9.9 (6.9, 12.9)	10.7 (7.8, 13.5)	71.8 (67.7, 75.9)	17.5 (14.7, 20.3)	9.6 (7.1, 12.0)	57.5 (51.6, 63.4)	33.0 (27.9, 38.0)
Region									
North	0.3 (0.0, 0.7)	89.5 (83.3, 95.7)*	10.2 (4.4, 16.1)*	11.6 (7.1, 16.1)*	72.7 (65.7, 79.6)	15.8 (11.0, 20.5)	5.1 (2.5, 7.6)*	61.1 (53.8, 68.4)	33.9 (25.9, 41.9)
Central	--	87.0 (81.4, 92.6)*	13.0 (7.4, 18.6)*	15.1 (10.9, 19.2)*	68.5 (62.5, 74.5)	16.5 (13.4, 19.5)	8.3 (5.0, 11.6)*	59.2 (52.2, 66.2)	32.5 (27.3, 37.8)
South	--	96.1 (93.3, 98.8)*	3.9 (1.2, 6.7)*	6.0 (2.9, 9.1)*	74.0 (68.4, 79.5)	20.0 (15.0, 25.0)	13.5 (9.9, 17.1)*	53.1 (42.5, 63.7)	33.4 (23.5, 43.3)
Total	**0.0 (0.0, 0.1)**	**90.9 (88.0, 93.8)**	**9.1 (6.1, 12.0)**	**11.0 (8.3, 13.8)**	**71.2 (67.3, 75.1)**	**17.8 (15.2, 20.3)**	**9.9 (7.7, 12.1)**	**57.0 (51.6, 62.5)**	**33.0 (28.2, 37.8)**

Sample size for sickle cell testing (n=1074), G6PD (n=1075) and alpha-thalassemia (n=1070). Data are weighted to account for survey design. CI, Confidence Interval.

[1] Affected individuals were defined as sickle cell disease (HbSS), or hemizygous males or homozygous females for the G6PD A^- allele, or two (-α/-α) deletions

[2] Unaffected individuals had normal phenotype

[3] Carriers were defined as sickle cell trait (HbAS), or hemizygous females for the G6PD allele, or as one (-α/αα) deletion.

[4] G6PD is a sex-linked trait and thus only females are carriers.

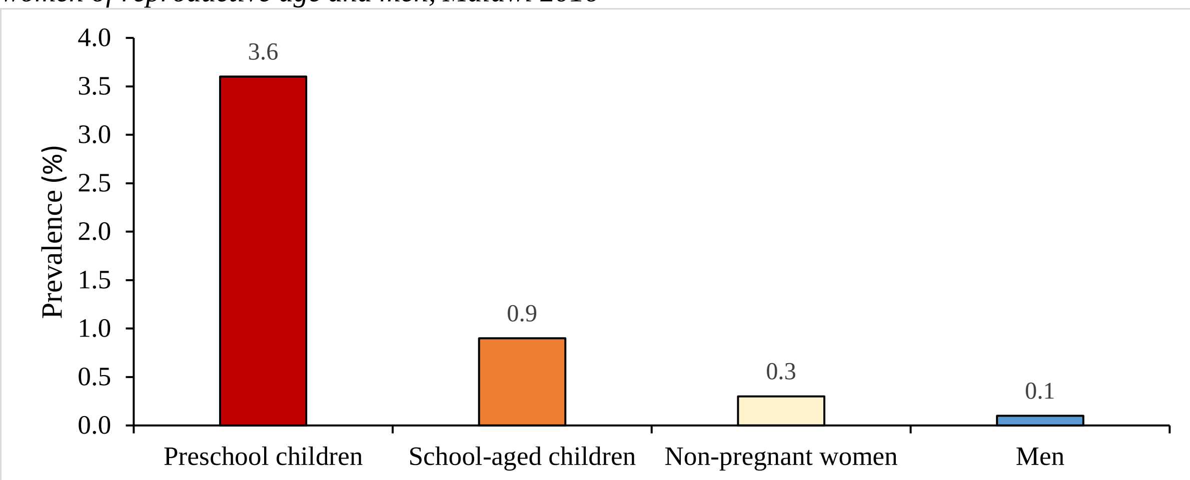
*signifies demographic variable differs within given group ($p<0.05$) using pairwise Chi-square test.

CHAPTER 8. VITAMIN A STATUS

Vitamin A is essential for the functioning of the immune system and the healthy growth and development of children (27). Vitamin A deficiency is primarily caused by an inadequate dietary intake of vitamin A and was assessed in this survey using the modified relative dose response test among a subsample of the population. Retinol-binding protein (RBP) was also used to assess vitamin A status. The WHO recommended cutoff for vitamin A deficiency in populations based on serum retinol is a concentration < 0.7 µmol. It has been assumed that the molar ratio of RBP and retinol is 1:1, but there is growing evidence to indicate that the relationship between RBP and retinol is variable. Therefore, a subsample of serum was also analyzed for serum retinol to adjust the RBP cutoffs, as was also done in the 2009 Malawi national micronutrient survey. Based on comparisons among the subsample with serum retinol and RBP measured, low retinol binding protein was defined as RBP < 0.46 µmol/L, which in the subsample was equivalent to a serum retinol concentration of 0.7 µmol/L.

Figure 8.1 summarizes the prevalence of low RBP across all 4 population groups.

Figure 8.1 Prevalence of low retinol binding protein among preschool children, school-aged children, women of reproductive age and men, Malawi 2016



Defined as retinol binding protein <0.46 umol/L calibrated to equal retinol <0.7 umol/L. Sample size was n=1102 in PSC, n=758 in SAC, n=752 in WRA, and n=219 in men.

Table 8.1 presents the prevalence of low RBP in PSC. Due to low prevalence, stratified analysis is only shown for PSC. Overall, the prevalence of vitamin A deficiency was low in PSC (4%) and less than 1% in SAC, WRA, and men. There were no apparent differences in low retinol binding protein concentration by background characteristics.

Table 8.1 Prevalence of low retinol binding protein among preschool children, Malawi 2016

Background characteristic	Low retinol binding protein[1]	
	N	% (95% CI)
	PRESCHOOL CHILDREN	
Sex		
Male	563	4.7 (2.2 ,7.3)
Female	539	2.4 (0.6, 4.1)
Residence		
Urban	128	3.7 (0.0, 10.5)
Rural	974	3.6 (1.6, 5.5)
Region		
North	383	2.3 (0.8, 3.8)
Central	395	3.0 (1.1 ,4.8)
South	324	4.6 (0.8, 8.3)
Wealth		
Lowest	252	5.7 (1.1, 10.2)
Second	220	4.5 (1.6, 7.4)
Middle	258	2.0 (0.0, 4.0)
Fourth	207	1.2 (0.0, 3.0)
Highest	163	3.9 (0.0, 10.0)
Received VAC in last 6 months		
Yes	658	3.5 (0.6, 6.4)
No	316	3.4 (1.7, 5.2)
Total	**1102**	**3.6 1.7, 5.4)**

Data are weighted to account for survey design, CI: Confidence Interval, VAC: vitamin A capsule.
[1]Defined as retinol binding protein (RBP) <0.46 umol/L calibrated to equal retinol <0.7 umol/L
*signifies variable differs across groups (p<0.05) using Chi-square test.

Modified relative dose response (MRDR) measures vitamin A liver stores and is used to assess vitamin A status from deficiency through sufficiency; however, it is not used for defining toxic levels. MRDR was measured in a randomly selected subsample of PSC, SAC and WRA. A challenge dose of 3, 4 didehydroretinol was administered 4-6 hours before the collection of blood, and the increase in the release of RBP was calculated. Vitamin A deficiency was defined as MRDR $\geq$0.060 (28). The MRDR results are presented in Table 8.2. The mean (+/- standard error) MRDR concentration was 0.013 +/- 0.0008. Only 1 non-pregnant WRA had an elevated MRDR. There were no cases of elevated MRDR in PSC or SAC.

Table 8.2 Prevalence of vitamin A deficiency using MRDR and mean MRDR concentration

Background characteristic	Vitamin A deficiency : Modified Relative Dose Response (MRDR)[1]								
	PRESCHOOL CHILDREN			**SCHOOL-AGED CHILDREN**			**WOMEN**		
	N	% (95% CI)	Mean ± SE	N	% (95% CI)	Mean ± SE	N	% (95% CI)	Mean ± SE
Total	**76**	**0.0**	**0.018 ± 0.001**	**85**	**0.0**	**0.011 ± 0.001**	**96**	**0.0**	**0.010 ± 0.001**

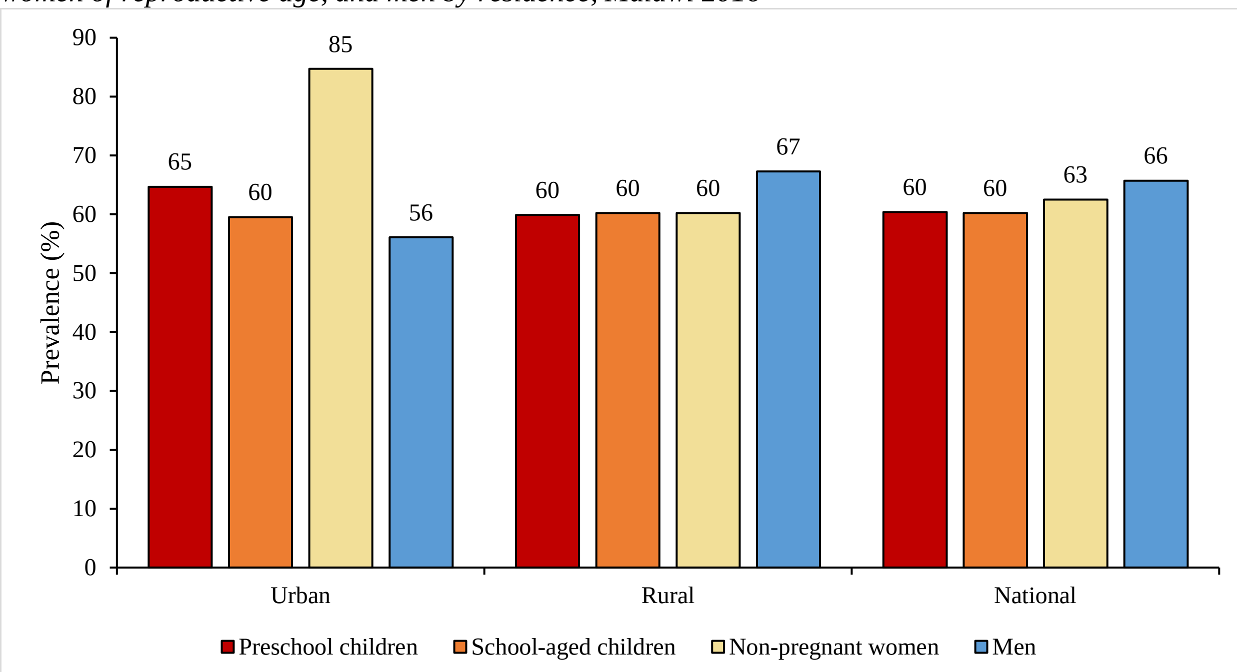
Data are weighted to account for survey design. [1]Vitamin A deficiency defined as MRDR ≥0.060.

CHAPTER 9. ZINC DEFICIENCY

This chapter provides estimates of zinc deficiency. Zinc is important for normal child growth, proper immune function, and healthy pregnancy (11, 29). Inadequate zinc from the diet, malabsorption of zinc, or excess losses of zinc during diarrhea can cause zinc deficiency. Deficiency in this micronutrient contributes to preventable childhood deaths from diarrhea, pneumonia, and malaria (11).

The overall prevalence of zinc deficiency in PSC, SAC, WRA and men, stratified by residence, is summarized in Figure 9.1. The overall prevalence of zinc deficiency was approximately 60% in PSC, 60% in SAC, 63% in WRA, and 66% in men.

Figure 9.1 Prevalence of zinc deficiency among preschool children, school-aged children, non-pregnant women of reproductive age, and men by residence, Malawi 2016



Data are weighted to account for survey design. Sample size was n=1086 in PSC, n=765 in SAC, n=757 in WRA, and n=218 in men.

9.1 ZINC DEFICIENCY IN PRESCHOOL AND SCHOOL-AGED CHILDREN

Data on serum zinc was available for 1086 PSC and 765 SAC. Tables 9.1 and 9.2 present the prevalence of zinc deficiency for PSC and SAC, by background characteristics. Nationally, the proportion of PSC and SAC with zinc deficiency was similar and high (60%). For PSC, there were no significant differences noted in the zinc status by age, gender, residence, region, and wealth. For SAC, the only significant difference in zinc status was by age. Younger school-aged children (5-10 yr) had a lower prevalence of zinc deficiency than older school aged children (11-14 yr) ($p<0.05$).

Table 9.1 Prevalence of zinc deficiency among preschool children, Malawi 2016

Background characteristic	Zinc deficiency[1,2]	
	N	% (95% CI)
Age category		
6 – 23 mo	325	56.7 (48.4, 65.1)
24 – 59 mo	761	62.0 (55.9, 68.1)
Sex		
Male	553	61.1 (54.3, 67.9)
Female	533	59.7 (52.3, 66.8)
Residence		
Urban	129	64.7 (49.6, 79.8)
Rural	957	59.9 (53.5, 66.3)
Region		
North	375	50.5 (37.2, 63.8)
Central	388	58.7 (50.2, 67.2)
South	323	65.3 (55.4, 75.2)
Wealth quintile		
Lowest	248	64.0 (55.6, 72.4)
Second	217	61.2 (51.2, 71.3)
Middle	253	63.0 (54.3, 71.8)
Fourth	205	54.2 (44.6, 63.8)
Highest	161	55.4 (38.6, 72.2)
Total	**1086**	**60.4 (54.4, 66.4)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Zinc deficiency defined as serum zinc concentration < 65 µg/dL for morning, non-fasting samples and < 57 µg/dL for afternoon, non-fasting samples.
[2]No significant differences across groups ($p<0.05$) using Chi-square test.

Table 9.2 Prevalence of zinc deficiency among school-aged children, Malawi 2016

Background characteristic	Zinc deficiency[1]	
	N	% (95% CI)
Age category		
5 – 10 y	508	56.9 (47.9, 65.9)*
11 – 14 y	257	66.4 (57.9, 74.9)*
Sex		
Male	389	62.0 (53.3, 70.6)
Female	376	58.4 (49.8, 67.0)
Residence		
Urban	95	59.5 (41.4, 77.6)
Rural	670	60.2 (51.8, 68.6)
Region		
North	256	64.7 (51.2, 78.2)
Central	281	59.9 (50.5, 69.3)
South	228	59.0 (44.2, 73.8)
Wealth quintile		
Lowest	148	58.7 (45.9, 71.5)
Second	140	70.0 (60.4, 79.5)
Middle	186	53.0 (39.6, 66.4)
Fourth	158	63.8 (53.1, 74.4)
Highest	133	54.1 (34.9, 73.3)
Total	**765**	**60.2 (52.2, 68.1)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Zinc deficiency defined as serum zinc concentration < 65 µg/dL for morning, non-fasting samples for SAC under 10 years of age and < 57 µg/dL for afternoon, non-fasting samples. For those 10 years old and older, a cutoff of < 70 µg/dL was used for males and < 66 µg/dL was used for females for morning, non-fasting samples; a cutoff of < 70 µg/dL was used for females and < 74 µg/dL was used for males for morning, fasting samples; a cutoff of < 61 µg/dL was used for males and < 59 µg/dL was used for females for afternoon, non-fasting samples.
*signifies variable differs across groups (p<0.05) using Chi-square test.

9.2 ZINC DEFICIENCY IN NON-PREGNANT WOMEN OF REPRODUCTIVE AGE AND MEN

Data on serum zinc was available for 757 non-pregnant WRA and 218 men. Tables 9.3 and 9.4 present the prevalence of zinc deficiency for non-pregnant WRA and men, by background characteristics. Nationally, nearly 2 out of 3 adults had zinc deficiency. For WRA and men, there were no significant differences noted in the zinc status by age, residence, region, and wealth.

