

This Malaria Operational Plan has been approved by the U.S. Global Malaria Coordinator and reflects collaborative discussions with the national malaria control programs and partners in country. The final funding available to support the plan outlined here is pending final FY 2018 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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## U.S. PRESIDENT'S MALARIA INITIATIVE



**PRESIDENT'S MALARIA INITIATIVE**

**LIBERIA**

**Malaria Operational Plan FY 2018**

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## ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
CBIS	Community-based information system
CDC	Centers for Disease Control and Prevention
CDO	County diagnostic officer
CHA	Community health assistant
CHSS	Community health services supervisor
CHT	County health team
CMS	Central medical stores
CSH	Collaborative Support for Health
CY	Calendar year
DHS	Demographic and Health Survey
DHIS2	District Health Information System 2
DTS	Dried blood tube sample
EUV	End-use verification
EVD	Ebola virus disease
FARA	Fixed Amount Reimbursement Agreement
FY	Fiscal year
gCHV	General community health volunteer
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GOL	Government of Liberia
HFS	Health facility survey
HMIS	Health management information system
iCCM	Integrated community case management
IEC	Information, education, communication
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
LLIN	Long-lasting insecticide-treated mosquito net
LMHRA	Liberia Medicines and Health Products Regulatory Authority
LMIS	Logistics management information system
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
NDS	National Drug Service
NDU	National Diagnostics Unit
NGO	Non-governmental organization
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
NPHRL	National Public Health Reference Laboratory
OR	Operational research
PACS	Partnerships for Advancing Community-based Services
PMI	President's Malaria Initiative

QA/QC	Quality assurance/quality control
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SBCC	Social and behavior change communication
SCMP	Supply chain master plan
SCMU	Supply Chain Management Unit
SM&E	Surveillance, monitoring, and evaluation
SP	Sulfadoxine-pyrimethamine
TA	Technical assistance
TES	Therapeutic efficacy study
TTM	Trained traditional midwife
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

## I. EXECUTIVE SUMMARY

When it was launched in 2005, the goal of the President's Malaria Initiative (PMI) was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

In 2015, PMI launched the next six-year strategy, setting forth a bold and ambitious goal and objectives. The PMI Strategy for 2015-2020 takes into account the progress over the past decade and the new challenges that have arisen. Malaria prevention and control remains a major U.S. foreign assistance objective and PMI's Strategy fully aligns with the U.S. Government's vision of ending preventable child and maternal deaths and ending extreme poverty. It is also in line with the goals articulated in the Roll Back Malaria (RBM) Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and World Health Organization's (WHO's) updated *Global Technical Strategy: 2016-2030*. Under the PMI Strategy 2015-2020, the U.S. Government's goal is to work with PMI-supported countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination.

Liberia began implementation as a PMI focus country in fiscal year (FY) 2008.

This FY 2018 Malaria Operational Plan (MOP) presents a detailed implementation plan for Liberia, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the National Malaria Control strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Liberia, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with FY 2018 funding.

The proposed FY 2018 PMI budget for Liberia is \$14 million. PMI will support the following intervention areas with these funds:

**Entomological monitoring and insecticide resistance management:** Liberia's 2016–2020 National Malaria Strategic Plan (NMSP) includes the objective of institutionalizing entomological and insecticide resistance monitoring with a plan to produce a vector prevalence map of the country, highlighting vector behavior, susceptibility to insecticides and location, as well as to use the NMCP's insectary as a testing

site for studies of malaria vectors. Over the past year, PMI expanded support for the NMCP to evaluate the spatial and temporal composition of anopheline mosquitoes at four sites and insecticide resistance at nine sites. PMI also supported an entomologist to sit with the NMCP to help build capacity for entomological surveillance, and supported two NMCP vector control unit staff to receive training on the CDC bottle assay in Atlanta, GA.

With FY 2018 funds, PMI will continue to support NMCP capacity building in entomological monitoring, insecticide resistance surveillance, determination of the spatial and temporal composition of anopheline species, and maintenance of a functional insectary.

**Insecticide-treated nets (ITNs):** Liberia's 2016–2020 NMSP includes the objective of ensuring that 80% of the country's population is protected by malaria prevention measures. Under this objective, Liberia aims to ensure universal access to long-lasting insecticide-treated nets (LLINs) by reaching 100% of households through mass campaigns conducted every three years. Currently, mass campaigns are the main distribution method, reinforced by continuous distribution of nets during the first antenatal care (ANC) visit and at the time of delivery in a registered health care institution to encourage delivery in facilities. Between 2008–2016, approximately 7.4 million LLINs were distributed in Liberia through campaigns, ANC services, and at institutional deliveries, including approximately two million LLINs purchased by PMI.

With FY 2018 funds, PMI will continue to support routine distribution of LLINs by procuring LLINs to cover ANC and institutional delivery needs, and transporting the nets down to the county level. In addition, PMI will continue to provide technical support for the institutionalization and evaluation of these routine distribution methods. Liberia's next LLIN mass campaign will take place in early 2018 with LLINs procured by the Global Fund. In addition, PMI will support the monitoring of attrition and physical durability of nets distributed during the 2018 mass campaign at two sites.

**Malaria in pregnancy (MIP):** Liberia's policy on MIP is a three-pronged approach, consistent with WHO's recommendation to combat malaria in pregnancy. This approach consists of prompt and effective case management of malaria and anemia, providing IPTp with three or more doses of SP and use of LLINs. According to the 2013 Demographic and Health Survey (DHS), 48% of pregnant women received two or more doses of IPTp during their last pregnancy. Scaling up implementation of IPTp was slowed during the Ebola Virus Disease (EVD) epidemic from 2014 to 2015, but in 2016, updated training manuals and protocols were reviewed by instructors from midwife training institutions and heads of ANC in different counties. In addition, a column was created in the ANC ward register and the HMIS reporting form to capture three plus SP doses. Moreover, 900 Trained Traditional Midwives were educated on encouraging women to demand IPTp and referring them to health facilities for delivery, while 15 reproductive health supervisors were trained on MIP.

With FY 2018 funding, PMI will continue to provide technical assistance to support the NMCP in the implementation, scale-up, and monitoring of MIP, including implementation of routine LLIN distribution and the new IPTp and treatment guidelines. Specifically, PMI will procure SP, and maintain its support to improve quality of care and adherence to standards for MIP, capacity building of health providers, in-service training and supervision for health care workers, support for County Health Teams and technical assistance to strengthen the distribution and availability of antenatal care commodities including SP and LLINs.

**Case management:** By 2014, when the EVD epidemic hit Liberia, confirmatory testing for malaria had been fully scaled up. Following the EVD epidemic in 2014–2015 and the suspension of testing in

facilities without adequate personal protective equipment, diagnostic services were reduced for approximately 18 months, although testing resumed quickly in many health facilities because of adequate stocks of personal protective equipment and a focus on infection control by the MoH. In March 2016, WHO lifted the ban on testing, and, as a result, malaria testing at facilities and in the community has steadily increased and is expected to be soon at pre-EVD levels. PMI continues to work with the NMCP/MOH to scale up prevention services in the community, including testing by community health assistants (CHAs).

With FY 2018 funding, PMI will procure laboratory supplies, including reagents for microscopy and approximately 1.2 million RDTs. PMI will also expand its support to all 15 counties for the provision and improvement of quality malaria case management, including testing through training and supportive supervision. PMI will procure approximately 1.1 million ACTs for treatment of uncomplicated malaria, as well as artesunate for severe malaria. PMI will also continue to support the extension of malaria case management to the community level and refresher training for facility-level case management. Together with the Global Fund and other partners, PMI expects to fill all ACT and RDT needs for Liberia. In addition, PMI will support training and capacity building of MoH staff at both the central and county level, including in the community through support of activities conducted by community health assistants (CHAs).

**Health systems strengthening and capacity building:** PMI supports a range of targeted health system strengthening activities that cut across intervention areas but bolster achievement of malaria program results, such as training of health workers, supply chain management, health information systems strengthening, drug quality monitoring, and NMCP capacity building. To encourage integration of malaria prevention and control activities into routine health care in ways that are sustainable, PMI has supported the NMCP to more actively engage with other parts of the MOH involved in malaria-related activities, as well as broader health system strengthening efforts that can benefit the malaria program. For instance, PMI support combined with funding from other USAID program elements will help to strengthen management and leadership of county health teams to oversee and monitor malaria service delivery through updated national clinical standards, support for quality improvement interventions, including regular supervision as well as clinical training, strengthening of the health information system, and improved human resource management.

With FY 2018 funds, PMI will also continue to support pre-service training for laboratory technicians, initiated in FY 2016, to complete their studies and obtain certification. In addition, PMI will provide support to the central MOH/NMCP and county health teams to strengthen crosscutting health systems functions to improve management and governance of the health system, and support decentralization. PMI will also support Peace Corps to strengthen malaria messaging in schools by supporting two, third-year Peace Corps volunteers for malaria, and malaria education activities carried out by the network of Peace Corps volunteers throughout the country.

**Social and behavior change communication (SBCC):** With PMI support, the NMCP recently updated and validated its SBCC strategy. The current SBCC strategy focuses on the dissemination of malaria-related messaging through mass media, interpersonal communication and community engagement activities to help ensure that everyone presenting with a fever receives a diagnostic test, and if positive, effective ACT treatment within 24 hours, that pregnant women receive IPTp at every ANC visit after the first trimester, and that community members are aware of the benefits of and are using LLINs to prevent malaria. In addition, PMI supported the development of messages and materials for ANC education campaigns.



With FY 2018 funds, PMI will continue to support the NMCP to implement their Malaria Communication Implementation Plan 2016 – 2020. At the facility level, service providers will be trained on counselling skills, standard practices in adhering to the national case management and MIP guidelines, protocols and RDTs results. Facility health workers will provide counselling services to the clients on all aspect of malaria SBCC including; prompt care-seeking behavior, importance of malaria testing for all cases presenting with fever, completion of ACT treatment course, encouraging pregnant women on IPTp uptake and sleeping under ITNs. At the community level, general community health volunteers (gCHVs) will encourage pregnant women to seek prompt care and attend ANC services regularly at the health facilities. Other SBCC activities will include; regular mass media campaigns, community meetings and drama /theatre.

**Surveillance, monitoring and evaluation (SM&E):** The NMCP is finalizing its 2016–2020 SM&E plan to accompany the 2016–2020 NMSP. The Global Fund and PMI provides the bulk of the funding for SM&E activities, while WHO provides technical support. The MOH has a fully integrated computerized HMIS that serves all public facilities and those private clinical facilities that receive malaria medications and diagnostic support from the MOH. Personnel have been trained and the system is operational nationwide; however, reporting is not uniform and data are underutilized at all levels. Liberia has a census planned for 2018, which will inform the sampling of the next DHS to be conducted in 2018 or 2019. PMI will use FY 2017 funding to support the malaria module in the next DHS.

With FY 2018 funding, PMI will work to improve the collection, reporting, and use of HMIS malaria data, as well as household survey and implementing partner data through supportive supervision of SM&E activities from the national level, and for malaria data collection and use at the county level across all counties, as well as embedded technical assistance at the MOH, NMCP, and in select counties. PMI will also support continued implementation of the end-use verification survey of the availability of malaria commodities and the quality of malaria case management at the health facility level and support training at the national and county level on malaria SM&E.

**Operational research (OR):** The NMCP Research, Monitoring, and Evaluation Department is responsible for planning and conducting operational research studies in collaboration with other NMCP focal points and partners. Liberia had one PMI-supported OR study that was completed in 2013, which examined using a dried blood tube sample as a stable source of quality control samples for RDTs in an external quality assurance system in the field.

Liberia does not have any ongoing studies or studies planned with PMI FY 2018 funding.

## II. STRATEGY

### 1. Introduction

When it was launched in 2005, the goal of PMI was to reduce malaria-related mortality by 50% across 15 high-burden countries in sub-Saharan Africa through a rapid scale-up of four proven and highly effective malaria prevention and treatment measures: insecticide-treated mosquito nets (ITNs); indoor residual spraying (IRS); accurate diagnosis and prompt treatment with artemisinin-based combination therapies (ACTs); and intermittent preventive treatment of pregnant women (IPTp). With the passage of the Tom Lantos and Henry J. Hyde Global Leadership against HIV/AIDS, Tuberculosis, and Malaria Act in 2008, PMI developed a U.S. Government Malaria Strategy for 2009–2014. This strategy included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050. Consistent with this strategy and the increase in annual appropriations supporting PMI, four new sub-Saharan African countries and one regional program in the Greater Mekong Subregion of Southeast Asia were added in 2011. The contributions of PMI, together with those of other partners, have led to dramatic improvements in the coverage of malaria control interventions in PMI-supported countries, and all 15 original countries have documented substantial declines in all-cause mortality rates among children less than five years of age.

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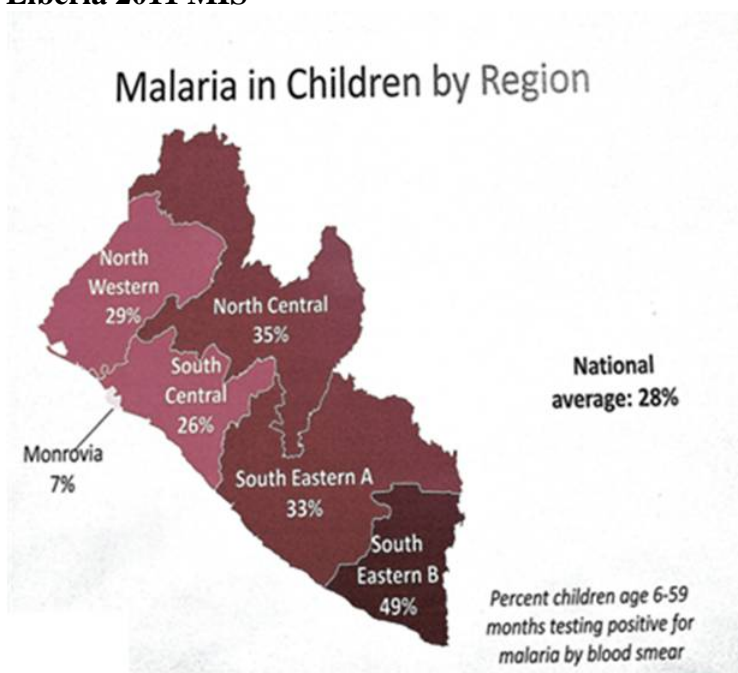
### 2. Malaria situation in Liberia

Liberia covers 43,000 square miles in West Africa, and it is bounded by nearly 350 miles of Atlantic Ocean off the southwest and by the neighboring countries of Sierra Leone (northwest), Guinea (north), and Côte d'Ivoire (east and southeast). Most of the country lies at altitudes below 500 meters. The

coastal areas are characterized by mangrove swamps, which give way to tropical rain forest that gradually thins out northwards to be replaced by deciduous forest. All geographic areas of Liberia are favorable to malaria transmission. The major vectors for malaria are *Anopheles gambiae* s.l. and *An. funestus*. The major parasite species are *Plasmodium falciparum* (>90%), *P. ovale*, and *P. malariae*.<sup>1</sup>

According to results from the Malaria Indicator Surveys (MIS), the prevalence of malaria parasitemia in children under five by RDT was 66% in 2005, 37% in 2009 and 45% in 2011. The prevalence rate as measured by microscopy was 32% in 2009 and 28% in 2011. The geographical prevalence of malaria according to the 2011 MIS is shown in the map below.

**Figure 1. Prevalence of Malaria Parasitemia in Children under Five Years of Age by Region, Liberia 2011 MIS**



The entire population of approximately 4.2 million<sup>2</sup> is at risk of the disease; children under five and pregnant women are the most affected groups. The 2013 Health Facility Survey (HFS) found that malaria remains the leading cause of morbidity and mortality, accounting for about 42% of all clinical consultations and 44% of all inpatient deaths among children under five years of age.<sup>3</sup>

Since August 2005, Liberia has made considerable progress in malaria control and prevention. The achievements from August 2005 to 2013 documented in the 2013 Demographic and Health Survey (DHS) are included in the section on coverage/impact indicators to date.

