

This Malaria Operational Plan has been endorsed by the President's Malaria Initiative (PMI) Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. If any further changes are made to this plan, it will be reflected in a revised posting.

PRESIDENT'S MALARIA INITIATIVE

Malaria Operational Plan (MOP)

LIBERIA

FY 2008

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List of Abbreviations

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
AM	Artemether
ANC	Antenatal care
AQ/SP	Amodiaquine/sulfadoxine-pyrimethamine
AS	Artesunate
ARV/ART	Anti-retroviral/therapy
BCC	Behavior change communications
CCM	Country Coordinating Mechanism
CDC	Centers for Disease Control and Prevention
CHT	County Health Team
CHW	Community health workers
CQ	Chloroquine
CSHGP	Child Survival and Health Grants Program
DDT	Dichloro-Diphenyl-Trichloroethane
DHS	Demographic and Health Survey
EC	European Commission
EML	Essential medicines list
FBO	Faith-based organization
GFATM	Global Fund to Fight AIDS, TB, and Malaria
GOL	Government of Liberia
HBM	Home-based management/of fever
HCW	Health care worker
HMIS	Health Management Information Service
ICRC	International Committee of the Red Cross
IDP	Internally displaced persons
IM	Intramuscular
IMC	International Medical Corps
IMCI	Integrated Management of Childhood Illnesses
INGO	International Nongovernmental Organization
IPTp	Intermittent preventive treatment of pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated bed net
IV	Intravenous
JICA	Japanese International Cooperation Agency
LIBR	Liberian Institute of Biomedical Research
LLIN	Long-lasting insecticide-treated bed net
M&E	Monitoring & evaluation
MCH	Maternal and child health
MERCI	Medical Emergency & Relief Corps International
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MOH&SW	Ministry of Health & Social Welfare
MSC	Malaria Steering Committee
MSF	<i>Medicins sans Frontières</i> [Doctors without Borders]

NDRA	National Drug Regulatory Authority
NDP	National Drug Plan
NDS	National Drug Service
NGO	Non-governmental organization
NMCP	National Malaria Control Program
OFDA	Office of Foreign Disaster Assistance
OPD	Outpatient department
PBL	Pharmacy Board of Liberia
PCR	Polymerase chain reaction
PLWHA	People living with HIV/AIDS
PMI	President's Malaria Initiative
PMTCT	Prevention of mother-to-child transmission
PSM	Procurement and supply management
QN	Quinine
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
RTI	Research Triangle Institute
SC-UK	Save the Children – United Kingdom
SP	Sulfadoxine-pyrimethamine
SSS	Sentinel Site Surveillance
TA	Technical assistance
TCC	Technical Coordinating Committee
UN	United Nations
UNDP	United Nations Development Program
UNHCR	United Nations High Commissioner for Refugees
USAID	United States Agency for International Development
USG	United States Government
WB	World Bank
WHO	World Health Organization
WVL	World Vision - Liberia

EXECUTIVE SUMMARY

Liberia has been selected as one of the eight new countries to receive funding during the third year of the President's Malaria Initiative (PMI). The objective of this Initiative is to assist African countries, in collaboration with other partners, to rapidly scale up coverage of vulnerable groups with four highly effective interventions: artemisinin-based combination therapy (ACT), intermittent preventive treatment for malaria in pregnancy (IPTp), insecticide-treated mosquito nets (ITNs), and indoor spraying (IRS) with residual insecticides.

Malaria is the leading cause of morbidity and mortality in Liberia. It accounts for over 40% of all outpatient consultations, 18% of inpatient deaths, and is reported to cause approximately 21,000 deaths among children under five years of age. Liberia has 15 counties, all of which have year-long, stable, malaria transmission. The entire population of approximately 3.6 million is at risk of malaria, including the estimated 565,000 children under-five and 188,500 pregnant women.

According to the most recent Malaria Indicator Survey (MIS), conducted in 2005, only 3.2% of children under-5 with fever received first-line treatment for malaria within 24 hours, and only about 4% of pregnant women received any kind of treatment during their pregnancy. Approximately 18% of households owned a net (not necessarily an ITN), and only 2.6% of children under-five had slept under an ITN the previous night. Indoor residual spraying was conducted from 2004-2006 by MENTOR in internally displaced persons (IDP) camps, covering a population of approximately 150,000. No up-to-date information exists on national or county coverage with ACTs or IPTp.

The Government of Liberia subscribes to the Roll Back Malaria Abuja targets and the Millennium Development Goals. Malaria is considered a priority for poverty reduction and the government's development agenda. Although the Ministry of Health (MOH) is committed to increasing access to health services and increasing the efficiency and quality of those services nationwide, a weak health infrastructure, a shortage of health workers, lack of vehicles, and damaged physical infrastructure, all due in large part due to the recent conflict, are formidable obstacles. Over 80% of health services are still provided by NGOs. Funding for many of these emergency NGOs is coming to an end, and services are slowly transitioning to the MOH and development NGOs. An obstacle to this transition, however, is the inability of the MOH, including the NMCP, to support staff salaries, forcing the few qualified staff within the MOH to consider jobs with other organizations.

Liberia is the recipient of one malaria grant from the Global Fund to Fight AIDS, Tuberculosis and Malaria totaling \$12,140,921 million. Additional support of over four million dollars was provided for malaria control through USAID, UNICEF, and WHO in 2007. Several international and local NGOs have supported malaria control efforts as well, primarily in small ITN distributions, and training and supervisions of health care workers.

This PMI Year 1 Malaria Operational Plan for Liberia was developed in close consultation with the NMCP and with participation of nearly all national and international partners involved with malaria prevention and control in the country. The activities that the PMI is proposing to support fit in well with the Ministry of Health National Malaria Strategic Plan, and build on investments

made by the NMCP, GFATM, USAID, UNICEF, WHO, and other donors to improve and expand malaria-related services over the past several years. To achieve the goal and targets of the MOH/NMCP and PMI in Liberia, the following major activities will be supported during year one of the Initiative.

Insecticide-treated nets: The GFATM has provided almost a half million ITNs to Liberia since 2005 and the total number that have been distributed are over 660,000. Several service delivery mechanisms have been used to distribute the ITNs, including free door-to-door and other types of campaign distributions, and free distribution through antenatal care (ANC) clinics. Bed nets are also for sale through a few vendors in Monrovia, but the target groups have been expatriate workers as the price is prohibitive for the vast majority of Liberians. The NMCP has set a target of three ITNs per household, or approximately one ITN for each sleeping space. In year one, to support this target, PMI will procure 480,000 LLINs for free distribution through ANCs, and 150,000 for free distribution in Bomi County through a door-to-door campaign. Other partners are procuring approximately 200,000 ITNs; the combined effort is expected to bring nationwide ownership of target groups to 60%. While coverage has increased dramatically over the last several years, usage remains low; therefore, PMI will work with non-governmental organizations (NGOs) to support community-based information, education, and communication/behavior change communication (IEC/BCC) campaigns to increase demand for and correct usage of LLINs.

Indoor residual spraying: Liberia has a history of IRS with DDT during the malaria eradication campaign in the late 1950s. Spraying over the last two years has primarily been done in internally displaced person (IDP) camps, and camps for returning refugees, with a population of approximately 150,000 covered. No IRS baseline information, such as type of vectors, insecticide resistance, etc, was collected prior to the spraying. The NMCP would like to begin IRS for the general population, but has not yet developed a national plan. They expressed a desire to gather the necessary baseline information to help them develop this, and are open to again using DDT. In year one, to support these goals, PMI will support a baseline assessment, build entomologic capacity, and conduct spray campaigns in Monrovia covering 25,000 households with both DDT and pyrethroids to determine which insecticide the country will use on a nationwide basis.

Intermittent preventive treatment of pregnant women: The 2005 MIS showed substantially low coverage of IPTp. In order to increase demand for IPTp, PMI will support pre-service and in-service training and supervisions/coaching in MIP. Sulfadoxine-pyrimethamine (SP) doses in-country, and commitments from other donors, will assure adequate supply.

Case management: There are currently no written national policy guidelines for malaria diagnosis. The NMCP expressed a desire to expand microscopic diagnosis, and continue to use rapid diagnostic tests (RDTs) until microscopic capacity has been developed. RDTs have been the primary means of diagnosis, provided through the GFATM grant and NGOs, over the last several years. The NMCP supports a policy of diagnostic confirmation in all age groups, and does not promote presumptive diagnosis in children under five. To support efforts to increase diagnostic capacity and quality, PMI in year one will support the development of a policy and a national reference laboratory, an assessment of current capacity to identify gaps, provision of

RDTs with funding for supervision and monitoring of their use, and development of microscopic capacity through training. PMI will procure ACTs and drugs for severe malaria, and invest in strengthening the supply chain and logistics systems for malaria drugs to ensure reliable access and a steady supply of these essential antimalarial medications. To ensure that ACTs are properly used and to improve the quality of malaria treatment, PMI will support training and supervision at the health facility level, and pre-service training of health care providers. Finally, PMI will support increased demand for and correct use of ACTs through national and community-based IEC/BCC activities. Combined with the investment from other donors, PMI support in this area is expected to result in over 40% of children under five in Liberia receiving ACTs by the end of year one.

Monitoring and evaluation: The PMI includes a strong monitoring and evaluation component to measure progress against the project goal and targets and identify and correct problems in program implementation. The PMI monitoring and evaluation plan will be coordinated with the NMCP and other partners through the Monitoring and Evaluation System Strengthening Tool (MESST) to ensure that critical gaps are being filled, and to standardize data collection and reporting. In the first year, PMI will provide support to strengthening the health information system, including the printing and dissemination of registers, establishment of insecticide resistance monitoring, establishment of sentinel sites, and support the a MIS.

Building NMCP capacity: To achieve PMI targets for coverage of ACTs, ITNs, IPTp, and IRS, the PMI will work with other partners to strengthen the capacity of the MOH/NMCP at the central, provincial, and district levels to plan, conduct, supervise, monitor and evaluate malaria prevention and control activities. Efforts will also be directed at improving coordination/communication between the MOH/NMCP and partners.

To launch the PMI in Liberia, support will be provided with Fiscal Year (FY) 2007 and 2008 funding to support a door-to-door distribution of 150,000 LLINs in Bomi County.

The proposed FY08 PMI budget for Liberia is \$12.5 million. Of this amount, 2% will support malaria in pregnancy activities, 36% will support procurement and distribution of ITNs, and over 4% will go toward IRS. Just over 33% will support improved case management including the purchase of ACTs and drugs for severe malaria and 10% will support monitoring and evaluation. Approximately 48% of the total budget will be spent on commodities.

THE PRESIDENT'S MALARIA INITIATIVE

In late June 2005, the United States Government (USG) announced a new five-year, \$1.2 billion initiative to rapidly scale up malaria prevention and treatment interventions in high-burden countries in sub-Saharan Africa. The goal of this Initiative is to reduce malaria-related mortality by 50% after three years of full implementation in each country. This will be achieved by reaching 85% coverage of the most vulnerable groups---children under five years of age and pregnant women ---with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated bed nets (ITNs), intermittent preventive treatment (IPT) of pregnant women, and indoor residual spraying (IRS).

The President's Malaria Initiative (PMI) began in three countries in 2006: Angola, Tanzania, and Uganda. In 2007, four countries were added: Malawi, Mozambique, Senegal, and Rwanda. In December, 2006, at the Malaria White House Summit, the 2008 countries were announced: Benin, Ethiopia (one region), Ghana, Kenya, Liberia, Madagascar, Mali, and Zambia. Funding began with \$30 million in Fiscal Year (FY) 06 for the initial three countries, and will increase to \$135 million in FY07, \$300 million in FY08, and reach \$500 million in FY10.

In implementing this Initiative, the U.S. is committed to working closely with host governments and within existing national malaria control plans. Efforts will be coordinated with other national and international partners, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM), Roll Back Malaria (RBM), the World Bank (WB) Malaria Booster Program, and the non-governmental and private sectors, to ensure that investments are complementary and that RBM and Millennium Development goals are achieved. Country Assessment and Planning sessions for the PMI, as well as subsequent evaluations, will be highly consultative and held in collaboration with the national malaria control program and other partners.

In Liberia, a needs assessment was conducted from March 19-30, 2007, and consisted of meetings with the National Malaria Control Program (NMCP) and other partners to identify current activities and gaps. Results of the needs assessment were used to guide the planning visit from May 20-30, 2007. During this visit, members of the PMI team met with the NMCP to identify priorities for funding for FY08, guided in part by a stakeholders meeting with partners involved in malaria control. This document presents that detailed one-year implementation plan for the first year of the PMI in Liberia. It briefly reviews the current status of malaria control and prevention policies and interventions, identifies challenges and unmet needs if the goals of the PMI are to be achieved, and provides a description of planned Year One activities under the PMI. The document was developed in close consultation with the National Malaria Control Program and with participation of many national and international partners involved in malaria prevention and control in the country. The total amount of PMI funding requested for Liberia is \$12.5 million for FY 2008.

COUNTRY BACKGROUND

Liberia covers 43,000 square miles in West Africa and is bounded by nearly 350 mile (greatest length) of Atlantic Ocean coastline off the southwest and by the neighboring countries of Sierra Leone (Northwest), Guinea (North) and Cote d'Ivoire (East and South east). Its greatest width is

150 miles. Liberia is administratively divided into 15 counties and 95 political districts. The country is grouped among the least developed countries in the world ranking 174 out of 175 countries in the UNDPs Human Development Index for 1999¹. The population in the 2006 World Health Report was 3.58 million.

