

**PROTOCOL FOR  
2008 LIBERIA MALARIA INDICATOR SURVEY  
(LMIS)**

**National Malaria Control Program  
Ministry of Health and Social Welfare  
Monrovia, Liberia**

**Liberia Institute of Statistics and Geo-Information Services  
Monrovia, Liberia**

**Demographic and Health Surveys  
Macro International Inc.  
Calverton, Maryland, USA**

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# PROTOCOL FOR 2008 LIBERIA MALARIA INDICATOR SURVEY

## I. INTRODUCTION

Although it is preventable and curable, malaria remains a major public health problem in Liberia, taking its greatest toll on young children and pregnant women. Malaria is the leading cause of attendance at out-patient departments (38 percent) and is also the number one cause of in-patient deaths. Hospital records suggest that at least 42 percent of in-patient deaths are attributable to malaria (NMCP, 2006). This health problem was exacerbated by 15 years of civil conflict that resulted in large population displacements as well as damage to health systems. In an effort to reduce the malaria burden in Liberia, the Ministry of Health and Social Welfare (MOHSW) introduced a policy and strategic plan for malaria control and prevention. This plan is in line with the Abuja Declaration, which the Government of Liberia signed in April 2000. The measures laid out in the National Strategic Plan are attempts to fulfill WHO's Roll Back Malaria objective of reducing malaria morbidity and mortality by 50 percent by the year 2010. As part of this plan, the MOHSW has endorsed the use of more effective drugs for treatment in Liberia—Artesunate plus Amodiaquine (ACT)—as well as preventive measures such as intermittent preventive treatment (IPT) for pregnant women, the use of insecticide-treated nets (ITNs), and indoor residual spraying (IRS), especially in selected communities.

In 2005, the National Malaria Control Program (NMCP) at the MOHSW implemented a nationally representative, household-based Malaria Indicators Survey (MIS) (NMCP, 2006). The overall objective of this survey was to update the core baseline indicators of malaria in Liberia. Data collection in 8,226 households was conducted by the NMCP in close collaboration with the Bureau of Statistics of the Ministry of Planning and Economic Affairs, now the Liberia Institute of Statistics and Geo-Information Services (LISGIS), with funding and support from several international donors, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria; the World Health Organization; and the UN Population Fund (UNFPA). The survey also included a health facility component. Among the more important findings of the survey was the fact that 66 percent of children under five were infected with the malaria parasite (*Plasmodium falciparum*) at the time of the survey and that 87 percent of children under five had anemia (NMCP, 2006).

In addition, the Government of Liberia implemented the 2007 Liberia Demographic and Health Survey (LDHS), with LISGIS as the national implementing agency, assisted by the Ministries of Planning and Economic Affairs (MPEA) and Health and Social Welfare (MOHSW). The survey was a joint undertaking of LISGIS, MPEA, MOHSW, the National AIDS Control Program (NACP), the Liberia Institute for Biomedical Research (LIBR), the United Nations Population Fund, the US Agency for International Development (USAID), UNICEF, UNDP, and Macro International, Inc. The survey provides information about the levels and trends in fertility, child mortality, family planning use, and maternal and child health. It also shows that 30 percent of households in Liberia in 2007 owned a mosquito bednet and that 59 percent of children under five with fever were treated with antimalarial drugs, mostly chloroquine.

## II. RATIONALE FOR THE SURVEY

A 2008 MIS survey has been planned for some time in order to update the data provided

by the 2005 MIS and the 2007 LDHS. Available data on malaria is sparse and mostly based on field reports from non-governmental organizations (NGOs). The NMCP has distributed thousands of mosquito bednets in the last few years. One way to assess the success of this distribution is to review process indicators based on the number of nets distributed by various organizations. However, in order to measure the effect of this distribution, it is important to measure the proportion of households that own a net and, even more important, the number of children who actually sleep under them.

Similarly, it is only through scientifically designed surveys that it is possible to measure the prevalence of malaria and its associated syndrome, anemia, among children throughout the country. Data from health facilities are biased since they only cover those who reach the facility.