It must be noted that the extent of the impact of the 2014/2015 Ebola virus disease (EVD) crisis on progress achieved to date in malaria control in Liberia is not known. Massive disruptions in health service delivery and distrust in the health system by the population were well documented. However, data suggest that there has been a significant recovery in health system utilization post-EVD. For

<sup>1</sup> Roll Back Malaria-National Desk Analysis-Liberia- 2001

<sup>2</sup> 2017 estimate; National Population and Housing Census, 2008 plus a growth rate of 2.1%

<sup>3</sup> Liberia Service Availability and Readiness Assessment (SARA+) and Quality of Care (QOC)

instance, 1,580,083 cases of malaria were reported via the Health Management Information System (HMIS) in calendar year 2016, compared to 1,256,068 in 2015, 1,057,635 in 2014, 1,483,408 in 2013, and 1,858,373 in 2012. It should also be noted that the number of cases reported in 2013 is considered artificially low due to the Ministry of Health's moratorium on distribution of RDTs and antimalarials until security of commodities could be addressed. Thus, 2012 is the last year without a major event affecting attendance at health facilities and the year in which the bulk of the private sector facilities were enrolled in HMIS.

### **3. Country health system delivery structure and Ministry of Health (MoH) organization**

The health system in Liberia is set up in a pyramid structure with community health volunteers as the foundation. Community health volunteers include household health promoters, trained traditional midwives (TTMs), and general community health volunteers (gCHVs). Together, these groups serve outreach functions with prevention messaging and referrals to health clinics and health centers. In some areas, gCHVs also participate in directly observed treatment for tuberculosis and integrated community case management (iCCM) for diarrhea, acute respiratory infections, and malaria. Based on the new Community Health Strategy, the MOH is in the process of transitioning some gCHVs with certain basic qualifications, working in communities more than an hour walk/5km distance from a health facility, to a well-trained, supervised and remunerated cadre that will be called community health assistants (CHAs). Health clinics are the primary care unit of the health system and are meant to have at least two professional staff: a nurse and a certified midwife.<sup>4</sup> With catchment areas 10 km in diameter, clinics typically serve populations of 3,500 – 12,000, and are mandated to be open 8 hours a day, 5 days a week. Clinics are intended for outpatient care, and their beds are for observation only. Patients requiring further supervised care are referred to health centers or hospitals.

Health centers provide larger catchment populations of around 25,000 – 40,000 with secondary care, focusing on maternal and child health care. These centers are open 24 hours a day, every day and are meant to have up to 40 beds, laboratory diagnostic services, and provide services for severe medical and obstetric care.

Cases requiring surgical intervention are referred to hospitals, which are meant to be equipped with an operating theater, advanced laboratory, basic radiography, and basic ultrasonography. In addition to secondary care, hospitals have outpatient departments, which provide surrounding residents with primary care.

The MOH is working to decentralize responsibility for service delivery from the central ministry to the counties, and this mandate includes delegating responsibility, authority, and resources to the counties, so they can effectively manage the systems that most significantly affect the day-to-day delivery of health care. There are a total of 15 counties in Liberia. For the last five years, the MOH has contracted out service delivery to non-governmental organizations (NGOs) with donor funding for the majority of facilities in Bong, Lofa, and Nimba counties, focusing on stewardship functions and management tasks. In other counties, the Government of Liberia (GOL) operates facilities directly. Liberia is now aiming to shift towards placing more responsibility on the county health teams (CHTs) and facilities nationwide to directly manage local health systems and oversee service delivery. The United States Agency for International Development (USAID)/Liberia is committed to the MOH strategy and is focused on improving the capacity of CHTs to effectively make this transition.

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<sup>4</sup> Due to the shortage of certified midwives, this combination also takes the shape of a licensed practical nurse and TTM.

## Impact of the Ebola Virus Disease Epidemic on the Health System in Liberia

Before the 2014 start of the EVD epidemic, Liberia was considered to be one of the poorest countries in the world, ranking 175 of 187 on the UNDP Human Development Index (2013). The country was still rebuilding after a civil war through much of the 1990s, which ended in 2003, and was making substantial progress in improving the health status of its citizens until the onset of the EVD epidemic. The first report confirming EVD in Guinea and reports of suspicious deaths in Liberia occurred in March 2014. The epidemic peaked in mid-September 2014, with another slightly smaller peak in December 2014.

As a result of the EVD epidemic, Liberia experienced dramatic declines in public health indicators and in the delivery of basic health care, reversing years of progress in improving the health of Liberians, particularly women and children. For example, measles vaccination rates dropped from 77.8% in January 2014 to 44.8% in January 2015. This low vaccination rate resulted in Liberia recording over 850 measles cases in the first six months of 2015.<sup>5</sup> Similarly, during 2014 health facility deliveries declined from 65% to 27.8%, deliveries attended by skilled providers dropped from 61% to 30.6% and pregnant women having the recommended four or more antenatal care visits declined from 78.1% to 31.3%.<sup>6</sup>

Basic primary health care services virtually stopped functioning in a climate of little or no confidence in the safety of the health system, on the part of both service providers and clients. This was caused by deep fear among providers coupled with a lack of adequate training and personal protective equipment to deliver services safely, and in some cases reassignment of health workers to Ebola Treatment Units. Community-based health services, still at a nascent stage before the crisis, also broke down. In many locations, gCHVs with limited training and few supplies served as the only health service available, apart from private drug-sellers and “pharmacies.” Many large health centers and hospitals, already struggling before the EVD epidemic, were similarly unprepared to diagnose or manage suspected EVD cases and were quickly overwhelmed, leading to nosocomial Ebola virus infections, declines in other services, and fear of the health care system.

Those facilities that remained open provided only rapid identification and triage of suspected EVD patients; some turned away patients altogether. Many settings, lacking adequate infection prevention control training and personal protective equipment, moved to a “no-touch” approach of treating major causes of morbidity and mortality in order to reduce the risk to health workers. Specifically, with respect to malaria, despite great progress made in scaling up diagnosis for malaria prior to the EVD crisis, parasitological diagnosis was suspended. Outpatient visits dropped 61% nationwide between August and October 2014. Recorded malaria cases plummeted, yet with the WHO and other experts suspecting a likely increase in actual malaria cases among the population as a result of the crisis.

On May 9, 2015, WHO announced the end of the EVD epidemic in Liberia; however, on June 29, 2015, one confirmed case of EVD was reported in Liberia and five contacts associated with that case were confirmed to have EVD. All contacts completed their 21-day monitoring period and the country was declared Ebola free for the second time on September 3, 2015. Persistence of the virus in survivors has since been associated with subsequent clusters of cases. As the focus on the EVD response has waned, the GOL has shifted its attention to recovery efforts and the United States Government country team has been working to address urgent short term health needs such as malaria; plan for longer term

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<sup>5</sup> WHO <http://www.who.int/features/2015/measles-vaccination-liberia/en/>

<sup>6</sup> UNICEF 2014 (based on analysis of Liberia HMIS 2014 as of October 2014)

investments that will shore up health worker capacity, strengthen critical components of the health system, and prepare to address future epidemics.

#### Government of Liberia Health Sector Plans

As part of its overall EVD recovery efforts, the GOL has developed an integrated Investment Plan for Building a Resilient Health System (2015–2021) as an addendum to the ten-year National Health Policy and Plan. The Investment Plan focuses on priorities for the restoration of essential primary health care services as part of the development of a more resilient health system able to sustain basic services while detecting and responding to outbreaks. The three overarching objectives of the plan are to promote universal access to safe, quality services under Liberia’s Essential Package of Health Services; strengthen capacity to prevent, detect, and respond to infectious disease threats; and restore trust in the health system. The plan calls for investment in the health workforce, health infrastructure, and epidemic preparedness. It also outlines priorities for improved supply chains; better infection prevention and control; more comprehensive health information and surveillance systems; sustained community engagement; and strengthened capacity for leadership, governance, and health financing.

#### **4. National malaria control strategy**

Under Liberia’s 2016–2020 National Malaria Strategic Plan (NMSP), the NMCP assumed the lead coordination role and took responsibility for the decentralization of malaria control and prevention activities throughout the country by gradually devolving implementation responsibilities to CHTs. This coordination role includes all health partners, donors, and private sector stakeholders.

Malaria control and prevention activities in Liberia follow the principle of the “three ones:”

- One national malaria control coordinating authority where implementation is a country-led process
- One comprehensive plan for malaria control, including costed work plans
- One country-level monitoring and evaluation framework

The GOL/MOH’s fourth Liberian Malaria Control Strategy for 2016–2020:

- Addresses the need to scale-up malaria control and prevention activities to build on gains made under the Millennium Development Goals
- Addresses gaps identified in the implementation of the 2010–2015 Strategic Plan
- Includes a more detailed and budgeted strategy in dealing with the malaria situation

Given the lessons learned from the negative effect of EVD on malaria programming, this strategy has included a plan and budget to ensure malaria control activities are able to continue with minimal disruptions during emergencies.

The vision of the Liberia malaria program is a healthier Liberia with universal access to high quality malaria interventions with no malaria deaths. The objectives of Liberia’s 2016–2020 NMSP are:

- **To strengthen and sustain institutional and human resource capacity of the National Malaria Control Program for effective program management by 2020**

Key strategies under this objective highlight the building of both institutional and human resource capacities and advocacy, resource mobilization and oversight for effective program management.

- **To increase access to prompt diagnosis and effective treatment targeting 85% of the population by 2020.**

Strategies under this objective include conducting parasite based diagnosis at all levels and strengthening quality assurance/quality control (QA/QC) for malaria diagnostics, scaling-up the management of uncomplicated and severe cases of malaria in both public and private health facilities throughout the country, scaling-up integrated community case management of malaria, strengthening the QA/QC system for malaria commodities and services, and sustaining malaria in pregnancy (MIP) services at all antenatal care (ANC) facilities.

- **Ensure that 80% of the population is protected by malaria preventive measures by 2020**

The key strategies under this objective include ensuring universal access to LLINs, ensuring implementation of IRS activities in targeted areas, deployment of effective and sustainable larviciding as a complementary vector control measure where breeding sites are few, fixed, and findable, and institutionalization of entomological and insecticide resistance monitoring.

- **Increase the proportion of the population with knowledge and practice of malaria preventive measures to 95% and 75% by the end of 2020**

Key strategies under this objective involve promoting malaria prevention measures, as well as prompt and effective health seeking behavior amongst the population.

- **Strengthen the supply chain system for effective quantification and prompt distribution of commodities under a universal system by 2020**

Key strategies considered under this objective include ensuring availability and access to antimalarial drugs and other commodities at all health facilities, revising the logistics management information system (LMIS) tools to reflect key commodities, ensuring continuous availability and use of LMIS tools and standard operating procedures.

- **Improve routine data monitoring and program evaluation to ensure quality data management at all levels by 2020**

Key strategies under this objective include improving data management at all levels, as well as prioritizing and strengthening the local research agenda.

- **To initiate effective preparedness and timely response during emergencies**

Under this objective, during an emergency, the NMCP in collaboration with the National Emergency Operation Center would conduct an assessment of the magnitude of the emergency and the area(s) affected to determine the appropriate level of response.

## **5. Updates in the strategy section**

There is a new five-year strategy as noted above.

## **6. Integration, collaboration, and coordination**

In order to achieve maximum ownership and results, USAID/Liberia ensures that all U.S. Government health investments align with Liberia's 2011–2021 National Health and Social Welfare Policy and Plan and its companion Investment Plan for Building a Resilient Health System 2015–2021, which outline the GOL's priorities and strategies to expand access to basic health services and to establish the building

blocks of equitable, effective, responsive, and sustainable health service delivery. The U.S. Government complements the Liberian MOH's efforts by concentrating its resources on two key focus areas: 1) improving service delivery through support for the Essential Package of Health Services, and 2) for strengthening health systems to increase institutional capacity and sustainability.

The U.S. Government is investing in capacity building and technical assistance for policy formulation, strategy development, health systems strengthening, and countrywide social and behavior change communication (SBCC) initiatives. Additionally, the U.S. Government is using MOH systems to provide both facility-based and community-based support under performance-based contracting with NGOs for specific health facilities and their catchment communities. The U.S. Government is also providing complementary technical assistance for quality assurance, in-service training, supportive supervision, public financial management and performance-based financing, human resource management, and strengthening of health information systems.

Initiated by the MOH, performance-based contracting is a service agreement entered into between the MOH and NGOs to carry out service delivery at health facilities and catchment communities. These NGOs are expected to ensure health care services are in accordance with the Essential Package of Health Services, which is a standard government-approved package for primary health care services in Liberia. These contracts include a performance-based financing scheme that provides a performance bonus for reaching targets on health service delivery indicators after verification of submitted data at the county level and counter-verification by the central level committee comprised of the MOH and third party stakeholders.

From 2005 until 2007, the Global Fund constituted the majority of external funding for the implementation of malaria control and prevention activities in Liberia. A \$37 million Global Fund Round 7 grant was signed in April 2008, with the United Nations Development Program as the Principal Recipient, and in 2011 a \$60 million Round 10 grant was signed with the MOH and an NGO, Plan Liberia, as the 2 Principal Recipients. Based on the Phase 1 evaluation of the Round 10 grant that was completed in 2013 and Liberia's approved Phase 2 award signed in April 2014, the funding available for Round 10 was approximately \$35 million for the period through June 2016. However, planned implementation of some Global Fund grant activities stalled as a result of the EVD crisis. As a result, a Simplified Application Process was developed for the three affected countries in the region. Negotiations pursued for a grant split between malaria (\$30 million) and health systems strengthening (\$7.3 million). To accommodate the next mass distribution of LLINs, anticipated in the first quarter of 2018, the current Global Fund malaria grant has been extended to June 2018. The MOH is currently in the process of completing their funding request for malaria to the Global Fund for continuation of the current level of activities for a period of three years (July 2018-June 2021).

As PMI complements the activities under the Global Fund, support was provided to the NMCP and other parties during the evaluation of the first phase and during the development of the proposal for the second phase of the Round 10 grant, which is now in operation. PMI provided technical assistance, particularly regarding the quantification of commodities. A key element supported by the Global Fund Round 10 grant involved a national mass distribution of LLINs. This was a change from the previous strategy of rolling mass distribution of LLINs, during which different parts of the country received nets at different times. Going forward, in coordination with the NMCP, the Global Fund will provide LLINs for nationwide mass campaigns and PMI will provide LLINs for routine distribution through ANC visits and at delivery in a health care institution and technical assistance for both types of distribution.

Liberia underwent a Malaria Program Review with an *Aide Mémoire* outlining the findings and recommendations signed in March 2014 by the MOH, USAID, Plan Liberia as the Global Fund co-



Principal Recipient with the MOH, and WHO. This review effort informed the process of updating Liberia's NMSP.

In Liberia, PMI prioritizes the scale-up of iCCM to increase access to health services at the community level, and in collaboration with UNICEF and other partners, PMI supports the Community Health Services Division of the MOH to implement iCCM. This program provides diagnosis and treatment for malaria, diarrhea, and acute respiratory infections for children under five at the community level. The Global Fund, under its Round 10 grant, had committed support to the expansion of the iCCM program from 2% to 5% of the number of national febrile episodes tested for malaria and treated if positive. Although iCCM activities were impacted by the EVD crisis, the NMCP has renewed its focus for supporting the nationwide implementation of iCCM in collaboration with PMI and other partners. For the new period that began in July 2016, the Global Fund has committed to supporting 811 CHAs to cover all of Bomi County and supplement USAID support in Lofa and Nimba.

The MOH has prioritized the integration of diagnostic capacity for malaria, tuberculosis, and HIV at all levels. The MOH established a National Diagnostics Unit (NDU) to coordinate the support of partners to maintain achievements and continue progress. PMI and other USAID programs are coordinating with the NDU, the Global Fund, and other partners to operationalize an integrated diagnostics strategy that will provide comprehensive diagnostic policies, standard operational guidelines, and a national diagnostic quality assurance program for Liberia. As part of the post EVD health system recovery and rebuilding efforts, the U.S. government is working with the Government of Liberia and other international partners to transition laboratory capacity provided during the EVD epidemic and strengthen Liberia's laboratory system over the long-term, including aspects that will benefit malaria diagnostics.

A pilot activity was supported in the greater Monrovia area of Montserrado County to provide ACTs to private pharmacies and medicine shops for increased access to malaria treatment. This pilot provided testing with RDTs and treatment (if RDT-positive) to an estimated 0.5% of the national febrile cases. PMI has provided technical input to the NMCP and, based on results and lessons learned, the NMCP would like to expand this and is including private sector ACTs and RDTs in their current Global Fund grant application.

PMI, in collaboration with the NMCP, had initiated a partnership with private companies to support implementation of IRS in the years that IRS was conducted. Under this initiative, the Arcelor Mittal Steel Company conducted three rounds of spraying in its concessional areas in Nimba and Grand Bassa counties from 2010 to 2012. The Liberia Agriculture Company was also engaged in this public-private partnership and supported one round of spraying in its concessional area in Grand Bassa County in 2011. PMI provided insecticides and technical support, including training and mentoring, to these companies to build capacity to conduct IRS. As IRS has not been prioritized for PMI funding since FY 2013, the IRS equipment remains in storage, and the NMCP hopes to work in the future with these companies and other private sector sources to support IRS for their populations. PMI will continue to strengthen the vector control and entomological capacity of the NMCP to better understand vector ecology and insecticide resistance in collaboration with the U.S. Naval Medical Research Unit No. 3, the Liberian Institute for Biomedical Research, the Armed Forces of Liberia, and other groups who are collecting relevant data related to their individual projects.