Table 9.3 Prevalence of zinc deficiency among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	**Zinc deficiency**[1]	
	N	% (95% CI)
Age category		
15 – 19 y	161	61.8 (51.7, 71.8)
20 – 29 y	274	65.0 (56.6, 73.3)
30 – 49 y	322	60.6 (51.8, 69.5)
Residence		
Urban	122	84.5 (69.9, 99.0)
Rural	635	60.2 (53.6, 66.9)
Region		
North	239	58.1 (41.7, 74.5)
Central	262	58.7 (49.3 68.2)
South	256	67.0 (56.1, 78.0)
Wealth quintile		
Lowest	144	62.7 (51.1, 74.3)
Second	136	66.4 (56.5, 76.3)
Middle	144	60.8 (48.7, 72.9)
Fourth	172	59.0 (48.9, 69.2)
Highest	161	65.6 (48.3, 82.9)
Total	**757**	**62.5 (55.8, 69.3)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Zinc deficiency defined as serum zinc concentration <70 µg/dL for morning fasted samples; < 66 µg/dL for morning non-fasting samples; cutoff of < 59 µg/dL was used for females for afternoon non-fasting samples.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 9.4 Prevalence of zinc deficiency among men, Malawi 2016

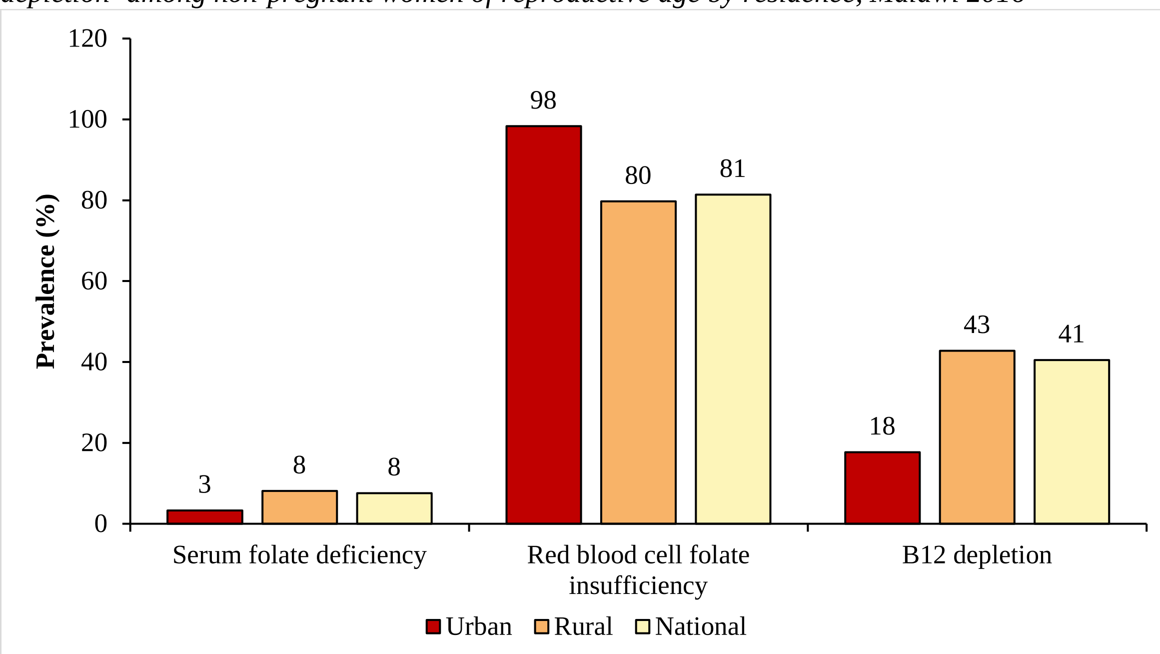
Background characteristic	**Zinc deficiency**[1,2]	
	N	% (95% CI)
Age category		
15 – 29 y	75	64.6 (47.7, 81.4)
30 – 54 y	143	66.3 (54.6, 78.0)
Residence		
Urban	28	56.1 (42.2, 70.0)
Rural	190	67.3 (56.6, 78.0)
Region		
North	70	57.5 (36.4, 78.5)
Central	85	61.9 (47.8, 76.0)
South	63	73.8 (57.6, 89.9)
Wealth quintile		
Lowest	35	71.7 (52.3, 90.2)
Second	55	69.8 (50.1, 89.6)
Middle	42	46.0 (27.7, 64.2)
Fourth	43	72.5 (58.6, 86.4)
Highest	43	60.0 (44.3, 75.8)
Total	**218**	**65.7 (55.8, 75.6)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Zinc deficiency defined as serum zinc concentration <74 µg/dL for morning fasted samples; < 70 µg/dL for morning non-fasting samples; cutoff of < 61 µg/dL was used for males for afternoon non-fasting samples.
[2]No significant differences across groups (p<0.05) using Chi-square test.

CHAPTER 10. FOLATE AND VITAMIN B12 STATUS

Deficiencies in folate and vitamin B12 have been linked to a range of adverse health outcomes, especially among women and young children. For example, macrocytic anemia is commonly caused by folate and vitamin B12 deficiencies (12). Poor maternal folate status is associated with higher risk of pre-eclampsia, spontaneous abortion, stillbirth, preterm delivery, and low birthweight (12, 30). Poor folate status during early pregnancy is a major contributor to neural tube defects in infants, which can result in serious disability or death (30). Increased risk of neural tube defects has also been associated with B12 deficiency during the antenatal period (31).

Figure 10.1 Prevalence of serum folate deficiency[1], red blood cell folate insufficiency[2], and vitamin B12 depletion[5] among non-pregnant women of reproductive age by residence, Malawi 2016



Data are weighted to account for survey design.
Sample size for serum folate deficiency: urban (n=118); rural (n=635); national (n=753); Sample size for red blood cell folate insufficiency: urban (n=119); rural (n=634); national (n=753); Sample size for B12 depletion: urban (n=122); rural (n=640); national (n=762)
[1]Serum folate deficiency based on risk of megaloblastic anemia defined as serum folate concentration < 6.8 nmol/L.
[2] Red blood cell folate insufficiency defined as red blood cell folate concentration <748 nmol/L.
[4] B12 depletion was defined as serum vitamin B12 concentration <220 pmol/L.

Table 10.1 presents serum folate deficiency among WRA, by background characteristics. Nationally, nearly 8% of WRA had serum folate deficiency. There was a significant difference in the prevalence of serum folate deficiency among WRA by age, but not by residence, region, and wealth.

Table 10.1 Serum folate deficiency among non-pregnant women of reproductive age, Malawi 2016

Background characteristic		**Serum folate < 6.8 nmol/L[1]**
	N	% (95% CI)
Age category		
15 – 19 y	162	2.9 (0.0, 6.0) *
20 – 29 y	274	7.0 (3.1, 10.9) *
30 – 49 y	317	10.7 (6.5, 14.9) *
Residence		
Urban	118	3.3 (0.0, 7.1)
Rural	635	8.1 (5.2, 11.0)
Region		
North	238	8.5 (4.0, 12.9)
Central	258	6.3 (2.5, 10.1)
South	257	8.6 (4.2, 13.0)
Wealth quintile		
Lowest	145	4.3 (0.8, 7.9)
Second	137	7.6 (1.0, 14.2)
Middle	143	7.2 (3.3, 11.2)
Fourth	170	11.2 (4.4, 18.0)
Highest	158	7.6 (1.3, 13.9)
Total	**753**	**7.6 (5.0, 10.3)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Serum folate deficiency based on risk of megaloblastic anemia defined as serum folate concentration < 6.8 nmol/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 10.2 presents red blood cell folate status among non-pregnant WRA, by background characteristics. Overall, the prevalence of red blood cell folate insufficiency was 81%. There was a higher prevalence of red blood cell folate insufficiency in WRA living in urban, compared to rural households (p<0.05).

Table 10.2 Red blood cell folate status among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	N	**Red blood cell folate insufficiency**[1] % (95% CI)
Age category		
15 – 19 y	159	75.9 (67.4, 84.5)
20 – 29 y	270	83.6 (76.5, 90.7)
30 – 49 y	324	82.0 (74.9, 89.0)
Residence		
Urban	119	98.3 (95.9, 100.0) *
Rural	634	79.7 (73.7, 85.6) *
Region		
North	240	87.3 (80.4, 94.3)
Central	259	83.8 (76.3, 91.3)
South	254	77.8 (68.4, 87.2)
Wealth quintile		
Lowest	143	80.7 (72.6, 88.8)
Second	135	76.1 (65.8, 86.4)
Middle	146	80.4 (70.6, 90.2)
Fourth	171	83.2 (75.2, 91.2)
Highest	158	88.4 (80.1, 96.6)
Total	**753**	**81.4 (75.7, 87.0)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Red blood cell folate insufficiency defined as red blood cell folate concentration <748 nmol/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table 10.3 presents vitamin B-12 status among WRA, by background characteristics. Nationally, the prevalence of B12 depletion and B12 deficiency among WRA is 40% and 13%, respectively. WRA in rural areas had a higher prevalence of both B12 depletion and B12 deficiency compared to WRA in urban areas. There was a significant difference in the prevalence of B12 depletion and B12 deficiency among WRA by region, with the Central region having the highest prevalence of both B12 depletion and B12 deficiency. Also, the prevalence of B12 depletion and B12 deficiency among WRA was higher among low versus high wealth quintile (p<0.05).

Table 10.3 Vitamin B12 status among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	N	**B12 Depletion**[1]	**B12 Deficiency**[2]
		% (95% CI)	% (95% CI)
Age category			
15 – 19 y	162	39.8 (25.9, 53.8)	11.0 (4.6, 17.3)
20 – 29 y	276	39.6 (30.9, 48.3)	10.6 (4.7, 16.4)
30 – 49 y	324	41.6 (33.5, 49.6)	16.1 (8.1, 24.0)
Residence			
Urban	122	17.7 (5.0, 30.4) *	0.4 (0.0, 0.9) *
Rural	640	42.8 (35.8, 49.9) *	14.2 (9.9, 18.5) *
Region			
North	242	38.4 (25.6, 51.1) *	12.8 (3.8, 21.8) *
Central	262	55.6 (48.1, 63.1) *	18.8 (13.2, 24.5) *
South	258	27.5 (16.8, 38.2) *	7.6 (1.6, 13.7) *
Wealth quintile			
Lowest	145	58.0 (44.5, 71.5) *	25.4 (17.3, 33.5) *
Second	138	50.6 (37.5, 63.8) *	14.6 (7.4, 21.9) *
Middle	147	39.5 (25.9, 53.1) *	11.8 (1.4, 22.3) *
Fourth	171	30.0 (19.4, 40.6) *	6.8 (2.3, 11.2) *
Highest	161	16.0 (9.6, 22.3) *	1.9 (0.0, 4.3) *
Total	**762**	**40.5 (33.8, 47.2) ***	**12.9 (8.8, 17.0) ***

Data are weighted to account for survey design.
[1] B12 depletion was defined as serum vitamin B12 concentration <220 pmol/L.
[2] B12 deficiency was defined as serum vitamin B12 concentration <150 pmol/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

CHAPTER 11. NUTRITION IN PREGNANT WOMEN

Good nutritional status in pregnancy is important for the health and survival of mothers and their children. For example, iron deficiency increases the risk of maternal mortality and low birthweight (30). Anemia in pregnancy results in a higher risk of maternal mortality, and iron deficiency anemia in pregnancy is associated with low birthweight and perinatal mortality (30). Vitamin A deficiency in pregnancy can cause night blindness, linked to increased risk of low birthweight and infant mortality (28, 30). Poor maternal iodine status can harm fetal development, with severe maternal iodine deficiency leading to cretinism (30, 32). Folate deficiency in pregnancy increases the risk of pre-eclampsia, spontaneous abortion, stillbirth, preterm delivery, low birthweight, and neural tube defects in infants (30, 33).

Data on nutritional status was available for only 30 to 35 pregnant women, depending on the indicator. It is important to note that pregnancy-specific cutoffs are not available for most micronutrients, so we used the same cutoffs in pregnant and non-pregnant WRA, except for hemoglobin to define anemia. It is also important to note that from a sample of 30 – 35 pregnant women, prevalence estimates need to be interpreted with caution.

The prevalence of iron deficiency, anemia, and iron deficiency anemia among pregnant women was 25%, 45%, and 23% respectively. The prevalence of low retinol binding protein as a proxy for vitamin A status was 15% among pregnant women. The prevalence of zinc deficiency among pregnant women was 37%. Serum folate deficiency, indicating risk of megaloblastic anemia, was 0.2% and red blood cell folate insufficiency, indicating risk of neural tube defects, was 46% among pregnant women. Approximately half (53%) of pregnant women had evidence of vitamin B12 depletion, and 9% of pregnant women were vitamin B12 deficient. The prevalence of inflammation by elevated CRP, elevated AGP, and any inflammation (elevated CRP or AGP) was 25%, 15%, and 25%, respectively for pregnant women. Approximately 1 in 10 pregnant women had a positive result on the malaria rapid diagnostic test.

CHAPTER 12. COVERAGE OF NUTRITION INTERVENTIONS

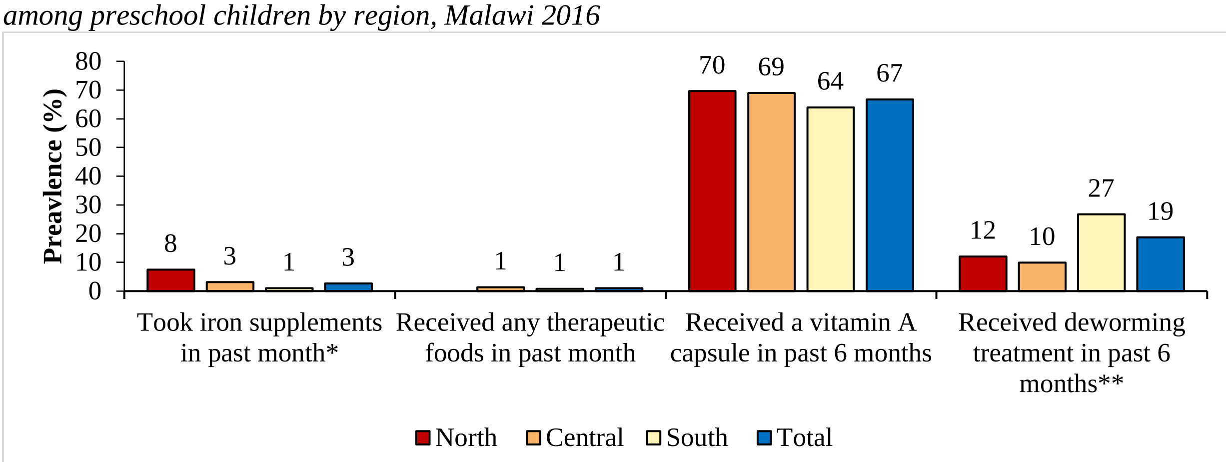
This chapter describes the coverage of nutrition-specific and nutrition-sensitive interventions. It also describes the purchasing patterns of potentially fortifiable foods. Nutrition-specific interventions, such as vitamin A and iron supplementation and delivery of therapeutic foods, are essential actions for addressing undernutrition among children (34). An example of a nutrition-sensitive intervention is deworming treatment. Helminths (commonly referred to as worms) not only cause diarrhea, but also contribute to poor absorption of nutrients, appetite loss, and, in turn, heighten vulnerability to micronutrient deficiencies.

Household food security – the ability of the household to secure adequate food for meeting the dietary needs of all household members – is an important determinant of nutrition (30). Malawi has implemented social protection programs to support household food security, including a social cash transfer program, food or cash support during droughts and floods, and coupons from the Farm Input Subsidy Program.

To address micronutrient deficiencies, Malawi has implemented mandatory fortification of salt with iodine and sugar and oil with vitamin A(35).

Figure 12.1 shows the percentage of PSC who took an iron-containing supplement in the past month, used therapeutic foods in the past month, received a vitamin A capsule in the past 6 months, and received deworming treatment in the past 6 months. Overall, the use of iron-containing supplements (3%) and therapeutic foods (1%) was low. The prevalence of PSC receiving a vitamin A capsule in the previous 6 months was 67% nationally. High dose vitamin A supplementation is generally provided through biannual campaigns, and the most recent campaign before the survey took place in June 2015. The percentage of children 12 – 59 months who received deworming treatment in the previous 6 months was 19% overall.

Figure 12.1 Prevalence of micronutrient supplementation use and other nutrition-related interventions among preschool children by region, Malawi 2016



Data are weighted to account for survey design
* Iron supplements include iron tablets, syrups, or multiple micronutrient powders
** Only children 12-59 months were eligible to receive deworming treatment, total N=1098
Sample size: North (n=389); Central (n=447); South (n=384); Total (n=1220)

Table 12.1 presents the percentages of PSC who received vitamin A capsule in the past 6 months, according to residence, region, and wealth quintile. Across these background characteristics, there was little variation.

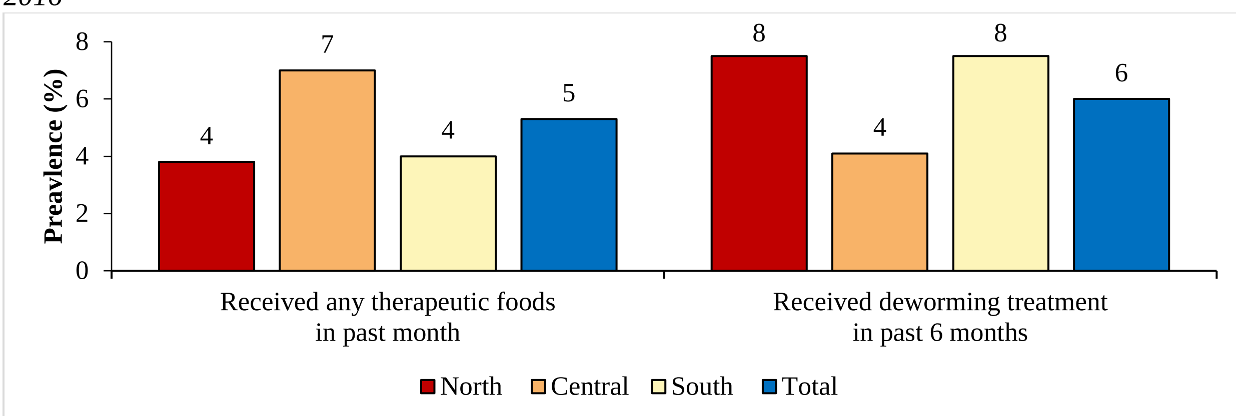
Table 12.1 Vitamin A supplementation among preschool children, Malawi 2016

Background characteristic	**Received vitamin A capsule in past 6 months**	
	N	**% (95% CI)**
Residence		
Urban	75	63.8 (34.5, 93.1)
Rural	655	67.1 (61.8, 72.5)
Region		
North	235	69.6 (62.4, 76.7)
Central	276	69.0 (60.7, 77.3)
South	219	64.0 (54.9, 73.0)
Wealth quintile		
Lowest	174	67.2 (58.4, 76.0)
Second	159	73.5 (63.4, 83.5)
Middle	156	65.8 (57.4, 74.2)
Fourth	135	57.8 (48.8, 66.8)
Highest	106	69.9 (51.8, 88.1)
Total	**730**	**66.8 (61.4, 72.3)**

Data are weighted to account for survey design.
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

Figure 12.2 presents the percentages of SAC who used therapeutic foods in the past month and received deworming treatment in the past 6 months. Nationally, 5% of SAC received therapeutic foods in the past month and 6% received deworming treatment in the past 6 months. There was little variation across background characteristics (data not shown).