Liberia has been in a state of intermittent civil war for more than a decade. The latest conflict ended in 2003, and humanitarian assistance groups have been providing much of the services to the Liberian population over the last 2-3 years, including almost all health services. Few health or other indicators were collected over the period of the conflict, but as the country begins to transition from an emergency to a development phase, data has become available and is being collected by a number of organizations. Life expectancy for females and males is 44 and 41, respectively. The expenditure on health is approximately 5.6% of the GDP. Infant, under-five, and maternal mortality rates are high at 157 (2005), 235 (2005), and 770 (2000), respectively (WHO World Health Statistics). A DHS conducted in the beginning of 2007 reported an HIV prevalence of 1.5%.

HEALTH SYSTEM INFRASTRUCTURE AND HEALTH SERVICE DELIVERY

There is considerable policy commitment on the part of the Government of Liberia (GOL) to improve health service delivery, as well as a commitment to malaria control. This is reflected in several key policy documents, including the National Health Policy of the Ministry of Health and Social Welfare (MOH&SW, January, 2007), the National Malaria Strategic Plan 2004-2008, and the NMCP Malaria Action Plan for 2007. The vision of the National Health Policy is a nation with improved health and social welfare status of its citizens through dedication to equitable and sustainable health promotion and protection, and the provision of comprehensive and affordable health care and social welfare services. The plan aims to do this by 1) expanding access to a basic package of health care by investments in infrastructure, human resources, and decentralized management; and 2) establishing the building blocks of an equitable, effective, lean, responsive and sustainable decentralized health care delivery system.

Liberia is currently transitioning from a post-war, complex emergency period that saw a near complete breakdown in health services, destruction of infrastructure, and mass population displacement, to a period of sustainable development. The post-conflict economic situation in Liberia has affected livelihoods of the population, and the ability of the MOH&SW to provide basic primary health care services. As a result, access to health services for much of the population has been severely limited with an estimated 41% having access to any type of health facility. The MOH&SW has partnered with many international and local non-governmental organizations (NGOs), faith-based organizations (FBOs), and United Nations (UN) agencies to support the provision of health services in these areas, and expand training of health care workers (HCWs).

Programs at the MOH&SW fall under three categories: preventive, curative and social services. Each program, including the NMCP, develops their activities, which are implemented at the

¹ Malaria Programmatic and Financial Gap Analysis in Liberia, World Bank Joint Mission, Nov 25-December 3, 2006

county level through county health teams (CHTs). The CHTs interact directly with health centers, providing training and supervision on the ground. Health teams from the facilities then interact directly with community health workers. Supervision is undertaken at the CHT level supported by international NGOs in many areas.

In an effort to deal with the malaria problem in Liberia, the MOH&SW has introduced a policy and strategic plan for malaria control and prevention. The plan is in line with the Abuja declaration, which the government signed in 2000. The measures laid out in this national strategy are attempts to meet the RBM objectives for reducing malaria morbidity and mortality by 50% by the year 2010. As part of this plan, the MOH&SW has endorsed the use of more effective drugs in Liberia – Artesunate-amodiaquine (AS + AQ) – as first line treatment of uncomplicated malaria, multiple preventive measures such as IPTp, the use of ITNs and IRS (especially in Internally Displaced Persons (IDPs) camps), IEC/BCC, and monitoring and evaluation.

In line with the RBM push to strengthen partnerships and coordination at the country level, a malaria steering committee (MSC) was formed. The committee advises and guides the NMCP and other participating partners on the content and organization of their malaria work plan and projects. The MSC consists of the NMCP as well as all implementing partners, including relevant government ministries and agencies, international and national NGOs and faith-based organizations (FBOs) and funding agencies. The MSC meets every month and as necessary.

The role of private facilities is not yet well-defined, and they are not regulated or monitored. Many facilities are run by FBOs. And while drug vendors are common, they commonly sell products that are not regulated, for example, chloroquine is still widely available and sold in these shops. Finally, there is still no specific policy or approach to social marketing of health commodities, although it is known that the private sector does sell antimalarial drugs.

It is important to note that the NMCP acknowledges the private sector and the potentially important role they can play, including private locally-owned facilities and shops, and facilities managed by NGOs. They rightly have identified however the need to try and bring everyone under a single authority, in order to promote improved care and provision of quality drugs. With only 41% of the population having access to health care, the greater challenge will be extending the coverage of general health services, including malaria prevention and treatment, to the more remote and isolated regions of the country.

Financing²

Current total annual health care expenditure is estimated at about US\$12 per head, but may be higher if private spending is included. The state budget contribution to health is increasing (Msuya and Sondorp, 2005). Most facilities supported by NGOs are providing services free of charge. FBOs usually charge user fees. Other facilities charge for services, often on an informal basis. No overall estimate of private health expenditure in Liberia is available.

Human Resources⁴

⁴ National Health Policy, MOH&SW, December 28, 2006

According to the *Rapid Assessment of the Health Situation in Liberia* 2006, the workforce is composed of approximately 4,000 full-time and 1,000 part-time staff. WHO estimates that there are 103 physicians (0.5/10,000) and 613 nurses (0.9/5,000)³, both below WHO's recommendation of 1 physician per 10,000 population and 1 nurse per 5,000 population. The distribution of trained health workers is grossly imbalanced with a higher proportion found in hospitals and other easily accessible, urban areas. Qualified professionals overall are scarce, and many health workers do not hold advanced degrees. As the health system continues to recover, and if the 5% yearly growth in health facility access is met, human resources must be strengthened in terms of numbers, retraining, skills and productivity.

Health Facilities⁴

In 2006, 18 hospitals, 50 health centers and close to 300 health clinics were considered functional. The number of functioning facilities is dynamic, and during the PMI needs assessment visit the MOH&SW reported about 398 functioning facilities, approximately 80% of which are supported by NGOs. Many of these facilities struggle and are in need of robust investments in human, material and infrastructural resources to become truly functional. Fewer than 2,000 inpatient hospital beds were reported as of 2000. Investments are already under way to restore hospitals, such as the support to the laboratory at J.F.K. Hospital by the Chinese Government, and support to their Maternal Health Center by the Japanese Government.

Drugs⁴

Antimalarial drug procurement has been supported by the GFATM; other drug procurement is mainly paid by donors. The National Drug Service (NDS) is an autonomous, publicly-owned agency, mandated to supply the health sectors with medicines and other critical health commodities. In 2001, the MOH&SW issued a National Drug Policy (NDP) but this has not been operationalized. Enforcement of the regulations is deficient and private dealers freely import, distribute and sell medicines. Anecdotally, the circulation of fake, sub-standard and expired medicines is considerable.

Management Systems⁴

Management systems are dysfunctional or non-existent. Staff with professional management skills are in severe shortage, including within the NMCP. The collapse of the old hierarchical state structure has given way to a variety of pragmatic arrangements. Local health authorities have been left to fend for themselves, seeking help from available partners including NGOs and FBOs. These programs operate independently with their own management structures. Decentralization, adopted as policy before the war, has been chosen by the new government as a key driver of reconstruction. In the present context of management disarray, the first step towards decentralization is strengthening the capacity and the structure of the central health authority in order to provide appropriate supervision and guidance to the county health departments.

MALARIA SITUATION AND FUNDING IN LIBERIA

⁵ www.who.int

Malaria is holoendemic (perennial intense transmission with considerable immunity outside of childhood) in Liberia and a leading cause of morbidity and mortality. The entire population is at risk of acquiring malaria. The major vectors for transmission are *Anopheles gambiae s.s.*, *An. funestus*, *An. melas* and the major parasite species are *Plasmodium falciparum* (>90%), *P. ovale*, and *P. malariae*. Malaria is the leading cause of out-patient department (OPD) attendance (40-45%), and the number one cause of inpatient deaths. Hospital records suggest that at least 17.8% of inpatient deaths are attributable to malaria, and child mortality rates in Liberia are among the worst in the world (235/1000)⁴. An estimated 120,000 children <5 years of age of five die each year in Liberia based on these figures, putting conservative estimates of malaria-attributable childhood deaths at 21,300 each year. This number may well be underestimated because of a weak surveillance system and poor reporting. Also each year, approximately 167,000 children are born. During pregnancy, both the unborn child and their mothers are highly vulnerable to malaria. The maternal mortality ratio is one of the highest in the world at 760/100,000⁵. Since pregnant women constitute around 5% of the population (approx. 3.6 million), at any given time in a year, approximately 180,000 pregnant women are at risk of malaria each year.

The GFATM, World Health Organization (WHO), and UNICEF have constituted the major external sources of funding for the implementation of malaria control and prevention activities in Liberia. The GFATM, in round 3, granted US\$12,140,921 for a period of 2 years, which ended February 28th, 2007. The grant focused on improving case management and the use of IPTp, vector control, information, education, and communication (IEC)/behavior change communication (BCC) activities and community mobilization, and improving overall program management. According to the 2006 WB Joint Mission report, the achievements include: 6,290 health workers trained in malaria case management; 67 laboratory technicians trained in accurate diagnosis; 3,343 community health workers (CHWs) trained and deployed in the field; 493,000 ITNs distributed to pregnant women and children under five; 596,793 persons received effective treatment for malaria with amodiaquine AS+AQ; and 95,859 pregnant women received sulfadoxine-pyrimethamine (SP) for IPTp. Salaries for many of the staff at the National Malaria Control Program (NMCP) were also funded by the grant, and while temporary continuation of salaries will continue through a private donor, a sustainable solution needs to be found.

In addition, WHO will contribute US\$327,000 for malaria control activities for 2006-2007, and UNICEF, which contributed US\$1,441,051 for 2006, is planning to add more in 2007. Other RBM Partners (MENTOR, *Medecins sans Frontières* (MSF), USAID, AFRICARE, Save the Children-United Kingdom (SC-UK), MERLIN, International Committee of the Red Cross (ICRC), World Vision-Liberia (WVL), the United Nations Development Program (UNDP), Republic of China, YMCA, and some local NGOs) are contributing to malaria control and prevention activities as well. MENTOR was just funded for an additional 12 months of activities until the spring of 2008 by USAID/Liberia through the Office of Foreign Disaster Assistance (OFDA) for training, supervision, and coaching in case management and malaria in pregnancy activities.

CURRENT STATUS OF MALARIA CONTROL

⁴ WHO, World Health Report, 2006

⁵ UNICEF

The 2005 malaria indicator survey (MIS) – the results of which have only recently been finalized -- demonstrated low coverage of treatment and prevention measures for malaria control. These numbers have very likely improved with the work that has been accomplished in the last two years, although with almost 60% of the population without access to health facilities, much remains to be accomplished.

The 2005 MIS showed weak case management practices for malaria in children under-five. Only 5.3% of children with fever were seen within 48 hours (3.5% the same day and 1.8% the next day). Of those treated for fever, only 3.2% received an artemisinin-based combination therapy (ACT), which was the national first-line treatment at the time, while 45.7% received chloroquine (CQ). Other antimalarial drugs used included SP (0.5%), and quinine (QN) (2.5%), while > 38% of children with fever were not given any antimalarial drug.

Use of preventive measures is also inadequate, although there has been some recent progress in the coverage and use of ITNs. The 2005 MIS reported household ownership of *any* net in Liberia to be 17.9%, and of those that owned a net, 36% of them owned an ITN. Of 8,933 children under-five sampled, only 2.6% had slept under an ITN the previous night. The GFATM Round 3 grant has distributed 493,000 ITNs and UNICEF an additional 146,000, and while coverage numbers have thus improved since 2005, they remain below national targets for coverage and use. The most common reason people gave for not owning a net (40.6%) was that they were too expensive.

Only 4.3% of pregnant women had taken IPTp as recommended (2 or more doses; 6.9% had taken one dose), and 31% had slept under any net the previous night. Data was not available on how many had slept under an ITN. Of the 67.6% of women who took any drug to prevent malaria in the survey (510/755), only 12.2% took SP, while 59.6% took CQ, and almost 30% took another drug or did not know the name of the drug they took.

Results of a DHS survey conducted in 2006 are due in mid 2007, but this survey did not contain a malaria module, so it is of limited use to NMCP, PMI, and other partners.

A. CURRENT STATUS OF MALARIA INDICATORS

Recent Estimates of Malaria Indicators: 2005 Liberia MIS	
Indicator	Estimates
Proportion of children receiving first-line treatment for malaria within 24 hours	NA
Proportion of households with at least one ITN	NA
Proportion of children under five who slept under an ITN the preceding night	2.6% [^]
Proportion of pregnant women who slept under an ITN the preceding night	NA
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	4.3%
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months #	IDP
[^] 666,000 ITNs have been distributed since the MIS, so this number is likely an underestimate [#] Performed in IDP camps	

B. GOAL AND TARGETS OF THE PRESIDENT’S MALARIA INITIATIVE (by 2010)

The goal of PMI is to reduce malaria-associated mortality by 50% compared to pre-Initiative levels in PMI countries. By the end of 2010, PMI will assist Liberia to achieve the following targets in populations at risk for malaria:

- More than 90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;
- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with ACTs within 24 hours of onset of their symptoms.

C. EXPECTED RESULTS

By the end of Year 1, the PMI together with other partners will achieve the following key results:

Prevention:

- Procure and distribute a total of 480,000 LLINs to vulnerable groups through existing approaches to bring national household ownership of an ITN to approximately 60%;
- Distribute 150,000 LLINs procured with FY07 funds in a jump-start door-to-door campaign in Bomi County.