PMI investments have been bolstered by additional support from the U.S. Government and other donors for restoration of health services and health system functioning following the EVD epidemic. USAID, with resources under the FY 2015 Ebola Supplemental Funding, expanded support for service delivery

in 77 additional facilities and associated communities across four counties, Bong, Lofa, Nimba, and Grand Bassa, and is providing additional support to the county health teams in six counties to strengthen management of the health system and expand community-based services, including iCCM. Coordination is led by the NMCP and facilitated by the USAID Mission; a key feature is the use of the same implementing partners as PMI, thus ensuring that resources are coordinated to increase overall coverage of key malaria interventions rather than duplicate them. In addition, USAID has funded a new, 2.5-year pre-service training program focused on supporting six training institutions to improve the quality of training for midwives and laboratory technicians, including in provision of malaria-related services.

Lastly, the Centers for Disease Control and Prevention (CDC) has established a country office to support key activities under the Global Health Security Agenda, which includes a focus on strengthening surveillance, public health laboratory functions, and adherence to infection prevention and control standards. Global Health Security Agenda funding through CDC helps to build epidemiology skills within the public health system at both the national and county level. There is not an explicit focus on malaria; however, broader improvements in the overall public health epidemiology and laboratory systems are expected to create opportunities for strengthening management of malaria services. PMI will work with both the U.S. Government and GOL and partner counterparts to ensure that the NMCP continues to be strengthened and supported – for instance, by inclusion of malaria service indicators in activities targeting restoration of the health system and by supporting the inclusion of NMCP staff in the basic Field Epidemiology and Laboratory Training Program being established with support from CDC.

## **7. PMI goal, objectives, strategic areas, and key indicators**

Under the PMI Strategy for 2015-2020, the U.S. Government’s goal is to work with PMI focus countries and partners to further reduce malaria deaths and substantially decrease malaria morbidity, towards the long-term goal of elimination. Building upon the progress to date in PMI focus countries, PMI will work with NMCPs and partners to accomplish the following objectives by 2020:

1. Reduce malaria mortality by one-third from 2015 levels in PMI focus countries, achieving a greater than 80% reduction from PMI’s original 2000 baseline levels.
2. Reduce malaria morbidity in PMI-supported countries by 40% from 2015 levels.
3. Assist at least five PMI focus countries to meet the World Health Organization’s (WHO) criteria for national or sub-national pre-elimination.<sup>7</sup>

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. Achieving and sustaining scale of proven interventions
2. Adapting to changing epidemiology and incorporating new tools
3. Improving countries’ capacity to collect and use information
4. Mitigating risk against the current malaria control gains
5. Building capacity and health systems towards full country ownership

To track progress toward achieving and sustaining scale of proven interventions (area of strategic focus #1), PMI will continue to track the key indicators recommended by the Roll Back Malaria Monitoring and Evaluation Reference Group (RBM MERG) as listed below:

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<sup>7</sup> [http://whqlibdoc.who.int/publications/2007/9789241596084\\_eng.pdf](http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf)

- Proportion of households with at least one ITN
- Proportion of households with at least one ITN for every two people
- Proportion of children under five years of age who slept under an ITN the previous night
- Proportion of pregnant women who slept under an ITN the previous night
- Proportion of households in targeted districts protected by IRS
- Proportion of children under five years of age with fever in the last two weeks for whom advice or treatment was sought
- Proportion of children under five with fever in the last two weeks who had a finger or heel stick
- Proportion receiving an ACT among children under five years of age with fever in the last two weeks who received any antimalarial drugs
- Proportion of women who received two or more doses of IPTp for malaria during ANC visits during their last pregnancy

## 8. Progress on coverage/impact indicators to date

**Table 1: Evolution of Key Malaria Indicators in Liberia from 2005 to 2013**

Indicator	MIS 2005	DHS 2007	MIS 2009	MIS 2011	DHS 2013	MIS 2016*
% Households with at least one ITN	18%	30% <sup>a</sup>	47%	50%	55%	62%
% Households with at least one ITN for every two people	n/a	n/a	n/a	17%	22%	25%
% Children under five who slept under an ITN the previous night	3%	n/a	26%	37%	38%	44%
% Pregnant women who slept under an ITN the previous night	n/a	n/a	33%	39%	37%	40%
% Households in targeted districts protected by IRS	n/a	n/a	n/a	9% <sup>b</sup>	11% <sup>b</sup>	n/a
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	n/a	n/a	n/a	60%	71%	78%
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	23%	33%	42%	50%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	n/a	n/a	45%	70%	43% <sup>d</sup>	81%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	4%	12% <sup>c</sup>	45%	50%	48%	55%
Under-five mortality rate per 1,000 live births	n/a	110	n/a	n/a	94	n/a

Indicator	MIS 2005	DHS 2007	MIS 2009	MIS 2011	DHS 2013	MIS 2016*
% children under five with parasitemia (by microscopy)	n/a	n/a	32%	28%	n/a	n/a
% children under five with parasitemia (by RDT)	66%	n/a	37%	45%	n/a	45%

\*2016 MIS indicators are still preliminary and are from the Key Indicators report.

<sup>a</sup> The 2007 DHS only asked about any net ownership, not specifically about ITNs, and did not ask about net use

<sup>b</sup> This is out of all households

<sup>c</sup> The 2007 DHS only asked about pregnant women who took any SP

<sup>d</sup> There is a note in the 2013 DHS regarding some confusion on this question as an additional 42.2% (compared to only 9.9 % in 2011 MIS) reported use of amodiaquine, which is how AS/AQ is known in Liberia, making it difficult to distinguish between actual use of the mono vs. combination therapy.

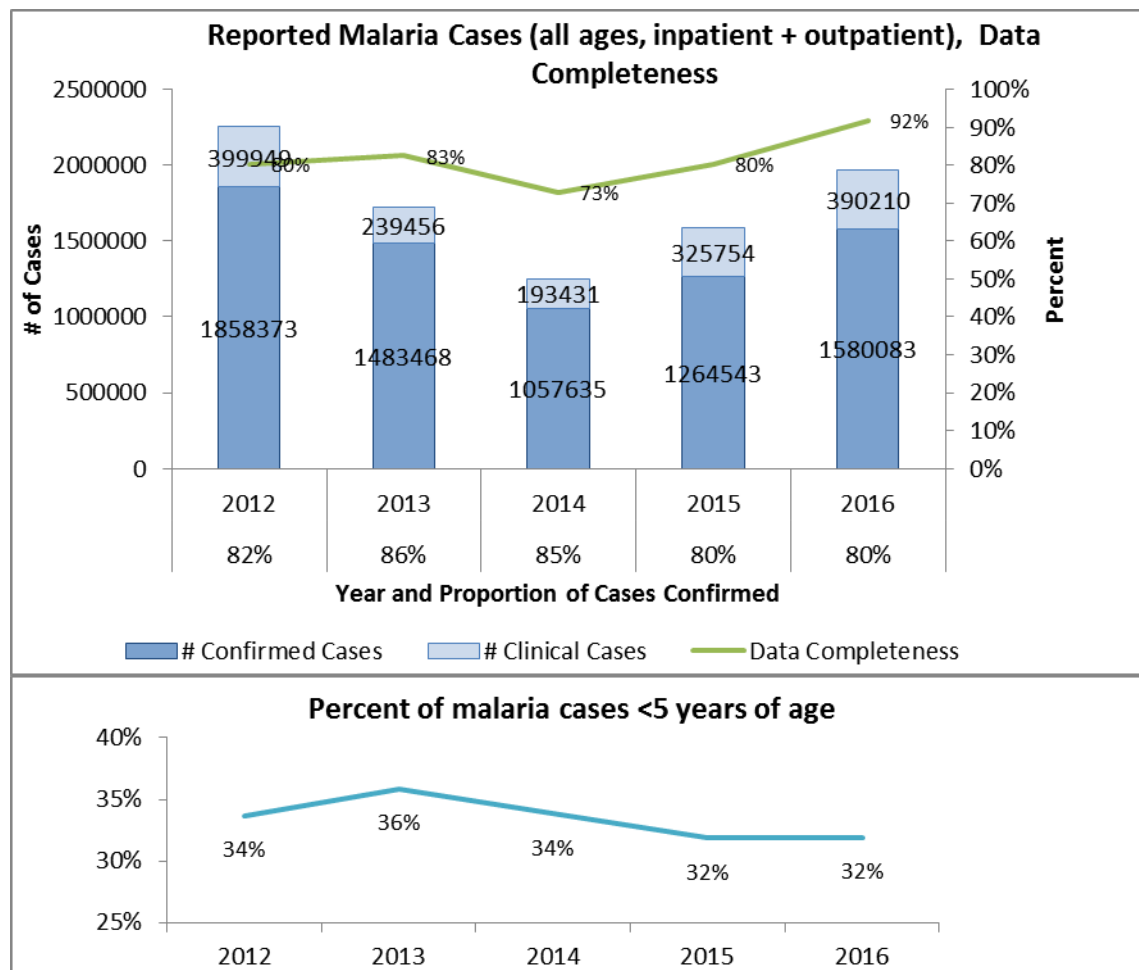
**Table 2: Evolution of Key Malaria Indicators reported through routine surveillance systems in Liberia from 2012 to 2016**

Indicator	2012	2013	2014	2015	2016
<b>Total # Cases</b>	1,858,373	1,483,468	1,057,635	1,261,247	1,580,083
<b>Total # Confirmed Cases</b>	1,458,524	1,244,012	864,204	936,265	1,189,873
<b>Total # Clinical Cases</b>	399,949	239,456	193,431	324,982	390,210
<b>Total # &lt;5 Cases</b>	760,740	616,987	423,140	506,549	628,530
<b>Total # inpatient malaria deaths*</b>	1,725	1,191	2,288	1,379	1,260
<b>Data Completeness** (%)</b>	80%	83%	73%	80%	92%
<b>Test Positivity Rate (TPR)</b>	69%	63%	71%	64%	61%

\*Malaria deaths for 2012-2015 are from the World Malaria Report

\*\*Percentage of health facilities reporting each month

**Figures 2 – 3: Trends in Key Routine Based Malaria Indicators**



**9. Other relevant evidence on progress**

The 2009 Health Facility Survey (HFS) also provides useful information on the progress of facility-based malaria activities. A total of 418 health facilities, representing 79% of all health facilities in Liberia, were visited, and the survey included record review, assessment of commodities, and observation of malaria case management. Results from the 2009 HFS were encouraging, as 86% of health workers were prescribing antimalarial drugs according to national guidelines and 85% of health workers had access to essential malaria drugs.

A follow-up HFS was undertaken in 2013. The protocol and methodology of the 2013 survey were slightly different from the 2009 survey. For instance, the number of interviews was reduced for some forms per facility level (i.e., clinic, health center, and hospital). The initial review of the 2013 HFS report also revealed some systematic issues with how the 2013 data set was created and analyzed that are not amenable to re-analysis. Lessons learned will be incorporated into the planning at all stages for the 2017 HFS and any future surveys.

**Table 3: Key Indicators of the Liberia Health Facility Surveys**

	<b>INDICATORS</b>	<b>HFS 2005*</b>	<b>HFS 2009</b>
1	% of GOL health facilities that have all four presentation of ACTs available for treatment of uncomplicated malaria on the day of visit	58	71
2	% of health workers who search for danger signs	11	20
3	% of health workers who prescribe antimalarial drug according to national guidelines	75	86
4	% of health workers who counsel patients/caretakers on malaria	26	45
5	% of health workers with access to essential malaria drugs	48	85
6	% of out-patient department attendance due to malaria among children under five years	59**	38
7	% of pregnant women with confirmed malaria	31	18
8	% of patients receiving appropriate malaria treatment within 24 hours	21	35
9	% of overall deaths with laboratory-confirmed malaria (rapid diagnostic test or blood smear)	44	33

\*The 2005 HFS was part of the 2005 MIS, which collected information from households and health facilities; the 2005 and 2009 HFSs were supported by the Global Fund

\*\*Clinical malaria

In 2016, PMI supported a formal impact evaluation for the period 2007 to 2013 using a pre and post design with a plausibility assessment. Trends in all-cause childhood mortality were analyzed against trends in coverage of malaria control interventions and contextual factors that affect child survival. Data from the Demographic and Health Surveys and Malaria Indicator Surveys, referenced above, and the HMIS were used in the evaluation. During this period the all-cause childhood mortality gradually declined from 109 (95% CI: 99-120) in 2007 to 94 (95% CI: 84-103) deaths per 1,000 live births in 2013. This decline was mainly due to a decrease in infant mortality from 71 (95% CI: 62-80) to 54 (95% CI: 46-61) deaths per 1,000 live births as child mortality (mortality between age 1 and 4 years) remained stable during this period (41 and 42 deaths per 1,000 live births in 2007 and 2013, respectively). The evaluation period occurred within an overall environment of improvement in the country post-civil war, where the healthcare system was being rebuilt, gross domestic product was rising, and other improvements in maternal and child health were taking place. Preliminary results indicate the gradual expansion of malaria control interventions likely contributed to the 21% decrease in malaria parasitemia (by RDT), but that it is too early in the process of the expansion of malaria control interventions to have observed a significant impact on all cause under-five mortality. Other socioeconomic and child health interventions likely contributed to the decline in all cause under-five mortality during the evaluation period. The impact evaluation was completed by the end of 2016 and the report is being finalized.

In 2016, PMI supported a Malaria Indicator Survey with additional health indicators included. The field work was completed in December 2016. The data have been entered and are currently being cleaned in preparation for generation of tables and report writing. Preliminary results are reported in the indicator table above.

### III. OPERATIONAL PLAN

The overall PMI support strategy for Liberia is nested within USAID’s Global Health Strategy for Liberia, which seeks to align, complement, and support Liberia’s 2011–2021 National Health and Social Welfare Policy and Plan. To improve the overall health status of the population, strategic investments need to be made that take the best advantage of resources from government, development partners, and technical agencies.

PMI’s national-level support includes health system strengthening, bolstering the HMIS and LMIS, improving pharmaceutical and commodity supply chain management, improving national clinical standards and strengthening quality improvement systems, and enhancing SBCC activities. Improving diagnostic capacity, promoting quality medicines, and supporting LLIN distribution through ANC clinics and at institutional delivery, and antimalarial commodity distribution through health facilities, are among specific interventions that PMI will continue to support under its nationwide investment approach. In many cases, PMI is one partner among several others, enabling PMI to expand its activities beyond what could have been possible otherwise.

PMI supports malaria programming throughout the country utilizing several approaches. USAID support in three priority counties (Bong, Lofa, and Nimba) consists of support for implementation of Liberia’s Essential Package of Health Services at the facility and community levels through a government-to-government Fixed Amount Reimbursement Agreement (FARA). Bong, Lofa and Nimba counties were the three counties selected for health program support in USAID/Liberia’s five-year strategy based on their population concentration (the three counties account for approximately 25% of the total population of Liberia) and their potential to fuel nationwide development. PMI relies on the FARA as the principal mechanism to strengthen service delivery for comprehensive preventive and curative malaria services and community level iCCM and SBCC activities in these three FARA focus counties. Outside of the USAID FARA focus counties PMI provides support for iCCM, malaria SBCC, and through support of the County Health Teams (CHTs) strengthens malaria case management, MIP, and SM&E in three additional counties (Margibi, Grand Bassa, and Rural Montserrado). PMI leverages other USAID funding streams, including HIV/AIDS, maternal and child health, and family planning when providing support for malaria in the three FARA counties as a component of integrated service delivery. This brings the reach of U.S. Government-funded malaria service delivery support to 37% of the population. Scale-up to nationwide coverage for activities will be achieved through coordination with the Global Fund, the multi-donor Pool Fund, and the European Union.

Starting with FY 2016 funding, in addition to providing wrap around technical assistance for malaria service delivery, SBCC, and SM&E in USAID focus counties (Bong, Nimba and Lofa), PMI will provide targeted technical assistance for strengthening management and oversight of malaria service delivery, SBCC and SM&E in Liberia’s remaining 12 counties, where other donors support implementation of the activities themselves. Table 4 depicts PMI/Liberia’s support by technical area and indicates the expansion to additional counties.