The data from the survey will be used as a baseline for the President's Malaria Initiative (PMI) that was recently initiated in Liberia with funding from the USAID. Survey results will provide much-needed data for the NMCP program regarding bednet coverage and use, coverage of intermittent preventive treatment for pregnant women, treatment practices for childhood fever, and prevalence of malaria and anemia among children age 6-59 months.

### **III. OBJECTIVES**

The key objectives of the 2008 Liberia Malaria Indicator Survey (LMIS) are to:

- Measure the extent of ownership and use of mosquito bednets
- Assess coverage of the intermittent preventive treatment program to protect pregnant women
- Identify practices used to treat malaria among children under five and the use of specific anti-malarial medications
- Measure the prevalence of malaria and anemia among children age 6-59 months
- Assess knowledge, attitudes and practices of malaria in the general population.

A secondary objective of the survey is to transfer knowledge about best practices in survey implementation and to transfer skills to Liberian counterparts related to survey design, training, budgeting, logistics, data collection monitoring, data processing, analysis, report drafting, and data dissemination.

### **IV. METHODOLOGY**

#### ***a) Organizational Structure***

The LMIS will be implemented by the **National Malaria Control Program (NMCP)** of the MOHSW. The NMCP will be responsible for general administrative management of the survey, including ensuring adequate level and distribution of funding; overseeing day-to-day operations; establishing and hosting meetings of the Technical Committee; designing the survey; developing the survey protocol and ensuring that it is approved by the Liberian National Ethics Committee on Bio-Medical Research prior to the data collection; participating along with LISGIS in recruiting, training, and monitoring field staff, and providing the necessary medicines for treatment of any children who test positive for malaria (and/or anemia) during the survey. The NMCP will also take primary responsibility for the data processing operation, report writing, and data dissemination. The latter task will involve distributing the preliminary and final reports

to appropriate organizations and individuals, designing and holding a seminar to present the survey findings to policymakers, program managers and interested researchers, and disseminating a press release on the major survey findings to news media. NMCP will also be responsible for administering all the funds for the local costs and for keeping adequate accounts. The NMCP will provide office space needed to accomplish these tasks and will provide space and data entry staff for use in data processing.

The **Liberia Institute of Statistics and Geo-Information Services (LISGIS)** will assist NMCP in the design of the LMIS, especially in the area of sample design and selection. In this regard, they will provide the necessary maps and lists of households in the selected sample points. LISGIS will also take a primary role in recruiting, training, and monitoring the data collection staff and will loan some of its vehicles for the survey operations. LISGIS will also provide the use of its global positioning system (GPS) units to ensure that data collection teams can locate the selected sample points, as well as their portable weighing scales.<sup>1</sup>

The **Malaria Center** at the JFK Hospital compound will implement the microscopic reading of the malaria slides to determine malaria parasite infection. Inclusion of malaria testing may depend on whether a sufficient number of experienced malaria microscopists can be identified who will be available for the laboratory work.

**MEASURE DHS, Macro International**, with funding from the U.S. Agency for International Development (USAID)/Liberia, will provide technical assistance for the survey on overall survey design, sample design and selection, questionnaire design, biomarkers (anemia testing, rapid malaria testing, and making and reading blood smears), interviewer training, fieldwork logistics, data processing, data analysis, sampling errors, report production, and data dissemination. MEASURE DHS staff will make approximately 10 short-term visits to Liberia over the course of the survey. DHS will provide copies of its model Malaria Indicator Survey questionnaires; model interviewers', supervisors' and training manuals; data entry and editing programs; programs for tracking the results of the malaria blood smear testing at the laboratory, and tabulation and report plans. DHS will also provide all the supplies needed for collecting anemia and malaria parasitemia testing, as well as some computers and related equipment for data processing.

In order to maintain communications between all parties and to ensure widespread acceptance and ownership of the survey, NMCP will organize periodic meetings of the **Technical Committee**. The Technical Committee will constitute a task force that will meet frequently during the planning and implementation of the survey. It will consist of mid-level staff who will make recommendations to review the overall project design and questionnaires, monitor the progress of the activities and provide guidance in the design of the tabulation and report plans. Task force members are welcome to observe the field staff training and fieldwork and provide feedback on their observations. The Chairman of the Technical Committee will report directly to the Deputy Minister for Planning of the MOHSW; however, he will also report on the progress of the survey at meetings of the senior staff of the MOHSW as necessary.