Treatment:

- Procure and assist with the distribution of over 900,000 treatments of AS+AQ. This, together with AS+AQ distribution, training and BCC efforts supported by other partners is expected to increase the proportion of children with suspected malaria who receive an ACT within 24 hours of the onset of symptoms;
- Fill one-half of the severe malaria drug and supply gap;
- In collaboration with the NMCP and other NGOs (through a new RFA), conduct training at facilities in proper case management;
- Enhance laboratory capacity for microscopic diagnosis of malaria through provision of training and equipment;
- Procure 1.1 million RDTs to fill in supply gap, and supervise/evaluate/monitor their use.

Malaria in Pregnancy

- Conduct pre-service and in-service training of health workers in IPTp at both the facility and community level.

INTERVENTIONS-PREVENTION

Prevention: Malaria in Pregnancy (MIP)

The burden of malaria during pregnancy in Liberia is substantial, yet coverage of prevention measures is inadequate. The 2005 Liberia MIS reported that in the health facilities surveyed, 30.6% of pregnant women coming for outpatient services had malaria. The 2006 Liberia Human Development Report states that malaria is the main cause of severe anemia in pregnant women and a major contributor to maternal mortality. Nonetheless, the 2005 MIS reported that only 6.9% of pregnant women received IPT1 and that only 4.3% of pregnant women received two doses of SP, while 67.6% reported that they had taken some medicine to prevent malaria. Furthermore, 31% of women reported sleeping under a bed net, although not necessarily an ITN. According to the recent DHS, approximately 75-80% of reproductive-aged women had antenatal care from a health professional, but only about 37% delivered in a health facility. A reported 83% of mothers took an antimalarial drug for prevention during pregnancy for their last birth in the five years preceding the survey.

The 2004-2008 National Malaria Strategic Plan highlights MIP as one of its focused areas of intervention. The NMCP has adopted IPTp as a policy with SP as the drug of choice. The *Training Manual for Management of Malaria, Participants Guide, June 2005*, developed by the NMCP with support from MENTOR, provides guidance for MIP and has superseded the original 2004 IPTp guidance as follows:

- 3 tablets of SP should be administered to pregnant women, once in the second trimester, and once in third trimester, swallowed in front of the health worker;
- Doses of SP should be given at least 4 weeks apart;
- Pregnant women who receive SP should swallow the drug in the presence of the health worker (directly observed therapy);
- Women should be given clear instructions when to return for the next dose of SP; and
- Women should be instructed that they may still get clinical malaria, and that if they develop a fever they should immediately return to the clinic for follow up.

The NMCP also promotes the use of ITNs by all pregnant women and with support from the GFATM since 2005, over 491,225 ITNs have been procured and distributed to pregnant women through ANC services in health facilities and through a recent measles/ITN campaign. The first line drug for uncomplicated malaria in pregnant women is oral quinine (QN) with AS+AQ recommended in the second and third trimesters of pregnancy.

Services and Coverage

Since the GFATM Round 3 funding became available, major activities have been conducted by the NMCP including procurement and distribution of SP through health facilities, distribution of ITNs targeting pregnant women, development of national guidelines for IPTp, the development of training manuals for HCWs, and training of over 4,000 HCWs.

The quantification of antimalarial SP has not been very accurate resulting in stock-outs at different levels of the health system. Quantification has been based on consumption, but the reporting data is not reliable. There is SP in the health facilities but the NDS has no data on it. During the assessment visit there were only 130,000 tablets of SP left at the NDS which was estimated to be three months supply. The Clinton Foundation has agreed to procure SP through the first half of 2008.

There is inadequate coordination in the strategic planning among the partners for the distribution of ITNs to pregnant women. Clinics visited reported that they did not have supplies of ITNs for pregnant women and did not know where ITNs could be located, although they advised pregnant women to sleep under ITNs.

The Division of Family Health participated in the development of a training manual for MIP, but there is a need for more interaction at central level with the NMCP, and more integration into the

ANC care package. Information received by each group in regards to this program is not shared or analyzed. There has not been any update of the curriculum of pre-service health institutions for physicians, nurses, physician assistants, etc. to include state-of-the-art guidance on MIP. There has, however, been considerable training of facility and community-based health workers including traditional midwives by the NMCP, MENTOR and other NGOs. There appears to have been some improvements in coverage where this training has taken place. For instance, in their 2007 report on the results of their coaching (supervision and on the job training), MENTOR cites 88% of clinics assessed offering antenatal care, with 99% of these ANC clinics providing IPT. An overall BCC/IEC strategy for MIP, however, has not been developed.

Reporting of MIP indicators back to the central level has been highly inadequate, with several parallel systems including facility reporting to NGOs, the GFATM, and the Division of Family Health. Data collected and reported should be assessed to ensure reporting of the most useful information for decision making and management.

Proposed USG activities: (\$250,000)

1. Support pre-service training on MIP within the context of focused antenatal care (FANC) at medical and nursing schools, including development or updating and printing of training materials. (\$100,000)
2. Support continued training of HCWs, including community health workers (CHWs) and midwives in MIP, which will include the development and production of training materials where needed. Facility-based training will include public facilities as well as those run by NGOs and faith-based organizations (FBOs), and will include on-going supervision and coaching. (\$150,000)

Prevention: Vector Control

Insecticide-Treated Nets (ITNs)

Status of ITN implementation

Policy

Although malaria is endemic in Liberia and all persons are at risk, the NMCP strategic plan (2004-2008) regarding ITNs focuses on populations most vulnerable for malaria morbidity and mortality, children under five and pregnant women. The MOH&SW set a target of 80% of households owning at least one ITN, 80% of vulnerable groups (children under five, pregnant women, IDPs, refugees, and those returning home in the short term) having at least one ITN at no cost to them, and 80% of re-treatable ITNs retreated by 2008. In the recent DHS, only 30% of households reported ownership of any kind of net, treated or untreated. ITN distribution outlets are not widespread. Access to ITNs is limited to the few health facilities that have them in stock, private sector establishments that sell ITNs at a price that is cost prohibitive to most Liberians, and national integrated disease campaigns. The NMCP also supports strategies to promote demand creation to ensure the development of a sustainable ITN market. Recently, the NMCP decided on a goal of three ITNs per household. Current ITN estimates are being based on that ownership goal.

ITN distribution

The MOH&SW, along with NGOs and FBOs, have recently been providing the highest risk groups with free ITNs, funded by GFATM. Prior to the recent conflict, there was little history of ITN use in Liberia. At the time the national malaria strategic plan was written in 2004, ITN ownership and use in country was low. Round 3 of the Global Fund provided 493,000 ITNs to Liberia: 300,000 Permanet® brand LLINs were a part of the integrated campaign led by the Canadian Red Cross in late January with door-to-door LLIN distribution occurring in 7-9 counties; 193,000 Permanets® were distributed through various ANCs and through mass campaigns in coastal counties. The Japanese International Cooperation Agency (JICA) distributed an additional 146,000 Olyset® brand LLINs through various ANCs and mass campaigns in northern counties. Various NGOs and other partners provided some additional Permanet® brand LLINs through the campaign and through the health facilities. Following the NMCP policy, these LLINs were targeted to pregnant women and children 6-59 months of age. The combined target population was 871,224, or 1.3 vulnerable people per ITN. The estimated total number of ITNs in Liberia is 666,000. UNICEF is procuring an additional 185,000-200,000 ITNs through UNITAID, which are supposed to arrive in September, 2007, intended for distribution in three counties by the end of the year.

Estimated need for targets

Although 666,000 ITNs were projected to have been distributed through the various mechanisms in Liberia, there remains a shortage of 205,224 to cover all children under five and pregnant women in 2007, most of which would be covered by the incoming UNICEF/UNITAID ITNs. This is dependent, however, on all 660,000 ITNs having been distributed to the at risk population, but there is no confirmation that this happened. A post-campaign evaluation was performed, but an analysis is pending.

As the NMCP has changed their strategy as they've begun drafting the 2009-2013 strategic plan, the estimated needs go beyond the numbers for the target populations they have identified as most vulnerable. The long term NMCP strategy is a coverage level of approximately three LLINs per household, or one LLIN per sleeping area. This equates to a need for 2.2 million nets for complete coverage, based on 720,000 households. With an estimated 660,000 LLINs distributed to date, and about 200,000 coming through UNICEF, there is a current need for approximately 1.4 million LLINs to meet the NMCP goal. Malaria No More has indicated that there will be a benefit in late 2007 to raise money for LLINs for Liberia with a target of one million nets, but no pledges have yet been made.

In addition, the NMCP has an IEC component in its 2004 strategy document. It is uncertain how completely the ITN IEC strategy has been implemented or how effective it has been. While traveling through Monrovia, several billboards were visible promoting ITN importance and usage. Several posters promoting similar messages were seen in the few health clinics visited. The health facility staff interviewed replied that they encouraged pregnant women and mothers of children under five to acquire ITNs, but unfortunately, they did not know where to obtain them. The staff was unaware of any ITNs available in any shops and did not have any available to distribute.

In the recent mass distribution campaign, there was a very short planning period and integrated social mobilization messages were not developed. There were no pre-campaign, campaign, or post-campaign ITN distribution social mobilization activities. Many key staff of the NMCP were not available during the pre-campaign to develop IEC activities.

Proposed USG activities: (\$4,560,000)

1. Procure 480,000 LLINs for distribution through ANC and EPI clinics, as well as through community-based systems such as the door-to-door distribution used in the integrated campaign. (\$3,360,000)
2. System support for strengthening management of national ITN program: warehousing and distribution of GFATM LLINs was managed by UNDP, and there is a need to build the capacity of the NMCP to take over these tasks. Funding would include strengthening these skills in members of the central NMCP, and supporting capacity for central storage. (\$200,000)
3. Strengthen distribution and tracking systems for LLINs for both community and facility-based approaches, including training of county staff on distribution mechanisms, and support of proper storage of LLINs in county warehouse and health facilities, and transport of LLINs to health facilities and the community. (\$300,000)
4. Support BCC/IEC activities at the community level to promote proper ITN use. This will be a new RFA to include both international and local NGOs. (\$500,000)
5. Organization and logistics for jump-start activity of community-based distribution of LLINs in Bomi County (197,000 LLINs procured with FY07 funds. (\$200,000)

Indoor Residual Spraying (IRS)

Status of IRS implementation

The National Policy for Malaria Control and Prevention (NMCP) has used IRS sparingly in Liberia. IRS has been recently used primarily for emergency response such as in Internally Displaced Persons (IDP) camps during and post conflict. For 2004-2008 the National Policy for Malaria Control and Prevention has a target of 100% of all IDPs, refugee camps, and temporary shelters to be sprayed with IRS by 2008. Along with the NMCP, MENTOR and CONCERN have implemented IRS in a few counties. A small cadre of expertise exists in country with recent IRS utilization. MENTOR trained approximately 800 individuals as sprayer operators for IRS in the IDP camps, however, they currently have only 20 functional sprayers, no dedicated transport and limited insecticide stock (Fendona, or alpha-cypermethrin). From September 2004-July 2006 MENTOR sprayed 26,872 shelters covering a population of approximately 148,000. There has been no quality control conducted on the insecticide used, and the original source and expiration date for the Fendona are unknown. We were unable to determine if any IRS activities were being conducted by private companies, e.g., Firestone Rubber Plantation. Neither a pre-IRS environmental assessment nor recent insecticide resistance monitoring of anopheline vector mosquitoes has been conducted. There is no tax/tariff relief on insecticides currently.

The NMCP has very limited malaria vector surveillance or control capacity. There is no laboratory or equipment available for mosquito collection, identification or for determining the

resistance status of malaria vectors. Only two individuals on the NMCP staff have IRS experience, and only two of the four sprayers available are functional.

A malaria eradication project was sponsored by UNICEF and WHO, from 1958-61, to ascertain whether transmission could be interrupted with IRS. The project covered the central province of Liberia, an area of ~14,000 km², using DDT at 2 gm/m² with one application per year. Entomological investigations showed an apparent disappearance of vectors immediately after spraying; control persisted for up to 26 months. Bio-assays on walls demonstrated activity 12 months after spraying. Conclusions drawn from this study were that anopheline vectors in the area were highly susceptible to single annual application of DDT and that interruption of transmission was technically feasible in the forest areas of Liberia. Population movement and the lack of trained spray personnel, equipment and facilities to support the program were identified as major limiting factors for IRS-based vector control at that time.

The NMCP requested PMI support to establish a malaria vector surveillance capacity and assistance to conduct an IRS baseline assessment to determine efficacy and cost, and identify the optimum parameters to include insecticide, duration of efficacy, etc. An environmental assessment will have to be completed before any PMI-supported IRS can be conducted. A capacity to conduct ecological assessment is also required to determine vector species, behavior and resistance status at sentinel sites.

Spraying of 25,000 households in Monrovia will be conducted using both DDT as well as a pyrethroid insecticide. Based on the results of these small spray campaigns, and data collected for the IRS baseline assessment, Liberia will be better placed to choose an insecticide for further national-level spray efforts in Years 2 and 3 of PMI and beyond.