**Table 4: PMI-Supported Interventions by County and Year**

No.	County	Population (2017)	Start-up year (CY) <sup>1</sup>	PMI Supported Interventions								
				ITN <sup>2</sup> (routine dist)	IRS (stopped in 2013)	Ento Monitor	MIP/ IPTp	CM	iCCM <sup>3</sup>	M&E	SBCC	SCM <sup>4</sup>
1	Bong	429,282	2009	x	x	x	x	x	x	x	x	x
2	Lofa	356,399	2009	x	x		x	x	x	x	x	x
3	Nimba	594,755	2009	x	x		x	x	x	x	x	x
4	Monstserrado	1,439,484	2015-2017	x		x	(x)	x	x	(x)	x	x
5	Margibi	270,299	2015-2017	x		x	(x)	x	x	(x)	x	x
6	Grand Bassa	285,380	2015-2017	x		x	(x)	x	x	(x)	x	x
7	Grand Cape Mount	163,582	2017-2018	x			(x)	x		(X)	(x)	x
8	Grand Gedeh	161,242	2017-2018	x			(x)	x		(x)	(x)	x
9	Maryland	174,990	2017-2018	x			(x)	x		(x)	(x)	x
10	River Gee	85,976	2017-2018	x			(x)	x		(x)	(x)	x
11	River Cess	92,052	2017-2019	x			(x)	x		(x)	(x)	x
12	Bomi	108,284	2018-2019	x			(x)	x		(x)	(x)	x
13	Gbarpolu	107,343	2018-2019	x			(x)	x		(x)	(x)	x
14	Grand Kru	74,550	2018-2019	x			(x)	x		(x)	(x)	x
15	Sinoe	131,805	2018-2019	x			(x)	x		(x)	(x)	x

1 (x) parentheses refers to planned expansion of these activities in 2017-2019.  
2 ITN distribution started in 2009 in counties 1-3, expanded to include counties 4-6 in 2015 and expanded to cover all 15 counties in 2016  
3 iCCM is supported by other donors in the remaining counties  
4 Supply Chain Management (SCM) started in 2009 in counties 1-3, expanded to include counties 4-6 in 2015, and expanded to cover all 15 counties in 2017



Accountability of PMI resources at the county level will be enhanced through MOH performance-based contracting of NGOs supported by PMI through the FARA. There are malaria-specific indicators used to assess the performance of contracted NGOs under the FARA. USAID visits U.S. Government-supported counties every quarter and randomly selects facilities for field monitoring. USAID uses baseline assessment documents and integrated supportive supervision monitoring reports provided by the CHTs and partners to verify performance of the various health facilities under the FARA. In addition, HMIS indicators are used to assess the FARA, as both IPTp and treatment indicators are included as indicators in the performance-based financing scheme.

USAID's first FARA ended on December 31, 2015, and the follow-on FARA 2.0 was awarded in January 2016 for five years. An evaluation of FARA 1.0 is underway in 2017. The new agreement maintains key interventions, especially those related to malaria, and its design was influenced by lessons learned from the previous FARA. Indicators for the new FARA have been discussed in-country and with the headquarters SM&E team in order to ensure full coverage of supported activities, in conjunction with PMI implementing partners, at both the health facility and community level.

## **1. Vector monitoring and control**

### NMCP/PMI objectives

Liberia's 2016–2020 NMSP includes the objective of ensuring that 80% of the country's population is protected by malaria prevention measures by 2020. Under this objective, Liberia aims to ensure universal access to LLINs by reaching 100% of households through mass campaigns conducted every three years. Liberia follows the WHO definition of universal coverage as one net per two people. Currently, mass campaigns are the main distribution method, reinforced by continuous distribution of nets during the first ANC visit and at the time of delivery in a registered health care institution to encourage delivery in facilities. Liberia has included expanding the channels for continuous distribution to include the Expanded Program on Immunization and schools in its 2016–2020 NMSP.

Liberia's updated strategic plan also includes IRS conducted in rural districts with high malaria prevalence if funding is available. IRS implementation would ensure that at least 90% of the structures in targeted areas are sprayed. The insecticide selected for IRS would be recommended by WHOPES and chosen based on susceptibility testing. However, IRS is not currently implemented in Liberia. In addition, the plan calls for the deployment of effective and sustainable larviciding as a complementary vector control measure where breeding sites are few, fixed, and findable. However, it is recognized that currently Liberia does not meet this criterion for an effective larviciding program.

Lastly, the 2016–2020 NMSP includes the objective of institutionalizing entomological and insecticide resistance monitoring with a plan to produce a vector prevalence map of the country, highlighting vector behavior, susceptibility and location, as well as to use the NMCP's insectary as a testing site for studies of malaria vectors.

### **a. Entomologic monitoring and insecticide resistance management**

#### Progress since PMI was launched

PMI supported IRS in Liberia from 2009 to 2013. In 2014, after consultations within the PMI interagency team and discussions with the NMCP, the decision was made to suspend PMI-supported IRS in Liberia and focus resources on increased entomological monitoring and universal LLIN coverage. In 2013, two vector surveillance sites were established in Bong and Montserrado Counties that

provided important information on the spatial and temporal composition and distribution of anopheline species. In 2014, a functional insectary, modified from a shipping container, was situated next to the NMCP for annual insecticide resistance monitoring and to provide work space for NMCP vector control unit staff.

In 2015, PMI supported an entomologist to be embedded with the NMCP to help build capacity for entomological surveillance, and supported two NMCP vector control unit staff to attend a week-long entomology training in Ghana that included refresher training on morphological identification, as well as practical exercises using the CDC bottle insecticide resistance intensity assay. In addition, WHO supported one senior member of the vector control unit to attend a three-month training course in Benin, which included molecular analyses for species identification and malaria infection rates.

#### Progress during the last 12-18 months

Over the past year, PMI supported the NMCP in expanding to two additional surveillance sites (i.e., Bokay town in Grand Bassa County and Jeneta in Margibi County) and continued to support established sites of Tomato Camp in Bong County and Franktown in Montserrado County. All four sites are located in rural areas surrounded by human settlements and contain numerous breeding sites such as borrow and brick pits. Mosquito collections were made using monthly pyrethrum spray catches (PSCs) and CDC light trap collections, and bimonthly human landing catches. In an effort to increase mosquito sampling, PMI doubled the number of PSCs from 10 to 20 houses per site during 2 consecutive days. *An. gambiae* s.l. was found to be the major vector in all sites. The peak biting activity for *An. gambiae* s.l. was observed after 12:00 am for both indoor and outdoor collections, when people would be expected to be asleep and protected by bed nets.

In 2016, the insectary was altered to support a mosquito rearing room, an insecticide resistance and laboratory diagnostics workroom, and an equipment / storage room. In November 2016, a laboratory colony of *An. gambiae* s.s. (Kisumu) strain was successfully established and successive generations have been maintained. In addition, PMI supported two members of the vector control unit to receive CDC bottle assay training at CDC in Atlanta.

PMI supported insecticide susceptibility testing in nine counties. Significant and widespread pyrethroid and DDT resistance has been found in Liberia (Table 5).

**Table 5. Insecticide susceptibility from nine counties in Liberia using WHO Bioassay tube tests, July – December 2016**

County	Sites	Pirimiphos-methyl	Bendiocarb	Deltamethrin	Alpha-cypermethrin	DDT
Montserrado	Bensonville	100 (100)	89 (100)	27 (100)	6 (100)	46 (100)
Gbarpolu	Bopulu	100 (100)	89 (100)	73 (100)	47 (102)	
River Cess	Cestos City	100 (100)	90 (100)	5 (100)	2 (100)	0 (100)
River Gee	Fish Town	100 (100)	96 (100)	5 (100)	4.3 (100)	9 (100)
Sinoe	Greenville	100 (125)	99.2 (125)	27.2 (125)	32.8 (125)	52 (125)
Lofa	Voinjama	99 (100)	96 (100)	4 (100)	3 (100)	5 (100)
Cape Mount	Garwula	100 (100)	99 (100)	3 (100)	1 (100)	1 (100)
Bomi	Tubamanburg	99.2 (124)	100 (100)	35.87 (100)	15.2 (100)	38.04 (100)
Grand Kru	Barclayville	100 (100)	99 (100)	3 (100)	1 (100)	1 (100)

Greater than 98% mortality in tube bioassays indicates full susceptibility (green), 90-97% mortality indicates probable resistance (yellow), and less than 90% mortality indicates resistance (orange/red) to the insecticide being tested. Numbers tested are in parentheses.

### Plans and justification

PMI will continue to assist the NMCP in maintaining a comprehensive mosquito surveillance program. Moreover, in 2017 PMI will focus on assisting the NMCP with laboratory diagnostic testing of mosquitoes to include ELISA and PCR for the presence of *Plasmodium falciparum* and mosquito species identification. Insecticide resistance testing will continue in three to five counties each year to maintain skills and capacity, such that all counties in the country will be covered within a cycle (e.g. every three to five years depending on the results obtained and the appearance of new agents). PMI will continue to support efforts in maintaining a susceptible mosquito colony in the NMCP's insectary. PMI will also continue to support the determination of the spatial and temporal composition and distribution of anopheline species, as well provide additional molecular support and training to elucidate the members of the *An. gambiae* s.l. complex.

### Proposed activities with FY 2018 funding: (\$529,000)

- **Increase NMCP entomology capacity and entomological monitoring.** PMI will provide equipment, supplies, and mentoring for NMCP entomology technicians to conduct field work (mosquito surveillance for mosquito density, behavior, species identification, and insecticide resistance testing) plus molecular analysis (e.g., infectivity rate, resistance markers, source of blood meal etc.). The frequency and number of entomological monitoring sites will be based on results of the transect monitoring to be conducted in 2017. In addition, PMI will continue to support the maintenance of a mosquito colony. (Note that the colony is currently housed in the

container insectary established in 2014. Location may change should the NMCP offices relocate). (\$500,000)

- **Technical assistance for vector control activities.** CDC staff will conduct two technical assistance (TA) visits to assist with training and to monitor planning and implementation of vector control activities, including use of WHO tube and CDC bottle assays, molecular techniques to include ELISA testing, mosquito collection techniques, and morphological identifications. In addition, assistance with the maintenance of a susceptible mosquito colony will be provided. (\$29,000)

## **b. Insecticide-treated nets**

### *Progress since PMI was launched*

Liberia conducted its first nationwide mass universal net coverage campaign between April and June of 2015 during the EVD epidemic, distributing approximately 2.8 million long-lasting insecticide treated nets (LLINs) donated by the Global Fund. This replaced Liberia's older model of distributing LLINs door-to-door through phased campaigns in combination with net "hang-up" in households. This change was based on evidence from the 2013 DHS and a PMI-supported qualitative study<sup>8</sup> that showed low ownership of nets and low use due to lack of access. Liberia also supports continuous distribution of nets to pregnant women at their first ANC visit and after delivery in a health facility. Between 2008–2016, approximately 7.4 million LLINs were distributed in Liberia through campaigns, ANC services, and at institutional deliveries, including approximately 2 million LLINs purchased by PMI.

Results from the 2013 Liberia DHS indicated the number of households owning at least one LLIN increased from 50% in 2011 to 55% in 2013. Additionally, although there was a small decrease in the number of urban households owning at least one LLIN, from 52% in 2011 to 50% in 2013, the percentage of rural households that owned at least one LLIN increased markedly over the same period from 47% to 61%. LLIN use rates among populations with access to an LLIN were observed to be 86% in 2013, indicating that even after the 2012 campaigns Liberia continued to have an LLIN access constraint, rather than an LLIN-use behavior problem. The 2016 Malaria Indicator Survey (MIS) conducted after the 2015 universal coverage campaign looked at ownership and use of nets and is still being analyzed with results expected in mid-2017.

The PMI-supported qualitative assessment<sup>9</sup> of ownership of mass distribution campaign nets was conducted in 2014 to explore possible reasons for low LLIN ownership despite repeated phased campaigns. A main finding was that not every household received the number of nets they were eligible to receive due to poor working relationships between the NGO distributors and county and district health teams, inaccurate enumeration of sleeping spaces, incomplete coverage of some communities and/or households, and insufficient availability of nets. The assessment also confirmed that LLIN usage was related to access, with the proportion of sleeping spaces that were covered in the four communities averaging 53% (ranging from 29% to 69%). Results of this and the DHS led the NMCP to revise its strategy to nationwide mass universal coverage campaigns.

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<sup>8</sup> A Qualitative Assessment of the Ownership and Use of Mass Distribution Campaign Nets in Liberia. 2014. Denise Roth Allen and Kathryn Shuford. Centers for Disease Control and Prevention, Atlanta, Georgia USA

<sup>9</sup> A Qualitative Assessment of the Ownership and Use of Mass Distribution Campaign Nets in Liberia. 2014. Denise Roth Allen and Kathryn Shuford. Centers for Disease Control and Prevention, Atlanta, Georgia USA

### Progress during the last 12-18 months

After the universal coverage campaign, 100,000 LLINs donated by PMI were distributed to communities in Monrovia that were missed during the campaign. PMI also distributed 168,650 LLINs to facilities in 13 counties for continuous distribution through ANC clinics and at institutional delivery. In 2016, PMI began supporting the NMCP to distribute nets to hang over beds in hospitals and registered residential institutions including orphanages, welfare homes, military barracks, and nursing schools not reached by the house-to-house mass distribution and delivered approximately 23,350 LLINs.

PMI also supported supportive supervisions of the continuous facility-based LLIN distribution system. After 2015 supervision reports indicated that the recording and reporting of LLINs given to beneficiaries was a challenge, PMI supported a series of on-site trainings to address some of the main challenges ensuring: 1) LLINs are given to the right target groups at the agreed health facility visit; 2) LLINs are always available and the system for resupply is functioning well; and 3) the recording of LLINs distributed is done correctly and appropriately, and they have a system to record institutional delivery nets until new registers are delivered. In addition, the storage of nets was found to be a major challenge, thus the second tranche of nets for health facilities were delivered to specific counties in shipping containers.

LLINs issued to patients after delivery are currently being captured on the postpartum ward register. The HMIS monthly summary forms as well as the ANC registers were revised to capture institutional delivery distribution and dissemination of the registers to counties began in January 2017 with the support of PMI and will continue throughout the year. Supervision for continuous LLIN distribution is done by a national level supportive supervision core team, including the NMCP, the Family Health Division of the MOH, and the MOH's Supply Chain Management Unit. This team was formed in 2015 and trained 172 community health and district officers to conduct health facility on-the-job orientations for ANC and institutional delivery staff in LLIN distribution. In 2016, these District and Community Health Management teams trained 2,388 service providers from 13 counties on the processes for ANC and institutional delivery LLIN distribution and proper documentation and reporting. After orientations are conducted, these District and Community Health Management Teams will visit and provide monitoring reports from each health facility in their districts on continuous LLIN distribution.

An update of Liberia's LLIN strategic plan and an assessment of the viability of additional continuous distribution channels such as school-based distribution in selected counties were both planned for 2016, but were delayed to allow time to ensure the ANC and institutional delivery channels were functioning. The assessment is planned to take place in 2017 and will start with a field exploration to gather information on available structures and feasibility of channels for LLIN distribution, with a focus on looking at school-based distribution. A stakeholders meeting will be organized to share and discuss findings from the exploratory trip and the draft process guidelines. Once an alternate route is identified, PMI will collaborate with the NMCP to support a pilot to evaluate feasibility in country.

Commodity gap analysis

**Table 6. ITN Gap Analysis**

<b>Calendar Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Total Targeted Population	4,206,701	4,295,042	4,385,238
<b>Continuous Distribution Needs</b>			
Channel #1: ANC <sup>1</sup>	199,818	214,752	219,262
Channel #2: Institutional Delivery <sup>2</sup>	143,028	154,622	166,639
Channel #3: Institutions (e.g. hospitals, orphanages, boarding schools, military)	0	20,000	30,000
<i>Estimated Total Need for Continuous</i>	342,846	389,374	415,901
<b>Mass Distribution Needs</b>			
2018 mass distribution campaign	0	2,386,134	0
<i>Estimated Total Need for Campaigns</i>	0	2,386,134	0
<b>Total Calculated Need: Routine and Campaign</b>	<b>342,846</b>	<b>2,755,508</b>	<b>415,901</b>
<b>Partner Contributions</b>			
ITNs carried over from previous year	0	0	626
ITNs from Global Fund	0	2,386,134	0
ITNs planned with PMI funding	320,000	390,000	416,000
<b>Total ITNs Available</b>	320,000	2,776,134	416,626
<b>Total ITN Surplus (Gap)</b>	(22,846)	626	725

<sup>1</sup>5% of national population pregnant in a given year with 95%, 100%, 100% ANC coverage; <sup>2</sup>4% of population under one with 85%, 90% and 95% pregnant women delivering in an institution for 2017-2019

Plans and justification

PMI will continue to support routine distribution of LLINs by procuring and supporting the storage and distribution of LLINs to cover the entire ANC and institutional delivery need, as well as nets for specialized institutes including orphanages, hospitals, and boarding schools. PMI will support the Central Medical Stores (CMS) in the storage, transportation and distribution of the nets. With FY 2018 funding, PMI will continue to support the CMS through technical assistance to move routine LLINs from the central level to the county warehouses semi-annually and from the county depots to the health facilities through a resupply system. In addition, PMI will provide technical support for the

institutionalization and evaluation of this routine distribution method including exploring the question of whether or not an additional distribution channel is needed.