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<sup>1</sup> Vehicles, GPS units, and scales were purchased with USAID/Liberia funds for use in the 2007 LDHS.

### Technical Committee, 2008 LMIS

Mr. Sanford Wisseh, Assistant Minister for Vital Statistics, *Chair*  
Dr. Joel Jones, Director, National Malaria Control Program  
Dr. Tolbert Nyenswah, Deputy Program Assistant, NMCP  
Mrs. Yah Zolia, Monitoring and Evaluation Officer, NMCP  
Mr. Gabriel Thompson, Data Manager, NMCP  
Mr. Emmanuel Dahn, Monitoring and Evaluation Officer, NMCP  
Mr. Paye Nyansaiye, NMCP  
Mrs. Chris Dagadu, Health Promotion Director, NMCP  
Mr. Joseph Alade, IT officer, NMCP  
Dr. Louise Kpoto, Epidemiologist, Ministry of Health and Social Welfare  
Mr. Francis Wreh, Deputy Director General, LISGIS  
Mr. Johnson Kei, LISGIS  
Mr. Augustine Fayiah, LISGIS  
Dr. Eugene Dolopei, College of Medicine  
Dr. Kassahun Belay, Malaria Advisor, USAID/Liberia  
Mr. Kaa Williams, Malaria Advisor, USAID/Liberia  
Dr. Fatumo Bolay, WHO Disease Control Officer

#### *b) Sample Design*

The LMIS household survey sample will be designed to produce most of the key indicators for the country as a whole, for urban and rural areas separately, and for Monrovia and each of five regions formed by grouping the 15 counties. The regional groups are as follows:

- 1 Greater Monrovia
- 2 North Western: Bomi, Grand Cape Mount, Gbarpolu
- 3 South Central: Montserrado (outside Monrovia), Margibi, Grand Bassa
- 4 Southeastern A: River Cess, Sinoe, Grand Gedeh
- 5 Southeastern B: Rivergee, Grand Kru, Maryland
- 6 North Central: Bong, Nimba, Lofa

The survey will utilize a two-stage sample design. The first stage will involve selecting approximately 150 sample points or clusters from the list of enumeration areas (EAs) covered in the 2008 Population Census. In place of undertaking a fresh household listing operation in all the selected areas prior to the fieldwork, instead, the list of names of the heads of households will be taken from the census questionnaire forms. This will result in a large savings in funds and time. From these lists, households to be included in the survey will be selected. LISGIS will organize the operation for selecting enumeration areas, pulling out the necessary census forms and maps for each area, and oversee the production of lists of households and selection of those to be interviewed in the LMIS. If possible, LISGIS will also provide the GIS coordinates for each of the selected clusters.

Because of the approximately equal sample sizes in each region, the sample will not be self-weighting at the national level and weighting factors will be added to the data file so that the results will be proportional at the national level. It is expected that the sample will produce interviews with approximately 3,400 women and anemia and malaria tests for about 3,250 children under five.

The NMCP is interested in collecting data from health facilities to help evaluate malaria case management as was done in the 2005 LMIS. Given the relative complexity of this component (exit interviews, observations, inventory of supplies, etc), it should be done as a separate operation after the LMIS household interviews. Whether it will be included under this project depends on approval by USAID/Liberia as well as funding availability. If implemented, the health facility component will likely be implemented on a sample of about 150 health facilities selected from MOHSW's list of all 435 government and non-government facilities.

**c) Questionnaires**

The LMIS will involve three questionnaires: a Household Questionnaire, a Woman's Questionnaire for all women age 15-49 in the selected households, and a Health Facility Questionnaire. The first two instruments will be based on the model Malaria Indicator Survey questionnaires developed by the Roll Back Malaria and DHS programs, as well as on previous surveys conducted in Liberia, including the 2005 LMIS and the 2007 LDHS.