Proposed USG Activities: (\$562,500)

1. IRS Baseline Assessment: Support entomological surveys on vector taxonomy, density, insecticide resistance status in IRS target areas. (\$37,500)
2. Procure IRS equipment and supplies (sprayers, safety equipment, insecticides, etc.) and conduct an assessment of DDT and selected pyrethroid insecticides by spraying 25,000 households in Monrovia. (\$375,000)
3. CDC technical assistance on vector control activities: CDC staff will conduct three TA visits for the IRS baseline assessment, to strengthen capacity in entomology, and to monitor planning and implementation of vector control activities. (\$37,500)
4. Capacity strengthening for entomological monitoring: establish an insectary and entomology laboratory to support malaria vector studies, to include vector identification and insecticide resistance monitoring. (\$62,500)
5. Insecticide resistance monitoring at selected sentinel sites. (\$50,000)

Case Management: Malaria treatment and diagnosis

Malaria Treatment

Adoption of ACTs and a new treatment policy

Liberia changed the national treatment policy for malaria and adopted ACTs in May 2003 in response to increasing reports of *P. falciparum* resistance to the country's first- and second-line treatments for uncomplicated malaria: CQ and SP, respectively. ACTs (specifically, AS+AQ) were first introduced in Liberia as first-line treatment for malaria by MSF during the country's complex emergency in 2003. Other NGOs followed suit, implementing AS+AQ in their facilities independently of the MOH&SW, which was functioning in a limited capacity during the conflict. Based on mounting evidence of resistance and recommendations from WHO, the MOH&SW/NMCP changed the national policy and introduced ACTs as first-line treatment in all public facilities. Additional pressure to change from CQ to an ACT came from the GFATM, which rejected the country's Round 2 malaria grant proposal in 2003 in part because the program planned to continue implementing CQ. NMCP adopted AS+AQ as the official first-line treatment not only because it was already being used by NGOs in a number of the government health facilities, but also because at the time AL was more expensive (although a price reduction in 2006 has made it nearly comparable to the AS+AQ co-packaged blisters), and AL could not be used as treatment during pregnancy or in children weighing less than 10 kg (although current WHO recommendations permit dosing down to 5 kg and use in the 2nd and 3rd trimesters of pregnancy).

The therapeutic efficacy of AQ alone, or the AS+AQ combination, was not studied in the Liberian population prior to its selection as first-line treatment. Given that the effectiveness of AQ is generally reduced where CQ resistance is high, and that studies conducted around the time of the policy change showed high levels of CQ resistance in some areas of the country, efficacy studies should have been conducted as part of the policy change process. A small efficacy study of AS+AQ and AL—the most likely alternative to AS+AQ should it become necessary to change the first-line treatment policy again—is currently underway at JFK Hospital in Monrovia, but none are being conducted outside of Monrovia.

In addition to adopting ACTs, the policy change in 2003 replaced SP with oral QN for second-line treatment of uncomplicated cases, introduced intramuscular artemether (AM) and artesunate suppositories as pre-referral drugs for severe malaria and a more accessible alternative to intravenous QN for the treatment of severe malaria, and instituted IPTp with SP. The NMCP has planned to do an initial pilot evaluation of artesunate suppositories prior to actually implementing them as a treatment alternative, but this has not yet occurred. The current stock of artesunate suppositories expires in late 2008.

Implementation of the treatment policy/guidelines

Through the round 3 GFATM malaria grant, the NMCP and its partners have implemented the new treatment policy on a national scale. Their activities have focused on training health workers in malaria case management, particularly the appropriate use of ACTs according to the new treatment policy and guidelines; supplying the facilities with adequate stocks of the necessary antimalarials; and educating communities about correct treatment as part of a comprehensive BCC/IEC strategy for malaria control.

Under the GFATM malaria grant, progress towards implementation of the treatment policy on a national-scale was measured primarily by the following three indicators:

1. Number of health workers trained in malaria case management;
2. Number of facilities with no reported stock-outs of anti-malarials;
3. Number of malaria cases treated with artemisinin-based derivatives.

The NMCP together with MENTOR have conducted over 100 trainings in case management since July 2004, reaching approximately 3400 health workers. MENTOR estimates that close to three-quarters of health workers currently in the public health system have undergone training in malaria case management, however there is high staff turnover and introduction of new HCWs as facilities continue to open. The training is designed for all cadres of health workers, including doctors, physician assistants, registered nurses, licensed practical nurses, certified midwives, dispensers, laboratory technicians and, in some cases, trained traditional midwives and nursing assistants.

The most direct indicator of treatment policy implementation is the number of malaria cases treated with ACTs. Based on the grant performance report submitted to the GFATM, 596,793 cases of malaria (60% of the target number) were treated with ACTs between August 2005, when AS+AQ was first supplied to facilities, and September 2006, but the proportion of cases treated promptly and properly is not known.

BCC/IEC activities aimed at educating communities about the new first-line treatment for uncomplicated malaria were integrated into the treatment policy implementation plan, but have not been carried out to the extent planned.

Quantification and Procurement

The quantification of malaria medicines has posed a significant challenge since the implementation of the new treatment policy. A fundamental problem appears to be the quality of the data available for both morbidity-based and consumption-based forecasts. The quality of these data is poor because surveillance and reporting systems are weak. UNDP, as the principal recipient of the round 3 GFATM grant, has had primary responsibility for the procurement of malaria medicines and supplies for the public health sector since the end of 2004. The first procurement under UNDP arrived in August 2005 and the final procurement arrived in March 2007. NDS does not presently procure any antimalarials or have immediate plans to resume procuring them now that the GFATM grant has ended.

Uncomplicated malaria: The most current estimate of total need available from the NMCP is a morbidity-based quantification, which was conducted by a consultant for the GFATM round 7 proposal. The estimated needs for 2008 are 1,900,000 doses of ACTs to cover both the adult and child populations that currently have access to health facilities, half of which the NMCP has requested in the GFATM round 7 proposal.

In 2007, the final procurement from the Global Fund round 3 included a total of 241,625 AS+AQ treatments and 22,835 ampoules of AM, which based on the quantification for 2008, represent a 1-2 month supply of AS+AQ and a 6-month supply of injectable AM.

Additional donations include 34,000 AS+AQ packets (three 4+4 blisters per packet; equivalent to a 12+12 adult blister pack) from the Chinese government, 679,000 doses from UNITAID, and 943,000 doses from USAID.

In-kind donations from NGOs, bilateral donors and multilateral funding agencies have helped fill critical gaps in the supply of malaria medicines. During the complex emergency, NGOs provided the bulk of malaria medicines used in their facilities without any government regulation of those donations. Although the NGOs have received most of their stock through the GFATM-supported supply system since the first arrival of malaria medicines in August 2005, many of them have continued to procure antimalarials—mainly AS+AQ, procured in small quantities and on an emergency basis—to cover both real and potential stock-outs. The absence of a standardized or centralized system for tracking these donations makes assessing the extent to which they have supplemented the primary supply, difficult.

The Chinese government has been another important source of relatively small, emergency stocks of AS+AQ and other antimalarials (including dihydroartemisinin-piperazine tablets and injectable artesunate, which are not in the treatment policy). They have provided these medicines to cover short-term gaps in supply, upon request from the NMCP, and intend to continue supplying them in this way, rather than establishing a formal agreement with pre-defined commitments. A recent donation of, 20,000 packets of injectable AS (one 60mg/mL vial of AS + one 1mL vial of 5% sodium bicarbonate per packet) and 39,840 packets of dihydroartemisinin-piperazine (8 tablets per packet) was given to the NMCP in mid-March of this year and immediately distributed to facilities. Another donation was being negotiated at the time of the assessment visit.

The largest donation of antimalarials has come from UNITAID, which is providing a total of 678,858 AS+AQ blister packs to cover the substantial gap in supply caused by the completion of the round 3 GFATM grant and the unexpected rejection of the round 6 proposal. The medicines are scheduled to arrive in-country in June 2007 and will cover first-line treatment needs for approximately 4-5 months at current reported consumption rates. UNICEF has donated additional funds to support the storage and distribution of these medicines.

The Clinton Foundation has agreed to procure drugs for uncomplicated and severe malaria treatment, as well as SP for IPTp but have not confirmed the quantity.

Pharmaceutical Supply System for Malaria

Pharmaceutical Sector

The pharmaceutical sector in Liberia is comprised of the Pharmacy Division, Pharmacy Board, and the National Drug Service (NDS). The Pharmacy Division, which is part of the MOH&SW and headed by the Chief Pharmacist, has been responsible for registration. However, this process has consisted primarily of signing the importation approval for medicines being brought in by the private sector. The Division has also been responsible for drug quality testing, although it has not had sufficient funding, equipment, or technical capacity to do drug testing since the war. In addition, the Chief Pharmacist serves on the Pharmacy Board. The Pharmacy Board is slated to

become the National Drug Regulatory Authority (NDRA), which will be responsible for registering all drugs for use in the private sector as well as in MOH&SW programs.

NDS is a semi-autonomous organization, which is responsible for procurement of essential medicines, customs clearance, storage and distribution through a contract with MOH. It also serves these same functions for private non-profit entities, namely NGOs, as well as some UN agencies. As the principal recipient of the GFATM grants, UNDP has been responsible for the procurement of all medicines for AIDS, TB and malaria since the grants started in late 2004. NDS, however, has retained its responsibility for the storage and distribution of those medicines.

Product Selection

The antimalarials being procured, distributed and used within the public health system are consistent with WHO's recommended treatment regimens for malaria and are included in the country's current treatment guidelines. However, not all of these antimalarials are on the Essential Medicines List (EML), which has not been updated since 1998, or formally registered in the country, which are typically among the criteria for selection. The EML is currently undergoing revision.

Storage and Distribution

NDS is responsible for the storage and distribution of all medicines supplied to the public health sector through the MOH&SW as well as through the GFATM programs.

Storage at the Central Warehouse

For the GFATM grant, UNDP assumed responsibility for ensuring that the medicines were cleared through customs and safely transported to NDS' central warehouse where UNDP and NDS physically inspected and counted the stock, entered the medicine names, quantities, batch numbers and expiry dates into both a computerized and a manual inventory control system, and stored them in a locked storage unit set up especially for the GFATM malaria medicines. Initially, NDS did not have the physical space required to store the increased volume of medicines brought in by the three GFATM programs, on top of the stocks already being stored for the MOH&SW and other private organizations that contracted the services of NDS. To address this need for more space, as well as better security and more modern amenities, grant funds were allocated to improve NDS' storage facility for the GFATM medicines.

Distribution

For the duration of the malaria grant, the NDS warehouse served as the sole supply point for all of the antimalarials used in the public health sector. NDS has implemented a de-centralized model for distribution, which uses depots at the county health offices as holding areas for the facilities' regular orders. NDS prepared the orders at the central warehouse based on the NMCP-approved requisition forms from facilities, and then send the pre-packaged orders out to the county-level depots, of which there are nine, where they were stored until the facilities came to pick them up.

NDS proposes distributing medicines to the county depots on a quarterly basis using a push system; then, the county depots will supply the health facilities on a monthly basis using a pull system. In both cases, transportation will be provided by the distributor, not the receiver.

As part of the decentralization, the county depots will also assume responsibility for collecting consumption and existing stock level reports from the facilities each month. The new system is currently being piloted in three counties to assess its feasibility for the AIDS grant

Inventory Management

Since 2005, the inventory of antimalarials has been managed at the central level according to a system that was set up specifically and exclusively for the GFATM grants. The inventory management system proposed for the round 6 AIDS grant, which will also be used for the round 7 malaria grant if it is approved, has been clearly outlined in the PSM plan and accompanying Standard Operating Procedures (SOPs). Although the basic roles and responsibilities of NDS and the facilities have not changed substantially from those instituted under the previous grants, the structure of the system has been modified to include the county drug depots as an intermediary point.

Rational Use

The use of ACTs, as measured by the number of cases treated with AS+AQ, has been monitored for the GFATM grant since the facilities began using it in August 2005, but the numbers represent basic *use*, not necessarily *rational use*. The rational use of ACTs and other antimalarials has been promoted and strengthened through nation-wide trainings in the new malaria treatment policy, followed by on-site coaching visits. Estimates obtained from follow up assessments of health workers who underwent training in case management suggest over 80% of health workers are using AS+AQ correctly. The methodology NMCP and MENTOR developed for the trainings uses a cascade approach based on a training-of-trainers model. It targets nearly all cadres of health workers (listed in “Implementation of the treatment policy” section), including both prescribers and dispensers. The training modules cover background on the malaria situation in Liberia, diagnosis, treatment, adverse events/pharmacovigilance, complicated malaria, malaria during pregnancy, IPT, and supervision and surveillance.

The effectiveness of Liberia’s efforts to improve the prescribing and dispensing of antimalarials should ultimately be measured in part by patient adherence to treatment. However, no studies on patient adherence have been conducted to date. Patient adherence studies will also help determine the needs for community-based BCC/IEC activities on treatment.

Quality assurance/quality control

Since the onset of the civil conflict, the pharmaceutical sector has not consistently assured the quality of medicines in the public or private sector through the appropriate registration procedures and regular analytical drug monitoring and testing (including post-marketing surveillance). The use of WHO pre-qualified medicines and approved suppliers, particularly for

medicines procured under the GFATM grants, has been the primary means of assuring the quality of medicines in the public health system at the time of procurement. A post-marketing surveillance system has not been instituted to assure the quality of medicines already available in the public and private sector.

Three people from Liberia have been trained at a workshop in Ghana on the use of mini-labs in the detection of substandard or counterfeit products. The idea currently proposed is to use mini-labs for preliminary testing, and if potential problems are detected, to send samples to the reference laboratory in Ghana, where there is sufficient capacity for more sophisticated compendial testing.

After a number of reported problems with strong side effects to the AQ, some of which may have been classified as adverse drug reactions, NMCP recognized the importance and necessity of a pharmacovigilance program. This was also important at the beginning of implementation of ACTs in-country as the AS+AQ combination had formerly not been used or fully tested in larger patient populations. Although standard reporting forms have been developed and distributed, it is unclear if they are filled out appropriately or with any regularity. Additionally, nothing is done with the information that is reported.

Private Sector

Under the GFATM grant, the NMCP has supplied *some* private facilities with ACTs, but the majority of private facilities still procure medicines on their own, including CQ, use of which is widespread. Medicines on their own and there appears to be widespread use of chloroquine, and there is not a regulatory board with the authority to enforce the proper use and sale of medicines.