Liberia's next LLIN mass campaign will take place January-March 2018 with approximately 2.4 million LLINs procured by the Global Fund, with net needs calculated based on one net per 1.8 persons. PMI will support technical assistance for campaign planning with FY 2016 funds, and will support SBCC before, during, and after the campaign with FY 2017 funds. In addition, PMI will support the monitoring of attrition and physical durability of nets distributed during the 2018 mass campaign at two sites for a three-year period (2018–2020). The 2018/19 DHS will provide coverage indicators for the campaign.

Proposed activities with FY 2018 funding: (\$2,124,000)

- **Procure LLINs.** PMI will procure approximately 416,000 LLINs for distribution through ANC visits and at delivery in a health care institution, which will meet Liberia's routine distribution needs for calendar year 2019. PMI will also distribute nets to special institutes, including hospitals (which will be hung over beds), orphanages, and boarding schools. (\$1,248,000)
- **Distribute LLINs.** PMI support for routine LLIN distribution nationwide will be strengthened. Warehousing and transportation of LLINs from the CMS to the county depots will continue semi-annually and be integrated into the national distribution system for health commodities; whereas, currently this is conducted by a PMI implementing partner. In addition, PMI will support the distribution of LLINs down to the facility level for those facilities that provide ANC services and/or institutional delivery. Technical assistance to the CHTs to replicate the national distribution system for health commodities will be scaled up with support from PMI to enable CHTs to sustain routine distribution. (\$416,000)
- **Technical assistance for continuous distribution.** PMI will fund technical assistance to help the NMCP continue to institutionalize LLIN distribution through ANC clinics and at institutional delivery through supportive supervision and a monitoring and evaluation plan to track distribution of nets and reordering needs. This technical assistance will support the county and district health teams in their work ensuring nets are at facilities and given out appropriately. In addition, this assistance will support the piloting of another distribution channel, pending the results of the assessment and stakeholder meeting in 2017. (\$250,000)
- **Net durability monitoring.** Monitor attrition and physical durability of nets distributed as part of the 2018 LLIN mass campaign at two sites. This funding will support the fieldwork for year two of the net durability monitoring activity. (\$200,000)
- **CDC Technical assistance for net durability monitoring.** PMI will provide technical assistance for analysis of the net durability monitoring as part of the 2018 LLIN mass campaign. (\$10,000)

**c. Indoor residual spraying**

Progress since PMI was launched

PMI supported IRS in Liberia from 2009 to 2013. As part of the IRS program, PMI collaborated with private companies to support implementation of IRS. The Arcelor Mittal Steel Company conducted

three rounds of spraying in its concessional areas in Nimba and Grand Bassa counties from 2010 to 2012, and the Liberia Agriculture Company supported one round of spraying in its concessional area in Grand Bassa County in 2011. PMI provided insecticide and technical support, including training and mentoring, to these companies to build capacity to conduct IRS.

The last time IRS was conducted, PMI supported spraying with a long-lasting organophosphate due to the observation of significant pyrethroid resistance throughout Liberia and the requirement to spray carbamates twice during the malaria transmission season because of their short residual life. However, because of the higher cost of the organophosphate, only 10% of the Liberian population could be protected with IRS in 2013, compared with 23% of the population on a similar budget the previous year. Therefore, after consultations within the PMI interagency team and discussions with the NMCP, the decision was made to suspend PMI-supported IRS in Liberia. Since that time, PMI has increased entomological monitoring and concentrated on universal LLIN coverage, relying on LLINs' ability to act as a physical barrier even in areas of pyrethroid resistance.

**Table 7: PMI-supported IRS activities 2009 – 2013**

Calendar Year	Number of Districts Sprayed	Insecticide Used	Number of Structures Sprayed	Coverage Rate	Population Protected
2009	2	pyrethroid	~22,000	n/a	~160,000
2010	4	pyrethroid	52,468	98%	420,532
2011	5	pyrethroid and carbamate	89,710	96%	834,671
2012	5	pyrethroid and carbamate	96,901	98%	869,707
2013	1	organophosphate	42,708	96%	367,930

Plans and justification

PMI does not plan to support IRS in Liberia with FY 2018 funding.

Proposed activities with FY 2018 funding: (\$0)

There are no PMI-supported IRS activities planned with FY 2018 funding.

**2. Malaria in pregnancy**

NMCP/PMI objectives

Liberia's 2016 – 2020 National Strategic Plan encompasses a three-pronged approach toward MIP, consisting of prompt and effective case management of malaria and anemia, intermittent preventive treatment in pregnancy (IPTp) with three or more doses of sulfadoxine-pyrimethamine (SP), and use of LLINs. Current objectives related to MIP include:



- At least 80% of pregnant women attending antenatal consultation receive three or more doses of SP for IPTp according to the national MIP protocol;
- 100% of health facilities have SP available, with no stockout lasting more than one week;
- At least 80% of pregnant women attending antenatal consultation receive a LLIN;
- At least 85% of women of child-bearing age sleep under LLINs; and
- At least 80% of pregnant women have access to prompt and effective treatment of MIP according to the national MIP protocol.

PMI and the Global Fund remain the biggest donors supporting the NMCP to meet its objectives. With the support of PMI and based on WHO's guidance, the NMCP has changed the policy for treatment of MIP from oral quinine as the first-line treatment for uncomplicated malaria throughout all trimesters to oral quinine in the first trimester and use of ACTs in the second and third trimester. For severe disease, the 2015 revised case management guidelines recommend intramuscular/intravenous artesunate or intramuscular artemether as first-line treatments, including pregnant women in all trimesters. However, due to the EVD epidemic and delays in availability of Global Funds' funding, the actual implementation of this policy at the health facility level is still being rolled out. In May 2016, a comprehensive review was conducted to align the updated MIP and treatment guidelines and training material. At the end of the consultation, a validation workshop was held with instructors from training institutions and county heads of ANC services.

Iron/folic acid is distributed to pregnant women during ANC visits. The current formulation contains 200 mg dried ferrous sulfate to 65 mg ferrous iron and 0.25 mg folic acid or 0.4 mg folic acid. This presentation complies with the WHO recommendation for daily administration.

#### Progress since PMI was launched

Since the introduction of IPTp in Liberia in 2005, there has been increasing coverage parallel to gradual increases in access to health care. While uptake of IPTp2 has increased nationally from 4.5% in 2005 to 48% in 2013, availability of SP at health facilities remains a challenge – an issue believed to be associated with supply chain problems.

Results from the 2013 DHS indicate that 96% of women who gave birth in the five years preceding the survey received care from a skilled provider at least once for their last birth. According to the 2013 DHS, 78% of women had at least four ANC visits. This number dropped to 31.3% during the EVD epidemic in 2014, but has now increased to 52.2% according to 2015 HMIS data. The MOH, through the NMCP, the Family Health Division, the Community Health Division, and the Health Promotion Unit, continue to make efforts to improve the quality of ANC service delivery throughout the country at health facilities and ANC attendance through outreach efforts; a MIP working group has been formed and assists with these efforts. Community outreach efforts by certified midwives have delivered ANC services, including immunizations and SP as recommended by Liberia's MIP guidelines, to pregnant women residing more than five kilometers from health facilities as a means of extending key aspects of ANC services outside of facility based ANC clinics.

PMI supported the development of training manuals and protocols used in the training of gCHVs, as well as the training of trained traditional midwives (TTMs). PMI supported the revision of core competencies in the new national curricula of pre-service training institutions by updating the malaria section of the Tropical and Communicable Disease Course. The malaria component of The Handbook for Health Workers in Liberia was also revised. In addition, PMI has supported information, education, communication (IEC)/SBCC at the community level through reproduction of comprehensive community health education materials that promote ANC attendance and the importance of prevention of malaria

during pregnancy, as well as nationwide radio campaigns and printing of posters on MIP. PMI supported the NMCP to develop four creative briefs on LLINs, IPTp, diagnosis, and treatment, validated through the Messages and Materials Development Working Group. These briefs were based on Liberia's existing SBCC Strategy plus the latest research on determinants of behavior.

*Progress during the last 12-18 months*

During the past two years, PMI assisted the NMCP in finalizing and printing updated MIP protocols and treatment guidelines based on WHO 2012 guidance. The revised content focused on encouraging pregnant women to seek IPTp (and receive three or more doses of SP throughout pregnancy) and on recognizing danger signs that warrant referring pregnant women to a higher level of care. These new guidelines were harmonized across all MIP and case management related documents, including the national pre-service curriculum, in-service community training materials, SBCC module materials, and SM&E tools, and were revised for nationwide use.

Despite challenges faced in the scaling up and implementation of IPTp, particularly during the EVD epidemic from 2014 to 2015, some significant achievements have been accomplished over the past 18 months. Last year, updated training manuals and protocols were reviewed by instructors from midwife training institutions and heads of ANC in different counties. In addition, a column was created in the ANC ward register and the HMIS reporting form to capture three plus SP doses, and the post-partum ledgers were updated to capture nets given out during institutional deliveries. With PMI's support, the new registers were printed and distributed to all clinics providing ANC services. New ANC cards have been updated with sections on IPTp3 plus and are awaiting approval from the Family Health Division of the MOH. Moreover, 900 trained traditional midwives of the 927 certified midwives and traditional midwives in the country were educated on encouraging women to demand IPTp and referring them to health facilities for delivery, while 15 reproductive health supervisors (one per county) were trained on MIP. The reproductive health supervisors are the focal people from each county based at the facility level to whom gCHVs/CHAs report. After printing and distribution of ANC cards and registers, counties will be expected to train all ANC service providers. In 2016, PMI also supported the NMCP to conduct supervision (integrated with case management and MCH supervision) and orientation of health workers providing ANC services in all 15 counties.

**Table 8. Status of IPTp policy in Liberia**

Status of training on updated IPTp policy		Number and proportion of HCW trained on new policy in the last year if training on new policy is not yet completed	Are the revised guidelines available at the facility level?	ANC register updated to capture 3 doses of IPTp-SP	HMIS/DHIS updated to capture 3 doses of IPTp-SP
Completed/Not Completed	Date (If completed, when, if not completed, when expected)				
Not completed	2017	15 (100%) reproductive health supervisors and 900 (97%) TTMs oriented	Yes in some facilities	Yes	Yes

*Commodity gap analysis*

**Table 9. SP Gap Analysis for Malaria in Pregnancy**

<b>Calendar Year</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Total Population	4,206,701	4,295,042	4,385,238
Total number of pregnant women targeted	210,335	214,752	219,262
<b>SP Needs</b>			
Total number of pregnant women attending ANC <sup>1</sup>	199,818	214,752	219,262
<b>Total SP Need (in treatments)<sup>2</sup></b>	<b>599,455</b>	<b>644,256</b>	<b>624,896</b>
<b>Partner Contributions</b>			
SP carried over from previous year	0	222,545	0
SP from Global Fund	0	0	0
SP from UNICEF	411,000	0	0
SP planned with PMI funding	411,000	172,704	329,000
<b>Total SP Available</b>	<b>822,000</b>	<b>395,249</b>	<b>329,000</b>
<b>Total SP Surplus (Gap)</b>	<b>222,545</b>	<b>(249,007)</b>	<b>(328,786)</b>

<sup>1</sup>5% of national population pregnant in a given year; 95%, 100%, 100% ANC coverage.

<sup>2</sup>Assume each woman received 3 doses

*Plans and justification*

PMI will continue to provide technical assistance to support the NMCP in the implementation, scale-up, and monitoring of activities to prevent MIP, including implementation of the new IPTp guidelines.

Planned activities with FY 2018 funding include:

- Scaling-up implementation of the revised MIP guidelines;
- Providing support for training to fill out the new HMIS forms and revised registers to enter data on the three plus doses of SP;
- Procuring and distributing LLINs nationwide to all pregnant women during ANC visits and at institutional delivery and ensuring that LLINs given out are captured in the postpartum ward register;
- Ensuring that pregnant women with malaria symptoms are tested and treated as directed by the national standard treatment guidelines;

- Strengthening the supply chain and management system to ensure availability of LLINs, SP, and antimalarial drugs in all targeted health facilities; and
- Strengthening SBCC for MIP, including SBCC aimed at health care workers on the importance of having medication on site and avoiding stockouts, SBCC at the community level regarding use of SP for the prevention of malaria in pregnant women, continuous use of LLINs during pregnancy, and prompt care-seeking behavior for malaria in pregnancy, as well as SBCC to discourage off-label use of SP by health care workers and the public.

Proposed activities with FY 2018 funding: (\$839,480)

- **Procure SP treatments.** PMI will procure approximately 329,000 SP treatments. (\$39,480)
- **In-service training and supervision for health care workers at ANC facilities.** As in previous years, funding will be channeled to the MOH through a FARA with the GOL for performance-based contracts with NGOs in the counties of Bong, Nimba, and Lofa. Activities will include in-service training and supervision of health providers in targeted health facilities, as well as community outreach. In addition, support will be provided for the MOH and CHTs to supervise health facilities in focus counties every quarter. Funding from the Global Fund, the GOL, and other donors will support implementation of similar activities in the remaining, non-PMI supported counties. (\$300,000)
- **Improve quality of care and adherence to standards for MIP in the non-USAID focus counties.** This activity is focused on strengthening the capacity of CHTs to deliver quality MIP services through effective training and supportive supervision at the county and facility level and, in addition, provide support for health worker interpersonal communication. (\$500,000)

### 3. Case management

#### a. Diagnosis and treatment

NMCP/PMI objectives

The Liberia National Strategic Plan 2016–2020 adheres to the WHO recommendation for parasitological confirmation of all suspected malaria cases and prompt effective treatment of positive uncomplicated cases with an ACT. To achieve the malaria diagnostic testing and treatment objectives of the Strategic Plan, the NMCP supports improved availability and quality of malaria diagnostics in all public and private health facilities regardless of operational level, in private medicine stores and pharmacies, and in the community through integrated community case management (iCCM). In addition, in collaboration with the National Public Health Reference Laboratory/National Diagnostics Unit (NPHRL/NDU) and the county diagnostics supervisors, the NMCP plans to continue improving the quality of malaria diagnostic testing through on-site training and supportive supervision in all 15 counties. PMI supports the NMCP to focus on RDT use at the primary level (health posts and community) as well as some health centers and quality microscopy at hospitals and health centers with adequate capacity. According to the 2016 Strategic Plan, the NMCP plans to increase access to prompt and effective malaria treatment to reach 90% of children under five years of age living in hard-to-reach communities, defined as >5 km from a fixed health facility. Specific recommendations in the Liberia Technical Guidelines for Malaria Case Management are listed in Table 9.

**Table 10. Status of Case Management Policy in Liberia**

<b>Status of Case Management Policy in Liberia according to the Liberia Technical Guidelines for Malaria Case Management (2016)</b>	
What is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria?	artesunate + amodiaquine
What is the second-line treatment for uncomplicated <i>P. falciparum</i> malaria?	artemether + lumefantrine
What is the first-line treatment for severe malaria?	artesunate (IV/IM)
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the first trimester?	oral quinine
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the second and third trimesters?	artesunate + amodiaquine or artesunate + lumefantrine
In pregnancy, what is the first-line treatment for severe malaria?	artesunate (IV/IM)
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	rectal artesunate for children < six years IM artemether or artesunate for adults or children ≥ six (and children < six where rectal artesunate is not available)
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	rectal artesunate for children < six years
If pre-referral rectal artesunate is recommended, for what age group? (note: current international guidelines do not recommend administering to those ≥ six years)	children < six years

*Progress since PMI was launched*

PMI funded nationwide implementation of an outreach training and supportive supervision program for facility-based malaria diagnosis and treatment from 2010–2012. PMI purchased and funded the distribution of microscopes (including two multi-head training microscopes), parts, bulbs, fuses, glass slides, and Giemsa stain to facilities that had microscopy capacity as well as a dedicated set of 25 microscopes for training at the NPHRL. In addition to supportive supervision, PMI funded microscopy training for county diagnostic officers (CDOs) and microscopists from the NPHRL in 2014 and 2016. Progress in rolling out malaria diagnostics supervision and quality assurance has been slow due to the inability of the NMCP and implementing partners to recruit laboratory focal persons to coordinate activities as well as inconsistent support at the county level for CDOs to conduct supervision.