The **Household Questionnaire** will be used to list all the usual members and visitors in the selected households. Some basic information will be collected on the characteristics of each person listed, including age, sex, education and relationship to the head of the household. The main purpose of the Household Questionnaire is to identify women who are eligible for the individual interview and children under five for anemia and malaria testing. Questions on ownership and use of mosquito bednets will be included in the Household Questionnaire. The Household Questionnaire will also collect non-income proxy indicators about the household's dwelling unit, ownership of various durable goods and land, and household food insecurity.

The **Woman's Questionnaire** will be used to collect information from women aged 15-49 years, covering background characteristics (age, education, media exposure, employment, religion, etc.), reproductive history (number of births in the last 6 years, date of last birth, whether received intermittent preventive treatment for malaria during last pregnancy; whether currently pregnant) and antimalarial treatment for children under five with recent fever.

**KEY INDICATORS—2008 LIBERIA MALARIA INDICATOR SURVEY<sup>1</sup>**

**Malaria**

- Proportion of households that own a mosquito net, an insecticide-treated net (ITN), and number of nets owned
- **Proportion of children under five who slept under an ITN the night before the survey#**
- Proportion of pregnant women who slept under an ITN the night before the survey
- Proportion of women who received intermittent preventive treatment for malaria at least twice during their most recent pregnancy
- **Proportion of children under five with fever in the last two weeks who were treated with appropriate anti-malarial drugs (ACT) within 24 hours of onset of fever #**
- Prevalence of malaria infection (parasites) among children aged 6-59 months
- Prevalence of anemia among children aged 6-59 months
- Proportion of children under five with fever in the last 2 weeks who had a finger or heel stick for malaria testing

**General**

- **source of household drinking water #**
- **type of toilet facility #**
- household socio-economic status (wealth quintile)
- education level attained by household population

# Millennium Development Goal indicator

<sup>1</sup> Most indicators will be produced separately by sex, urban-rural residence, education, and wealth quintile. Depending on sample size, most variables will be available by region.

NMCP will organize a Stakeholders' Workshop to review the draft questionnaires with a wide range of potential users, including government health agencies, non-governmental health organizations, interested donor groups, and faith-based service groups. Stakeholders will be requested to make their data needs known and if necessary, to send their requests in writing to NMCP for review and follow up. Nevertheless, NMCP will bear in mind that the quality and efficiency of the data collection depend in part to the complexity/simplicity of the instruments so only the most important requests for additions to the questionnaires should be entertained.

**d) Malaria and Anemia Testing**

The 2008 LMIS will incorporate three “biomarkers”: taking fingerprick blood samples to perform on-the-spot testing for anemia and malaria among children under five and thick blood smears that will be read in the laboratory to determine malaria parasitemia.

**1. Anemia testing.** Because of the strong correlation between malaria infection and anemia, the LMIS will include anemia testing for children under five. After administering informed consent to the child's parent or guardian, blood samples will be requested and will be collected with a microcuvette from a drop of blood taken from a finger-prick (or a heel prick in the case of young children with small fingers). Hemoglobin analysis will be carried out on site using a battery-operated portable HemoCue analyzer which produces a result within one minute. Results will be given to the child's parent or guardian verbally and in written form. Those whose children have anemia requiring treatment (under 8 g/dl) will be provided with a one month's supply of iron tablets along with verbal and written instructions about dosage and frequency. Parents/guardians of these children will be urged to take the child to a health facility for follow-up care. All households with children 6-59 months will be given a brochure explaining the causes and treatment of anemia. Results of the anemia test will be recorded on the household questionnaire.

**2. Rapid malaria testing.** Another major objective of the LMIS is to provide information about the extent of malaria infection among children under five. Using the same finger or heel prick used for anemia testing, a drop of blood will be tested immediately using the Paracheck rapid diagnostic test, which tests for *Plasmodium falciparum* (which can lead to cerebral malaria). The test includes a loop applicator that comes in a sterile packet. A tiny portion of blood is captured on the applicator and placed on the well of the device. Results are available in 15 minutes. The results will be provided to the respondent or the child's parent/guardian in oral and written form and will be recorded on the household questionnaire.