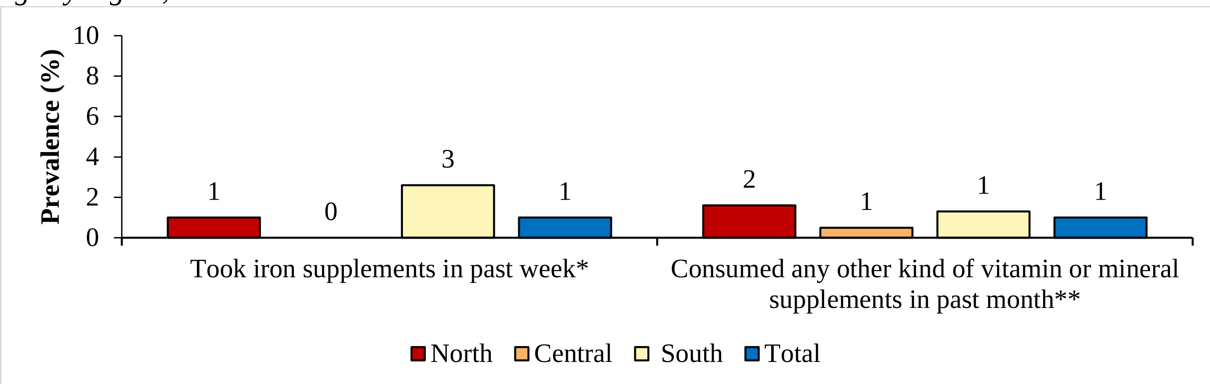
Figure 12.2 Prevalence of nutrition-related interventions among school-aged children by region, Malawi 2016[1]



Data are weighted to account for survey design.
[1] Data on iron supplements (including iron tablets or syrups) were not available in the MNS dataset for SAC. Sample size: North (n=243); Central (n=278); South (n=231); Total (n=752)

Figure 12.3 presents the percentage of non-pregnant WRA who took iron containing supplements in the past week and those that consumed any kind of vitamin or mineral supplement in the past month. Very few women took either iron containing supplements in the last week or vitamin or mineral supplements in the past month (1% nationally).

Figure 12.3 Prevalence of micronutrient supplementation use among non-pregnant women of reproductive age by region, Malawi 2016



Data are weighted to account for survey design. * Supplements include iron tablets or syrups. ** Supplements include tablets, syrup, or powder. Sample size: North (n=238); Central (n=265); South (n=260); Total (n=763)

Table 12.2 presents the prevalence of household hunger. The prevalence of households that experienced household hunger in the past 4 weeks was high (60% nationally). A total of 65% of households experienced moderate to severe hunger in rural areas, compared to 29% in urban areas. Regionally, approximately two-thirds of the Central and Southern region households experienced moderate to severe hunger, compared to 41% in the Northern region.

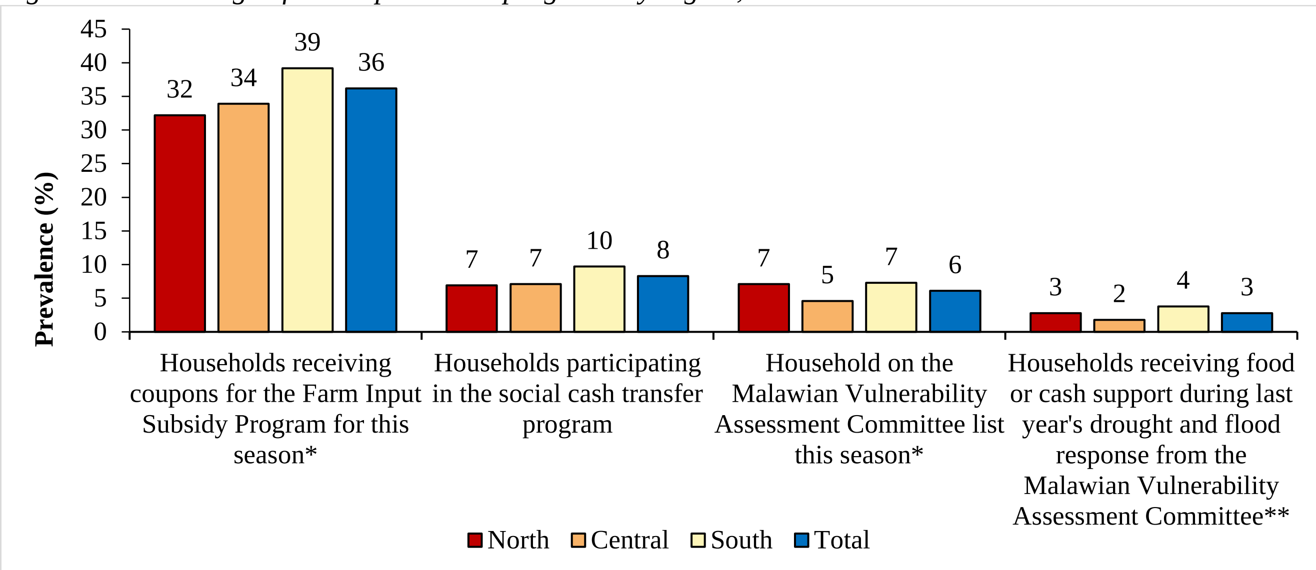
Table 12.2 Prevalence of household hunger, Malawi 2016

Background characteristic		**% of households that experienced household hunger in the past 4 weeks[1] (95% CI)**	
	Median hunger score	**Little to none (score 0-1)**	**Moderate to severe (score 2-6)**
Residence			
Urban	0.0 (-0.3, 0.3)	70.8 (56.7, 84.9)	29.2 (15.1, 43.3)
Rural	1.6 (1.3, 1.8)	35.0 (31.1, 38.6)	65.0 (61.4, 68.7)
Region			
North	0.0 (-0.6, 0.6)	59.5 (49.3, 69.6) *	40.5 (30.4, 50.7) *
Central	1.6 (0.9, 2.4)	37.6 (26.9, 48.3) *	62.4 (51.7, 73.1) *
South	1.4 (1.0, 1.8)	36.5 (29.3, 43.7) *	63.5 (56.3, 70.7) *
Total	**1.4 (1.1, 1.7)**	**39.6 (33.9, 45.3)**	**60.4 (54.7, 66.1)**

[1] Data are weighted to account for survey design, Household Hunger Scale used; range is 0-6.(36)
*signifies variable differs across groups (p<0.05) using Chi-square test.

Figure 12.4 presents the coverage of social protection programs in Malawi. Just over a third of households in Malawi received coupons for the Farm Input Subsidy program (36%). Approximately 8% of households participated in the social cash transfer program, 6% of households reported being on the Malawian Vulnerability Assessment Committee list for 2015-2016, and 3% of households reported receiving food or cash support during last year’s drought and flood response from the Malawian Vulnerability Assessment Committee for 2014-2015.

Figure 12.4 Coverage of social protection programs by region, Malawi 2016



Data are weighted to account for survey design, *This season refers to the 2015-2016 season. ** Last year refers to 2014-2015.
Sample size: North (n=740); Central (n=759); South (n=751); Total (n=2250)

In Malawi, there are three food vehicles that are mandated to be fortified: salt with iodine and sugar and oil with vitamin A. Table 12.3 presents the prevalence of households that had salt, sugar and oil available for testing on the day of the survey. Overall, 95% of households had salt available in the household on the day of the survey, 74% of households had sugar and 77% had oil. There were no statistical differences in availability of each of these vehicles by background characteristics.

Table 12.3 Households with presence of salt, sugar, oil available for testing

Background characteristics		HH has salt for testing[1]	HH has sugar for testing[1]	HH has oil for testing[1]
	N	% (95% CI)	% (95% CI)	% (95% CI)
Residence				
Urban	320	95.7 (90.0, 100.0)	82.2 (62.8, 100.0)	72.8 (45.8, 99.8)
Rural	1770	94.5 (93.1, 95.9)	73.0 (66.2, 79.7)	77.0 (71.1, 82.9)
Region				
North	684	95.1 (93.1, 97.0)	78.5 (71.6, 85.3)	79.2 (73.1, 85.4)
Central	703	96.4 (94.5, 98.2)	79.0 (68.6, 89.4)	79.3 (70.4, 88.2)
South	703	93.0 (90.0, 95.1)	68.6 (59.2, 78.1)	73.1 (63.4, 82.8)
Wealth quintile				
Lowest	426	92.9 (89.8, 96.1)	68.4 (57.5, 79.3)	71.2 (62.8, 79.5)
Second	414	92.5 (89.5, 95.4)	69.3 (61.5, 77.0)	76.0 (69.3, 82.6)
Middle	420	95.6 (93.1, 98.0)	75.7 (67.3, 84.0)	79.2 (73.4, 84.9)
Fourth	433	97.1 (95.3, 99.0)	76.4 (68.1, 84.6)	78.2 (70.1, 86.4)
Highest	397	95.5 (91.3, 99.6)	85.3 (73.1, 97.5)	78.3 (62.2, 94.3)
Total	**2090**	**94.7 (93.3, 96.0)**	**74.2 (67.6, 80.7)**	**76.5 (70.3, 82.6)**

Data are weighted to account for survey design, CI-Confidence Interval
[1]No significant differences across groups (p<0.05) using Chi-square test

Table 12.4 presents the proportion of salt, sugar and oil samples that had food specimens labelled as fortified. Overall 12% of the salt, 24% of sugar and 6% of the oil were labelled as fortified. There were differences in proportion of all three foods labelled as fortified by residence, region and wealth quintile, most notably for salt and sugar.

Table 12.4 Salt, sugar and oil labelled as fortified

Background characteristics		Salt labelled as fortified	Sugar labelled as fortified	Oil labelled as fortified
	N	% (95% CI)	% (95% CI)	% (95% CI)
Residence				
Urban	320	35.1 (24.5, 45.7) *	43.4 (29.1, 57.7) *	17.6 (2.8, 32.5) *
Rural	1770	8.7 (6.6, 10.7) *	20.6 (16.1, 25.2) *	4.8 (3.3, 6.3) *
Region				
North	684	24.2 (14.2, 34.1) *	59.4 (46.8, 72.1) *	12.0 (5.8, 18.1) *
Central	703	12.0 (8.0, 15.9) *	19.6 (13.7, 25.4) *	3.7 (2.0, 5.5) *
South	703	9.2 (3.7, 14.6) *	18.2 (11.3, 25.1) *	7.4 (3.8, 11.1) *
Wealth quintile				
Lowest	426	3.0 (0.9, 5.1)*	14.9 (9.0, 20.8) *	1.8 (0.3, 3.3) *
Second	414	5.6 (2.7. 8.5)*	14.3 (9.1, 19.5) *	1.2 (0.0, 2.7) *
Middle	420	10.4 (6.2, 14.7)*	13.4 (7.7, 19.1) *	4.2 (0.9, 7.6) *
Fourth	433	14.3 (9.6, 18.9)*	30.8 (21.0. 40.6) *	6.4 (3.0, 9.7) *
Highest	397	36.0 (28.6, 43.4)*	52.8 (44.4, 61.3) *	24.8 (13.5, 36.1) *
Total	**2090**	**12.1 (8.9, 15.3)**	**23.9 (19.4, 28.4)**	**6.4 (4.4, 8.3)**

Data are weighted to account for survey design, CI-Confidence Interval
*signifies variable differs across groups (p<0.05) using Chi-square test

Table 12.5 presents the proportion of households with iodized salt. Nationally, three-quarters of households had iodized salt. Table 12.5 presents more details about the iodine levels in salt. The median salt iodine content was 32 ppm. Among all households, 41% had salt with an adequate iodine level, 34% had salt with an excess iodine level, and 25% had salt with either an inadequate iodine level or no iodine.

Table 12.5 Proportion of households with iodized salt as measured by titration, Malawi 2016

Background characteristic	**Total number of households**	**% households with iodized salt >15 ppm**
	N	% (95% CI)
Residence		
Urban	283	89.7 (77.1, 100.0)
Rural	1660	73.1 (66.9, 79.3)
Region		
North	681	63.2 (53.2, 73.2)
Central	702	77.3 (66.9, 87.7)
South	700	75.3 (66.2, 84.5)
Wealth quintile		
Lowest	386	73.9 (64.0, 83.7)
Second	372	72.2 (64.5, 79.8)
Middle	390	74.2 (67.3, 81.1)
Fourth	407	72.5 (64.1, 80.9)
Highest	364	87.2 (78.2, 96.2)
Total	**1943**	**74.8 (68.5, 81.1)**

Data are weighted to account for survey design, CI-Confidence Interval
*signifies variable differs across groups (p<0.05) using Chi-square test

Table 12.6 Distribution of households by iodine level in salt as measured by titration, Malawi 2016

Distribution of households by iodine level in salt						
Background characteristic	**N**	**Median (Q1, Q3) salt iodine content (ppm)**	**% None (0 ppm) (95% CI)**	**Inadequate % (0-15 ppm) (95% CI)**	**Adequate % (15-39.9 ppm) (95% CI)**	**Excess % (40+ ppm) (95% CI)**
Residence						
Urban	283	36 (16, 50)	1.8 (0, 4.8)	8.4 (0, 18.6)	51.0 (25.2, 77.0)	38.7 (20.9, 56.4)
Rural	1660	31 (15, 46)	3.1 (1.5, 4.8)	23.8 (17.6, 29.9)	39.9 (35.7, 44.1)	33.2 (29.0, 37.3)
Region						
North	681	27 (9, 42)	15.3 (6.4, 24.2)	21.5 (15.6, 27.4)	35.7 (30.1, 41.2)	27.5 (20.3, 34.8)
Central	702	32 (19, 43)	2.1 (0.6, 3.5)	20.7 (10.5, 30.8)	46.7 (37.2, 56.1)	30.6 (26.1, 35.1)
South	700	37 (19, 52)	0.6 (0.0, 1.3)	24.0 (14.9, 33.2)	36.6 (30.9, 42.4)	38.7 (31.0, 46.4)
Wealth quintile						
Lowest	386	32 (15, 44)	3.8 (0.6, 7.0)	22.3 (12.4, 32.2)	45.3 (36.1, 54.4)	28.6 (21.9, 35.3)
Second	372	29 (12, 42)	3.5 (1.4, 5.6)	24.4 (17.0, 31.7)	45.9 (38.5, 53.2)	26.3 (19.1, 33.4)
Middle	390	30 (13, 45)	2.5 (0.8, 4.1)	23.4 (16.6, 30.1)	33.9 (27.7, 40.1)	40.3 (32.3, 48.2)
Fourth	407	32 (15, 47)	3.2 (0.8, 5.6)	24.3 (16.1, 32.4)	39.6 (32.0, 47.1)	33.0 (26.6, 39.4)
Highest	364	38 (20, 51)	1.4 (0.0, 2.9)	11.4 (3.2, 19.6)	39.7 (22.4, 57.0)	47.5 (33.2, 61.8)
Total	**1943**	**32 (15, 47)**	**3.0 (1.5, 4.5)**	**22.2 (16.1, 28.4)**	**41.0 (35.9, 46.2)**	**33.8 (29.7, 37.8)**

Data are weighted to account for survey design, CI-Confidence Interval
*signifies variable differs across groups (p<0.05) using Chi-square test

Table 12.7 presents the coverage of oil fortified with vitamin A. Nationally, a small percentage of households had adequately fortified oil (12%). The percentages of households with adequately fortified oil were highest in the Northern and Southern regions (16% and 20% respectively) and lowest in the Central region (3%). There was no significant variation by residence and wealth quintile.

Table 12.7 Household coverage of oil fortified with vitamin A, Malawi 2016

Background characteristic	**Total number of households**	**% households with adequately fortified oil (95% CI)** [1]
	N	% (95% CI)
Residence		
Urban	221	7.7 (3.0, 12.5)
Rural	1220	12.4 (7.1, 17.8)
Region		
North	403	16.1 (7.6, 24.8)*
Central	521	2.9 (0.0, 5.9) *
South	517	20.4 (10.5, 30.3) *
Wealth quintile		
Lowest	277	11.1 (5.2, 16.9)
Second	270	11.6 (5.5, 17.7)
Middle	287	15.4 (8.2, 22.5)
Fourth	301	9.9 (4.6, 15.3)
Highest	289	12.0 (5.9, 18.2)
Total	**1441**	**11.9 (7.2, 16.7)**

Data are weighted to account for survey design, CI-Confidence Interval
[1] Adequately fortified oil is defined as $\geq$ 20 mg/kg
*p <.01 by Chi-square test for difference in household coverage of fortified oil by region

Table 12.8 presents household coverage of sugar fortified with vitamin A in Malawi. Overall, 58% of households had adequately fortified sugar (79% in the Northern region, 63% in the Central region, and 46% in the Southern region).