A set of validated microscopy slides has been procured with PMI support that will be used for training and proficiency testing of malaria microscopists at the national and county levels in order to maintain competency. Although plans are being made to utilize the slide set, progress has been slow due to absence of a coordinating body or person to finalize the plans and implement activities. Space for a parasitology laboratory has been identified at the NPHRL to be used for training and other activities to support malaria microscopy, including being the repository for the slide set. PMI, along with Global

Fund, continues to support the NMCP and MoH in procuring laboratory supplies and reagents for malaria diagnosis.

Since 2007, PMI has procured over 18 million ACT treatments and 10 million RDTs in Liberia. Malaria diagnostics and antimalarials are provided to all public facilities and private facilities that provide diagnostic and treatment services through a memorandum of understanding with the MOH that requires private facilities to report via the HMIS. In addition, beginning in 2013 with support from Comic Relief, and later the USAID Office of Foreign Disaster Assistance, partners worked with the NMCP to train and supply subsidized RDTs and ACTs through registered private retail pharmacies and medicines shops in Montserrado County (where a majority of these outlets operate). The planned expansion of these services to other communities in Montserrado following a successful pilot in 200 facilities in Bushrod Island and Paynesville communities was interrupted by the EVD epidemic, and to date no further expansion has taken place and will be reassessed when the results of the 2016 MIS are available.

According to a 2016 Service Availability and Readiness Assessment, 701 health facilities exist in the country—36 hospitals, 48 health centers, and 615 clinics—with roughly 62% public and 38% private (although data on the percentage of patients with fever seeking care in the private sector is lacking). Approximately 200 medical doctors, 500 physician assistants, and 3100 nurses work in the country. In 2016, UNICEF conducted a country-wide mapping of gCHVs and determined that approximately 4,000 gCHVs were responsible for providing malaria case management and performing house-to-house education on a range of malaria topics, including the proper use of LLINs and management of fever in children less than five years of age.

#### *Progress during the last 12-18 months*

Over the past 12 months, PMI has procured approximately 2.6 million ACT treatment courses, 2.3 million RDTs, 20,100 vials of intravenous quinine, and 259,255 vials of injectable artesunate. With PMI's support, the Malaria Case Management Technical Guidelines were updated in 2016. Training sessions incorporating the new guidelines reached a total of 350 facility-based healthcare workers in January 2017 and are planned to continue throughout the year. In addition, onsite training and supportive supervision was conducted in 151 health facilities spanning 6 counties, reaching a total of 453 healthcare workers in January 2017. The updated guidelines and training sessions address rectal artesunate use in both peripheral health facilities and in the community, although this modality has not yet been used in the country. With PMI support, the NMCP began creation of a malaria laboratory manual to guide health workers in confirmatory testing of malaria. Feedback on a draft document was provided to the NMCP in Q3 of 2016. However, additional input is needed to finalize the document.

Following the 2014 EVD epidemic, and in recognition of the need for community health workers to improve access to health services, the MOH and partners reconsidered the role of volunteers across the health sector and elaborated a plan to transition iCCM activities from gCHVs to remunerated community health workers over the period 2015–2017. As a result, the concept of paid community health workers, or community health assistants (CHAs), was introduced into the health workforce. CHAs possess certain prerequisite qualifications, as opposed to gCHVs who are volunteers trained to perform certain functions. Together, CHAs and gCHVs are expected to form the backbone of the iCCM program and will be supervised by community health services supervisors (CHSSs). The duties of CHAs include treating diarrhea and respiratory infections and conducting malaria testing and treatment of patients. In contrast, gCHVs will primarily perform community services and SBCC activities to increase uptake of prevention services for malaria and other childhood diseases. Another distinction is that CHAs traditionally work in underserved areas more than five kilometers from a health facility while gCHVs

will work within five kilometers of a health facility. CHAs are being recruited from the current cohort of gCHVs who meet eligibility criteria. In addition to the supervisory aspect of their visits, CHSSs will also transport commodities to CHAs and collate malaria case counts which will be entered into the community-based information system (CBIS) (see SM&E section) that will eventually feed into the HMIS. The change from a volunteer workforce to paid CHAs is expected to improve health worker retention while consolidating the investments made in building up adequate numbers of community health workers.

In July 2016, the CHA program was launched with training (e.g., RDT use and interpretation) supported by PMI and non-PMI partners in all 15 counties. A revised Community Health Policy and Strategy document was created and distributed at the district and county level throughout the country. CHA and CHSS training curricula were created, permitting 107 master trainers to initiate training of 306 CHSSs and 1277 CHAs in 13 of the 15 counties. An additional 1290 gCHVs have been trained over the course of 2016, with some of this pool expected to receive additional CHA training in 2017. PMI supports CHA costs such as training, transportation, and materials, but does not support CHA salaries. PMI has also supported pre-service training for laboratory technicians. As of March 2017, 8 students have graduated and 42 remain at various stages of training.

Only one therapeutic efficacy study (TES) was conducted in Liberia over the last decade, in 2010-2011. A study report summarized that artesunate-amodiaquine fixed dose combination therapy was "highly efficacious for treatment of uncomplicated malaria for children under five in Grand Gedeh County." WHO and NMCP have produced a TES protocol with the aim of implementing a two-site study in the latter half of 2017. It is not yet determined whether testing for k13 and other molecular markers of antimalarial resistance will be offered by WHO.

**Table 11. Therapeutic Efficacy Studies**

<b>Completed TESs</b>		
<b>Year</b>	<b>Site name</b>	<b>Treatment arm(s)</b>
2010-2011	Grand Gedeh	ASAQ 100% PCR-corrected ACPR <sup>†</sup>
<b>Planned TESs FY 2018</b>		
<b>Year</b>	<b>Site name</b>	<b>Treatment arm(s)</b>
2017	TBD	TBD

ACPR: Adequate clinical and parasitological response; TBD: To be determined

†: The MENTOR Initiative and USAID Expanding and Sustaining Malaria Control in Liberia, Annual Report of Year 3, October 2010-2011

*Commodity gap analysis*

**Table 12: RDT Gap Analysis**

Calendar Year	2017	2018	2019
<b>RDT Needs</b>			
Total country population	4,206,701	4,295,041	4,385,237
Population at risk for malaria <sup>1</sup>	4,206,701	4,295,041	4,385,237
PMI-targeted at risk population	4,206,701	4,295,041	4,385,237
Total number of projected fever cases <sup>2</sup>	3,624,137	3,289,106	2,938,405
Percent of fever cases confirmed with RDT	85%	85%	80%
<b>Total RDT Needs</b>	<b>3,080,517</b>	<b>2,795,740</b>	<b>2,350,724</b>
<b>Partner Contributions</b>			
RDTs carried over from previous year	0	0	0
RDTs from Global Fund	0	0	0 <sup>4</sup>
RDTs planned with PMI funding	2,400,000	2,400,000	1,175,362
<b>Total RDTs Available</b>	<b>2,400,000</b>	<b>2,400,000</b>	<b>1,175,362</b>
<b>Total RDT Surplus (Gap)</b>	<b>(680,517)</b>	<b>(395,740)</b>	<b>(1,175,362)</b>

<sup>1</sup>Total population at risk for malaria, 2008 population census, 2.1% population growth rate, 100% at risk

<sup>2</sup>The number of malaria cases was determined from the HMIS data in 2012-which was the last year with a full year's worth of data under "normal" circumstances. In 2013 there was a moratorium on commodity distribution and in 2014 and 2015 there was Ebola. Malaria cases reported in HMIS are adjusted for growth rate (2.1%), reporting rate (80%) and access to a reporting facility (71%). The quantification factors in increasing diagnosis (assuming 40% test negative) and vector control coverage (20%, 25%, 25%, reduction in cases). (NMCP Quantification & costing of malaria Global Fund SAP commodities 2017).

<sup>3</sup>85%, 85%, 80% RDT use (NMCP Quantification & costing of malaria Global Fund SAP commodities 2017).

<sup>4</sup>Although Global Fund has not yet submitted their planned RDT procurements for 2019, PMI intends on each organization contributing half of the need



**Table 13: ACT Gap Analysis**

Calendar Year	2017	2018	2019
<b>ACT Needs</b>			
Total country population	4,206,701	4,295,041	4,385,237
Population at risk for malaria <sup>1</sup>	4,206,701	4,295,041	4,385,237
PMI-targeted at risk population	4,206,701	4,295,041	4,385,237
Total projected number of malaria cases <sup>2</sup>	2,876,299	2,936,702	2,998,372
<b>Total ACT Needs<sup>3</sup></b>	<b>2,296,437</b>	<b>2,176,140</b>	<b>2,244,282</b>
<b>Partner Contributions</b>			
ACTs carried over from previous year	0	0	0
ACTs from Global Fund	200,160	0	0 <sup>4</sup>
ACTs planned with PMI funding	2,006,159	1,872,000	1,123,000
<b>Total ACTs Available</b>	<b>2,206,319</b>	<b>1,872,000</b>	<b>1,123,000</b>
<b>Total ACT Surplus (Gap)</b>	<b>(90,118)</b>	<b>(304,140)</b>	<b>(1,121,282)</b>

<sup>1</sup>Total population at risk for malaria, 2008 population census, 2.1% population growth rate, 100% at risk

<sup>2</sup>The number of malaria cases was determined from the HMIS data in 2012-which was the last year with a full year's worth of data under "normal" circumstances. In 2013 there was a moratorium on commodity distribution and in 2014 and 2015 there was Ebola. Malaria cases reported in HMIS are adjusted for growth rate (2.1%), reporting rate (80%) and access to a reporting facility (71%) (NMCP Quantification & costing of malaria Global Fund SAP commodities 2017).

<sup>3</sup>The quantification factors in increasing diagnosis (assuming 40% test negative) and vector control coverage (20%, 25%, 25%, reduction in cases). (NMCP Quantification & costing of malaria Global Fund SAP commodities 2017).

<sup>4</sup>Although Global Fund has not yet submitted their planned ACT procurements for 2019, PMI intends on each organization contributing half of the need

### Plans and justification

With FY 2018 funding, PMI will provide support for laboratories in Liberia, especially the NPHRL. In collaboration with the Global Fund, PMI will work to strengthen the diagnostic capacity of the MOH at the central and county levels through continued capacity strengthening for training and supervision for continuous quality improvements in malaria diagnostic testing. For malaria diagnostics, the program plans to provide continuous training to improve the competency of at least 1 county diagnostics supervisor for each of the 15 counties (2 supervisors for counties such as Montserrado with a large number of facilities). These supervisors will be supported to develop operational plans for conducting on-site supervision activities for malaria, including external quality assurance, in their respective counties aimed at quality improvements in diagnostics. In addition to supporting health worker training, PMI will procure laboratory supplies and reagents for malaria diagnostics in facilities. PMI supports an ongoing survey to assess staffing and equipment levels to inform the program on gaps to be addressed.

Through coordinated efforts with the MOH, NMCP, Global Fund and other partners, PMI will continue to support capacity development of facility-based health workers to appropriately diagnose and treat

malaria cases in the three USAID focus counties and will expand to the remaining 12 counties. PMI will also support malaria case management capacity development at the community level through Liberia's iCCM program. As the MOH transitions some gCHVs to CHAs, PMI will work with other partners such as UNICEF and Last Mile Health to support the expansion of iCCM to all target populations and to develop the capacity of CHAs to appropriately manage malaria cases.

In past years, PMI has supported pre-service training of laboratory technicians to help improve the quality of instruction and the shortage in Liberia of qualified laboratory staff. PMI will continue to support this activity aimed at improving teaching instructions and learning environments in pre-service training institutions through improvements in instruction at technical institutions and support ten individuals/year to attend pre-service laboratory technician training for the three-year training duration. These program activities are expected to help fill the need for qualified health workers in Liberia. Through its direct funding to the Liberia MOH, PMI in collaboration with the USAID-Liberia mission will continue to support capacity building for quality malaria case management at the facility and community levels. PMI will also support the central level with one case management expert embedded within the NMCP.

PMI will plan to procure half of the national need of RDTs and ACTs, with the other half being filled by Global Fund or other donors. PMI will also procure medications for treatment of severe malaria. To remain consistent with recent Liberian Case Management Technical Guidelines, NMCP preference and ongoing Global Fund health worker training, PMI will no longer procure IV quinine and will exclusively procure injectable artesunate. The quantities of injectable artesunate needed will be based on the number of severe malaria cases estimated to be 3% of total malaria cases in the country. The NMCP has trained 350 frontline health workers in six counties on the correct use of injectable artesunate, an additional 850 health workers from the remaining nine counties will be trained by the end of 2017. Although pre-referral rectal artesunate has not been used in the country yet, it is now part of healthcare worker and CHA training modules. To support this new modality in all 15 counties receiving iCCM assistance, 10,000 rectal artesunate pre-referral treatments will be provided to CHAs and health clinics unable to adequately manage severe malaria. This is based on the NMCP's treatment guidelines recommending management of 5% of the severe malaria cases at the lower-level health facilities and in the community (in all 15 iCCM-supported counties) with this modality. Depending on uptake and other sources of data such as the revised LMIS, this amount could be altered in future years. Because WHO is already supporting two TES sites, PMI will not fund additional TESs in Liberia but will work with WHO to further evaluate any concerning findings and to adjust ACT selection if necessary.

*Proposed activities with FY 2018 funding: (\$5,483,974)*

- **Procurement of RDTs.** PMI will procure approximately 1.175 million RDTs for the public sector, community case management providers, and private sector facilities. This quantity is half the estimated need with the remainder of the gap expected to be filled by Global Fund procurements. (\$646,449)
- **Procure laboratory supplies.** PMI will procure quality laboratory supplies, including Giemsa stain, slides, bulbs, and replacement parts for microscopes in health facilities across the country and for the NPHRL. In addition, when needed, PMI will procure items such as gloves, sharps containers, and other supplies to support safe testing practices in the community, especially by CHAs. (\$200,000)

- **Procure ACTs.** PMI will procure approximately 1.123 million ASAQ treatments for the public sector, community case management providers, and private sector facilities. Similar to RDTs, this quantity is half the estimated need with the remainder of the gap expected to be filled by Global Fund procurements. (\$932,525)
- **Procure severe malaria medications.** PMI will procure approximately 175,000 vials of injectable artesunate and 10,000 rectal artesunate suppositories to treat severe malaria cases. (\$450,000)
- **Support for strengthening malaria case management.** As part of a comprehensive approach to malaria case management practices that emphasize testing of all suspected cases and treatment of only positive cases with an ACT, the MOH will continue to support CHTs and health facilities in updating case management practices based on best practices, and will monitor adherence to policy guidelines.
  - Capacity development and support to the NMCP and MOH through a FARA to provide supportive supervision at the county, district, and facility level in malaria diagnosis and in prompt and appropriate treatment of malaria. The focus of this activity will be in Bong, Lofa, and Nimba Counties and will emphasize clinicians' adherence to test results, use of case management algorithms, reporting of malaria data to the HMIS, and triangulation of data for decision-making. (\$400,000)
  - Strengthen CHT capacity for training and supportive supervision at the county, district, and facility level for improving malaria case management; will also cover technical assistance to the MOH to plan and implement malaria diagnostic activities nationwide in collaboration with the NPHRL, NDU, CDOs, and NMCP in order to increase the provision and maintenance of quality diagnostic services. (\$1,100,000)
  - Technical assistance embedded with NMCP to strengthen malaria technical capacity in case management with a focus on laboratory capacity building. (\$200,000)
- **Capacity development of community-based health workers in prompt diagnosis and appropriate treatment of malaria and technical assistance for iCCM scale-up.**
  - Support CHT oversight and supportive supervision of iCCM in Bong, Lofa, Nimba, Grand Bassa, and Margibi Counties, as well as rural Montserrado County. (\$600,000)
  - Support the MOH/NMCP for iCCM training, coordination and oversight at the central level and to support CHT oversight and supportive supervision of iCCM in the nine counties and areas not covered in the line above. (\$900,000)
- **Human resource capacity building for malaria diagnosis**
  - Support the laboratory/diagnostic training costs for at least ten pre-service training students in each class of a 3-year program culminating in laboratory technician certification. (\$45,000)

- **Technical assistance for malaria diagnostics.** CDC will provide technical assistance to the NMCP and the NPHRL/NDU for monitoring and improvement of the quality assurance activities for malaria diagnostics at all levels of the health care system, including testing by private facilities, pharmacies, medicine stores, and iCCM. (\$10,000)

## **b. Pharmaceutical management**

### NMCP/PMI objectives

The NMCP's objective in the 2016–2020 NMSP is to strengthen the supply chain system for effective quantification and prompt distribution of commodities under a universal system by 2020. The MOH has strengthened its collaboration with PMI and other partners to implement and maintain an effective and functional supply chain system for the distribution of health commodities. A transition plan built on the consolidation of storage for health commodities and the distribution of these commodities through an integrated manner was developed and initiated in 2017. The outcome of the transition plan will continue to support the storage and distribution of malaria commodities in a more routine, transparent, and responsive model that continues to ensure malaria commodities are available to care-seekers at facility and community levels.