Those who test positive for malaria will be given a full course of medicine according to standard procedures for treating malaria in Liberia (NMCP, 2007—see table below), along with instructions on how to take the medication. In order to ascertain the correct dose, children will first be weighed, using SECA portable scales that were used in the 2007 LDHS. The parents/guardians of all children tested will be told to take the child to a health facility immediately if they become sicker, develop a fever or difficulty breathing or are not able to drink or breastfeed. They will also be told how to prevent malaria. All drugs for malaria treatment will be provided by the NMCP.

**Proposed Treatment\* for Children Testing Positive for Malaria Parasites**

<b>Weight</b>	<b>Amodiaquine (153 mg)</b>	<b>Artesunate (50 mg)</b>
5-7 kgs.	¼ tablet once a day for 3 days	½ tablet once a day for 3 days
8-10 kgs.	½ tablet once a day for 3 days	½ tablet once a day for 3 days
11-13 kgs.	¾ tablet once a day for 3 days	1 tablet once a day for 3 days
14-16 kgs.	1 tablet once a day for 3 days	1 tablet once a day for 3 days
17-19 kgs.	1 tablet once a day for 3 days	1.5 tablets once a day for 3 days
* Amodiaquine and Artesunate (ACT) to be taken together. Contraindication = children weighing less than 5 kg.. Source: NMCP, 2007, p. 41.		

**3. Malaria testing: blood smears.** In addition to the Paracheck rapid test, a thick blood smear will be taken for all children tested. These blood smears will be dried and packed carefully in the field and then transported to the Malaria Center at the JFK hospital compound in Monrovia for microscopic reading and determination of malaria infection. The purpose of the blood slides is to provide a “gold standard” as to whether the child has malaria and not to ascertain the type of parasite. Since reading the slides requires 6-7 full-time, experienced malaria microscopists who may not be available in Liberia, it may be necessary to either reduce the sample of children for which smears are produced or to omit them altogether.

Each team will include two laboratory technologists who will be responsible for implementing the malaria and anemia testing and making the blood smear slides. Each field team will include at least one medically trained staff (nurse, physician’s assistant) who—in addition to either interviewing or conducting the testing—will also be responsible for ensuring that medications are given in accord with the appropriate treatment protocols. Verbal informed consent for testing of children will be requested from the child’s parent or guardian at the end of the household interview.

The final protocol adopted for the survey will depend on the comments and requirements posed by the ethical review boards, as well as on the results of the pretest. If the pretest reveals problems, procedures will be modified.

***e) Data Collection***

For the main survey, it is estimated that 12 teams will be needed. Each team will be composed of a supervisor (team leader), two interviewers, two lab techs, and a driver. At least one member of every team will be medically trained and will be responsible for dispensing malaria treatment. LISGIS will be responsible for recruiting the required number of field staff with the proper qualifications, with help from the MOHSW on recruiting the nurses/lab technicians. Extra candidates will be recruited to allow for some attrition during the training course and early days of fieldwork. It is important for field staff to be able to speak the local languages of the areas in which they will be assigned to work. Therefore, prior to recruiting, the NMCP and LISGIS will review the team assignments and determine the number of field staff required for each of the main languages spoken in Liberia. It is also important to recruit staff who are willing to travel to the field and work under sometimes uncomfortable and difficult

circumstances.

The 2-week training for the interviewer candidates will include a detailed description of the content of the questionnaire, how to fill the questionnaire, and interviewing techniques. Lab technicians on the team will be trained on conducting the anemia and malaria testing as well as on making the blood slides. Training will consist of classroom lectures, mock interviews and practice interviews in the field. Each interviewer will complete at least five interviews during the training period. The data processing manager will attend the training course in order to become thoroughly familiar with the questionnaires. Trainers will be from the NMCP, LISGIS, and MEASURE DHS. NMCP will be expected to provide an experienced trainer who can assist with the biomarker training during the training course, with assistance from Macro staff. All trainers should be assigned the task of monitoring the data collection and should be available to spend at least 6-8 weeks in the field over the course of the data collection.

The interviewers will also be trained to conduct the two biomarkers. Specifically, they will be trained on how to draw blood (1) onto microcuvettes to measure hemoglobin levels using a portable device (HemoCue); and (2) onto rapid diagnostic kits to test for malaria parasites. Macro will be responsible for preparing manuals on collecting these two biomarkers. Trainees will be expected to practice with both procedures during the training course, as well as in the field during the several days of field practice sessions. At least two days towards the end of the training course will be spent in the field, practicing all elements of the data collection in households in areas that are not selected for the survey sample.