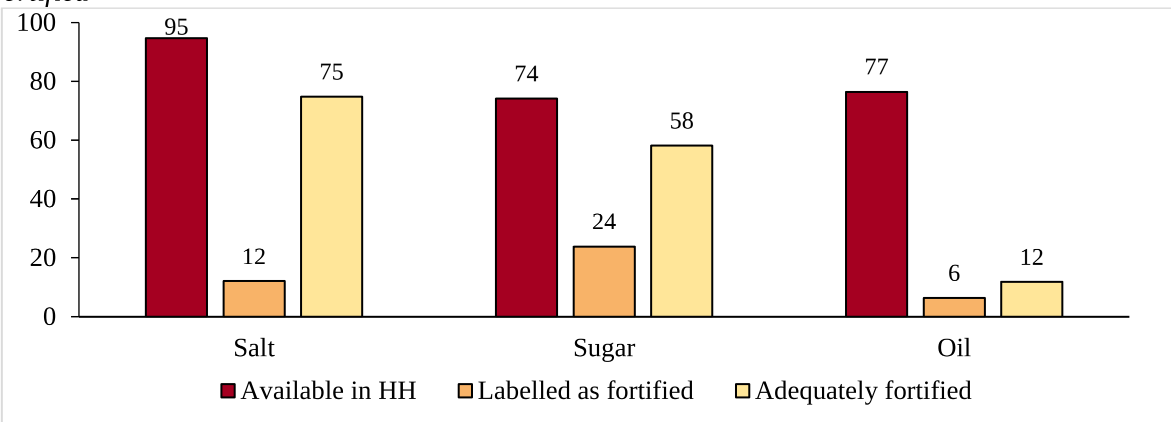
Table 12.8 Household coverage of sugar fortified with vitamin A, Malawi 2016

Background characteristic	**Total number of households**	**% households with adequately fortified sugar (95% CI)** [1]
	N	% (95% CI)
Residence		
Urban	260	68.6 (60.4, 76.8)
Rural	1307	56.8 (50.3, 63.3)
Region		
North	512	78.7 (72.0, 85.5)
Central	562	63.2 (53.6, 72.7)
South	493	46.2 (38.6, 53.7)
Wealth quintile		
Lowest	299	60.9 (50.5, 71.4)
Second	280	54.4 (44.1, 64.8)
Middle	304	55.3 (45.1, 65.5)
Fourth	329	60.5 (53.5, 67.4)
Highest	337	61.4 (48.3, 74.4)
Total	**1567**	**58.2 (52.3, 64.2)**

Data are weighted to account for survey design, CI-Confidence Interval
[1] Adequately fortified sugar is defined as $\geq$ 4mg/kg
*signifies variable differs across groups (p<0.05) using Chi-square test

Figure 12.5 presents the portion of households with salt, sugar and salt, the proportion with specimens labelled as fortified and the proportion of households with adequately fortified specimens. Although more than 70% of all households have these vehicles, far fewer households have foods that are adequately fortified.

Figure 12.5 Coverage of food vehicles available, and among them being labelled as fortified and adequately fortified



Data are weighted to account for survey design. Labelled as fortified and adequately fortified are among the households that had the vehicle available

Table 13.9 shows the brands of salt, sugar and oil at a national level. The majority of samples for all three vehicles had no brand name, 88% of salt samples and 76% of sugar and 94% of oil were not labelled. For the salt that was available, there were a variety of brands, with no one predominant brand. For sugar, 23% of the sugar was just one brand, Ilovo. For oil, very little was labelled and there was no predominant brand.

Table 12.9 Brands of household salt, sugar, and oil available in households for testing

Brand for each food item	**Number of households with brand**	**% households with brand (95% CI)**
	N	% (95% CI) [1]
Salt brand		
Botsalt	55	2.6 (1.4, 3.7)
Malawi	3	0.2 (0.0, 0.5)
Rab’s	51	1.7 (0.4, 2.9)
Fa rahima	39	2.9 (0.7, 5.2)
Seafresh	8	0.4 (0.0, 0.8)
Family pride	7	0.2 (0.0, 0.4)
Not labeled	1605	87.9 (84.7, 91.1)
Other label	164	4.2 (2.7, 5.7)
Total	***1932***	***100.0***
Sugar brand		
Ilovo	512	22.6 (18.1, 27.1)
Not labeled	1007	76.1 (71.6, 80.6)
Other label	30	1.3 (0.5, 2.1)
Total	***1549***	***100.0***

Oil brand		
Kukoma	29	1.8 (0.6, 2.9)
Sunfoil	23	0.9 (0.3, 1.6)
Not labeled	1436	93.6 (91.7, 95.6)
Other label	98	3.5 (2.2, 5.4)
Total	***1586***	***100.0***

Data are weighted to account for survey design, CI-Confidence Interval

Table 12.10 shows the purchasing patterns of wheat flour products and maize flour in the 7 days prior to the survey. Over half the households in Malawi bought a wheat flour product in the week prior to the survey and almost all the households (91%) purchased maize flour. The prevalence of households in urban areas purchasing wheat flour products was higher in urban areas (90%) compared to rural areas (57%). More households in the Southern region bought wheat flour products (71%) compared to Central and North, 55% and 44% respectively. Purchase also varied by wealth quintile, with only 39% of households in the lowest quintile purchasing wheat products compared to 87% of households in the highest wealth quintile.

Most households in Malawi bought maize flour in the 7 days prior to the survey 91%. More households in the Southern region purchased maize flour 97% compared to the North (85%) and Central (84%) regions.

Table 12.10 Purchasing patterns of products made from wheat flour and purchase of maize flour in the 7 days prior to the survey

Background characteristics		**Household purchasing any wheat flour products[1]**	**Household purchasing any maize flour**
	N	% (95% CI)	% (95% CI)
Residence			
Urban	320	89.8 (80.9, 98.7) *	90.5 (81.4, 99.7)
Rural	1770	57.1 (52.0, 62.1) *	90.5 (86.5, 94.4)
Region**			
North	684	43.8 (32.9, 54.8) *	85.1 (76.9, 93.3) *
Central	703	55.4 (42.8, 68.0) *	84.4 (75.8, 93.1) *
South	703	71.1 (64.9, 77.4) *	97.4 (95.4, 99.5) *
Wealth quintile			
Lowest	426	38.5 (28.3, 48.8)*	88.6 (83.3, 94.0)
Second	414	54.6 (48.6, 60.6) *	88.0 (82.4, 93.7)
Middle	420	61.9 (55.6, 68.2) *	93.2 (90.1, 96.3)
Fourth	433	74.9 (68.0, 81.8) *	93.6 (90.0, 97.3)
Highest	397	87.2 (79.7, 94.7) *	88.9 (81.9, 95.9)
Total	**2090**	**61.2 (55.0, 67.5)**	**90.5 (86.8, 94.1)**

[1] Wheat flour products is anything purchased made from wheat flour including, pasta, bread, biscuits, mandazi (doughnuts), and cake.
Data are weighted to account for survey design, CI-Confidence Interval
*signifies variable differs across groups (p<0.05) using Chi-square test.

APPENDICES

Table A.1 2015-16 Malawi DHS/Nutrition Survey Referral Criteria

	Preschool children	School children	Women	Pregnant women	Men	Comments
Severe anemia	Hb <7.0 g/dL	Hb <7.0 g/dL	Hb <7.0 g/dL	Hb <7.0 g/dL	Hb <7.0 g/dL	Refer to clinics
Malaria	+RDK	+RDK	+RDK	+RDK	+RDK	Refer to clinics
Moderate or severe acute malnutrition	MUAC < 12.5cm or bilateral edema	MUAC < 16.0 cm or bilateral edema	MUAC < 19.0cm	MUAC < 22.0cm	MUAC < 19.0cm	Refer to clinics
Urinary Schistosomiasis	Hematuria	Hematuria	-	Hematuria	Hematuria	Refer to clinics
Other illness	Diarrhea with dehydration, fever, pneumonia, etc.					At discretion of nurse, refer to clinic

Hb = Hemoglobin; RDK = Rapid diagnostic test kit; MUAC = Mid-upper arm circumference; Bilateral edema = When indentation in both feet remain after normal thumb pressure is applied to the feet of preschool or school aged children, which indicates retention of water in tissues of the body; Hematuria = Presence of blood in urine.

Table A.2 Details of biological indicators

Indicator	**Laboratory test**	**Sample volume**	**Location of testing**
Anemia	Hemoglobin, using Hemocue 301	10 µL	Field test
Malaria	Rapid diagnostic test kit	10 µL	Field test
Vitamin A deficiency	Retinol binding protein-ELISA (37)	30 µL	VitMin Laboratory (Germany)
Vitamin A deficiency	Serum retinol –HPLC	250µL	INCAP Laboratory (Guatemala)
Vitamin A status	Modified relative dose response (MRDR)-HPLC (28)	250µL	INCAP Laboratory (Guatemala)
Iron deficiency	Ferritin and soluble transferrin receptor- ELISA (37)	30 µL	VitMin Laboratory (Germany)
Inflammation	C-reactive protein and α–1 acid glycoprotein-ELISA (37)	30 µL	VitMin Laboratory (Germany)
Zinc deficiency	serum zinc- Atomic emission spectrometry (11)	100µL	CHORI Laboratory (Oakland, USA)
Vitamin B12 deficiency	Immunoassay	500 µL	CDC Laboratory (Atlanta, GA, USA)
Serum folate deficiency	Microbiologic assay (33)	250 µL	CDC Laboratory (Atlanta, GA, USA)
Red blood cell folate deficiency	Microbiologic assay (33)	250 µL	CDC Laboratory (Atlanta, GA, USA)
Urinary schistosomiasis	Hematuria- dipstick	~5 mL	Field test
Urinary iodine	Urinary iodine- Sandell-Kolthoff reaction (Spectrophotometry) (38)	250µL	CHSU Laboratory (Malawi)
Inherited blood disorders (sickle cell, alpha-thalassemia, G6PD deficiency)	Dried blood spot- PCR	100µL	CHSU Laboratory, Malawi and CCHMC Laboratory (Cincinnati, USA)

All personnel responsible for collecting, processing, storing, shipping, and analyzing biologic samples followed procedures outlined in a Laboratory Manual provided by CDC. All laboratories handling biologic samples collected from participants were required to successfully participate in VITAL-EQA and EQUIP, CDC's external quality assurance programs. All laboratories conducting sample analyses carried out quality control procedures. Laboratories responsible for analyzing survey samples were required to successfully pass the external quality assurance programs. Additionally, backup samples for additional analyses (if needed) were stored at CHSU in Lilongwe.

Table A.3 Design effects for main micronutrient outcomes

Outcome	Design Effect
Anemia	
Preschool children	1.9
School-aged children	2.3
Women of reproductive age	1.8
Men	1.8
Iron Deficiency – adjusted for inflammation	
Preschool children	5.0
School-aged children	1.6
Women of reproductive age	1.7
Men	1.5
Iron Deficiency – not adjusted for inflammation	
Preschool children	3.3
School-aged children	1.8
Women of reproductive age	1.8
Men	1.5
Iron Deficiency Anemia	
Preschool children	2.9
School-aged children	2.3
Women of reproductive age	1.5
Men[1]	--
Inherited Blood Disorders	
Preschool children – alpha thalassemia	3.3
Preschool children – Sickle cell	0.4
Preschool children – G6PD	2.1
Low retinol binding protein	
Preschool children	2.7
School-aged children	2.9
Women of reproductive age	2.5
Men	0.5
Zinc Deficiency	
Preschool children	4.1
School-aged children	5.2
Women of reproductive age	3.3
Men	2.5
Vitamin B-12 Deficiency	
Women of reproductive age	2.9
Serum Folate Deficiency	
Women of reproductive age	2.0
Red Blood Cell Folate Deficiency	
Women of reproductive age	3.4

[1] The prevalence of IDA in men is 0, and therefore a design effect cannot be calculated.

Table A.4 Prevalence of iron deficiency, not corrected for inflammation, among preschool children, Malawi 2016

Background characteristic	Iron deficiency[1]	
	N	% (95% CI)
Age category		
6 – 23 mo	332	26.6 (18.4, 34.9) *
24 – 59 mo	770	3.5 (1.7, 5.4) *
Sex		
Male	539	9.4 (5.1, 13.7)
Female	563	12.1 (8.4, 15.8)
Residence		
Urban	128	27.5 (23.5, 31.5)
Rural	974	8.8 (6.2, 11.5)
Region		
North	383	11.9 (7.4, 16.5)
Central	395	10.1 (3.9, 16.2)
South	324	11.1 (6.6, 15.5)
Wealth quintile		
Lowest	252	7.6 (4.0, 11.3)
Second	220	9.5 (4.6, 14.3)
Middle	258	7.6 (3.1, 12.0)
Fourth	207	13.1 (5.4, 20.7)
Highest	163	23.7 (11.2, 36.3)
Total	**1102**	**10.7 (7.4, 14.1)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Iron deficiency defined as serum ferritin < 12 µg/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table A.5 Prevalence of iron deficiency, not corrected for inflammation, among school-aged children, Malawi 2016

Background characteristic	**Iron deficiency[1]**	
	N	% (95% CI)
Age category		
5 – 10 y	502	2.2 (0.4, 3.9)
11 – 14 y	256	4.3 (0.4, 8.2)
Sex		
Male	386	2.8 (0.7, 5.0)
Female	372	3.0 (0.4, 5.6)
Residence		
Urban	93	1.2 (0.0, 3.1)
Rural	665	3.0 (1.3, 4.8)
Region		
North	256	1.9 (0.0, 3.9)
Central	279	3.1 (0.3, 5.7)
South	223	3.0 (0.5, 5.5)
Wealth quintile		
Lowest	147	1.1 (0.0, 3.4)
Second	137	4.5 (0.8, 8.1)
Middle	187	4.2 (0.0, 9.2)
Fourth	157	1.8 (0.0, 3.8)
Highest	130	3.4 (0.0, 8.0)
Total	**758**	**2.9 (1.3, 4.5)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Iron deficiency defined as serum ferritin < 15 µg/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Table A.6 Prevalence of iron deficiency, not corrected for inflammation, among non-pregnant women of reproductive age, Malawi 2016

Background characteristic	**Iron deficiency[1]**	
	N	% (95% CI)
Age category		
15 – 19 y	159	9.2 (4.1, 14.3)
20 – 29 y	270	13.4 (8.5, 18.4)
30 – 49 y	323	10.7 (6.3, 15.0)
Residence		
Urban	121	15.8 (6.7, 24.9)
Rural	631	15.1 (11.5, 18.7)
Region		
North	240	25.4 (16.8, 34.4)*
Central	261	10.2 (6.7, 13.9)*
South	251	17.0 (11.3, 22.6)*
Wealth quintile		
Lowest	141	9.9 (3.7, 16.0)
Second	136	11.4 (5.4, 17.4)
Middle	144	9.2 (4.3, 14.2)
Fourth	171	12.4 (6.2, 18.6)
Highest	160	15.6 (8.7, 22.5)
Total	**752**	**11.4 (8.3, 14.6)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1]Iron deficiency defined as serum ferritin < 15 µg/L.
*signifies variable differs across groups ($p<0.05$) using Chi-square test.

Table A.7 Description of RBP: retinol in subsample and regression equation used to adjust the RBP cutoff in this survey

Among the subsample where retinol was measured, a regression model was used to generate an equation with retinol as the outcome (y) and RBP is the exposure. Then, we solved for RBP, setting retinol = 0.7 µmol/L. The regression was calculated for the following groups:

- Preschool children only (n=76); 0.7 = 0.3788 + 0.7549*RBP; yielding RBP cut off for deficiency calculated to be 0.4255
- School age children only (n=91); 0.7 = 0.2747 + 0.9291*RBP; yielding RBP cut off for deficiency calculated to be 0.4578
- Women of reproductive age only (n=91); 0.7 = 0.2747 + 0.9291*RBP; yielding RBP cut off for deficiency calculated to be 0.4578
- The entire group (n=260); 0.7 = 0.2914 + 0.8817*RBP; yielding RBP cut off for deficiency calculated to be 0.4634

Thus, RBP=0.46 µmol/L was decided to be an appropriate cut off equivalent to retinol=0.7 µmol/L in this survey.