Proposed USG activities: (\$2,965,000)

1. Procurement of ACTs (AS+AQ) for uncomplicated malaria, including: 255,000 doses for < 5 years; 138,000 doses for 5-14 years; and 550,000 doses for > 14 years (\$1,270,000)
2. Procurement of drugs for severe malaria, including: 67,500 doses of IM artemether; 32,500 doses of IV quinine kits (\$345,000)
3. Pre-service and in-service training on case management at both public and NGO/FBO run facilities, including updating curricula, distribution of guidelines, and on-going supervision and coaching (\$400,000)
4. Support BCC/IEC activities for health workers and the general public on proper case management (\$400,000)
5. Strengthening of drug management system (\$300,000)
6. Strengthening of drug quality monitoring capacity (\$100,000)
7. Evaluation of rectal artesunate as a pre-referral drug: as over 50% of the population does not have access to facilities, the MOH wants to evaluate the possible use of the drug in the home before referral to a facility for severe malaria (\$100,000)
8. Support *in vivo* efficacy monitoring in two of the SSS outside of Monrovia (\$50,000)

Malaria Diagnostics

Policy

Diagnostic capacity in Liberia is limited, due in large part to the destruction of health facilities during the war that ended in 2003, and limited human resource capacity. During the last 3 years, over 80% of health facilities have been operationalized through work by NGOs, and diagnosis has been encouraged using RDTs. The overall MOH&SW national guidelines for diagnosis of malaria, while not clearly defined in the most recent National Malaria Strategic Plan, 2004-2008, have encouraged the use of RDTs for all patients suspected of having malaria, including children under 5 years of age with fever.

- For all patients:
 - In all patients with fever or a history of fever, the use of parasitological diagnosis is recommended.
 - At health facilities where malaria diagnostics (microscopy or RDT) are not available, patients presenting with a fever or history of fever in whom the health worker strongly suspects malaria and has eliminated other possible cause of fever should be presumptively classified and treated as malaria.

Although these recommendations are not in line with IMCI, NMCP stands by its recommendation that all cases of fever, even those in children <5 years, receive an RDT, as they believe that HCWs will be more motivated to seek out the underlying etiology of fever in those with a negative RDT (e.g., urinary tract infection, meningitis) than if they reflexively treated all febrile patients with an antimalarial. In the 2005 MIS, of the 4,099 children under 5 with fever in the previous 48 hours, 90.5% were RDT positive for malaria. The NMCP has indicated a desire to transition from a predominantly RDT based diagnosis to microscopy in facilities where it is practicable.

Diagnostic capability of health facilities

Interviews with NMCP staff suggested that few health centers outside of Monrovia and Phebe Hospital have microscopes and laboratory technicians capable of performing malaria diagnosis. The county health officer from Bomi Country, for example, indicated that only 3 out of 20 functional facilities in that county have microscopes, one of the more easily accessible areas of the country. An NMCP lab technician at J.F.K. hospital (Henry Kohia) indicated that as of November, 2006, there were 53 health centers with functioning laboratory capacity, but this couldn't be corroborated. Diagnosis has been free of charge during the emergency phase of humanitarian assistance.

Personnel and training

Current training of laboratory technicians takes place at the Mother Patern College of Health Sciences in Monrovia, with some additional training at Phebe Hospital. There is some discrepancy as to the number of laboratory technicians working in Liberia with MOH&SW putting the number somewhere between 77 and 149, although only 48 were said to be licensed by the National Lab Association of Liberia. The MOH&SW identified a need for 273 technicians, but it is unclear what this number is based on. Most non-hospital based laboratory facilities operate with only laboratory aides. The NMCP has stated a desire to have microscopic capacity at not only high level facilities (hospitals, health centers), but also low level facilities (clinics). Training at the Mother Patern College is three years, with student tuitions supported by

outside funding. In 2006 and 2007, 8 and 16 technicians respectively began the program. Most of the trained technicians in Liberia, however, are either working in other fields because of better economic opportunity, or working for international NGOs, many centrally in Monrovia.

Microscopes

The level of equipment for the laboratories is limited and most laboratories do not have microscopes whereas some of those with microscopes have them reserved for the work of the program that gave it out, such as TB. UNDP indicated that approximately 50 microscopes were procured through the TB grant. According to the MOH&SW, an additional 200 microscopes will be procured with support from the World Bank. Electric power is neither ubiquitous nor reliable in Liberia, suggesting that a self-contained source of light for microscopes (such as the “EARL” light) may be useful.

Reagents and supplies

There has been no central procurement unit for laboratory reagents since the war. The purchase of laboratory reagents has partially been through a grant from the GFATM round 3, which ended in February 2007, with distribution and procurement through the NDS. Currently, most are purchased locally on an as-needed basis through pharmacies when resources allow but shortages are frequent. There is some ongoing procurement through the GFATM tuberculosis grant.

RDTs

During the humanitarian emergency phase of funding, RDTs were provided through the GFATM round 3 grant. Regular shortages have been reported from peripheral health facilities. At the time of the needs assessment in late March 2006, there was approximately a three-month supply remaining, or about 350,000 tests. MENTOR will be funding an additional 100,000 test in the grant extension they’ll receive from OFDA. Based on the population figures, and number of fever episodes per year, the number of tests needed is 1,982,240.

There is no quality control system in place. Training on the use of RDTs has been undertaken by the NMCP with support from MENTOR, and incorporated into proper use of RDTs. Approximately 3400 national health workers (MOH&SW, NGO and/or FBO) have been trained/coached in case management including diagnosis. The trainings have targeted the County Health Teams (CHT), health agency supervisors, dispensers (including medicine stores in Monrovia) and screeners, with an estimated 80% of health facilities diagnosing with rapid tests and treating malaria cases with ACT.

National Public Health Laboratory

There is no national reference laboratory currently. Two sites discussed as possible sites include the John F Kennedy Hospital, and the Liberian Institute of Biomedical Research (LIBR). At JFK, there is currently 1 microscope in the central lab, 1 microscope in the maternity center, and 2 in the new laboratory building being funded by the Chinese. The laboratory has ELISA capabilities, and there is an understanding that the Chinese government will support PCR capabilities. The facility is overseen by Dr. George, with support from Henry Kohia, one of the

seven lab technicians that work for the MOH&SW, and they also support lab technician training at the Mother Patern College.

The LIBR was established in 1954 as the Liberia Institute of Tropical Medicine, and has been intermittently functioning since, depending on resources available. They have experience in malaria diagnosis, and in 1994 had two malaria epidemiologists, one pathobiologist, and one medical entomologist supported by the WHO/World Bank/TDR, but these individuals are no longer available due to the prolonged conflict in the region. The vision of the Institute is a group of Liberian scientists with scientists from developed nations playing a collaborative and supportive role. The center would also like to continue its training function in laboratory sciences. LIBR is located approximately one hour from central Monrovia.

There is no quality assurance/quality control system in place for malaria diagnostics, either for microscopy or RDTs. This, presumably, would be the function of the national reference laboratory in conjunction with the NMCP.

Proposed USG activities: (\$1,175,000)

1. Assist with the development of a national reference laboratory (\$100,000)
2. Support a baseline assessment of laboratory capacity at both the central and peripheral levels (\$37,500)
3. One TA visit for CDC staff (\$12,500)
4. Support training of laboratory technicians (\$100,000)
5. Support NMCP to provide supervision and assure quality control (\$75,000)
6. Procurement of 1.1 million RDTs (\$700,000)
7. RDT supervision, evaluation, and monitoring to assure proper use and guide NMCP decision on future use of RDTs (\$50,000)
8. Procure laboratory supplies and equipment, including reagents, slides, Earle lights, (\$100,000)

Surveillance, Monitoring and Evaluation

Health Management Information Systems (HMIS)

The data collection and reporting system in the MOH&SW has been functioning at a minimal level due to the conflict. Furthermore, while the NGOs that run most of the health facilities report regularly to donors, reporting to MOH is infrequent. The MOH has therefore developed an HMIS unit responsible for data collection and overall M&E. There are 3 data entry personnel in the unit who, due to a lack of training, are unable to do any analysis from the data generated and cannot provide any feedback to the counties. The county levels also lack data management capacity. The system is designed for health information to flow from the community to the health facility (district), then to the CHT and finally to the national level. Feedback information should then be provided to the community and district health facilities from the national level through the CHT.

In the recently developed health policy, decentralization was stressed as a strategy to improve health care services throughout the country. In the National Health Plan the decentralization functions of the various levels in HMIS are as follows:

Central: Monitor and Evaluate implementation of the National Health Plan

County: Compile, analyze and provide HMIS to central level and feedback to districts

District: Compile, analyze and provide feedback to communities

Community: Collect health information/data through CHWs

There is weekly reporting to the central MOH&SW on 7 epidemic prone diseases, and monthly reporting on several other diseases including malaria. These activities are supported by WHO, and it is estimated that approximately 70-80% of the 374 functional public health facilities contribute to this reporting.

Monitoring & Evaluation of Malaria Control activities in Liberia

The NMCP's National Strategic Plan for Malaria outlines a general M&E section with indicators based on RBM guidelines, as well as a few program indicators. The strategic plan lists the indicators with data sources, periodicity of collection, quality assurance method, and who is primarily responsible for data collection. While some of these activities have been undertaken, there has not been a formal work plan developed based on the guidelines in the strategic plan. Currently there are two individuals dedicated to these activities, the head of the M&E/research section and a data management person, but none has had any formal training in M&E.

Under the just ended GFATM Grant (ended February 28, 2007), the NMCP used a parallel system to collect data to enable it comply with the requirements due to the limited capacity of the current HMIS. The original proposal did not consider M&E by the NMCP as very cardinal to the success of the GFATM Project. In fact, no M&E Plan (based on the proposal) was initially developed to track performance. Consequently, no significant budget was allocated for M&E. However, GFATM funds were later provided for the following M&E activities:

- Conducting the Liberia Malaria Indicator Survey (LMIS, August 2005).
- Conducting one antimalarial drug efficacy study in Monrovia (JFK and ELWA Hospitals) with technical support from WHO.
- Development of reporting forms for routine data collection (malaria morbidity, mortality, trainings, ITNs distribution, malaria treatment), i.e., tracking inputs, processes and outputs.
- Quarterly monitoring of health facilities receiving GFATM drugs and supplies.
- Quarterly M&E surveys to estimate ITNs coverage (tracking outcome).
- Supportive supervision/coaching (especially for case management) to ensure that clinicians are performing as expected.
- Supervision by the NMCP program management on a quarterly basis.
- Program Review meeting (bi-annually and annually).

It is important to note that, according to the NCMP, most of these M&E activities were not well coordinated. For example, supportive supervision by the NMCP did not immediately follow training of clinicians. It was done towards the end of the Program (February 2007).

Proposed areas for USG activities: (\$1,187,500)

1. Support the establishment of a single, integrated, national HMIS plan through the development of standardized data collection forms (\$10,000), the integration of malaria M&E within the national plan (\$37,500), and support training to build capacity of personnel at the NMCP, HMIS, and the county levels in data collection, management, analysis, and reporting (\$37,500)
2. One TA visit from CDC to support above activities (\$12,500)
3. Support a national MIS to serve as the baseline for PMI (\$950,000)
4. Support establishment of 3 sentinel surveillance sites (SSS) (\$100,000)
5. Monitoring and evaluation system strengthening tool: an RBM initiative using a GFATM tool to train/support an independent facilitator for a 2-day stakeholders meeting in country to develop an M&E plan (\$40,000)

K. HIV/AIDS and MALARIA

Current Status

The HIV/AIDS epidemic in Liberia is characterized by mid-to-high prevalence in the general population (5.2%, MOHSW official data) with very high levels of infection among populations with high-risk behaviors, such as commercial sex workers, truck drivers, uniformed personnel and unemployed youth. Since the recent conflict destroyed much of the health system and rendered the HMIS non-functioning, the data are not widely known for the entire country. The results of the recent DHS carried out in early 2007 will soon be available, and should provide information on breakdowns in prevalence rates for the various at-risk groups, as well as the number of pregnant women infected and, in general, the number of people living with HIV/AIDS (PLWHA). Voluntary counseling and testing (VCT) services are available and some services are provided for PLWHA in urban areas. Prevention of mother-to-child transmission (PMTCT) is part of the national program, but the national reach of this effort is limited. The government is currently implementing a round 6 grant from the GFATM, which addresses PMTCT, PLWHA, drugs and other prevention activities as well as capacity building for the national program and for community-based efforts. The NMCP does not have a specific policy or plan in place to address HIV/AIDS and malaria, or PLWHA including pregnant women.

Proposed USG Activities: (no proposed funding for specific HIV/AIDS linked activities during Year 1 of the PMI)

While not specifically designed to support HIV/AIDS services, several activities included in Year 1 of PMI have the potential to contribute to the success of PLWHA and PMTCT activities in Liberia. The NMCP has informed PMI that the National HIV/AIDS Program does not officially make known PLWHA. PMI will try to insure through its implementing partners that, where possible, PLWHA should receive an LLIN. Also, PMI, through its implementing partners, will try to insure that pregnant women who are HIV positive receive at least three doses of SP as part of IPT, and that their status be monitored during routine ANC for possible malaria infection and prompt treatment. Finally, IEC/BCC activities will include several messages for PLWHA

and the risks of malaria in pregnancy for women who are HIV positive, on their need to protect themselves by using LLIN, and to seek prompt treatment when they develop a fever.