Prior to the start of the data collection, the NMCP—in collaboration with the Internal Affairs Ministry—will undertake community sensitization to try to ensure cooperation with the survey teams. Advocacy will start in the weeks prior to the start of data collection, with radio spots, newspaper ads, and discussions with district officials to alert them to the upcoming survey. Immediately prior to starting interviewing in a cluster, the team supervisor will discuss the survey with the local leaders in an effort to persuade the selected households to cooperate with the survey.

Fieldwork is expected to take a total of two months to complete. Close communication will be maintained at all times between the LISGIS central office and field personnel during fieldwork. A schedule will be developed for making phone calls from field teams to headquarters to ensure efficiency and accuracy of survey results. Most importantly, trainers and other supervisory staff should make frequent visits to the field to both monitor field work and motivate the teams to produce high quality results.

#### *f) Quality Control*

Quality control in the survey will be ensured through effective supervision of the interviewing teams during fieldwork. The first level of supervision will be provided by the team supervisors. The supervisors will be responsible for closely monitoring the work of the teams to ensure that all sampled households are visited, all eligible respondents are contacted, and that all questionnaires are edited in the field for accuracy and completeness. They will also observe the interviewers taking biomarker tests in order to ensure that all procedures are accurately implemented.

In addition to the regular interviewing teams, a quality control team will be in the field for

the first 6 weeks of fieldwork, making spot checks on teams in the field. They will visit a sub-sample of the households selected and will fill selected portions of the Household Questionnaire which they will subsequently compare with the data from the original questionnaires. The quality control team will also observe biomarker data collection and handling.

Also to ensure the quality of the fieldwork, senior staff from the NMCP and LISGIS will regularly visit the field to check on the performance of each team. Periodic review sessions will be held with the interviewing teams. These review sessions will be designed to identify and correct errors detected in the fieldwork, as well as to motivate and encourage the field teams.

Finally, a set of field control tables will be run at the NMCP periodically during fieldwork to check the data that are entered. Any problems that appear from review of these tables will be discussed with the appropriate teams and attempts made to ensure that they do not persist.

#### ***g) Data Processing***

After checking and correction in the field, all questionnaires will be brought to the MOH office in Monrovia for logging in. After logging in, NMCP will ensure that the blood slides are transported as soon as possible to the laboratory (see next section).

Data processing staff shall include data coders, data entry clerks, supervisors and office clerks. A total of 6 data entry clerks, 1 supervisor, 1 questionnaire administrator, 1 office editor, and 1 secondary editor will be deployed. These will be selected and trained just after the commencement of enumeration. Data entry clerks will be responsible for carrying out, under instruction, all aspects of data entry including verification, modification and electronic editing. The coders will ensure that appropriate codes are provided to all variables before data entry. Macro will provide the programs for entering, editing and tabulating the survey data, as well as technical assistance in installing them and in training data processing staff. Macro will provide at least 6 computers and related equipment to be used for the data processing. Data editing will include the checking of range, structure and a selected set of checks for internal consistency.

After the laboratory testing of the blood smears has been completed, the results of the tests will be merged with the questionnaire dataset by means of the bar code that will be common to the slide and the questionnaire. Prior to releasing the data files, NMCP will destroy the page of the Household Questionnaire that contains the bar codes for individuals and the cluster and household numbers on the data file will be 'scrambled' so as to eliminate the ability to locate any given respondent. These precautions will preclude compromising anonymity.

Macro will provide its standard MIS tabulation plan to prepare the preliminary and final reports. In addition, tables to address country-specific needs will be prepared by Macro in collaboration with NMCP and included into the standard tabulation plan.

#### ***h) Laboratory Testing of Blood Smears***

The Malaria Center will be responsible for reading the blood smears collected in the LMIS. The lab will ensure that the samples are stored appropriately if they cannot be tested immediately. This requires a sufficiently large storage space with a back-up generator in case of power failures. As part of this agreement, Macro will provide the necessary supplies, such as

slides, bar codes, staining trays, gloves, etc. The lab will need to recruit some 6-7 experienced malaria microscopists who can work full-time or close to full-time for a period of about three months. Macro will provide some in-service refresher training and will provide the computer software for documenting test results.