### Progress since PMI was launched

An interim approach, a modified “top-up” distribution system was initiated by the MOH with assistance from PMI in 2013 to remedy a surge in the unavailability of health commodities due to diversion, which had resulted in a moratorium on distribution of malaria commodities donated by PMI and the Global Fund. Following the pilot of the interim “top-up” delivery system to supply health commodities throughout Liberia in 2013, the MOH, supported by PMI and the Global Fund, adopted this distribution model for the supply and delivery of health commodities through subsequent years. The Supply Chain Master Plan (SCMP), developed in 2010, was revised in 2015 with technical assistance from PMI. The revised SCMP (2015–2020) maintains a uniform integrated supply and distribution system for malaria and other health commodities and pharmaceutical logistics at all levels through a network of regional storage hubs and county depots supported by an effective and efficient central medical store (CMS). Following the dissolution of the national drug service (NDS) in late 2015, the MoH endorsed a new strategic plan that laid out the roadmap for the implementation of the revised SCMP in 2016. The CMS has been developed and tasked with the responsibility of executing this plan. The key objectives of the strategic plan were the consolidation of storage for health commodities from dispersed locations to a central location and to align parallel commodity distribution systems with a uniformed integrated model. PMI supported the strategic plan of the MoH and with technical assistance from PMI's implementing partner, the A-Z warehouse situated in the Freeport of Monrovia was contracted, renovated, and organized to serve as the central storage for all health commodities pending the completion of the new central warehouse being constructed. Technical assistance funded by PMI also supported the movement of all health commodities of the MoH to the A-Z central warehouse in 2017. Additionally, PMI aided the MoH in designing a commodity distribution system that reformed the distribution of malaria commodities and other health products from a parallel model to a uniformed and integrated system. Although continued challenges affect the collection, analysis, and interpretation of data through the logistics management information system (LMIS), PMI provided technical assistance to support the MOH to revise and improve the LMIS to ensure greater availability and utilization of supply and logistics data. Significant progress has been made toward scaling up access to antimalarial drugs and other commodities nationally through the national Community Health Program and its cadre of CHAs.

The Liberia Medicines and Health Products Regulatory Authority (LMHRA), established with support from PMI in 2010, continues to address the problem of drug quality. This effort has helped the LMHRA reduce the number of major importers of malaria and other health commodities through regulatory actions. In addition, medicines imported into Liberia that do not meet the full registration requirements established by the LMHRA for the importation of medicines are confiscated and destroyed. The Inspectorate of the LHMRA, working alongside law enforcement agencies, has also been supportive in removing diverted donor-procured drugs, monotherapies for malaria and, substandard and counterfeit health products found in commercial medicine stores and pharmacies. Donor-procured commodities are returned to the CMS for redistribution to public health facilities across Liberia while monotherapies for malaria along with substandard and counterfeited products are destroyed by the LMHRA through incineration.

#### *Progress during the last 12-18 months*

The transition plan which laid out the roadmap for the revised SCMP was implemented by the MoH. A new pharmaceutical management structure called the CMS was developed and endorsed by PMI and other health donors. A technical oversight committee headed by the MoH and comprising representatives from USAID, the Global Fund, the Pool Fund, and the United Nations system provides oversight for the CMS. Through the technical oversight committee, collaboration among donors in support of the MoH reform efforts for supply chain management has increased and leveraged funding for pharmaceutical management. A consolidated storage site for all health commodities is being implemented by the MoH. The A-Z warehouse stores all health commodities, and PMI continues to provide technical assistance for the maintenance and management of this facility. All 11 dispersed storage sites of the MoH were closed and the commodities stored at these sites moved to the central storage facility in Freeport by mid-2017. USAID-funded warehouses have also been closed and the commodities relocated to central storage. This action has significantly improve the security and visibility of malaria and other health commodities through well-managed and routine inventorying and monitoring that has reduced commodity loss due to expiration and diversion. USAID continues to support the CMS to reform its commodity distribution system from multiple parallel channels to a uniformed integrated model. As described in the revised SCMP, one entity (CMS) is to be responsible for storage and distribution of commodities from central level to facility level. The remodeled distribution system did not eliminate the prevailing system for commodity distribution, but has increased efficiency and eliminated redundancy.

Maintaining the supply chain system remains a challenge to the realization of the Rebuilding a Resilient Health System Initiative undertaken by the MOH to ensure a responsive healthcare delivery system meets the demands of future and emerging health threats. Over the last 12 months, sustained resources for effective and efficient warehousing and distribution of health commodities and ensuring local capacity development for supervision and management of pharmaceuticals in Liberia have become prioritized. Equally critical to pharmaceutical management is the development of dedicated county-level supply chain management capacity within CHTs to effectively coordinate the planning, supply, and distribution of health commodities between NGOs operating in the counties and the CMS, and to monitor stock levels to ensure full availability of commodities nationwide. Challenges with commodity distribution to the facility-level largely contributed to the commodity stock-out in health facilities. With technical assistance from USAID-funded Project Last Mile (PLM), PLM supported the development of a network optimization for commodity distribution that highlighted the content and volume of commodities packaging transported from county depots to health facilities to improve commodity store management at health facilities. PLM also trained a cadre of available facility-based caregivers as product ordering technicians to improve requisitioning of commodities from the county depots to the

health facilities. Following the training of this cadre of facility-based caregivers, PLM initiated a pilot of the redesigned network distribution system with selected county depots linked to the central warehouse. The ongoing pilot of the redesigned network optimization for the distribution of health commodities from the county depots to health facilities includes distributing standardized commodity packages to health facilities; optimizing the frequency of distribution considering the requirements for cold chain distribution and warehousing; and, using geo-mapping and spatial routing tools to determine dynamic routing for commodity resupply to health facilities through a resourced mode dictated by changes in seasonal demands of commodities and local disease burden. Additionally, PLM also supported the development and recognition of organizational core values to health workers at the national and sub-national levels to increase self-esteem among health workers as a catalyst for improved individual and institutional performance highlighting the required HR competencies and training requirements that ensures efficient pharmaceutical management at county level.

The Ebola outbreak significantly reduced activities of the Liberia Medicines and Health Products Regulatory Authority (LMHRA). However, in 2016 following the cessation of the Ebola outbreak, the LMHRA with PMI support conducted a review of its laboratory standard operating procedures (SOPs) to ensure laboratory practices were aligned with infection prevention and control (IPC) measures that had become institutionalized by the MoH; and, conducted training on quality management system and analytical testing. In furtherance of system strengthening activities, the quality control manager of the National Quality Control Laboratory (NQCL) received a trainer-of-trainers training package on Good Laboratory Practices (GLP) which further strengthened the revised SOPs of the LMHRA, Good Documentation Practices (GDP) which enhanced the capacity of the registry of the LMHRA and, calibration of dissolution tests and HPLC. Through subsequent cascade training by the quality control manager, the capacity of the LMHRA to conduct drug quality testing through laboratory practices was further improved. Additionally, the LMHRA conducted the fifth round of its monitoring the quality of medicines (MQM) activity in March 2016. From five counties (i.e., Montserrado, Margibi, Bong, Bomi and Nimba), a total of 370 samples were collected with 62% of the total samples collected being anti-malaria drugs. Other samples collected during this exercise included anti-microbial, TB and antiretroviral which accounted for 38% of the total samples. Fifty-one percent of the collected samples were taken from the public sector. A significant finding from the MQM exercise revealed that more than half (58%) of the collected samples were unregistered in Liberia and included anti-malaria medicines. The LMHRA noted that almost all public sector medicines procured or donated by partners or donors are not processed through the official registry of the LMHRA. Hence, the LMHRA has little or no relevant information regarding the manufacture and quality of these medicines.

#### Plans and justification

PMI will continue its support for the implementation of the revised SCMP along with the revised supply planning and distribution model for health commodities, in collaboration with the CMS, PLM and other donors. PMI will continue its collaboration with PLM to provide technical assistance to CHTs to initiate and institutionalize demand-driven resupply of commodities based on local commodity forecasts, accurate data collection through the LMIS as the basis for systematic commodity ordering and processing. PLM is expected to strengthen the use of the LMIS at the county level and its analysis and reporting at the central level. Although PLM will not be involved in the physical movement of commodities from county depots to health facilities, it will provide the critical link between PSM and the CHTs to strengthen delivery channels for commodity from county depots to health facilities; determine content and volumes for commodity delivery and, improve the reporting and documentation of sub-national commodity transactions. PMI's continued support to the supply chain system will remain critical in assisting the MOH to maintain the institutionalized system for facility-level

distribution. The establishment of county-level supply chain management capacity within the CHTs to coordinate supply planning and distribution of health commodities at the county-level will also remain crucial to ensure health commodities are accounted for, available, and secure from the central level to the health facilities. This will continue to be evaluated through routine monitoring and reporting coordinated through a physical control room to visualize ongoing performances relative to targets. PMI will also continue its support for system-wide efforts to maintain the reformed commodity distribution system following the transition plan, and the revised LMIS aimed at providing more reliable routine reporting data.

PMI will expand its activities and interventions to prevent and control malaria beyond the USAID-focus counties (Bong, Nimba and Lofa). This expansion will increase the geographical coverage of PMI activities from 5 to 12 counties; further increasing implementation, monitoring and performance of PMI activities in these 12 counties. With this expansion, the MQM activity of the LMHRA will subsequently increase to ensure that the quality of anti-malaria drugs which is critical to the management of malaria cases at both the facility and community levels are quality-assured and rationally administered. The expansion of MQM activities with support from PMI will require the acquisition of additional minilabs including reagents for drug quality testing in the expanded counties; additional training and capacity development in these counties for new staff of the LMHRA to perform the technical functions; increased program services occasioned by the corresponding expansion of PMI activities in the expanded counties; and, increasing field monitoring and supervision that encourages compliance of pharmaceutical outlets in the expanded counties with prevailing regulatory requirements particularly those associated with the acquisition and storage of antimalarials used for malaria case management. Moreover, this expansion will complement the efforts of the LMHRA to ensure the dispensing of medicines, particularly antimalarials, is conducted within a medicine regulated environment involving both public and private service delivery points (SDPs).

*Proposed activities with FY 2018 funding: (\$1,600,000)*

- **Support warehousing and distribution of malaria commodities at CMS.** PMI will provide support for warehousing malaria commodities at CMS and nationwide distribution of malaria commodities to health facilities. (\$200,000)
- **Strengthen supply chain management (central level).** PMI will continue support to the newly completed CMS warehouse operations, ongoing mentoring to CMS management, supervision, national forecasting and quantification in line with the revised SCMP. PMI will continue to support implementation of the new LMIS. (\$300,000)
- **Strengthen supply chain management (county/district).** PMI will maintain expanded support to regional or county depots and CHTs to rationalize commodity management, storage, supervision, and reporting in line with revised SCMP. (\$700,000)
- **Monitor antimalarial drug quality and support regulation and rational use of pharmaceuticals.** PMI will help to strengthen LMHRA, Pharmacy Board, and the MOH systems for pharmaceutical regulations, including medicine registration and antimalarial quality testing and sampling. (\$400,000)

#### **4. Health system strengthening and capacity building**

PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as strengthening in-service training of health workers, supply chain management, health information systems, regulation of health services and pharmaceuticals, and capacity-building of the NMCP and other relevant MOH departments, as well as that of CHTs and supervisors to monitor and improve the quality of malaria interventions in the health system. In addition, PMI provides a portion of its support for malaria service delivery and quality improvement directly to the GOL through USAID's FARA with the MOH, while supporting technical assistance and capacity building of MOH systems to utilize FARA and other resources to improve the delivery of malaria services.

##### *NMCP/PMI objectives*

A high priority of the NMCP is to increase the qualifications of its staff, particularly in terms of their managerial and supervisory capacity. In addition, the Liberia MOH has made a commitment to decentralize services to the county and district levels and to integrate health services at both the health facility and the community level in order to improve access to health care. Strengthening the capacity of lower levels of the health care system management, particularly at the level of county and district health teams, to manage, supervise, and improve the quality of malaria services and program implementation is also a key priority. Finally, the NMCP is prioritizing the strengthening of core MOH-wide management systems that are essential for effective delivery and management of malaria services, such as for in-service training, supervision, and strengthening of the HMIS and LMIS.

##### *Progress since PMI was launched*

To encourage integration of malaria prevention and control activities into routine health care in ways that are sustainable, PMI has supported the NMCP to more actively engage with other parts of the MOH involved in malaria-related activities, such as the Reproductive Health Division, Community Health Division, Maternal and Child Health Division, and the NDU. In addition, PMI has encouraged engagement with regulatory bodies and professional associations such as the Liberia Medical and Dental Council, the Liberia Medicines and Health Products Regulatory Authority, and the Liberia Association of Medical Laboratory Technicians, as well as county and district health teams.

As part of the transition to a decentralized system, NMCP staff members are adapting to their changing roles in terms of integrated supervision, policy implementation, advocacy, and mentoring of staff on CHTs. Instead of directly providing services, the NMCP is now charged with ensuring that malaria policies, guidelines, and training materials are up to date, prevention and control measures are well conducted, and policy changes are implemented. Parallel to this change is the expansion of the HMIS data system to include more facilities, making it a more representative and useful data tool. The NMCP now also participates as part of the FARA management committee.

PMI support since 2008 has enhanced the capacity of the NMCP and counties for management of service delivery and has resulted in substantial improvements in the capacity and reach of the health system, particularly at the local level. In FY 2014, USAID assisted the MOH to conduct capacity self-assessments of internal MOH and county-level systems and supporting services looking at functions in each of six WHO Health System Building Blocks, as a follow-up to baseline assessments conducted two years earlier just after the FARA activity was initiated. Quantitative capacity scores, based on the WHO building blocks of health systems, for the central MOH increased from a baseline of 59% in 2012 to 79% in 2014, and scores at the county level increased from an average of 44% to 78% in Bong, Lofa and



Nimba.<sup>10</sup> Qualitative findings highlighted variability across counties and operating units, but also substantial progress in most system functions.

In 2015, PMI supported USAID's flagship health systems strengthening program to conduct follow-up county capacity assessments post-EVD jointly with the MOH and CHTs. Support was also provided to embed advisors in human resource management, supply chain, clinical quality improvement, and monitoring and evaluation in county health teams. There is also one public financial management advisor that supports all the counties as well as an information management advisor that sits in Monrovia with the MOH and supports the M&E advisors in the counties. The MOH, with USAID and PMI support, also launched a management and leadership development program for CHTs and County Health Boards, advancing a key priority of the GOL related to governance structures for decentralization.

Following the EVD crisis, the MOH undertook a thorough review of health system weaknesses that contributed to the crisis and the near-collapse of routine health care delivery. The Investment Plan developed following this review emphasized improving the availability and management of the health workforce as a key priority, along with investments in key systems PMI is committed to supporting, including supply chain, health information systems, and quality improvement. PMI-supported investments at both the central and county level are now advancing work across investment plan priority areas, leveraging Global Fund resources proposed to scale up systems interventions to the rest of the country, including in-service training, HMIS and LMIS strengthening, and clinical quality improvement.

#### *Progress during the last 12-18 months*

In 2016, the MOH developed a draft National Quality Strategy document and initiated development and roll-out of the Improvement Collaborative approach to expanding adherence to clinical protocols, combined with revisions to clinical protocols and routine supportive supervision tools. The national MIP and case management guidelines were both updated and aligned such that ACTs are the first-line therapy. A national health information strategy was developed and the U.S. Government, with PMI resources, provided significant support to the Health Information Systems Technical Working Group to finalize the strategy and coordinate donor investments to improve data collection and use. The NMCP is a key participant in the technical working group, and routine recording, reporting, and analysis of malaria data is a key focus of U.S. Government health information systems interventions at the county level. A new design for the national LMIS was also developed, which is being rolled out in 2017 in USAID focus counties and in collaboration with Global Fund resources in the others.