L. CAPACITY BUILDING WITHIN NATIONAL MALARIA CONTROL PROGRAM

Current Status

The recent conflict in Liberia destroyed effective central and peripheral health service delivery, including activities related to the control and prevention of malaria, and has resulted in a very limited capacity to carry out the National Malaria Strategic Plan. Lack of transportation to the counties, inadequate office space, lack of training of personnel, and uncertainty of staff salaries has contributed to this limited capacity. Although the strategic plan does not specifically address staffing or capacity issues for the NMCP, the MOHSW in its National Health Policy has identified the need to re-establish numbers of health care providers at all levels in order to improve and extend the reach of health coverage throughout the country. The MOHSW is being assisted, to some degree, by WHO, UNDP and other partners, including NGOs, to build capacity. Discussions with the NMCP identified their concern about this lack of capacity, and they specifically identified a need to not only increase the number some staff, but also to build the skills of those already in place in areas such as entomology, management and M&E. In addition, the NMCP and, the GOL in general, lack resources to pay staff and to perform routine activities such as supervision and program monitoring. Under the Round 3 GFATM grant, salaries and related program costs of the NMCP were covered. Finally, the NMCP does not have adequate space and office capacity to properly perform their duties in a timely and efficient manner. The building they are currently housed in is a structure separate from the main MOH buildings, which is small with only a couple offices and damage from the conflict that Liberia has recently emerged from. There is a much more sizeable structure on the property that has been identified as potentially serving as the NMCP offices, but the MOH has not received funding for its renovation.

Malaria program resources are very limited in Liberia. The NMCP has submitted a proposal for Round 7 to the GFATM, however, other than PMI, there are no other donors contributing directly to improving their capacity. The World Bank and GAVI are contributing to health sector reform and development, and DFID may be contributing as well in the coming year, but the NMCP needs to be assisted to address immediately the following gaps, in order for PMI to make its Year 1 targets:

Proposed USG Activities: (\$700,000)

1. Capacity strengthening for entomological monitoring: Training and mentoring for entomology technicians. (see Vector Control, IRS)
2. Training for lab technicians: Training lab technicians in microscopic, malaria diagnosis. (see Diagnosis)
3. Support for lab quality control and supervision: Support to the NMCP to improve supervision and quality control in the laboratory. (see Diagnosis)
4. Improve capacity for program management and supervision: Improve NMCP capacity for program management and supervision at the central and county levels through training and

mentoring. This will include the purchase of one, large, 7-ton truck for transport of nets to rural depots, as well as two, 4WD vehicles, to be assigned, one each to a county, as designated by the NMCP for to facilitate supervision of CHT to peripheral facilities and remote communities. PMI will not be responsible for recurring costs related to vehicle use and maintenance, such as fuel, replacement parts and other maintenance issues. (\$250,000)

5. Renovation and provision of materials for NMCP central office: One-time renovation of an existing building, which was neglected during the war, to make it functional, and to provide basic equipment for office operation including electric supply and plumbing, as well as desks, computers and printers. The agreement will include detailed roles and responsibilities of the NMCP/MOHSW that PMI will not be responsible for recurring costs and upkeep, which include but are not limited to generator fuel, replacement fixtures, water supply, office supplies, communication bills, and others to be clearly spelled out in the agreement. (\$450,000)

M. COMMUNICATION AND COORDINATION

Current Status

The NMCP national strategic plan includes the need for a multi-sector committee for coordinating activities related to the prevention and control of malaria in Liberia. Currently, the NMCP has direct communication with USAID/PMI, WHO, UNICEF, UNDP and some NGOs regarding support for their strategy. The following communication and coordination mechanisms exist in Liberia:

Country Coordinating Mechanism (CCM)

The CCM meets regularly with health sector stakeholders to review options and plans for submission of a proposal to round 7 of the GFATM. Liberia has been unsuccessful in the last two rounds of submission. They have recently completed a round 3 (April 2007) grant and are in the process of preparing for submission to round 7. USAID is a voting member of the CCM.

Malaria Steering Committee (MSC)

As part of the NMCP strategic plan and as a response to the current malaria situation in Liberia, a malaria steering committee (MSC) was formed, in line with RBM, to strengthen partnerships and coordination. The MSC advises and guides the NMCP and other participating partners on the content and organization of their work plan and projects. The MSC includes the NMCP as well as all implementing partners, including relevant government ministries and agencies, international and indigenous NGO, donor agencies and multilateral organizations. The MSC meets every month and as necessary.

Proposed USG Activities

Although there are no specific planned activities for “Coordination and Communication” in Year 1, under PMI both CDC and USAID/Liberia will hire two staff members (one representing each agency) to handle both technical and logistical planning for PMI activities. In collaboration with existing USAID/Liberia staff, these new people will coordinate PMI activities with the NMCP

and other key stakeholders, and be active members of both the CCM and the MSC where appropriate.

N. NGO COLLABORATION

Current Status

Besides USAID and multilateral organizations (such as UNDP, UNICEF and WHO), several international NGOs are active in malaria control in Liberia. There is also a significant role being played by at least one local NGO called Medical Emergency and Relief Corps International (MERC I). Some of the activities these NGOs have supported include spraying in internally displaced persons (IDP) camps, health care worker training, distribution of LLIN, and support to facilities in case management.

The European Union (EU) and the World Bank are playing key roles in health sector reform including improving M&E and infrastructural development and support to personnel. The Global Alliance for Vaccines and Immunizations (GAVI) is going to support health systems strengthening and immunizations for the next four years.

In general, international NGOs in collaboration with many local NGOs support health service delivery at the peripheral level, with each NGO taking responsibility for a particular number of facilities or a geographic zone. Currently, the NMCP relies on NGOs to assist with the delivery of malaria prevention and treatment services at the peripheral level.

USAID/Liberia is currently supporting Africare to provide services to 31 clinics in various counties, services which include prevention and treatment of malaria. Also, through an OFDA grant, USAID is supporting MENTOR to provide technical, operational, and material support to the NMCP and other partners to establish effective malaria control in Liberia.

Proposed USG Activities: (\$2,140,000)

Under the FY2008 PMI plan, a number of community-based, health-facility based, and central level activities are planned with NGOs, including: training and capacity building of the NMCP; training of health care providers; activities to raise awareness and knowledge in the community about malaria prevention and treatment. Specific activities will include:

1. Community based distribution of 197,000 LLIN as part of a “jump start” activity in Bomi County, providing IEC/BCC guidance in advance of, during and after distribution. The LLIN cost will be covered under the commodity procurement cost. UNICEF will procure the nets, and DELIVER will facilitate the distribution.. (\$200,000, see Vector Control, ITNs)
2. IEC/BCC targeting end users for LLIN and treatment seeking behavior at the household and community levels. This will be competed locally by USAID/Liberia through a new RFA for international and local NGOs. (\$900,000, see Vector Control, ITNs, and Case Management)

3. Pre-service and in-service training to strengthen case management of malaria and MIP, including development and production of materials, and coaching of health workers. Training will also be conducted to improve the skills of community-level personnel and volunteers in appropriate referral and community awareness. This will be completed locally by USAID/Liberia through a new RFA for international and local NGOs. (\$700,000, see Case Management and MIP)
4. PMI has identified DELIVER as the organization best-positioned to procure and import LLIN. PMI will require that DELIVER work through NGOs to insure the widest possible distribution and proper use of LLIN. (\$300,000, see Vector Control, ITNs)
5. Organization of Monitoring and Evaluation System Strengthening Tool stakeholders meeting in Monrovia by Africare. (\$40,000)

P. STAFFING AND ADMINISTRATION

Two new health professionals will be hired to oversee the PMI in Liberia, one representing CDC and one representing USAID. In addition, an FSN may be hired to support the PMI team however the Mission will make that assessment during the course of FY2008. All PMI staff members will be part of a single inter-agency team led by the USAID Mission Director or his/her designee in country. The PMI team will share responsibility for development and implementation of PMI strategies and work plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. Candidates for these positions will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the individual agency.

It is envisioned that these two PMI professional staff will work together to oversee all technical and administrative aspects of the PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. Both staff members will report to the USAID Mission Director or his/her designee. The CDC staff person will be supervised by CDC both technically and administratively. All technical activities will be undertaken in close coordination with the NMCP and other national and international partners, including the WHO, UNICEF, UNDP, WB, and the private sector.

Locally-hired staff to support PMI activities either in Ministries or in USAID will be approved by the USAID Mission Director. Because of the need to adhere to specific country policies and USAID accounting regulations, any transfer of PMI funds to Ministries or host governments will need to be approved by the USAID Mission Director and Controller.

Proposed USG Component: (\$1,100,000)

1. In-country PMI staff salaries, benefits, travel and other PMI administrative costs: Two expatriate PMI staff members to oversee activities supported by the Initiative in Liberia will be recruited and hired by CDC and USAID. The recruitment for the USAID position will be initiated in the summer of 2007 with FY07 malaria funds, with the CDC position

recruitment and hiring following immediately thereafter once early FY08 PMI funds have been made available. One FSN will be recruited early in FY08. (\$1,100,000)

ANNEX 1

**Table 1
President's Malaria Initiative – Liberia
Year 1 (FY08) Timeline of Activities**

ACTIVITY	2007	2008											
	OCT - DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hire PMI in-country staff													
Procure commodities (ACTs, severe malaria drugs/kits, LLINs, RDTs, lab supplies)													
Conduct "jump start" activity													
Develop logistic and managerial support to distribute LLIN at facility and community levels													
Assess and complete improvements to storage capacity for commodities													
Develop operational plan and materials needed to implement the NMCP's IEC/BCC strategy re: LLINs, case management, IPTp.													
Implement IEC/BCC strategies													
Train CHWs,													

Midwives and HCWs in MIP and ANC referral													
Pre-service training for HCWs in MIP and case management and in-service training for HCWs in case management													
Implement distribution of LLINs and ACTs													
Strengthen drug management system													
Strengthen drug quality monitoring system													
Conduct IRS baseline assessment													
Establish insecticide resistance monitoring system													
Train entomology technicians													
Conduct laboratory baseline assessment													
Provide TA to assist with development of National Reference Laboratory													
Train laboratory technicians													
Provide TA to NMCP to improve laboratory													

quality control													
Train HCW in data collection and management													
Conduct MIS to gather baseline data													
Establish malaria sentinel sites													
Renovate offices and build capacity of the NMCP													

Table 2

**President's Malaria Initiative – Liberia
Planned Obligations for FY 2008 (USD \$12,500,000)**

Proposed Activity	Mechanism	Budget (commodities)	Geographic area	Description of activity	Page number reference
PREVENTIVE ACTIVITIES					
Insecticide-Treated Bednets					
Support improved distribution of LLIN	Deliver TO III	300,000	Nationwide	Working with County Health Teams, support community-based and facility-based systems through NGOs and all other relevant partners that support communities and/or facilities, to improve distribution of LLIN to the household level and in facilities via ANC and EPI-related activities	
Jump Start	UNICEF & Africare	200,000	Grand Bassa County	Support “jump start” activity in Bomi and Cape Mount Counties to distribute 197,000 LLIN that UNICEF will procure and DELIVER will assist in the distribution as well as IEC/BCC development and in follow-up (Procurement of LLINs will be with FY07 funds; FY08 funds for logistics)	
Procure LLIN	Deliver TO III	3,360,000 (3,360,000)	Nationwide	Procure 480,000 LLIN for distribution through facilities and through community-based systems, covering 2008	
IEC/BCC at the community level to promote LLIN use	Local RFA for NGOs	500,000	Nationwide	Support year-long IEC/BCC at community level to assist NMCP to promote correct and consistent use of LLIN by pregnant women and children under five, using various media	

Proposed Activity	Mechanism	Budget (commodities)	Geographic area	Description of activity	Page number reference
Systems support for strengthening management of national ITN program	Deliver TO III	200,000	Nationwide	Systems support for strengthening management of national LLIN program	
SUBTOTAL Insecticide-treated bednets		\$4,560,000 (\$3,360,000)			
Indoor Residual Spraying					
IRS baseline assessment	RTI IRS-IQC/CDC-IAA	37,500/12,500	TBD	Support entomological surveys on vector taxonomy, density, insecticide susceptibility in IRS target areas, as well as insecticide acceptability in population, and 1 TA visits from CDC	
IRS in Monrovia	RTI-IRS-IQC	375,000 (250,000)	Monrovia	25,000 households will be sprayed in small pilots using DDT and a pyrethroid insecticide	
Capacity strengthening in entomology	RTI-IVM	62,500/12,500	NA	Training and mentoring for entomology technicians with one TA visit from CDC	
Technical assistance on vector control activities	CDC	12,500	NA	CDC will conduct one visit to monitor planning and implementation of vector control activities	
Insecticide Resistance Monitoring	RTI-IRS-IQC	50,000	2-3 sentinel sites	Assist NMCP to establish insecticide resistance monitoring system	
SUBTOTAL: IRS		\$562,500 (\$250,000)			
Malaria in Pregnancy (IPTp)					
Pre-service training for MIP	Local RFA for NGOs	100,000	Nationwide	Support and promote training curriculum for MIP at medical and nursing schools, including development	