***i) Analysis and Reports***

At least two reports will be prepared for the 2008 LMIS: a preliminary report and a final report. The preliminary report will be produced within three months after the end of data collection. It will be brief and consist primarily of the major malaria-related indicators. Text accompanying the report will be minimal. This report will be in English and will be prepared jointly by NMCP and MEASURE DHS staff. Copies will be reproduced and distributed to appropriate organizations within and outside Liberia.

The final report will be published approximately 6 months after the end of data collection. The report will be written by staff from the NMCP, LISGIS, and others if deemed appropriate, with technical assistance from MEASURE DHS staff. A brief workshop will be held in Liberia to review tabulations, analyze survey results and draft the chapters for the final report. Before publication of the report, drafts of the various chapters of the report will be exchanged by e-mail for review. Other experts will also be invited to read and comment on the report. MEASURE DHS will be responsible for the final formatting of the report, which will be printed in the U.S., with copies provided to all the parties to this agreement. Both the preliminary and final reports will include the names and logos of the MOHSW, LISGIS, USAID, and PMI on the inside cover and will mention the names of all donors in the text.

***j) Dissemination and Utilization of Results***

The NMCP will organize a short seminar to present the survey results to potential users. Administrators who work in malaria-related projects will be invited as well as government officials in charge of socio-economic planning and social science researchers. Media coverage of the seminar will be encouraged.

In view of the fact that more widespread use of the data benefits Liberia and that the survey will be part of a worldwide research project, the survey dataset will be made available to responsible researchers who request it. Prior to the publication of the final report, the dataset will be available only to those who need it to help complete the final report, unless agreed to by the NMCP. Upon completion of the final report, the dataset may be released to other responsible scientific organizations or individuals for statistical analysis. No information which would permit identification of the specific person(s) interviewed will be divulged. All researchers will be requested to send copies of the results of their analyses to the NMCP.

## V. TIMETABLE

Below is the expected timetable of the major activities for the 2008 LMIS

Activities	2008					2009							
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug
1. Formation of Steering/Technical Committees	■												
2. Sample design	■												
3. Survey instrument development	■												
4. Protocol submission to Ethics Review Board			■										
5. Preparation of list of sampled households			■										
6. Ordering/shipping supplies (Macro)			■										
7. Recruitment and training of field staff			■										
8. Awareness and sensitization					■								
<b>9. MAIN SURVEY (Field operations)</b>					■								
10. Data entry and editing							■						
11. Preliminary report writing								■					
12. Final report writing workshop									■				
13. Review and formatting of the final report											■		
14. Printing of the final report												■	
15. National seminar												■	
16. Financial audit													■

## VI. DELIVERABLES

The main deliverable from this project will be the final, detailed report of findings as well as a national seminar to release the report and the findings to users and the general public. Other deliverables will be the dataset that will be accessible to researchers after the final report is released.

In addition to the main products of the survey, there are also some less visible deliverables. For example, the NMCP will be provided with about 6-7 computers and related equipment for the survey processing that can be used for future operations. NMCP will also benefit from hands-on technical assistance and mentoring that should transfer some skills that will be useful in future survey implementation and interpretation and use. Finally, the survey will have tested thousands of Liberian children for malaria and anemia and will treat those who require it.

## VII. PROTECTION OF HUMAN SUBJECTS

Plans for the 2008 LMIS have been formulated so as to protect the confidentiality of survey respondents. Interviewers will be instructed to conduct interviews in private with no other adults present, unless specifically requested by the respondent. The importance of keeping all answers strictly confidential will be emphasized during training. Senior project staff and

Macro staff will review and discuss the issue of human subject protection and will be responsible for covering the topic during the training of the field teams. Every effort will be made to ensure that confidentiality is maintained during the implementation of fieldwork.

Tables and reports will show only aggregated figures so that it will not be possible to identify enumeration areas or individuals who were interviewed. Subnational estimates will be reported only down to the regional level, which will not allow the identification of enumeration areas, households, or individuals.