Scatter plot of retinol vs. RBP for children and women combined (n=260)

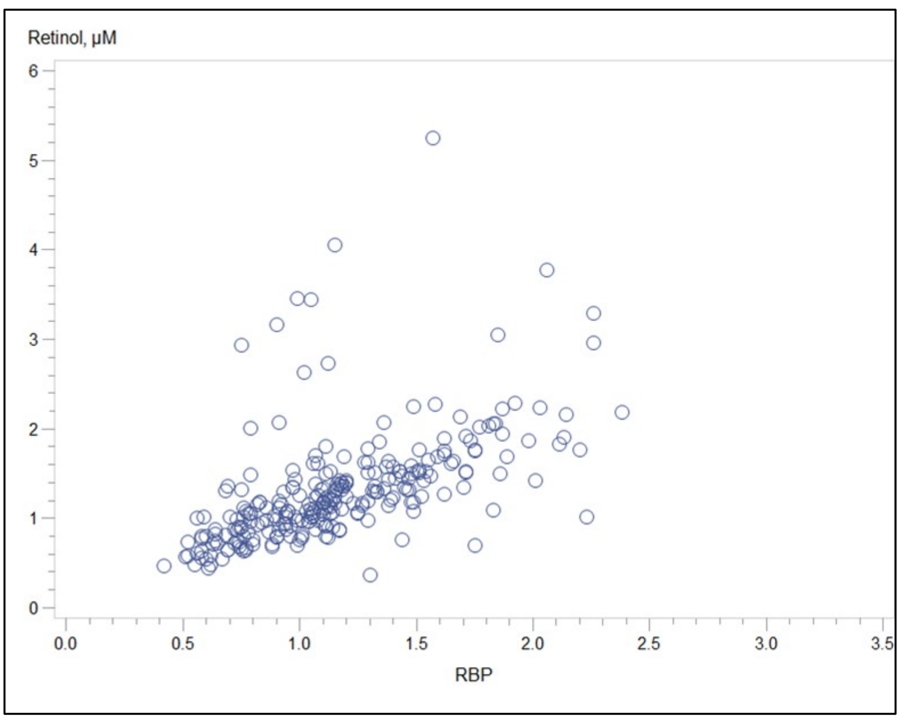


Table A.8 Anthropometry standard deviations for PSC and SAC

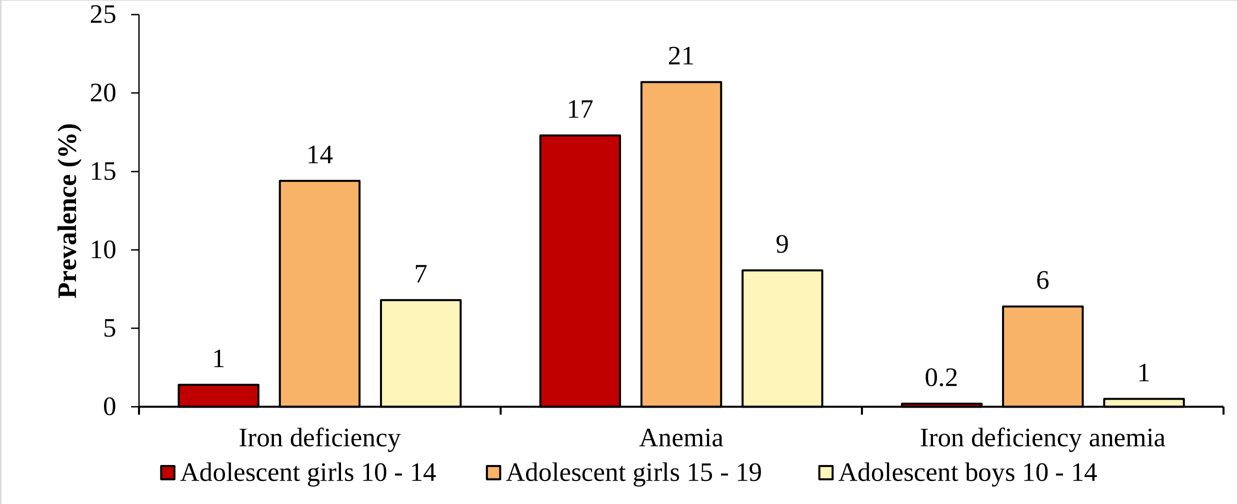
	N	Standard deviation
Preschool Children		
Weight-for-age Z-score	1,184	1.09
Length-for-age Z-score	1,184	1.39
Weight-for-length Z-score	1,219	1.19
School Age Children		
Weight-for-age Z-score	431	1.13
Length-for-age Z-score	784	1.29

Table A.9 Comparison of folate status indicators for risk of megaloblastic anemia, increased homocysteine, and risk of neural tube defect among non-pregnant women of reproductive age

Background characteristic		**Serum folate < 6.8 nmol/L[1]**	**Serum folate < 14.0 nmol/L[2]**	**Red blood cell folate < 748 nmol/L[3]**
	N	% (95% CI)	% (95% CI)	% (95% CI)
Age category				
15 – 19 y	162	2.9 (0.0, 6.0) *	30.0 (18.4, 41.7)	75.9 (67.4, 84.5)
20 – 29 y	274	7.0 (3.1, 10.9) *	34.6 (26.3, 42.9)	83.6 (76.5, 90.7)
30 – 49 y	317	10.7 (6.5, 14.9) *	36.8 (29.1, 44.4)	82.0 (74.9, 89.0)
Residence				
Urban	118	3.3 (0.0, 7.1)	51.7 (31.6, 71.8)	98.3 (95.9, 100.0) *
Rural	635	8.1 (5.2, 11.0)	32.8 (26.7, 38.8)	79.7 (73.7, 85.6) *
Region				
North	238	8.5 (4.0, 12.9)	36.6 (26.9, 46.3) *	87.3 (80.4, 94.3)
Central	258	6.3 (2.5, 10.1)	27.0 (19.2, 34.8) *	83.8 (76.3, 91.3)
South	257	8.6 (4.2, 13.0)	40.6 (30.5, 50.8) *	77.8 (68.4, 87.2)
Wealth quintile				
Lowest	145	4.3 (0.8, 7.9)	21.1 (14.4, 27.9) *	80.7 (72.6, 88.8)
Second	137	7.6 (1.0, 14.2)	31.8 (20.4, 43.2) *	76.1 (65.8, 86.4)
Middle	143	7.2 (3.3, 11.2)	33.6 (23.4, 43.8) *	80.4 (70.6, 90.2)
Fourth	170	11.2 (4.4, 18.0)	40.5 (27.0, 54.0) *	83.2 (75.2, 91.2)
Highest	158	7.6 (1.3, 13.9)	52.1 (36.0, 68.1) *	88.4 (80.1, 96.6)
Total	**753**	**7.6 (5.0, 10.3)**	**34.5 (28.6, 40.5)**	**81.4 (75.7, 87.0)**

Data are weighted to account for survey design. CI, Confidence Interval.
[1] Serum folate deficiency based on risk of megaloblastic anemia defined as serum folate concentration < 6.8 nmol/L.
[2] Serum folate deficiency based on risk of elevated homocysteine defined as serum folate concentration < 14.0 nmol/L.
[3] Red blood cell folate (RBCF) insufficiency based on risk of increase in neural tube defects defined as RBCF < 748 nmol/L.
*signifies variable differs across groups (p<0.05) using Chi-square test.

Figure A.1 Iron deficiency[1], anemia[2], and iron deficiency anemia[3] among adolescents, Malawi 2016



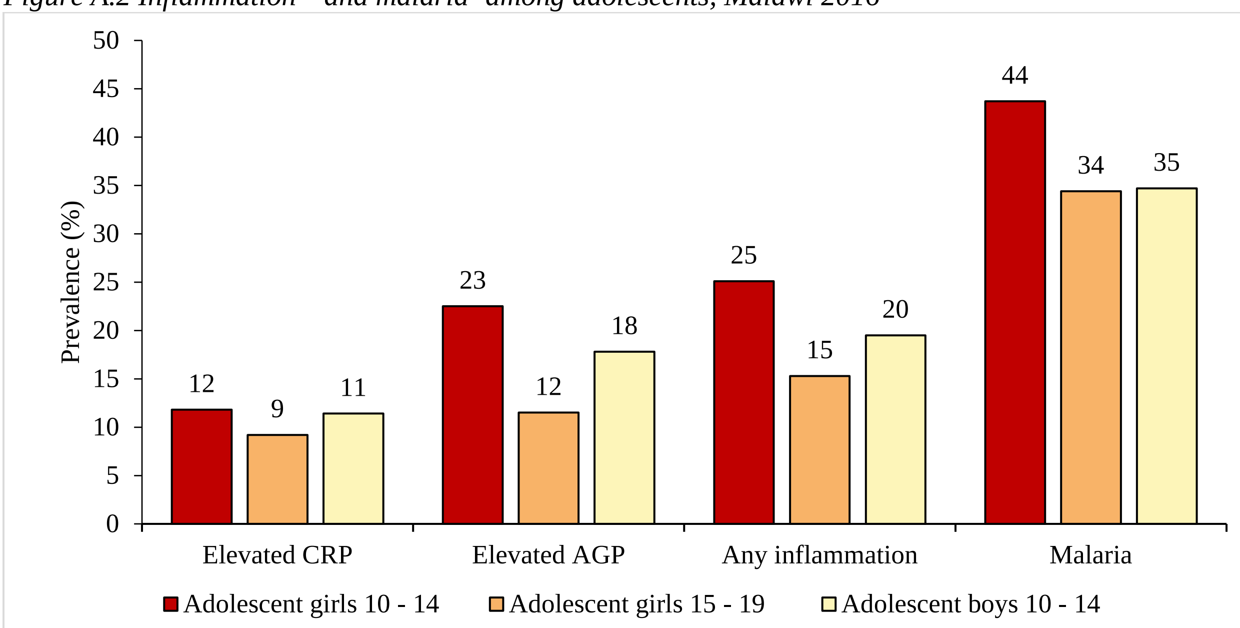
Data are weighted to account for survey design, but sampling was not deigned to produce nationally representative estimates for the adolescent population in Malawi. Sample size for adolescent girls 10-14: iron deficiency (n=184); anemia (n=194); iron deficiency anemia (n=184); for adolescent girls 15-19: iron deficiency (n=159); anemia (n=170); iron deficiency anemia (n=166); for adolescent boys 10-14: iron deficiency (n=160); anemia (n=166); iron deficiency anemia (n=160)

[1] Iron deficiency defined as ferritin < 15 µg/L. Ferritin concentrations were adjusted for inflammation.

[2] Anemia defined as hemoglobin < 11.5 g/dL for 10-11 y and <12.0 g/dL for 12-19 y. Hb was altitude-adjusted for all adolescents and adjusted for smoking in adolescents 15-19.

[3] Iron deficiency anemia defined as those with inflammation-corrected iron deficiency plus anemia. Note: there was no Vitamin A deficiency among adolescents so it is not presented in the figure.

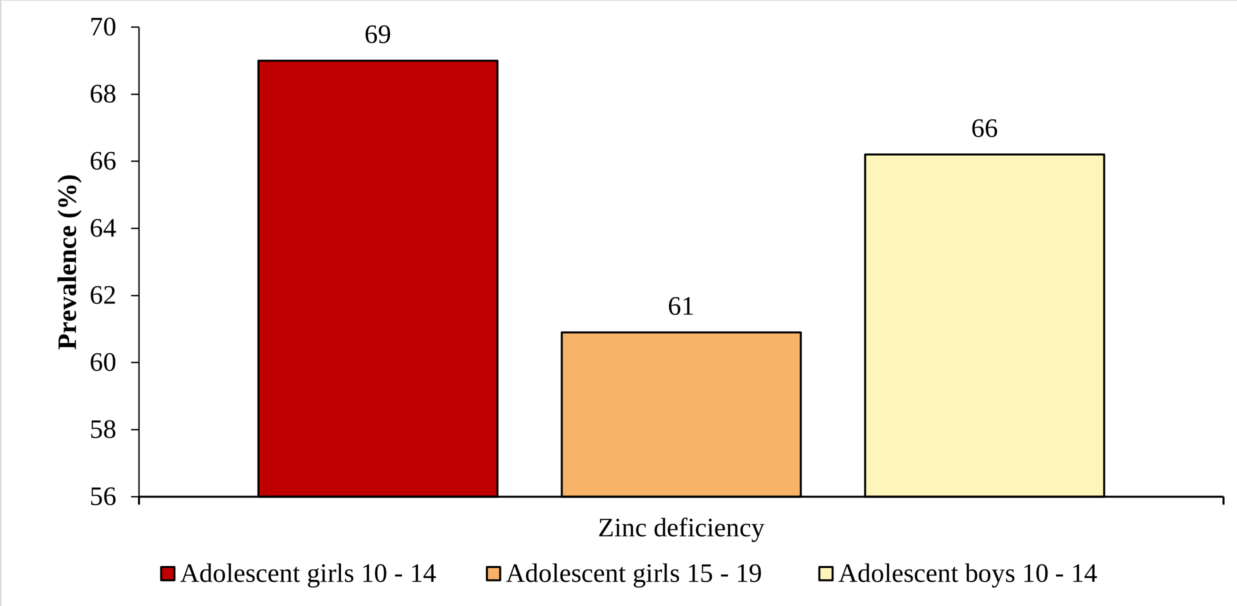
Figure A.2 Inflammation[1,2] and malaria[3] among adolescents, Malawi 2016



Data are weighted to account for survey design, but sampling was not deigned to produce nationally representative estimates for the adolescent population in Malawi. Sample size for adolescent girls 10-14: elevated CRP, elevated AGP, any inflammation (n=185); malaria (n=193); for adolescent girls 15-19: elevated CRP, elevated AGP, any inflammation (n=176); malaria (n=175); for adolescent boys 10-14: elevated CRP, elevated AGP, any inflammation (n=160); malaria (n=163)

[1] Elevated C-reactive protein (CRP) defined as CRP > 5 mg/L. [2] Elevated alpha-1-acid glycoprotein (AGP) defined as AGP > 1 g/L. [3]Measured by rapid malaria test kit

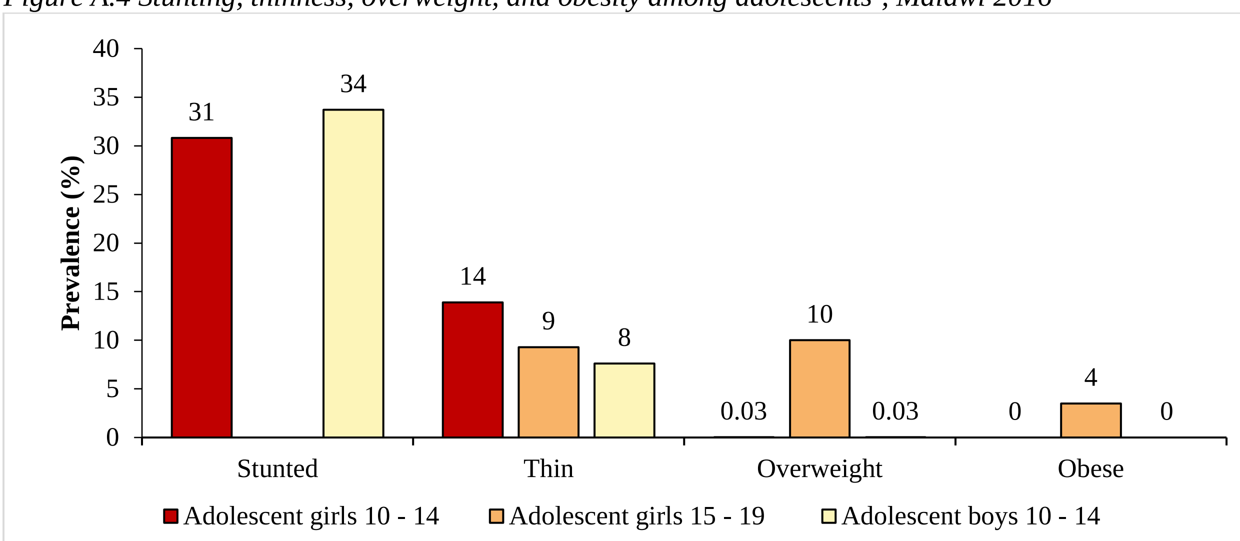
Figure A.3 Zinc deficiency[1] among adolescents, Malawi 2016



Data are weighted to account for survey design, but sampling was not deigned to produce nationally representative estimates for the adolescent population in Malawi. Sample size for adolescent girls 10-14: zinc deficiency (n=183); for adolescent girls 15-19: zinc deficiency (n=168); for adolescent boys 10-14: zinc deficiency (n=162)

[1]For adolescent girls and boys 10 y, zinc deficiency defined as serum zinc concentrations: < 65 µg/dL for morning, non-fasting; and < 57 µg/dL for afternoon, non-fasting. For adolescent girls 11-19 y, zinc deficiency defined as serum zinc concentrations: < 66 µg/dL for morning, non-fasting; < 59 µg/dL for afternoon, non-fasting; and < 70 µg/dL for morning, fasting. For adolescent boys 11-14 y, zinc deficiency defined as serum zinc concentrations: < 70 µg/dL for morning, non-fasting; < 61 µg/dL for afternoon, non-fasting; and < 74 µg/dL for morning, fasting.

Figure A.4 Stunting, thinness, overweight, and obesity among adolescents[1], Malawi 2016



Data are weighted to account for survey design, but sampling was not deigned to produce nationally representative estimates for the adolescent population in Malawi. Sample size for adolescent girls 10-14: stunted (n=194); thin, overweight, obese (n=193); for adolescent girls 15-19: thin, overweight, obese (n=161); for adolescent boys 10-14: stunted (n=166); thin, overweight, obese (n=166)

[1]For adolescent girls and boys 10-14 stunting defined as HAZ < -2, thin defined as BAZ < -2, overweight defined as BAZ > 1, obese defined as BAZ > 2 using WHO growth standards; For adolescent girls 15-19 thin defined as BMI < 18.5 kg/m^2, overweight defined as BMI 25-29.9 kg/m^2, obesity defined as BMI $\geq$ 30 kg/m^2

2015-2016 MALAWI DEMOGRAPHIC AND HEALTH SURVEY
MALAWI GOVERNMENT - NATIONAL STATISTICAL OFFICE
MALAWI MICRONUTRIENT MODULE

IDENTIFICATION

PLACE NAME ______________________

NAME OF HOUSEHOLD HEAD ______________________

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

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

PLACE BAR CODE LABEL. . . . . PUT THE HOUSEHOLD QUESTIONNAIRE BAR CODE LABEL HERE.