Proposed Activity	Mechanism	Budget (<i>commodities</i>)	Geographic area	Description of activity	Page number reference
				and production of training materials	
Training of CHW, HCW and Midwives	Local RFA for NGOs	150,000	Nationwide	Support and promote training of facility-based as well as community level personnel and volunteers in MIP and ANC referral, including development and production of training materials	
SUBTOTAL: Malaria in Pregnancy		\$250,000 (\$0)			
CASE MANAGEMENT ACTIVITIES					
Diagnostics					
Assist with development of national reference laboratory	MCDI	100,000	Monrovia	Assist NMCP/MOHSW to identify specific needs in order to establish a national reference laboratory, in collaboration with other donors	
Laboratory baseline assessment	MCDI	37,500	Nationwide	Conduct a rapid assessment of laboratory capacity to determine availability of equipment and trained personnel for microscopy, giving attention to quality and effectiveness; 1 TA visit for CDC staff	
TA Visit	CDC	12,500	NA	TA visit to oversee progress on diagnostic capacity development	
Train laboratory technicians	MCDI	100,000	Nationwide	Train laboratory technicians in malaria diagnostics	
Procurement of RDT	DELIVER TO III	700,000 (700,000)	Nationwide	Procure 1,200,000 RDT to fill 2008 gap	
RDT supervision, monitoring, and evaluation	MCDI	50,000	Nationwide	On-going supervision/coaching of HCW in use of RDTs, as well as monitoring and evaluation of their use	
Procurement of laboratory supplies	DELIVER TO III	100,000 (100,000)	Nationwide	Procure laboratory supplies, which identified as needed during rapid assessment, including reagents,	

Proposed Activity	Mechanism	Budget (commodities)	Geographic area	Description of activity	Page number reference
				battery-operated lights and others	
Support for laboratory quality control and supervision	MCDI	75,000	Monrovia	Support NMCP to improve supervision and quality control	
SUBTOTAL: Diagnostics		\$1,175,000 (\$800,000)			
Treatment					
Procurement of ACTs	DELIVER TO III	1,270,000 (1,270,000)	Nationwide	Procure AQ/AS for treatment of uncomplicated malaria: 255,000 doses for <5 years; 138,000 doses for ages 5-14, and; 550,000 doses for >14 years	
Procurement of drugs for severe malaria	DELIVER TO III	345,000 (345,000)	Nationwide	Procure 67,500 doses of IM artemether (125,000 ampoules), and 32,500 of IV quinine (kits)	
Pre-service and in-service training for case management	Local RFA for NGOs	400,000	Nationwide	Train HCW students and HCW in both public and private facilities in case management, including coaching; updating the curriculum and producing materials and distributing guidelines	
IEC/BCC for treatment	Local RFA for NGOs	400,000	Nationwide	Support broad communication strategy of NMCP on dangers of malaria, the need for prompt referral to health facilities, and current drug policy, and MIP, targeting HCW and the general public	
Strengthening of drug management system	Strengthenin g of Pharmaceutic al Management TBD	300,000	Nationwide	Support NMCP/MOHSW to strengthen the drug management system capacity including development of drug financing, registration, logistic/information system, supervision, forecasting and warehousing plans at all levels	
Strengthening drug quality monitoring capacity	USP-DQI	100,000	Monrovia	Support to NDS to strengthen inspection and testing of anti-malaria drugs	
Evaluation of rectal artesunate as a pre-referral drug for severe malaria	WHO	100,000	TBD	MOH wants to evaluate the possible use of the drug in the home before referral to a facility for severe malaria	

Proposed Activity	Mechanism	Budget (commodities)	Geographic area	Description of activity	Page number reference
Supporting <i>in vivo</i> clinical efficacy monitoring	WHO	50,000	TBD	Assist NMCP to select 2 sites (chosen from 5 sentinel sites), outside of Monrovia, to monitor drug efficacy	
SUBTOTAL: Treatment		\$2,965,000 (\$1,615,000)			
MONITORING AND EVALUATION					
Supporting integration of malaria M&E plan with national HMIS	TBD M&E support to PHN programs /CDC-IAA	37,500	Nationwide	Support to MOHSW to integrate and rationalize the NMCP data system and overall M&E plan with the national HMIS, including one TA visit from CDC	
Training of personnel in data collection and management	TBD M&E support to PHN programs /CDC	37,500	Nationwide	Support training of HCW in data collection, management, analysis and reporting, at all levels; this includes one TA visit from CDC	
Supporting standardization of data collection tools	TBD M&E support to PHN programs	10,000	Monrovia	Assist NMCP to develop standardized data collection tools for use at all levels, including tool production and dissemination; this includes TA from CDC (above)	
Support MIS	Measure DHS Phase III	950,000	Nationwide	Support for 2008 MIS to gather baseline data	
Supporting establishment of sentinel sites	Local RFA for NGOs	100,000	WHO	Assist NMCP to select and establish sentinel sites to collect malaria specific and all-cause mortality data disaggregated by age group and pregnancy status	

Proposed Activity	Mechanism	Budget (<i>commodities</i>)	Geographic area	Description of activity	Page number reference
TA Visit to support M&E activities	CDC	12,500	NA	One TA visit by CDC staff to support M&E activities	
Monitoring and Evaluation System Strengthening Tool (MESST)	TBD M&E support to PHN programs	40,000	Monrovia	Stakeholders meeting utilizing new RBM initiative tool to develop a country- specific M&E plan	
SUBTOTAL: Monitoring and Evaluation		\$1,187,500 (\$0)			
IN-COUNTRY MANAGEMENT AND ADMINISTRATION					
In-country staff and administrative expenses	TBD	1,100,000	Monrovia	Salaries and benefits as well as administrative-related costs of in-country PMI staff (CDC and USAID)	
SUBTOTAL: Management and Administration		\$1,100,000 (0)			
CAPACITY BUILDING					
Improving capacity for program management and supervision	Local RFA	250,000	Nationwide	Improve NMCP capacity for program management and supervision at central and county levels through training and mentoring; may include purchase of some vehicles	
Renovating NMCP offices	Local RFA	450,000	Monrovia	Renovation of NMCP office in MOHSW including electrical, plumbing, and related office equipment	
SUBTOTAL: Capacity Building		\$700,000 (\$0)			

Proposed Activity	Mechanism	Budget (<i>commodities</i>)	Geographic area	Description of activity	Page number reference
GRAND TOTAL		\$12,500,000 (\$6,025,000)		<i>Commodities represent 48.2% of total budget</i>	

Table 3

Name of Country – Year 1 Targets
Assumptions and Estimated Year 1 Coverage Levels

Assumptions:

Population of country (estimated) at risk for malaria: 3.77 million

Pregnant women: 5% of total population = 188,500 pregnant women

Infants (children <1): 3% of population = 113,100 infants

Children <5: 15% of population = 565,500 children under five

Average number of malaria-like illnesses per year and cost per treatment (costs given are for artemether-lumefantrine):

Children <5: 1.1 million illnesses/year at \$0.50 each

Older children illnesses/year at \$1.50 each

Adults 2.4 million illnesses/year at \$2.00 each (assume that the PMI will cover only one-third of adult episodes)

Cost of a LLIN = \$7.00; average of 2.5 nets/household needed to cover all pregnant women and children under five in family

610,000

Cost of spraying a house with an average of 5-6 inhabitants = \$15.00

Inter-vention	Needs for 100% Nationwide Coverage over 3 Years*	Needs for 85% Nationwide Coverage over 3 Years*	Annual Needs to Achieve 100% Coverage	Needs to Achieve Year 1 PMI Targets	Year 1 Contributions
IPTp	188,500 pregnant women x 2 treatments/woman = 377,000 treatments/year x 3 years = 1.13 million treatments	961,000 SP treatments	377,000 SP treatments	Target: 20 % of pregnant women receive 2 doses of IPT = 75,400	Clinton foundation covering procuring 37,500 doses, and GOL to fill gap for remaining
LLINs	770,000 households x 2.5 nets/household = 1,925,000 million nets	1,636,250 LLINs	641,667LLINs	Target: 40% of children under 5 and pregnant women sleep under LLIN = 256,667	UNICEF/UNITAID 190,000
ACTs – children < 5	565,500 children under 5 x 2.0 episodes/year = 1,131,000 million treatments/year x 3 years = 3.4 million treatments	2.9 million treatments	1,131,000 million treatments	Target: 85% of children under 5 = 961,350	UNITAID providing 685,000 doses
ACTs – older children	610,740 older children x 1.0 episodes/year = 610,740 treatments/year x 3 years = 1.8 million	1.6 million treatments	610, 740 treatments		GFATM round 7 application requested 950,000 doses
ACTs - adults	240,500 adults x 1 episodes/year x = 240,500 treatments/year x 3 years = 721,500	613,000 treatments	240,500 treatments		Therefore, 100% of ACT needs for children under 5 and older children are met in Year 1
TOTAL	5.9 million treatments	5.1 million treatments			

IRS			TBD	Target: <i>85% of targeted houses to be sprayed</i>	
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Table 4

**President's Malaria Initiative – Name of Country
Year 1 (FY08) Budget Breakdown by Intervention (USD)**

Area	Commodities \$ (%)	Other \$ (%)	Total \$
Insecticide-treated Nets	\$3,360,000 (74%)	\$1,200,000 (26%)	\$4,560,000
Indoor Residual Spraying	\$250,000 (45%)	\$312,500 (55%)	\$562,500
Case Management	\$2,415,000 (58%)	\$1,725,000 (42%)	\$4,140,000
Intermittent Preventive Treatment	--	\$250,000 (100%)	\$250,000
Capacity Building	--	\$700,000 (100%)	\$700,000
Monitoring and Evaluation	--	\$1,187,500 (100%)	\$1,187,500
Administration	--	\$1,100,000 (100%)	\$1,100,000
Total	\$6,025,000 (48%)	\$6,475,000 (52%)	\$12,500,000

Table 5**Year 1 (FY08) Budget Breakdown by Partner (USD)**

(Once the FY08 Implementation Plan is approved and contracts/grants cooperative agreements awarded, all other partners will be listed here)

Partner Organization	Geographic Area	Activity	Budget
RPM Plus/SPS	Nationwide	Strengthen the drug management system capacity	\$300,000
WHO	2 Sentinel Sites and two study districts	<i>In-vivo</i> drug efficacy monitoring and rectal artesunate pilot	\$150,000
CDC	Nationwide	TA for entomology, diagnostics, and M&E (5 visits)	\$62,500
DELIVER	Nationwide	Procurement of drugs, RDTs, and diagnostic equipment	\$6,275,000
UNICEF	Nationwide	Procurement of LLINs and support for distribution and system strengthening	\$100,000
RTI	Nationwide	IRS implementation, management, and TA	\$525,000
Africare	Grand Bassa County	Support UNICEF in LLIN jump-start activity	\$140,000
USP-DQI	Nationwide	Support to NDS to strengthen inspection and testing of anti-malaria drugs	\$100,000
TBD M&E support to PHN programs	Nationwide	M&E support	\$85,000

ORC-MACRO	Nationwide	MIS and establishment of sentinel sites	\$950,000
MCDI	Nationwide	Strengthen malaria diagnostics	\$362,500
New competed RFA for NGOs	Nationwide	BCC/IEC, training, and supervision for case management and MIP	\$1,600,000
New competed RFA	Nationwide	Improve NMCP capacity for program management and supervision at county/central level	\$250,000
New competed RFA	Monrovia	Rehabilitate MOH building for NMCP	\$450,000

Annex 2

Three Year Strategy and Plan: Liberia

GOAL AND TARGETS OF THE PRESIDENT'S MALARIA INITIATIVE (by 2010)

By the end of the program, reduce malaria-related mortality in Liberia by 50% compared to pre-Initiative levels.

By the end of 2010, in collaboration with other partners, PMI will have assisted Liberia to achieve the following targets in populations at risk for malaria:

- More than 90% of households with a pregnant woman and/or children under five will own at least one ITN;
- 85% of children under five will have slept under an ITN the previous night;
- 85% of pregnant women will have slept under an ITN the previous night;
- 85% of houses in geographic areas targeted for IRS will have been sprayed;
- 85% of pregnant women and children under five will have slept under an ITN the previous night or in a house that has been sprayed with IRS in the last 6 months;

- 85% of women who have completed a pregnancy in the last two years will have received two or more doses of IPTp during that pregnancy;
- 85% of government health facilities have ACTs available for treatment of uncomplicated malaria; and
- 85% of children under five with suspected malaria will have received treatment with an antimalarial drug in accordance with national malaria treatment policies within 24 hours of onset of their symptoms.

PREVENTION ACTIVITIES

Control of malaria in pregnant women

Liberia is a country of approximately 3.7 million inhabitants with approximately 180,000 newly pregnant women each year, all at risk of malaria infection which has severe consequences to the pregnant woman and the unborn baby. The NMCP has identified pregnant women as a vulnerable group, and targeted them with multiple malaria control interventions including LLINs, prompt case management, and IPTp.

An objective of the NMCP is to ensure that pregnant women sleep under a LLIN early in their pregnancy. For this reason, free LLIN distribution campaigns have targeted pregnant women and children less than 5 years old. In addition, training of health care workers in malaria case management has emphasized the importance of prompt diagnosis and immediate treatment of pregnant. The NMCP is also collaborating with the Division of Family Health to update the training materials for malaria in pregnancy using Focused Antenatal Care (FANC). This training is complemented by improved IEC to encourage pregnant women in the community to seek early prenatal care and emphasize the dangers of malaria and the importance of control interventions.

For Year 1 of Liberia's PMI implementation, PMI in Year 1 will support the pre-service and in-service training of health care workers at both a facility and community level, development and printing of FANC training materials, and on-going supervision and coaching after training. PMI will also be building capacity of the NMCP in distribution mechanisms for LLINs, including through ANC clinics.

Insecticide-treated bed nets

The NMCP strategic plan (2004-2008), as well as the 2009-2013 plan that is in development, includes a target of 80% of households owning at least one ITN, 80% of vulnerable groups (<5 years of age, pregnant women, as well as IDPs, refugees, and those returning home in the short term) having at least one ITN at no cost to them, and 80% of re-treatable ITNs retreated by 2008. Considering the

influx of ITNs in the last 2 years, the NMCP has recently decided on a goal of three ITNs per household in Liberia. The MOH, working with partners including NGOs, CBOs, FBOs, and bilateral and multilateral organizations, promotes a whole market approach to distribute ITNs to biologically and economically vulnerable populations.