Since part of the LMIS involves drawing blood from children, every care will be made to ensure that the respondents are the least inconvenienced. The area from which blood is drawn will be thoroughly cleaned with an alcohol prep swab before the puncture is made. The puncture will be made with a sterile, retractable, non-reusable lancet which contains a tiny blade activated by a trigger device. After the blood has been collected, the blood flow will be stopped by applying pressure on the puncture site with a gauze pad. Once the bleeding stops, the area will be protected from infection by a band-aid. All persons conducting the blood testing will be specifically trained in these procedures.

Test results for anemia (indicating whether the child has no anemia, mild anemia, moderate anemia, or severe anemia) and test results indicating whether the child has detectable malaria or not will be given to the child's parent or guardian in the field. Those with severe anemia will be provided with iron tablets and also referred to health facilities for medical follow-up. Children testing positive for malaria will be offered a free full-course treatment with ACT.

Informed consent will be sought from the household respondent for the Household Questionnaire, from a child's parent or guardian prior to anemia and malaria testing and from each individual woman aged 15-49 prior to the Woman's Questionnaire. In each case, an informed consent statement will be read to the respondent. The informed consent statements contain all of the information the respondent needs to make an informed decision about whether or not to participate in the survey (see the attached draft questionnaires).

The informed consent statements will be read to the respondents and if the respondent agrees to the interview (or the test), the interviewer will sign a statement that she has read the informed consent statement to the respondent and that the respondent has agreed. In addition to formal informed consent statements, respondents will be given an opportunity to ask any questions about the survey that will help them decide whether or not they want to participate.

The survey provides some indirect and direct benefits to human subjects. The LMIS surveys are high-profile surveys that often provide the only source of reliable, up-to-date information on the health of a nationally representative sample of individuals. As such, the findings have great potential for the betterment of the population in general with respect to the design of policies and the implementation of population, health, and environmental programs.

Direct benefits to individual subjects include receiving test results on malaria and anemia for children under five. Children who test positive for malaria will be provided with the standard regimen of antimalarial treatment drugs. For children who participate in the anemia testing and whose results indicate they have severe anemia, interviewers will offer iron tablets to the parent/guardian for the child. They will also recommend that the child be taken to a health facility for medical follow-up.

The risk to human subjects from participating in the interview portion of the survey is slight. Finger pricks or heel pricks for blood collection to test for malaria/anemia may inflict slight pain. Since the study will use sterilized, self-retracting, non-reusable lancets to make the finger pricks, there will be minimal risk of infection.

With respect to the ACT malaria treatment, side effects include purities, nausea, and vomiting (NMCP, 2007). Parents/guardians provided with the treatment for their children will be informed of these potential adverse effects and reassured that they are normal, but that the drugs are still working to rid the child of malaria parasites.

## **VIII. PRINCIPAL INVESTIGATORS**

- Dr. Joel Jones, Director, National Malaria Control Program
- Dr. Louise Kpoto, Epidemiologist, Ministry of Health and Social Welfare
- Dr. T. Edward Liberty, Director General, LISGIS

## **IX. BUDGET**

The local costs of the survey are estimated at U.S.\$350,000-\$450,000, including salaries, per diems, transportation, printing of questionnaires and reports and the cost of purchasing and shipping computers, reports, and all medical supplies. Technical assistance costs are not included in this estimate, but will be supplied by USAID/Liberia through Macro. Macro will be able to fund all the local costs via a contract with the MOHSW.

## **X. REFERENCES**

National Malaria Control Program (NMCP) [Ministry of Health & Social Services]. 2004. National Policy for Malaria Control and Prevention. Monrovia: NMCP.

National Malaria Control Program (NMCP) [Ministry of Health & Social Services]. 2006. *Liberia Malaria Indicators Survey 2005*. Monrovia: NMCP.

National Malaria Control Program (NMCP) [Ministry of Health & Social Services]. 2007. Training Manual for Management of Malaria: Liberia. Participants Guide, Version 3. Unpublished document. Monrovia: NMCP.

## **XI. APPENDIXES**

Appendix A. Household Questionnaire

Appendix B. Woman's Questionnaire