PERMISSION FOR REVISIT (1=GRANTED, 2=NOT GRANTED) . . . . [ ]

HOUSEHOLD SELECTED FOR MRDR TESTING? (1=YES, 2=NO) . . . . [ ]

FIELDWORKER VISITS

	1	2	3	FINAL VISIT	
DATE	______	______	______	DAY	[ ][ ]
				MONTH	[ ][ ]
	______	______	______	YEAR	2 0 [ ][ ]
FIELDWORKER'S NAME	______	______	______	FIELDW. NO.	[ ][ ]
RESULT*	______	______	______	RESULT*	[ ][ ]
NEXT VISIT: DATE	______	______		TOTAL NUMBER OF VISITS	[ ]
TIME	______	______			

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

TOTAL ELIGIBLE WOMEN 15-49 YEARS [ ][ ]

TOTAL ELIGIBLE MEN 20-54 YEARS [ ][ ]

TOTAL ELIGIBLE CHILDREN 0-4 YEARS [ ][ ]

TOTAL ELIGIBLE CHILDREN 5-14 YEARS [ ][ ]

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

LANGUAGE OF QUESTIONNAIRE** **ENGLISH**

**LANGUAGE CODES:
01 ENGLISH
02 CHICHEWA
03 TUMBUKA
04 OTHER ______________________
(SPECIFY)

SUPERVISOR		OFFICE EDITOR	KEYED BY
______________ NAME	[ ][ ] NUMBER	[ ][ ] NUMBER	[ ][ ] NUMBER

FOOD FORTIFICATION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
100	ASK CONSENT FOR FOOD FORTIFICATION COVERAGE INFORMATION FROM HEAD OF HOUSEHOLD/OTHER ADULT.	Hello. My name is ______________________. I am working with The National Statistical Office (NSO). As part of the Demographic and Health Survey we would like to ask you some questions about some of the foods that you may have in your home. We are particularly interested in learning more about salt, sugar and oil. If you agree we would like to take a very small sample of any of these foods that you have, so that we can test whether or not they have been fortified with vitamin A or iodine. In exchange we will replace any items you have given us. This information will help the Ministry of Health understand better what foods people have in their homes and the quality of the foods. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow us to talk to you about some foods you may have in your home?	
101	CIRCLE THE CODE AND SIGN YOUR NAME.	GRANTED . . . . 1 ______________ (SIGN) REFUSED . . . . 2 OTHER ______________ 6 (SPECIFY)	2, 6 → 200
102	Do you have salt in your household today? IF YES: Please can we see the salt you have in the household?	YES . . . . 1 NO 2	2 → 106
103	OBSERVE THE BRAND OF THE SALT RECORD OBSERVATION.	BOTSALT . . . . 11 MALAWI . . . . 12 RAB'S . . . . 13 FA RAHIMA . . . . 14 SEAFRESH . . . . 15 FAMILY PRIDE . . . . 16 NOT LABELED . . . . 95 OTHER ______________ 96 (SPECIFY)	95 → 105
104	RECORD IF THE SALT IS LABELLED AS IODIZED	YES, LABELLED AS IODIZED . . . . 1 NO, NOT LABELLED AS IODIZED . . . . 2 DON'T KNOW 8	
105	Please may we take a small sample of your salt so that we can test it for iodine? PUT THE SALT SPECIMEN BAR CODE LABEL ON THE SALT CONTAINER AND THE SALT FORM LABEL ON THE FOOD CONTROL FORM [B]	PUT THE SALT QUESTIONNAIRE LABEL HERE SALT NOT COLLECTED . . . . 9995 OTHER ______________ 9996 (SPECIFY REASON)	
` 106	Do you have any sugar in your household today? IF YES: Please can we see the main type of sugar you have in the household?	YES . . . . 1 NO 2	2 → 110
107	OBSERVE THE BRAND OF THE SUGAR RECORD OBSERVATION.	ILOVO . . . . 11 NOT LABELED . . . . 95 OTHER ______________ 96 (SPECIFY)	95 → 109

FOOD FORTIFICATION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
108	RECORD IF THE SUGAR IS LABELLED AS FORTIFIED WITH VITAMIN A	YES, FORTIFIED WITH VITAMIN A . . . . 1 NO, NOT LABELLED AS FORTIFIED WITH VIT. A 2 DON'T KNOW 8	
109	Please may we take a small sample of your sugar so that we can test it for vitamin A? PUT THE SUGAR SPECIMEN BAR CODE LABEL ON THE SUGAR CONTAINER AND THE SUGAR FORM LABEL ON THE FOOD CONTROL FORM [B]	PUT THE SUGAR QUESTIONNAIRE BAR CODE LABEL HERE. SUGAR NOT COLLECTED . . . . 9995 OTHER ____________________ 9996 (SPECIFY REASON)	
110	Do you have any oil in your household today? IF YES: Please can we see the main type of oil you have in the household?	YES . . . . 1 NO 2	 →114
111	OBSERVE THE BRAND OF THE OIL RECORD OBSERVATION.	KAZINGA . . . . 11 KUKOMA . . . . 12 SUPERSTAR . . . . 13 MULAWE . . . . 14 DELIGHT . . . . 15 SUNFOIL . . . . 16 RINA . . . . 17 NOT LABELED . . . . 95 OTHER ____________________ 96 (SPECIFY)	 →113
112	RECORD IF THE OIL IS LABELLED AS FORTIFIED WITH VITMAIN A	YES, FORTIFIED WITH VITAMIN A . . . . 1 NO, NOT LABELLED AS FORTIFIED WITH VIT. A 2 DON'T KNOW 8	
113	Please may we take a small sample of your oil so that we can test it for vitamin A? PUT THE OIL SPECIMEN BAR CODE LABEL ON THE OIL TUBE CONTAINER AND THE OIL FORM LABEL ON THE FOOD CONTROL FORM [B]	PUT THE OIL QUESTIONNAIRE BAR CODE LABEL HERE. OIL NOT COLLECTED . . . . 9995 OTHER ____________________ 9996 (SPECIFY REASON)	
114	Do you have Blue Band Margarine in your house currently?	YES . . . . 1 NO 2	
115	In the past 7 days, did anyone in your household purchase: a) Wheat flour? b) Pasta/Spaghetti? c) Bread? d) Biscuits/Cookies? e) Mandazi? f) Cakes g) Maize flour?	YES NO a) WHEAT FLOUR . . . . 1 2 b) PASTA/SPAGHETTI . . . . 1 2 c) BREAD . . . . 1 2 d) BISCUITS/COOKIES . . . . 1 2 e) MANDAZI . . . . 1 2 f) CAKES . . . . 1 2 g) MAIZE FLOUR 1 2	

FOOD FORTIFICATION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
116	In the past 4 weeks (30 days), was there ever no food to eat of any kind in your house because of lack of resources to get food?	YES . . . . . 1 NO 2	 → 118
117	How often did this happen in the past 4 weeks (30 days)?	RARELY (1–2 TIMES) . . . . . 1 SOMETIMES (3–10 TIMES) . . . . . 2 OFTEN (MORE THAN 10 TIMES) 3	
118	In the past 4 weeks (30 days), did you or any household member go to sleep at night hungry because there was not enough food?	YES . . . . . 1 NO 2	 → 120
119	How often did this happen in the past 4 weeks (30 days)?	RARELY (1–2 TIMES) . . . . . 1 SOMETIMES (3–10 TIMES) . . . . . 2 OFTEN (MORE THAN 10 TIMES) 3	
120	In the past 4 weeks (30 days), did you or any household member go a whole day and night without eating anything at all because there was not enough food?	YES . . . . . 1 NO 2	 → 122
121	How often did this happen in the past 4 weeks (30 days)?	RARELY (1–2 TIMES) . . . . . 1 SOMETIMES (3–10 TIMES) . . . . . 2 OFTEN (MORE THAN 10 TIMES) 3	
122	Has your household received coupons for the Farm Input Subsidy Program (FISP) for this season (2015-2016)?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
123	Does your household participate in the social cash transfer programme?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
124	Is your household on the Malawian Vulnerability Assessment Committee (MVAC) list this season (2015-2016)?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
125	Did your household receive food or cash support during last year's (2014-2015) drought and flood response from the Malawian Vulnerability Assessment Committee (MVAC)?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	
126	RECORD IF REPLACEMENT ITEMS WERE PROVIDED TO HOUSEHOLD	YES, REPLACEMENT ITEMS PROVIDED . . . . . 1 NO, REPLACEMENT ITEMS NOT PROVIDED . . 2	

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______
202	What is (NAME)'s date of birth?	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]
203	PRESCHOOL CHILD LABEL	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.
204	CHECK 202: CHILD BORN IN 2010-2015?	YES . . . . 1 NO . . . . 2 (SKIP TO 253)	YES . . . . 1 NO . . . . 2 (SKIP TO 253)	YES . . . . 1 NO . . . . 2 (SKIP TO 253)
205	CHECK 202: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2
206	CHILD'S SEX	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2
207	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM PARENT/OTHER ADULT.	As part of this survey we are asking a parent of some children to allow us to weigh and measure their children and check them for Oedma. If your child has severe acute malnutrition we will refer your child to the nearest facility that can help you. In addition to weighing and measuring your child we would like to take a sample of his/her blood and urine. The tests are safe. Some tests may cause your child slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your child's blood and collect their urine, which is clean and completely safe. The equipment will be thrown away after it has been used on your child. With the blood we will test your child for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to your child becoming anemic or making the anemia worse. You will be given these results immediately. If needed your child will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood.The results will be kept strictly confidential. This information will help the Ministry of Health understand better what problems children in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all children in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?		
208	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)
209	NURSE: ENTER YOUR ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________
210A	In the last month, has (NAME OF CHILD) taken iron tablets/ syrups/ Multiple micronutrient powders? SHOW COMMON IRON TABLETS/ SYRUP/ MNP IN MALAWI.	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
210	In the last six months, has (NAME OF CHILD) received deworming treatment?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
211	In the last month, has (NAME OF CHILD) received any therapeutic foods, such as PLUMPY NUT [CHIPONDE]? SHOW SACHET.	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
212	In the last month, has (NAME OF CHILD) received a vitamin A capsule?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
213	Has (NAME OF CHILD) had a fever in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
214	Has (NAME OF CHILD) had a fever in the last 24 hours?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
215	Has (NAME OF CHILD) had diarrhea in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
216	Has (NAME OF CHILD) had a cough or breathing problems in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
217	Has (NAME OF CHILD) been ill with malaria in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
218	Have you noticed blood in (NAME OF CHILD)'s urine in the past 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
219	In the last six months, has (NAME OF CHILD) received a blood transfusion?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
220	At what time approximately did (NAME OF CHILD) eat her/his most recent meal or was breastfed?	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
221	CHECK 208: AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)
222	**PURPLE TOP TUBE (EDTA)** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
223	**BLUE TOP TUBE (METAL FREE)** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________
224	DATE BLOOD SAMPLE TAKEN (DAY/MONTH/YEAR)	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]
225	TIME BLOOD DRAWN	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
226	**DBS** RECORD THE RESULT OF DBS SAMPLE COLLECTION	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
227	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
228	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . . . [ ][ ] . [ ] INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . [ ][ ] . [ ] INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . [ ][ ] . [ ] INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
229	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . . . [ ][ ] . [ ] APP G/DL . . . . . . [ ][ ] . [ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . [ ][ ] . [ ] APP G/DL . . . . . . [ ][ ] . [ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . [ ][ ] . [ ] APP G/DL . . . . . . [ ][ ] . [ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
230	CHECK 208: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 236)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 236)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 236)
231	WEIGHT IN KILOGRAMS.	KG. . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96
232	HEIGHT/LENGTH IN CENTIMETERS.	CM. . . . . [ ][ ][ ] . [ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)	CM. . . . . [ ][ ][ ] . [ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)	CM. . . . . [ ][ ][ ] . [ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)
233	MEASURED LYING DOWN OR STANDING UP?	LYING DOWN . . . . 1 STANDING UP 2	LYING DOWN . . . . 1 STANDING UP 2	LYING DOWN . . . . 1 STANDING UP 2
234	RECORD THE RESULT OF OEDEMA TESTING	HAS OEDEMA . . . . 1 NO OEDEMA 2	HAS OEDEMA . . . . 1 NO OEDEMA 2	HAS OEDEMA . . . . 1 NO OEDEMA 2
235	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.95 OTHER 99.96	CM . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.95 OTHER 99.96	CM . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.95 OTHER 99.96
236	LAB TECH: ENTER YOUR ID NUMBER.	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ____	LINE NUMBER . . . . NAME ____	LINE NUMBER . . . . NAME ____
237	TIME BLOOD CENTRIFUGED	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
238	CHECK 208: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)
239	In order to determine if your child has blood in their urine, which might suggest that they have schistosomiasis, we would like to collect a urine sample from your child. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your child's urine. We would like the freshest urine you can give us. Please use this cup to collect your child's urine.			
240	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
241	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
242	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6
243	CHECK FRONT COVER HOUSEHOLD SELECTED FOR MRDR TEST HOUSEHOLD NOT SELECTED FOR MRDR TEST → 249			
244	CHECK 222: WAS THE FIRST BLOOD SAMPLE COLLECTED?	YES NO (SKIP TO 249)	YES NO (SKIP TO 249)	YES NO (SKIP TO 249)
245	As part of this survey we are asking some people to participate in an additional test. We would also like to include your child in an additional test to find out more information about vitamin A in the body. This test will involve giving your child a small amount of liquid to swallow with a snack. We will then have to wait about 4 hours and then take an additional small blood sample. The results from this test will help the Ministry of Health understand better how well the food fortification program in Malawi is working and if other improvements are necessary. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?			
245A	CONSENT TO MRDR	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)
246	TIME OF INGESTING VITAMIN A2	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
247	**MRDR TEST - BLOOD SAMPLE** RECORD THE RESULT OF MRDR TEST BLOOD SAMPLE COLLECTION	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
248	TIME SECOND BLOOD DRAWN FOR MRDR TESTING	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________
249	**REFERRAL CLINICAL MALARIA** CHECK 227: REFER IF RDT POSITIVE (227=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
250	**REFERRAL SEVERE ANEMIA** CHECK 228: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
251	**REFERRAL MALNUTRITION** CHECK 234 AND 235: REFER IF OEDEMA PRESENT (234=1) AND/OR MUAC <11.5 CM	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
252	**REFERRAL PRESUMED SHISTOSOMIASIS** CHECK 242: REFER IF HEMATURIA POSITIVE (242=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
253	GO BACK TO 202 IN NEXT COLUMN OR IN THE FIRST COLUMN OF THE NEXT PAGE OF THIS QUESTIONNAIRE; IF NO MORE CHILDREN 0-4 YEARS, GO TO 300.			

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______
202	What is (NAME)'s date of birth?	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]
203	PRESCHOOL CHILD LABEL	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE PRESCHOOL CHILD QUESTIONNAIRE BAR CODE LABEL HERE.
204	CHECK 202: CHILD BORN IN 2010-2015?	YES . . . . 1 NO . . . . 2 (SKIP TO 253)	YES . . . . 1 NO . . . . 2 (SKIP TO 253)	YES . . . . 1 NO . . . . 2 (SKIP TO 253)
205	CHECK 202: CHILD AGE 0-5 MONTHS, I.E., WAS CHILD BORN IN MONTH OF INTERVIEW OR 5 PREVIOUS MONTHS?	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2	0-5 MONTHS . . . . 1 (SKIP TO 253) 6 MONTHS-4 YEARS 2
206	CHILD'S SEX	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2
207	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM PARENT/OTHER ADULT.	As part of this survey we are asking a parent of some children to allow us to weigh and measure their children and check them for Oedma. If your child has severe acute malnutrition we will refer your child to the nearest facility that can help you. In addition to weighing and measuring your child we would like to take a sample of his/her blood and urine. The tests are safe. Some tests may cause your child slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your child's blood and collect their urine, which is clean and completely safe. The equipment will be thrown away after it has been used on your child. With the blood we will test your child for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to your child becoming anemic or making the anemia worse. You will be given these results immediately. If needed your child will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood.The results will be kept strictly confidential. This information will help the Ministry of Health understand better what problems children in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all children in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?		
208	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 253)
209	NURSE: ENTER YOUR ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______
210A	In the last month, has (NAME OF CHILD) taken iron tablets/ syrups/ Multiple micronutrient powders? SHOW COMMON IRON TABLETS/ SYRUP/ MNP IN MALAWI.	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
210	In the last six months, has (NAME OF CHILD) received deworming treatment?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
211	In the last month, has (NAME OF CHILD) received any therapeutic foods, such as PLUMPY NUT [CHIPONDE]? SHOW SACHET.	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
212	In the last month, has (NAME OF CHILD) received a vitamin A capsule?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
213	Has (NAME OF CHILD) had a fever in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
214	Has (NAME OF CHILD) had a fever in the last 24 hours?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
215	Has (NAME OF CHILD) had diarrhea in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
216	Has (NAME OF CHILD) had a cough or breathing problems in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
217	Has (NAME OF CHILD) been ill with malaria in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
218	Have you noticed blood in (NAME OF CHILD)'s urine in the past 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
219	In the last six months, has (NAME OF CHILD) received a blood transfusion?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
220	At what time approximately did (NAME OF CHILD) eat her/his most recent meal or was breastfed?	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]
221	CHECK 208: AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 230)
222	**PURPLE TOP TUBE (EDTA)** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6
223	**BLUE TOP TUBE (METAL FREE)** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ____________	LINE NUMBER . . . . NAME ____________	LINE NUMBER . . . . NAME ____________
224	DATE BLOOD SAMPLE TAKEN (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
225	TIME BLOOD DRAWN	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
226	**DBS** RECORD THE RESULT OF DBS SAMPLE COLLECTION	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	DBS SAMPLE COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
227	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
228	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
229	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
230	CHECK 208: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 236)	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 236)	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 236)
231	WEIGHT IN KILOGRAMS.	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96
232	HEIGHT/LENGTH IN CENTIMETERS.	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . . . 999.5 OTHER . . . . 999.6 (SKIP TO 234)
233	MEASURED LYING DOWN OR STANDING UP?	LYING DOWN . . . . 1 STANDING UP 2	LYING DOWN . . . . 1 STANDING UP 2	LYING DOWN . . . . 1 STANDING UP 2
234	RECORD THE RESULT OF OEDEMA TESTING	HAS OEDEMA . . . . 1 NO OEDEMA 2	HAS OEDEMA . . . . 1 NO OEDEMA 2	HAS OEDEMA . . . . 1 NO OEDEMA 2
235	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . REFUSED . . . . 99.95 OTHER 99.96	CM . . . . REFUSED . . . . 99.95 OTHER 99.96	CM . . . . REFUSED . . . . 99.95 OTHER 99.96
236	LAB TECH: ENTER YOUR ID NUMBER.	ID NUMBER	ID NUMBER	ID NUMBER

BIOLOGICAL INFORMATION FOR CHILDREN AGE 6-59 MONTHS

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ________	LINE NUMBER . . . . NAME ________	LINE NUMBER . . . . NAME ________
237	TIME BLOOD CENTRIFUGED	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
238	CHECK 208: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 243)
239	In order to determine if your child has blood in their urine, which might suggest that they have schistosomiasis, we would like to collect a urine sample from your child. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your child's urine. We would like the freshest urine you can give us. Please use this cup to collect your child's urine.			
240	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
241	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
242	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 NOT PRESENT . . . . 4 OTHER 6
243	CHECK FRONT COVER HOUSEHOLD SELECTED FOR MRDR TEST HOUSEHOLD NOT SELECTED FOR MRDR TEST → 249			
244	CHECK 222: WAS THE FIRST BLOOD SAMPLE COLLECTED?	YES NO (SKIP TO 249)	YES NO (SKIP TO 249)	YES NO (SKIP TO 249)
245	As part of this survey we are asking some people to participate in an additional test. We would also like to include your child in an additional test to find out more information about vitamin A in the body. This test will involve giving your child a small amount of liquid to swallow with a snack. We will then have to wait about 4 hours and then take an additional small blood sample. The results from this test will help the Ministry of Health understand better how well the food fortification program in Malawi is working and if other improvements are necessary. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?			
245A	CONSENT TO MRDR	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 249)
246	TIME OF INGESTING VITAMIN A2	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
247	**MRDR TEST - BLOOD SAMPLE** RECORD THE RESULT OF MRDR TEST BLOOD SAMPLE COLLECTION	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
248	TIME SECOND BLOOD DRAWN FOR MRDR TESTING	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .

200	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 0-4 YEARS IN QUESTION 201; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
201	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________
249	**REFERRAL CLINICAL MALARIA** CHECK 227: REFER IF RDT POSITIVE (227=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
250	**REFERRAL SEVERE ANEMIA** CHECK 228: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
251	**REFERRAL MALNUTRITION** CHECK 234 AND 235: REFER IF OEDEMA PRESENT (234=1) AND/OR MUAC <11.5 CM	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
252	**REFERRAL PRESUMED SHISTOSOMIASIS** CHECK 242: REFER IF HEMATURIA POSITIVE (242=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
253	GO BACK TO 202 IN NEXT COLUMN OR IN THE FIRST COLUMN OF THE NEXT PAGE OF THIS QUESTIONNAIRE; IF NO MORE CHILDREN 0-4 YEARS, GO TO 300.			

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______
302	What is (NAME)'s date of birth?	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
303	SCHOOL-AGED CHILD LABEL	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.
304	CHECK 302: CHILD BORN IN 2000-2010	YES . . . . 1 NO . . . . 2 (SKIP TO 351)	YES . . . . 1 NO . . . . 2 (SKIP TO 351)	YES . . . . 1 NO . . . . 2 (SKIP TO 351)
305	CHILD'S SEX	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2
306	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM PARENT/OTHER ADULT.	As part of this survey we are asking a parent of some children to allow us to weigh and measure their children and check them for Oedma. If your child has severe acute malnutrition we will refer your child to the nearest facility that can help you. In addition to weighing and measuring your child we would like to take a sample of his/her blood and urine. The tests are safe. Some tests may cause your child slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your child's blood and collect their urine, which is clean and completely safe. The equipment will be thrown away after it has been used on your child. With the blood we will test your child for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to your child becoming anemic or making the anemia worse. You will be given these results immediately. If needed your child will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood.The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems children in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all children in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?		
307	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)
308	NURSE: ENTER YOUR ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ____	LINE NUMBER . . . . NAME ____	LINE NUMBER . . . . NAME ____
309A	In the last month, has (NAME OF CHILD) taken iron tablets or syrups? SHOW COMMON IRON TABLETS IN MALAWI.	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
309	In the last six months, has (NAME OF CHILD) received deworming treatment?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
310	In the last month, has (NAME OF CHILD) received any therapeutic foods, such as PLUMPY NUT [CHIPONDE]? SHOW SACHET.	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
311	In the last month, has (NAME OF CHILD) received a vitamin A capsule?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
312	Has (NAME OF CHILD) had a fever in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
313	Has (NAME OF CHILD) had a fever in the last 24 hours?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
314	Has (NAME OF CHILD) had diarrhea in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
315	Has (NAME OF CHILD) had a cough or breathing problems in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
316	Has (NAME OF CHILD) been ill with malaria in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
317	Have you noticed blood in (NAME OF CHILD)'s urine in the past 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
318	In the last six months, has (NAME OF CHILD) received a blood transfusion?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
319	At what time approximately did (NAME OF CHILD) eat her/his most recent meal?	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
320	CHECK 307: AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED CODE '2', '4', 6' OR '7' NOT CIRCLED (SKIP TO 328)	CODE '2', '4', '6' OR '7' CIRCLED CODE '2', '4', 6' OR '7' NOT CIRCLED (SKIP TO 328)	CODE '2', '4', '6' OR '7' CIRCLED CODE '2', '4', 6' OR '7' NOT CIRCLED (SKIP TO 328)
321	**PURPLE TOP TUBE (EDTA)** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
322	**BLUE TOP TUBE (METAL FREE)** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______
323	DATE BLOOD SAMPLE TAKEN (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
324	TIME BLOOD DRAWN	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
325	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
326	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . . . ☐☐.☐ INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . ☐☐.☐ INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . . . ☐☐.☐ INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
327	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . . . ☐☐.☐ APP G/DL . . . . . . ☐☐.☐ BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . ☐☐.☐ APP G/DL . . . . . . ☐☐.☐ BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . ☐☐.☐ APP G/DL . . . . . . ☐☐.☐ BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
328	CHECK 307: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED ☐ CODE '1', '4', '5' OR '7' NOT CIRCLED ☐ (SKIP TO 334)	CODE '1', '4', '5' OR '7' CIRCLED ☐ CODE '1', '4', '5' OR '7' NOT CIRCLED ☐ (SKIP TO 334)	CODE '1', '4', '5' OR '7' CIRCLED ☐ CODE '1', '4', '5' OR '7' NOT CIRCLED ☐ (SKIP TO 334)
329	WEIGHT IN KILOGRAMS.	KG. . . . . ☐☐.☐☐ REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . ☐☐.☐☐ REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . ☐☐.☐☐ REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96
330	HEIGHT/LENGTH IN CENTIMETERS.	CM. . . . . ☐☐☐.☐ REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . ☐☐☐.☐ REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . ☐☐☐.☐ REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6
333	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . ☐☐.☐☐ REFUSED . . . . 99.95 OTHER 99.96	CM . . . . ☐☐.☐☐ REFUSED . . . . 99.95 OTHER 99.96	CM . . . . ☐☐.☐☐ REFUSED . . . . 99.95 OTHER 99.96
334	LAB TECH: ENTER YOUR ID NUMBER.	ID NUMBER	ID NUMBER	ID NUMBER

BIOLOGICAL INFORMATION FOR CHILDREN AGE 5-14 YEARS

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______
335	TIME BLOOD CENTRIFUGED	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
336	CHECK 307: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)
337	In order to determine if your child has blood in their urine, which might suggest that they have schistosomiasis, we would like to collect a urine sample from your child. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your child's urine. We would like the freshest urine you can give us. Please use this cup to collect your child's urine .			
338	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
339	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
340	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
341	CHECK FRONT COVER HOUSEHOLD SELECTED FOR MRDR TEST HOUSEHOLD NOT SELECTED FOR MRDR TEST → 347			
342	CHECK 322: WAS THE FIRST BLOOD SAMPLE COLLECTED?	YES NO (SKIP TO 347)	YES NO (SKIP TO 347)	YES NO (SKIP TO 347)
343	As part of this survey we are asking some people to participate in an additional test. We would also like to include your child in an additional test to find out more information about vitamin A in the body. This test will involve giving your child a small amount of liquid to swallow with a snack. We will then have to wait about 4 hours and then take an additional small blood sample. The results from this test will help the Ministry of Health understand better how well the food fortification program in Malawi is working and if other improvements are necessary. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?			
343A	CONSENT TO MRDR	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)
344	TIME OF INGESTING VITAMIN A2	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
345	**MRDR TEST - BLOOD SAMPLE** RECORD THE RESULT OF MRDR TEST BLOOD SAMPLE COLLECTION	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
346	TIME SECOND BLOOD DRAWN FOR MRDR TESTING	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 1	CHILD 2	CHILD 3
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . ☐☐ NAME ____________	LINE NUMBER . . . . ☐☐ NAME ____________	LINE NUMBER . . . . ☐☐ NAME ____________
347	**REFERRAL CLINICAL MALARIA** CHECK 325: REFER IF RDT POSITIVE (325=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
348	**REFERRAL SEVERE ANEMIA** CHECK 326: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
349	**REFERRAL MALNUTRITION** CHECK 333: REFER IF MUAC <14.0 CM	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
350	**REFERRAL PRESUMED SHISTOSOMIASIS** CHECK 340: REFER IF HEMATURIA POSITIVE (340=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
351	GO BACK TO 302 IN NEXT COLUMN OR IN THE FIRST COLUMN OF THE NEXT PAGE OF THIS QUESTIONNAIRE; IF NO MORE CHILDREN 5-14 YEARS, GO TO 300.			

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______	LINE NUMBER . . . . NAME ______
302	What is (NAME)'s date of birth?	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
303	SCHOOL-AGED CHILD LABEL	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE SCHOOL AGED CHILD QUESTIONNAIRE BAR CODE LABEL HERE.
304	CHECK 302: CHILD BORN IN 2000-2010	YES . . . . 1 NO . . . . 2 (SKIP TO 351)	YES . . . . 1 NO . . . . 2 (SKIP TO 351)	YES . . . . 1 NO . . . . 2 (SKIP TO 351)
305	CHILD'S SEX	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2	FEMALE . . . . 1 MALE 2
306	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM PARENT/OTHER ADULT.	As part of this survey we are asking a parent of some children to allow us to weigh and measure their children and check them for Oedma. If your child has severe acute malnutrition we will refer your child to the nearest facility that can help you. In addition to weighing and measuring your child we would like to take a sample of his/her blood and urine. The tests are safe. Some tests may cause your child slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your child's blood and collect their urine, which is clean and completely safe. The equipment will be thrown away after it has been used on your child. With the blood we will test your child for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to your child becoming anemic or making the anemia worse. You will be given these results immediately. If needed your child will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood.The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems children in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all children in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?		
307	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . 2 AGREED, URINE TEST ONLY . 3 AGREED, ANTHROPO& BLOOD TEST ONLY 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . 7 REFUSED . . . . 8 ______ (SIGN) NOT PRESENT/OTHER . 9 (SKIP TO 351)
308	NURSE: ENTER YOUR ID NUMBER	ID NUMBER	ID NUMBER	ID NUMBER

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________
309A	In the last month, has (NAME OF CHILD) taken iron tablets or syrups? SHOW COMMON IRON TABLETS IN MALAWI.	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
309	In the last six months, has (NAME OF CHILD) received deworming treatment?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
310	In the last month, has (NAME OF CHILD) received any therapeutic foods, such as PLUMPY NUT [CHIPONDE]? SHOW SACHET.	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
311	In the last month, has (NAME OF CHILD) received a vitamin A capsule?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
312	Has (NAME OF CHILD) had a fever in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
313	Has (NAME OF CHILD) had a fever in the last 24 hours?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
314	Has (NAME OF CHILD) had diarrhea in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
315	Has (NAME OF CHILD) had a cough or breathing problems in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
316	Has (NAME OF CHILD) been ill with malaria in the last 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
317	Have you noticed blood in (NAME OF CHILD)'s urine in the past 2 weeks?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
318	In the last six months, has (NAME OF CHILD) received a blood transfusion?	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2	YES . . . . . 1 NO 2
319	At what time approximately did (NAME OF CHILD) eat her/his most recent meal?	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ]
320	CHECK 307: AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 328)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 328)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 328)
321	**PURPLE TOP TUBE (EDTA)** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6
322	**BLUE TOP TUBE (METAL FREE)** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . . 3 OTHER 6

BIOLOGICAL INFORMATION FOR CHILDREN AGE 5-14 YEARS

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME	LINE NUMBER . . . . NAME	LINE NUMBER . . . . NAME
323	DATE BLOOD SAMPLE TAKEN (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
324	TIME BLOOD DRAWN	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
325	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
326	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . INSUFFICIENT SAMPLE . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
327	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . . . APP G/DL . . . . . . BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
328	CHECK 307: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 334)	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 334)	CODE '1', '4', '5' OR '7' CIRCLED CODE '1', '4', '5' OR '7' NOT CIRCLED (SKIP TO 334)
329	WEIGHT IN KILOGRAMS.	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96	KG. . . . . REFUSED . . . . 99.94 NOT PRESENT . . . . 99.95 OTHER 99.96
330	HEIGHT/LENGTH IN CENTIMETERS.	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6
333	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . REFUSED . . . . 99.95 OTHER 99.96	CM . . . . REFUSED . . . . 99.95 OTHER 99.96	CM . . . . REFUSED . . . . 99.95 OTHER 99.96
334	LAB TECH: ENTER YOUR ID NUMBER.	ID NUMBER	ID NUMBER	ID NUMBER

BIOLOGICAL INFORMATION FOR CHILDREN AGE 5-14 YEARS

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ________	LINE NUMBER . . . . NAME ________	LINE NUMBER . . . . NAME ________
335	TIME BLOOD CENTRIFUGED	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
336	CHECK 307: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 341)
337	In order to determine if your child has blood in their urine, which might suggest that they have schistosomiasis, we would like to collect a urine sample from your child. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your child's urine. We would like the freshest urine you can give us. Please use this cup to collect your child's urine .			
338	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTE ... 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
339	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
340	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
341	CHECK FRONT COVER HOUSEHOLD SELECTED FOR MRDR TEST HOUSEHOLD NOT SELECTED FOR MRDR TEST → 347			
342	CHECK 322: WAS THE FIRST BLOOD SAMPLE COLLECTED?	YES NO (SKIP TO 347)	YES NO (SKIP TO 347)	YES NO (SKIP TO 347)
343	As part of this survey we are asking some people to participate in an additional test. We would also like to include your child in an additional test to find out more information about vitamin A in the body. This test will involve giving your child a small amount of liquid to swallow with a snack. We will then have to wait about 4 hours and then take an additional small blood sample. The results from this test will help the Ministry of Health understand better how well the food fortification program in Malawi is working and if other improvements are necessary. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF CHILD) to participate in these tests?			
343A	CONSENT TO MRDR	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 347)
344	TIME OF INGESTING VITAMIN A2	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
345	**MRDR TEST - BLOOD SAMPLE** RECORD THE RESULT OF MRDR TEST BLOOD SAMPLE COLLECTION	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTI 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6
346	TIME SECOND BLOOD DRAWN FOR MRDR TESTING	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .

300	CHECK COLUMN 7 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL CHILDREN 5-14 YEARS IN QUESTION 301; IF MORE THAN SIX CHILDREN, USE ADDITIONAL QUESTIONNAIRE BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		CHILD 4	CHILD 5	CHILD 6
301	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________
347	**REFERRAL CLINICAL MALARIA** CHECK 325: REFER IF RDT POSITIVE (325=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
348	**REFERRAL SEVERE ANEMIA** CHECK 326: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
349	**REFERRAL MALNUTRITION** CHECK 333: REFER IF MUAC <14.0 CM	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
350	**REFERRAL PRESUMED SHISTOSOMIASIS** CHECK 340: REFER IF HEMATURIA POSITIVE (340=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
351	GO BACK TO 302 IN NEXT COLUMN OR IN THE FIRST COLUMN OF THE NEXT PAGE OF THIS QUESTIONNAIRE; IF NO MORE CHILDREN 5-14 YEARS, GO TO 300.			