Considerable progress has been made recently in increasing access to ITNs. Since 2005 over 660,000 ITNs have been distributed free through mass campaigns (both door-to-door and integrated with vaccination campaigns), and through ANC clinics. International NGOs have distributed a small number through clinics, but there is no system in place for routine distribution currently, or a viable commercial sector. An additional 180,000 ITNs will be procured and distributed in the fall of 2007 by UNICEF and an additional 150,000 early in 2008 using USAID FY07 malaria funds. The NMCP estimates that with over 700,000 HH in Liberia, and a goal of 3 ITNs per HH, that an additional 1.2 million ITNs are currently needed for complete coverage. They would like to distribute these in both door-to-door campaigns, as well as develop a system for routine distribution through ANC and EPI clinics. Over the next three years, PMI will purchase additional LLINs to close this gap.

In addition to the purchase and assistance with delivery of ITNs, PMI will also support strengthening management of the national ITN program, and support routine distribution systems through the community and health facilities. Finally, a community based IEC/behavior change effort working with NGOs to encourage appropriate use of ITNs by vulnerable groups and to reach the targets of 85% of children under-five and pregnant women sleeping under an ITN will be supported. This behavior change effort will continue throughout the PMI. Overall, the ITN interventions will be closely linked with malaria in pregnancy interventions.

Indoor Residual Spraying

IRS has been used sparingly in Liberia over the past 2 years, primarily for emergency response in Internally Displaced Persons (IDP) camps post. The national plan targeted 100% of all IDPs, refugee camps, and temporary shelters to be sprayed with IRS by 2008, although all IDPs have now been repatriated into communities. Between 2004 and 2008, 26,872 shelters were sprayed covering a population of approximately 148,000. In Year 1 PMI will assist the NMCP with establishment an IRS capability, including a country environmental assessment, entomological baseline surveys, equipment procurement and efficacy/cost evaluation of selected insecticides, and spraying of approximately 25,000 households covering a population of 125,000 people in Monrovia. In years 2 and 3, PMI will continue to provide technical and management support for the implementation of IRS, and support insecticide resistance monitoring in districts with IRS coverage and in districts with high coverage of ITNs. PMI will also continue to support spraying, and use information from this experience to work with the NMCP and MOH to implement and target IRS efforts in the future.

CASE MANAGEMENT

In 2003, Liberia adopted artesunate-amodiaquine (AS+AQ) as its new first line treatment policy, and implementation began with the GFATM funding in 2004. With the ending of the GFATM in February of 2007, resources for purchase of AS+AQ, drugs for severe malaria, and RDTs became substantially more limited. The NMCP estimates that approximately 1.9 million doses are needed in 2008, and several bilateral and multilateral agencies and NGOs have committed to filling the ACT and severe malaria drug gap until mid-2008. In year 1, PMI will procure approximately 930,000 doses of ACTs to fill the gap for the latter half of the year, and approximately 100,000 doses of IV quinine and IM artemether for severe malaria. PMI anticipates procuring at least this same number of doses over the next three years, and may need to purchase more contingent on the results of Liberia's application for GFATM Round 7 funding for malaria.

Training of the treatment policy and proper case management has been conducted by the NMCP with MENTOR, funded through GFATM and OFDA. MENTOR is continuing training in the country for at least the next year, and together with the NMCP has conducted over 100 trainings since 2004. PMI will support additional training over the next three years as more health facilities become functional, and increasingly transition back to control by the public sector. The NDS has been primarily responsible for distributing medications procured through the GFATM. PMI will support NDS in their continued role to ensuring effective distribution of antimalarial drugs to their facilities.

Current policy in Liberia is that for all patients presenting with fever, a parasitological diagnosis through microscopy or the use of an RDT is recommended. The primary method of diagnosis in the post-conflict period has been RDTs, although the NMCP would like to transition to microscopy-based diagnosis. Through the new Malaria Diagnostics RFA, the PMI in the next three years will support the development of a diagnostics policy, and help implement effective malaria diagnosis in Liberia. Using results of a comprehensive laboratory needs assessment to be undertaken in Year 1, PMI will continue in Years 2 and 3 to strengthen laboratory and microscopy capacity through training of laboratory technicians and procurement of microscopes and reagents.

MONITORING AND EVALUATION

A critical component of PMI is monitoring and evaluation of program activities towards the achievement of our objectives. The latest Malaria Indicator Survey (MIS) results available in Liberia will be used as baseline information on malaria in Liberia as it was conducted in 2005. Furthermore, the Demographic Health Survey (DHS), which was completed in Liberia in the spring of this year, does not include a malaria module. PMI will therefore support a MIS in Year 1, which will serve as the baseline. Another MIS will be

conducted in Year 3 of PMI in Liberia (2010) and a DHS in 2012. Data will also be collected in Year 3 from the sentinel sites that will be established with PMI support.

As part of an effort to help the MOHSW to establish and improve routine data collection and analysis of diseases including malaria, PMI will support the MOHSW to improve the establishment and implementation of Health Management Information System at all levels of health services to ensure the HMIS collects key malaria indicators. PMI will support this roll-out in all three years.

PMI will also provide support to put in place effective insecticide resistance monitoring if IRS will be expanded. Implementing partners for each PMI activity will also be asked to provide routine monitoring information on program progress.

SUSTAINABILITY PLAN

In Liberia, the long-term sustainability of malaria control interventions implemented with the support of all malaria partners, including PMI, will depend on a number of factors. PMI's plan for sustainability addresses five major components: (1) human resources development, (2) mobilization and management of financial resources, (3) support for decentralization, (4) availability of services, and (5) integration and collaboration.

(1) *Human resources development*: The implementation of the PMI will result in the transfer of technical knowledge, management and implementation skills to local partners including the NMCP, NGOs, health workers, and private sector partners. Given the lack of experience in entomology and in M&E in Liberia, the PMI has specifically invested in training NMCP staff in entomology and in M&E. The intent is to ensure that there is staff with the technical knowledge to continue implementation of entomologically related activities such as vector monitoring, and to continue implementation of the malaria M&E plan, after PMI. PMI will also work with the NMCP to assist it to fill critical positions so that the NMCP has enough technical staff to continue to implement malaria activities after PMI.

(2) *Financial resources*: PMI will work with the NMCP and the GOL to assist with the mobilization and management of financial resources so that other partners (such as the GFATM and others) are encouraged to finance malaria control activities in Liberia.

(3) *Support for decentralization*: In the decentralizing environment of Liberia, PMI will support building capacity at the county and community levels so that decision-making is decentralized. This is particularly important for the supervision of health workers.

(4) *Availability of services:* If the population knows that malaria goods and services at the community and health facility level (including the private sector) are available then use of those goods and services will increase over time, and this demand will put pressure on all levels of the government to ensure that those goods and services are maintained. However, this will have to be carefully monitored as Liberia currently has very low capacity to provide any health services to its people, with less than half having direct access. Assisting the GOL to move forward and expand health service availability and, in particular, malaria goods and services, is a priority of PMI.

(5) *Integration and collaboration:* During the planning process for Liberia's MOP, PMI consulted extensively with other, in-country malaria and health partners, including the World Bank, GFATM, UNICEF, WHO, Clinton Foundation, NGOs, and others, in addition to other divisions of the MOHSW as well as the NMCP. Every effort will be made to identify areas of synergy, avoid duplication, and promote an integrated and complementary effort at all levels. Although PMI's support is specifically for malaria control activities, every effort will be made to integrate activities within the overall context of maternal and child health services, and use PMI as an opportunity to strengthen the overall health system in Liberia.

STAFFING AND ADMINISTRATION

In Years 2 and 3, PMI will continue to support the two health professionals who were hired in Year 1 to oversee the PMI in Liberia, one representing CDC and one representing USAID. In addition, one or more FSNs will be hired to support the PMI team. All PMI staff members will be part of a single inter-agency team led by the USAID Mission Director or his/her designee in country. The PMI team will share responsibility for development and implementation of PMI strategies and work-plans, coordination with national authorities, managing collaborating agencies and supervising day-to-day activities. Candidates for these positions will be evaluated and/or interviewed jointly by USAID and CDC, and both agencies will be involved in hiring decisions, with the final decision made by the individual agency.

It is envisioned that these two PMI professional staff will continue to work together to oversee all technical and administrative aspects of the PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, and reporting of results. Both staff members will report to the USAID Mission Director or his/her designee. The CDC staff person will be supervised by CDC both technically and administratively. All technical activities will

be undertaken in close coordination with the MOHSW/NMCP and other national and international partners, including the WHO, UNICEF, the GFATM, WB, and the private sector.

Locally-hired staff to support PMI activities either in Ministries or in USAID will be approved by the USAID Mission Director. Because of the need to adhere to specific country policies and USAID accounting regulations, any transfer of PMI funds directly to Ministries or host governments will need to be approved by the USAID Mission Director and Controller.

Table 1
Timeline of Expected Coverage of Interventions – Liberia 2008-2010

Indicator	2005 Liberia MIS	Year 1	Year 2	Year 3
Proportion of women who received 2 or more doses of IPTp during their last pregnancy in the last two years*	NA	40%	65%	85%
Proportion of households nationwide that own an ITN**	8%	50%	80%	90%
Proportion of pregnant women nationwide who slept under an ITN the previous night	NA	40%	65%	85%
Proportion of children under 5 nationwide who slept under an ITN the previous night**	2.6%	45%	70%	85%
Proportion of targeted houses adequately sprayed with a residual insecticide in the last 12 months.	50%	NA	85%	85%
Proportion of children under five years old with fever in the last 2 weeks who received an antimalarial drug in accordance with national treatment policy	NA	40%	65%	85%

within 24 hours of onset of fever				
* MOH estimates that 55% of population will have access to health facilities in 2010; these targets reflect 85% coverage in those facilities for IPTp				
** 2005 MIS				
# Data from MENTOR				

Table 2**Illustrative 3-Year Budget and Expected Coverage Levels**

PMI Targets: After three years of full implementation, the PMI will achieve the following targets in Liberia:

- i. 85% of children under five will have slept under an ITN the previous night;
- ii. 85% of pregnant women will have slept under an ITN the previous night;
- iii. 85% of pregnant women will have received two or more doses of SP for IPTp during their pregnancy;
- iv. 85% of houses targeted for indoor residual spraying will have been sprayed;
- v. 85% of children under five with suspected malaria will have received treatment with ACTs drug in accordance with national malaria treatment policies within 24 hours of the onset of their symptoms.

Assumptions:Assumptions:

Population of country (estimated) at risk for malaria: 3.77 million

Pregnant women: 5% of total population = 188,500 pregnant women

Infants (children <1): 3% of population = 113,100 infants

Children <5: 15% of population = 565,500 children under five

Average number of malaria-like illnesses per year and cost per treatment (costs given are for artemether-lumefantrine):

Children <5 (2.0 episodes/year): 1.1 million illnesses/year at \$0.50 each

Older children (1.0 episode/year): 610,000 illnesses/year at \$1.50 each

Adults (1.0 episode/year): 2.4 million illnesses/year at \$2.00 each (assume that the PMI will cover only one-third of adult episodes)

Cost of a LLIN = \$7.00; average of 2.5 nets/household needed to cover all pregnant women and children under five in family

Cost of spraying a house with an average of 5-6 inhabitants = \$15

Item/Activity	Annual Cost per Person	Annual Cost	3-Year Total	Assumptions/Comments
Prevention – insecticide-treated nets		\$2,500,000	\$7,500,000	3.77 million population at risk of malaria = 754,000 households x 3 nets/household x 85% coverage - 660,000 nets distributed since 2005 – 180,000 being distributed by UNICEF in the next 4 months x \$7/net
Prevention – indoor residual spraying		\$1,855,000	\$5,655,000	IRS will target 377,000 households or 1.885,000 people at \$14.00 per house doubling each year
Treatment – malarial illnesses		\$5,340,250	\$16,020,750	Children under 5, 565,000 x 2.0 episodes/year x 85% = 960,500 x \$.50 = 480,250; Older children/adults 610,000 million x 1.0 episode/year x 85% x \$1 = 780,000; 2.4 million adults x 1.0 episode/year x 85%x \$2.00= 4,080,000
Treatment – IPT for pregnant women		\$32,000	\$97,000	190,000 pregnant women x \$0.20 per year x 85% coverage
Epidemic Preparedness		NA	NA	Entire country is holoendemic
Implementation Support	\$0.92	\$3,470,000	\$10,400,000	Commodity management, human resources, supervision, training, social mobilization, etc
Monitoring and Evaluation		\$885,000	\$2,650,000	Directly from Liberia PMI M&E budget, assuming no cost sharing by other donors, and two time cost of MIS at 950,000
Cost of Program			\$42,322,750	

USG Implementation Support Costs		\$1,100,000	\$3,300,000	Long-term expatriate advisors' salaries, benefits, travel; local staff; office sup and equipment for PMI in-country office; TDY from CDC and USAID
Total funding needed (including USG program costs)		\$	\$45,622,750	
Government of Liberia malaria budget		\$0.0	\$0.0	
		\$		
Available funding from other sources			\$	
PMI funds available (estimated):				Assumes PMI funding is divided between countries based roughly on their populations
Year 1		\$12,000,000		Assumes 15 PMI countries
Year 2		\$12,000,000		Assumes 15 PMI countries
Year 3		\$18,000,000		Assumes 15 PMI countries
Years 1 through 3			\$42,000,000	
Total Available funding				
Remaining Gap			\$3,622,750	3-year shortfall to meet total need