BIOLOGICAL INFORMATION FOR WOMEN AGE 15-49 YEARS

400	CHECK COLUMN 1 IN HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER, NAME, AGE, AND MARITAL STATUS FOR ALL ELIGIBLE WOMEN IN 401, 402, AND 403. IF THERE ARE MORE THAN THREE WOMEN, USE ADDITIONAL QUESTIONNAIRE(S) BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		WOMAN 1	WOMAN 2	WOMAN 3
401	CHECK HOUSEHOLD QUESTIONNAIRE: LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________
402	CHECK HOUSEHOLD QUESTIONNAIRE COLUMN 7 (AGE):	15-17 YEARS . . . . 1 18-49 YEARS 2	15-17 YEARS . . . . 1 18-49 YEARS 2	15-17 YEARS . . . . 1 18-49 YEARS 2
403	CHECK HOUSEHOLD QUESTIONNAIRE COLUMN 8 (MARITAL	CODE 4 (NEVER IN UNION) . 1 OTHER 2	CODE 4 (NEVER IN UNION) . 1 OTHER 2	CODE 4 (NEVER IN UNION) . 1 OTHER 2
404	WOMAN LABEL	PUT THE WOMAN QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE WOMAN QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE WOMAN QUESTIONNAIRE BAR CODE LABEL HERE.
405	CHECK 402: AGE	15-17 YEARS . . . . 1 18-49 YEARS . . . . 2 (SKIP TO 407)	15-17 YEARS . . . . 1 18-49 YEARS . . . . 2 (SKIP TO 407)	15-17 YEARS . . . . 1 18-49 YEARS . . . . 2 (SKIP TO 407)
406	CHECK 403: MARITAL STATUS	CODE 4 (NEVER IN UNION) . 1 (SKIP TO 409) OTHER 2	CODE 4 (NEVER IN UNION) . 1 (SKIP TO 409) OTHER 2	CODE 4 (NEVER IN UNION) . 1 (SKIP TO 409) OTHER 2

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________________	LINE NUMBER . . . . [ ][ ] NAME ________________	LINE NUMBER . . . . [ ][ ] NAME ________________

ADULT RESPONDENT CONSENT

ADULT RESPONDENT CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM RESPONDENT

407	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM RESPONDENT	As part of this survey we are asking women from all over this country to allow us to weigh and measure you. In addition to weigh and measuring you we would like to take a sample of your blood and urine. The tests are safe. Some tests may cause you slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your blood and collect your urine, which is clean and completely safe. The equipment will be thrown away after it has been used on you. With the blood we will test you for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to you becoming anemic or making the anemia worse. You will be given these results immediately. If needed you will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood. The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems women in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all women in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you participate in these tests?		
408	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ________________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ] (SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ________________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ] (SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ________________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ] (SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________

PARENT/RESP ADULT CONSENT

PARENTAL/RESPONSIBLE ADULT CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING OF A MINOR

409	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM PARENT/ADULT.	As part of this survey we are asking women from all over this country to allow us to weigh and measure you. In addition to weigh and measuring (NAME OF MINOR) we would like to take a sample of (NAME OF MINOR) blood and urine. The tests are safe. Some tests may cause you slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take HER/HIS blood and collect your urine, which is clean and completely safe. The equipment will be thrown away after it has been used on you. With the blood we will test (NAME OF MINOR) for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to HER/HIM becoming anemic or making the anemia worse. You and (NAME OF MINOR) will be given these results immediately. If needed you (NAME OF MINOR) will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood. The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems women in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all women in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you allow (NAME OF MINOR) to participate in these tests?		
410	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ____________ (SIGN) (IF REFUSED, SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ____________ (SIGN) (IF REFUSED, SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ____________ (SIGN) (IF REFUSED, SKIP TO 413) NOT PRESENT/OTHER . . . . . . 9 (SKIP TO 413)

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________

MINOR RESPONDENT CONSENT

MINOR RESPONDENT CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING

411	ASK CONSENT FOR ANTHROPOMETRY AND BIOLOGICAL TESTING FROM MINOR RESPONDENT.	As part of this survey we are asking women from all over this country to allow us to weigh and measure you. In addition to weigh and measuring you we would like to take a sample of your blood and urine. The tests are safe. Some tests may cause you slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your blood and collect your urine, which is clean and completely safe. The equipment will be thrown away after it has been used on you. With the blood we will test you for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to you becoming anemic or making the anemia worse. You will be given these results immediately. If needed you will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood. The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems women in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all women in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you participate in these tests?		
412	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 (1-8 → ____________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ]) NOT PRESENT/OTHER 9	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 (1-8 → ____________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ]) NOT PRESENT/OTHER 9	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 (1-8 → ____________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ]) NOT PRESENT/OTHER 9
413	NURSE: ENTER YOUR ID NUMBER.	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER
414	In the last week, have you taken iron tablets or iron syrup? SHOW COMMON IRON TABLETS IN MALAWI.	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
415	In the last month, have you taken any other kind of vitamin or mineral tablet/syrup/powder?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2

BIOLOGICAL INFORMATION FOR WOMEN AGE 15-49 YEARS

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________	LINE NUMBER . . . . [ ][ ] NAME ____________
416	Have you had a fever in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
417	Have you had a fever in the last 24 hours?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
418	Have you had a cough or breathing problems in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
419	Have you had diarrhea in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
420	Have you been ill with malaria in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
421	In the past 2 weeks did you notice blood, other than menstrual blood, in your urine?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
422	In the last six months, have you received a blood transfusion?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
423	Are you pregnant?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
424	At what time approximately did you eat your most recent meal?	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
425	PROCEED ONLY WITH MEASUREMENTS AND/OR TESTS (S) FOR WHICH CONSENT HAS BEEN OBTAINED. IF ADULT RESPONDENT, CHECK 408; IF MINOR RESPONDENT, CHECK 410 AND 412.			
426	CHECK 408, 410 or 412 AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 434)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 434)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 434)
427	**PURPLE TOP TUBE (EDTA)** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTED 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6
428	**BLUE TOP TUBE (METAL** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTED . 1 INSUFFICIENT SAMPLE . . . . . . 2 REFUSED . . . . 3 OTHER 6

BIOLOGICAL INFORMATION FOR WOMEN AGE 15-49 YEARS

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________
429	DATE BLOOD SAMPLE TAKEN	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]
430	TIME BLOOD DRAWN	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
431	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
432	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
433	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
434	CHECK 408, 410, 412: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 439)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 439)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 439)
435	WEIGHT IN KILOGRAMS.	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96
436	HEIGHT IN CENTIMETERS.	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6
438	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . [ ][ ].[ ][ ] REFUSED . . . . 9995 OTHER 9996	CM . . . . [ ][ ].[ ][ ] REFUSED . . . . 9995 OTHER 9996	CM . [ ][ ].[ ][ ] REFUSED . . . . 9995 OTHER 9996

BIOLOGICAL INFORMATION FOR WOMEN AGE 15-49 YEARS

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . NAME ____________	LINE NUMBER . . . . NAME ____________	LINE NUMBER . . . . NAME ____________
439	LAB TECH: ENTER YOUR ID NUMBER.	ID NUMBER	ID NUMBER	ID NUMBER
440	TIME BLOOD CENTRIFUGED	HOURS . . . . MINUTES	HOURS . . . . MINUTES	HOURS . . . . MINUTES . . . .
441	CHECK 408, 410, 412: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 446)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 446)	CODE '3', '5', '6' OR '7' CIRCLED CODE '3', '5', 6' OR '7' NOT CIRCLED (SKIP TO 446)
442	In order to determine if you have blood in your urine, which might suggest that you have schistosomiasis, we would like to collect a urine sample from you. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your urine. We would like the freshest urine you can give us. Please use this cup to collect your urine.			
443	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTED ... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTED ... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTED ... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6
444	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR	DAY . . . . MONTH . . . . YEAR . . . .
445	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
446	CHECK FRONT COVER HOUSEHOLD SELECTED FOR MRDR TEST HOUSEHOLD NOT SELECTED FOR MRDR TEST → 452			
447	CHECK 427: WAS THE FIRST BLOOD SAMPLE COLLECTED?	YES NO (SKIP TO 452)	YES NO (SKIP TO 452)	YES NO (SKIP TO 452)

BIOLOGICAL INFORMATION FOR WOMEN AGE 15-49 YEARS

		WOMAN 1	WOMAN 2	WOMAN 3
	LINE NUMBER FROM COLUMN 1. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________
448	As part of this survey we are asking some people to participate in an additional test. We would also like to include you in an additional test to find out more information about vitamin A in the body. This test will involve giving you a small amount of liquid to swallow with a snack. We will then have to wait about 4 hours and then take an additional small blood sample. The results from this test will help the Ministry of Health understand better how well the food fortification program in Malawi is working and if other improvements are necessary. Do you have any questions? You can say yes or no. It is up to you to decide. Will you participate in these tests?			
448A	CONSENT TO MRDR	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 452)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 452)	CONSENT TO MRDR TEST GRANTED CONSENT TO MRDR TEST NOT GRANTED (SKIP TO 452)
449	TIME OF INGESTING VITAMIN A2	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
450	**MRDR TEST - BLOOD SAMPLE** RECORD THE RESULT OF MRDR TEST BLOOD SAMPLE COLLECTION	MRDR TEST-SAMPLE COLLECTED 1 INSUFFICIENT SAMPLE . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTED 1 INSUFFICIENT SAMPLE . 2 REFUSED . . . . 3 OTHER 6	MRDR TEST-SAMPLE COLLECTED 1 INSUFFICIENT SAMPLE . 2 REFUSED . . . . 3 OTHER 6
451	TIME SECOND BLOOD DRAWN FOR MRDR TESTING	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
452	**REFERRAL CLINICAL MALARIA** CHECK 431: REFER IF RDT POSITIVE (431=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
453	**REFERRAL SEVERE ANEMIA** CHECK 432: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
454	**REFERRAL MALNUTRITION** CHECK 438: REFER IF MUAC<19.0CM.	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
456	**REFERRAL PRESUMED SHISTO** CHECK 423 AND 445: REFER IF PREGNANT (423=1) AND HEMATURIA POSITIVE (445=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
457	GO BACK TO 404 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF AN ADDITIONAL QUESTIONNAIRE; IF NO MORE WOMEN 15-49 YEARS, GO TO 500.			

500	CHECK COLUMN 1 IN THE HOUSEHOLD QUESTIONNAIRE. RECORD THE LINE NUMBER AND NAME FOR ALL MEN AGE 20-54 IN 501. IF THERE ARE MORE THAN THREE MEN, USE ADDITIONAL QUESTIONNAIRE(S) BOOKLET AND USE THE DUPLICATE HH LABEL(S).			
		MAN 1	MAN 2	MAN 3
501	CHECK HOUSEHOLD QUESTIONNAIRE:			
	LINE NUMBER FROM COLUMN 10. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________	LINE NUMBER . . . . [ ][ ] NAME ______________
502	MAN LABEL	PUT THE MAN QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE MAN QUESTIONNAIRE BAR CODE LABEL HERE.	PUT THE MAN QUESTIONNAIRE BAR CODE LABEL HERE.
503	ASK CONSENT FOR FOR ANTHROPOMETRY AND BIOLOGICAL TESTING	As part of this survey we are asking men from all over this country to allow us to weigh and measure you. In addition to weigh and measuring you we would like to take a sample of your blood and urine. The tests are safe. Some tests may cause you slight discomfort, such as taking a blood sample. For all tests, there will be a brand new set of equipment used to take your blood and collect your urine, which is clean and completely safe. The equipment will be thrown away after it has been used on you. With the blood we will test you for anemia and malaria. Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease. Malaria can also be serious and can lead to you becoming anemic or making the anemia worse. You will be given these results immediately. If needed you will be referred to a local health facility for treatment. The rest of the blood will be sent to a laboratory to be tested for other vitamins and minerals, such as vitamin A and iron. The results from these tests will not be reported back to you as it will take some time to process the blood. The results will be kept strictly confidential and will not be shared with anyone other than members of our survey team. This information will help the Ministry of Health understand better what problems men in Malawi are experiencing and help them to improve the health and nutrition programs here, which will benefit all men in Malawi. Do you have any questions? You can say yes or no. It is up to you to decide. Will you participate in these tests?		
504	CIRCLE THE CODE AND SIGN YOUR NAME.	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ______________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ][ ] NOT PRESENT/OTHER 9	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ______________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ][ ] NOT PRESENT/OTHER 9	AGREED, ANTHROPOM. MEASURES ONLY . . . . 1 AGREED, BLOOD TEST ONLY . . . . 2 AGREED, URINE TEST ONLY . . . . 3 AGREED, ANTHROPO& BLOOD TEST ONLY . . . . 4 AGREED, ANTHROPO& URINE TEST ONLY . . . . 5 AGREED, BLOOD& URINE TESTS ONLY . . . . 6 AGREED **ALL**, ANTHROPO & BLOOD&URINE TESTS . . . . . . 7 RESPONDENT REFUSED . . . . 8 ______________ (SIGN AND ENTER YOUR ID NUMBER) [ ][ ][ ] NOT PRESENT/OTHER 9
505	NURSE: ENTER YOUR ID NUMBER.	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER
506	In the last week, have you taken iron tablets or iron syrup? SHOW COMMON IRON TABLETS IN MALAWI.	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
506A	In the last month, have you taken any other kind of vitamin or mineral tablet/syrup/powder?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
507	Have you had a fever in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
508	Have you had a fever in the last 24 hours?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
509	Have you had a cough or breathing problem in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
510	Have you had diarrhea in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
511	Have you been ill with malaria in the last 2 weeks?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
512	In the past 2 weeks did you notice blood in your urine?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2

	LINE NUMBER FROM COLUMN 10. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______	LINE NUMBER . . . . [ ][ ] NAME ______
513	In the last six months, have you received a blood transfusion?	YES . . . . . . 1 NO 2	YES . . . . . . 1 NO 2	YES . . . . . . 1 NO 2
514	At what time approximately did you eat your most recent meal?	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]
515	CHECK 504 AGREED FOR BLOOD TEST	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 523)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 523)	CODE '2', '4', '6' OR '7' CIRCLED [ ] CODE '2', '4', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 523)
516	**PURPLE TOP TUBE** RECORD THE RESULT OF THE PURPLE TOP TUBE BLOOD SAMPLE COLLECTION	PURPLE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	PURPLE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6
517	**BLUE TOP TUBE (METAL FREE)** RECORD THE RESULT OF THE BLUE TOP TUBE BLOOD SAMPLE COLLECTION	BLUE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	BLUE TOP TUBE COLLECTEI . . . . 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6
518	DATE BLOOD SAMPLE TAKEN (DAY/MONTH/YEAR)	DAY . . . . . . [ ][ ] MONTH . . . . . . [ ][ ] YEAR . . . . . . [ ][ ][ ][ ]	DAY . . . . . . [ ][ ] MONTH . . . . . . [ ][ ] YEAR . . . . . . [ ][ ][ ][ ]	DAY . . . . . . [ ][ ] MONTH . . . . . . [ ][ ] YEAR . . . . . . [ ][ ][ ][ ]
519	TIME BLOOD DRAWN	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]	HOURS . . . . . . [ ][ ] MINUTES . . . . . . [ ][ ]
520	RECORD MALARIA TEST RESULT	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
521	RECORD HEMOGLOBIN LEVEL HERE	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6	G/DL . . . . [ ][ ].[ ] INSUFFICIENT . . . . 99.3 REFUSED . . . . 99.4 NOT PRESENT . . . . 99.5 OTHER 99.6
522	RECORD POC HEMOGLOBIN LEVEL HERE	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7	VISUAL G/DL . . . . [ ][ ].[ ] APP G/DL . . . . [ ][ ].[ ] BLUE . . . . 99.3 GREEN . . . . 99.4 YELLOW . . . . 99.5 ORANGE . . . . 99.6 RED 99.7
523	CHECK 504: AGREED FOR ANTROPOMETRIC MEASUREMENTS	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 528)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 528)	CODE '1', '4', '5' OR '7' CIRCLED [ ] CODE '1', '4', '5' OR '7' NOT CIRCLED [ ] (SKIP TO 528)
524	WEIGHT IN KILOGRAMS.	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96	KG. . . . . [ ][ ][ ].[ ][ ] REFUSED . . . . 999.94 NOT PRESENT . . . . 999.95 OTHER 999.96
525	HEIGHT IN CENTIMETERS.	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6	CM. . . . . [ ][ ][ ].[ ] REFUSED . . . . 999.4 NOT PRESENT . . . . 999.5 OTHER 999.6

	LINE NUMBER FROM COLUMN 10. NAME FROM COLUMN 2.	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________	LINE NUMBER . . . . [ ][ ] NAME ________
527	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN CENTIMETERS.	CM . . . . [ ][ ] . [ ][ ] REFUSED . . . . 99.95 OTHER 99.96	CM . . . . [ ][ ] . [ ][ ] REFUSED . . . . 9995 OTHER 9996	CM . [ ][ ] . [ ][ ] REFUSED . . . . 9995 OTHER 9996
528	LAB TECH: ENTER YOUR ID NUMBER.	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER	[ ][ ] ID NUMBER
529	TIME BLOOD CENTRIFUGED	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]	HOURS . . . . [ ][ ] MINUTES . . . . [ ][ ]
530	CHECK 504: AGREED FOR URINE TEST	CODE '3', '5', '6' OR '7' CIRCLED [ ] CODE '3', '5', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 535)	CODE '3', '5', '6' OR '7' CIRCLED [ ] CODE '3', '5', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 535)	CODE '3', '5', '6' OR '7' CIRCLED [ ] CODE '3', '5', 6' OR '7' NOT CIRCLED [ ] (SKIP TO 535)
531	In order to determine if you have blood in your urine, which might suggest that you have schistosomiasis, we would like to collect a urine sample from you. If you can provide this now, we appreciate it. If not now, we can come back to pick up the sample at a later time. INSTRUCTIONS IF UNABLE TO PRODUCE AT WILL: FOR URINE: We will return tomorrow to pick up your urine. We would like the freshest urine you can give us. Please use this cup to collect your urine.			
532	**URINE SPECIMEN** RECORD THE RESULT OF URINE SPECIMEN COLLECTION	URINE SPECIMEN COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6	URINE SPECIMEN COLLECTED .... 1 INSUFFICIENT SAMPLE . . . . 2 REFUSED . . . . 3 OTHER 6
533	DATE URINE SAMPLE COLLECTED (DAY/MONTH/YEAR)	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]	DAY . . . . [ ][ ] MONTH . . . . [ ][ ] YEAR . . . . [ ][ ][ ][ ]
534	RECORD RESULTS OF DIPSTICK FOR HEMATURIA	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6	POSITIVE . . . . 1 NEGATIVE . . . . 2 INVALID . . . . 3 REFUSED . . . . 4 NOT PRESENT . . . . 5 OTHER 6
535	**<u>REFERRAL CLINICAL MALARIA</u>** CHECK 520: REFER IF RDT POSITIVE (520=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
536	**<u>REFERRAL SEVERE ANEMIA</u>** CHECK 521: REFER IF Hb <7 G/DL	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
537	**<u>REFERRAL MALNUTRITION</u>** CHECK 527: REFER IF MUAC <19.0	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
538	**<u>REFERRAL PRESUMED SHISTO</u>** CHECK 534 REFER IF HEMATURIA POSITIVE (534=1)	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2	REFERRED . . . . 1 NOT REFERRED 2
539	GO BACK TO 502 IN NEXT COLUMN OF THIS QUESTIONNAIRE OR IN THE FIRST COLUMN OF AN ADDITIONAL QUESTIONNAIRE; IF NO MORE MEN 20-54 YEARS, END INTERVIEW.			

FIELDWORKER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW AND TESTING

SUPERVISOR'S OBSERVATIONS

EDITOR'S OBSERVATIONS

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