For the NMCP, PMI-supported embedded technical advisors played a crucial role in helping NMCP staff navigate the post-EVD landscape and ensure the MOH maintained focused attention on scaling up malaria interventions. PMI also provided significant support and technical input for development of the two Global Fund malaria/health systems strengthening grant proposals. The first was submitted under the New Funding Model. In 2016, this was awarded and will run through June 2018 to allow for the next mass campaign. Currently, the technical advisor is assisting the NMCP with the application for an extension of activities for the three-year period from July 2018-June 2021 that will require validation by the Technical Review Committee but not the full review that would be required if new activities were to be proposed.

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<sup>10</sup> Capacity Assessments of Central MOHSW, Bong County, Lofa County, & Nimba County. Rebuilding Basic Health Services. 2012 & 2014.

PMI will be supporting a long term technical assistance (LTTA) advisor focused on improving SM&E skills for data analysis and use (see SM&E section). The candidate arrived in February 2017.

Plans and justification

The bulk of the capacity building activities are embedded in the relevant technical sections. By FY 2018, the projects supporting the LTTA for management and entomology will have ended with the purpose served of providing intense mentoring for self-sufficiency on core functions, on those topics. However, the specific LTTA for SM&E will continue. The focus of a second planned embedded LTTA will be on a different technical area (see case management). It is anticipated that this will be for laboratory support, because, as noted in the Diagnostics section, there is still a shortage of trained laboratorians. As of March 2017, the NMCP has not replaced the two laboratorians provided to the EVD response in 2014. In addition, PMI will continue to focus support to the central MOH/NMCP and CHTs to strengthen crosscutting health systems functions to improve management and governance of the health system, and support decentralization. PMI will also collaborate closely across United States Government agencies such as CDC, DOD, USAID and OFDA involved in post-EVD health system recovery efforts to leverage health system infrastructure and capacity building investments where possible. Peace Corps volunteers have returned to Liberia after being evacuated during the EVD outbreak. PMI plans to work with Peace Corps to improve malaria education in schools starting in 2017.

Proposed activities with FY 2018 funding: (\$180,000)

- **Support for strengthening NMCP technical capacity and program management.** PMI will support strengthening NMCP and CHT capacity for program management and oversight of quality malaria-related service delivery. PMI will provide support to the central MOH, first and foremost to the NMCP but also relevant units and departments responsible for clinical services (such as the Quality Management Unit and the Training Unit), as well as CHTs to strengthen crosscutting health systems functions to improve management & governance of the health system, and support decentralization. Support to the NMCP includes building their capacity in the area of leadership governance (e.g. development of work plans, setting targets and measureable results, taking ownership of the program, improved capacity to use data for decision making) in addition to providing training opportunities to improve their skills towards achieving their goals and objectives. (\$150,000)
- **Support for malaria messaging to reach adolescent populations.** PMI will provide support for Peace Corps volunteers who are teaching in secondary schools across the country. The goal is to incorporate pertinent evidence-based malaria information into the curriculum and encourage individual projects to carry accurate messages into the communities, particularly around implementation of malaria prevention activities, e.g. proper use and care of LLINs and encouraging uptake of IPTp plus prompt diagnosis of suspected malaria and appropriate treatment based on test results. The adolescent population is key in that many are either already or will soon be parents, representing the most vulnerable populations of pregnant women and children. The Peace Corps volunteers are expected to work in close collaboration with the SBCC focal person at the NMCP and will be using the already developed messaging tools. Sustainability of this program will be built through the involvement of community leaders. They will continue to monitor and advocate for behavior change through mechanisms put in place during the life of the project. PMI will support two malaria Peace Corps volunteers and also

provide support for malaria education activities carried out by other volunteers throughout the country. (\$30,000)

**Table 14: Health Systems Strengthening Activities**

<b>HSS Building Block</b>	<b>Technical Area</b>	<b>Description of Activity</b>
<b>Health Services</b>	Case Management	Improve, through training and supervision, QA systems to monitor the quality of implementation of malaria clinical protocols, as well as laboratory diagnostic services
		Updating of the national laboratory diagnostic guidelines
<b>Health Workforce</b>	Health Systems Strengthening	Build, through training and technical assistance, host country managerial and leadership capacity for effective malaria control
		Support RDT and microscopy external quality assurance
		Support pre-service training of laboratory technicians
<b>Health Information</b>	Surveillance, Monitoring, and Evaluation	Participate in post-EVD strengthening of disease surveillance systems to improve decision-making, planning, forecasting, and program management
		Support analysis and use of routine malaria data by the NMCP, county M&E officers and all levels of the health system
		Support implementation of the revised HMIS registers to record malaria data, including all doses of IPTp and LLINs distributed at institutional delivery
		Support implementation of the updated LMIS and national plans to move away from a paper-based system
		Support monitoring of commodity availability at health facilities through EUV surveys
<b>Essential Medical Products, Vaccines, and Technologies</b>	Pharmaceutical Management	Support improved forecasting, procurement, quality control, storage and distribution of malaria commodities, such as LLINs, ACTs, RDTs, SP and severe malaria medications
		Strengthen the regulatory environment for pharmaceutical management and routine monitoring of drug quality
<b>Leadership and Governance</b>	Health Systems Strengthening	Strengthen NMCP and national coordinating and regulatory bodies to direct and manage malaria resources, develop guidelines, and improve quality of services; and strengthen the managerial and technical capacity of CHTs and the developing of district health team capacity

## 5. Social and behavior change communication

### NMCP/PMI objectives

Liberia's 2016–2020 NMSP has been finalized and the Malaria Communication Strategy 2016–2020 has been revised. The current social and behavior change communication (SBCC) strategy focuses on the dissemination of malaria-related messaging through mass media, interpersonal communication, and community engagement activities to help ensure that everyone presenting with fever is tested and receives an ACT within 24 hours if positive for malaria, that pregnant women receive 2 or more doses of IPTp, and that community members are aware of the benefits of and are using LLINs to prevent malaria. The current national malaria health promotion targets include the following:

- 90% of the population has heard a malaria message through multimedia channels;
- 80% of community health committees and local leaders are reached with advocacy activities;
- 80% of local leaders are reached with advocacy activities;
- 100% of legislators and county superintendents are provided with information on malaria prevention, control and treatment strategies according to the MOH guidelines;
- All training for malaria control and prevention includes an interpersonal counseling and communication component;
- All teachers and instructors in primary and secondary schools are trained for child-to-child communication of malaria messages; and
- All schools receive SBCC materials on malaria control and prevention and include this information in the science curriculum.

The strategy seeks to facilitate the achievement of the following National Strategic Plan 2016–2020 objectives:

- To increase access to prompt diagnosis and effective treatment targeting 85% of population by 2020;
- To ensure that 80% of the population is protected by malaria preventive measures by 2020; and
- To increase the proportion of the population who practice malaria preventive measures from 40% to 85% and sustain knowledge at 98% by the end of 2020.

### Progress since PMI was launched

Concerted efforts from PMI and the Global Fund have successfully raised the population's awareness of malaria. The 2011 MIS indicated that 97% of women of reproductive age have heard of malaria and, of those, 82% cited mosquitoes as the cause of malaria. Moreover, among those women who have heard of malaria and who say there are ways to avoid getting malaria or that malaria can be treated, 80% of women cited use of mosquito nets as a way to avoid infection, 80% of community health committees are reached with activities, and 61% knew to treat malaria with ACTs.

In late 2013, the NMCP established a malaria SBCC technical working group at the national/central level. This working group, which has become operational, will focus on technical issues related to malaria SBCC strategy development, materials/messaging, medium of conveying messages, appropriate target audiences, timing, monitoring and evaluation of SBCC activities, and SBCC community outreach.

In 2014, PMI provided support for a strategic behavior change communication survey in four counties (Bong, Grand Cape Mount, Grand Kru, and River Cess Counties) to examine attitudes, beliefs and practices regarding net use, receipt of ACTs by children with fever, IPTp for pregnant women, and to identify communication gaps associated with current malaria SBCC messaging.<sup>11</sup> Similar to the 2011 MIS results, most participants had heard of malaria, were familiar with its symptoms, and mentioned mosquito nets as a prevention method. Nevertheless, only 41% of the participants in the 2014 survey were found to have adequate knowledge about malaria prevention (defined as mentioning at least one correct prevention method and no incorrect prevention methods). In terms of exposure to SBCC messaging, while only 42% of the participants in the 2011 MIS reported having seen or heard a malaria message in the past few months, 82% of the 2014 SBCC survey participants recalled having heard or seen a malaria message within the past 12 months. Despite this, only 19% of the SBCC survey respondents were able to correctly identify key messages from the “Healthy Baby, Happy Mother” campaign which was focused on improving care-seeking for fever among children less than five years of age. Additional findings from the 2014 survey indicate a disparity in malaria-related knowledge across the four study counties and a need for improvements in malaria SBCC messaging and dissemination for IPTp specifically and malaria in general. The results of this survey were taken into account in the revision of the national SBCC strategy, specifically in terms of increasing knowledge of pregnant women with regards to IPTp.

#### *Progress during the last 12-18 months*

In 2016, the NMCP revised its Malaria Communication Strategy for 2016 - 2020. The 2016 revision is the result of two consultative workshops involving partners of the MOH, donors, NGOs, and international partners. The development of this strategy demonstrates the tight collaboration between the National Health Promotion Division (NHPD), the Community Health Services Division (CHSD), the NMCP, and partners. Additionally, PMI supported the development of messages and materials for ANC education campaigns, as well as messaging of malaria prevention interventions around World Malaria Day activities.

In 2016, a KAP (Knowledge, Attitudes and Practices) Survey was conducted in the three USAID focus counties (Bong, Lofa and Nimba) to collect relevant information on individual health behaviors, and the factors which shape those health behaviors. Priority health indicators, including those around malaria among children under five years of age have guided the development of the survey. One of the main objectives of the study was to assess knowledge and behaviors in priority health areas, providing a snapshot of current behaviors specific to malaria prevention and treatment seeking behaviors. Findings of the survey showed that approximately 50% of the sample have knowledge of how malaria is transmitted. Although nearly 85% of respondents have at least one mosquito net in the house, only 38% reported a sufficient number of nets for everyone in the home to sleep under.

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<sup>11</sup> Health Communication Capacity Collaborative. Attitudes, Beliefs and Practices Relevant to Malaria Prevention and Treatment in Liberia, 2014. The study included a total of 1200 women and 360 men from households where a child under five years of age resided.

In December 2016, NMCP conducted a two-day workshop with Ministry of Health (MOH) divisions and their partners, to develop the Malaria Communication Plan (MCP) 2016–2020 implementation plan. The output of this activity was a list of next steps, covering 2017 and 2018, that ensure coordinated malaria SBCC in Liberia.

Recent findings indicate high community knowledge about the cause of malaria and how to prevent it; however, there are gaps between knowledge and practice. Based on this and with lessons learned from the EVD response, community and interpersonal behavioral change communications will be strengthened. SBCC trainings for service providers, gCHVs, TV shows, radio spots, leaflets, drama, road shows, community dialogues, and schools health promotion are some of the channels considered to be used to close gaps between malaria knowledge and practice.

The key messages developed for the 2016 – 2020 Malaria Communication Strategy will place emphasis on positive, actionable messages for communities and individuals on consistently sleeping under LLINs, seeking early treatment for fever, the importance of completing ACT therapy, allowing rooms to be sprayed during IRS (where applicable) and the need for pregnant woman to take their preventive malaria medicine three or more times before delivery.

### Plans and justification

The newly revised malaria communication strategy is intended to support the key strategies of malaria control and prevention in Liberia, focusing mainly on vector control, prevention of MIP, and malaria case management. All aspects of the strategy will rely on: strategic selection of priorities, and integrated context-appropriate and gender sensitive approaches. The SBCC strategy focuses on using community-based approaches in addressing challenges due to inadequate or lack of behavior change. Though the knowledge of malaria is high in the country, it has not resulted in positive behavior change. Community leaders will be engaged in ensuring that the right messaging is available at community level. The messaging will include perceived risk and severity.

### **Increase correct and consistent use of LLINs**

A high priority in the strategy is focused on increasing LLIN use among pregnant women and children less than five years of age. At the central level, national guidelines mandate the involvement of political and administrative officials in meetings and mass media campaigns supporting LLIN distribution. Policy maker engagement and involvement of civil society and media in vector management advocacy is also important. At the community level, year round net use must be encouraged by community health cadres, including gCHVs, the new CHAs, TTMs, and local leaders (e.g., chiefs, traditional and religious leaders). Net care messaging should also be included in comprehensive vector management messaging when possible. National guidelines mandate support for community-based services through incentive programs for community participation in vector control.

### **Increase in use of MIP services**

SBCC activities encouraging pregnant women to make use of MIP services will be planned and coordinated at the central level, between the Family Health Services Department, CHSD, NMCP, and NHPD. There are perceived risks associated with uptake of IPTp and inadequate knowledge on the benefits of SP to the pregnant mother and unborn baby. The attitude of service providers is not supportive in some cases, hence the greater need to target the service providers as well as clients with the right behavior change messaging using interpersonal communication. At the facility and community levels, midwives are largely responsible for communication with pregnant women. Facility personnel

are responsible for patient counseling. At the community level, gCHVs and TTMs are responsible for communicating with pregnant women.

General community health volunteers and TTMs will encourage early and regular ANC attendance, and remind pregnant women to demand both SP and LLINs. At the facility level, service providers (the most frequently cited source of information regarding IPTp) will be encouraged to counsel pregnant women on the importance, safety, and efficacy of IPTp.

### **Malaria Case Management**

At the facility level, service providers are responsible for counseling patients on the importance of prompt test seeking for fever. Service providers are expected to test every fever and administer ACTs to patients who test positive with malaria. They are expected to encourage patients to complete the full course of ACT treatment. At the community level, gCHVs will encourage prompt care-seeking behavior among those with fever, particularly for pregnant women and children under five years of age. Service providers will be trained to adequately understand malaria case management in pregnancy; and build counseling skills. The training will focus on building their skills to test pregnant women presenting with fever and treat only positive cases as opposed to treating all pregnant women with fever for malaria. In addition, service providers sometimes confuse IPTp with malaria case management in pregnancy. They will be trained to adhere to malaria treatment guidelines and protocols, encourage pregnant women to complete their treatment dosage, and encourage IPTp uptake and sleeping under ITNs. At the community level, through the gCHVs, pregnant women will be encouraged to seek care at a health facility and attend ANC services.

### **Monitoring SBCC**

The planned SBCC activities will be incorporated in the regular Monitoring and Evolution Plan of the National Malaria Control Program. The monitoring questionnaire will also be updated to include specific questions on SBCC activities to be monitored every quarter. Key performance indicators include the number of people reached with a set of key messages, number of advocacy meetings held, visibility of print and frequency broadcast messages, number of people who can recall key messages and the preferred source of these messages. Data from these key indicators will be triangulated with periodic Dipstick evaluations and the population based surveys like the DHS and MIS. Dipstick surveys are similar to exploratory surveys. It is called Dipstick because "dipstick" by definition means "a measuring rod that is dipped into a container to indicate the depth of liquid in it" and an exploratory survey is also conducted to measure the scope or depth of a problem. Dipstick surveys use either open ended questions in which participants freely express their opinion or apply a specific structured questionnaire administered to selected respondents on a particular health issue, e.g. malaria prevention. Respondents will be asked to provide feedback on SBCC activities in target project areas, for example if they have ever heard of these activities in their respective communities, or how the interventions (SBCC messages, outreach among others) have made an impact on their behavior. Based on the findings of the survey, we may continue with implementation or go back to redesign the SBCC strategy/ activities. The results from the various monitoring approaches will be used to review the messages, segment the audiences for effective targeting, messaging and prioritize the most effective channels to communicate. The monitoring activities will be carried out at both the county and national level. The county health promotion unit would be supported to monitor the process and output indicators on monthly basis, national monitoring will be done quarterly, and dipstick surveys would be done twice a year. Information from population based surveys like MIS and DHS will also be used to improve SBCC activities to promote positive malaria-related behaviors.

*Proposed activities with FY 2018 funding: (\$800,000)*

- **SBCC support to facility health workers.** PMI will support the implementation of integrated interpersonal communication activities with health facility workers to promote all aspects of malaria interventions in Bong, Nimba, and Lofa Counties. This will include promoting the practices and behavior of facility health workers in adhering to the national case management and MIP guidelines as well as RDT results. Training of these health workers will essentially focus on interpersonal communication to improve desired behavior. (\$200,000)
- **SBCC support to central and CHT level.** PMI will provide TA to the central MoH and Community Health Unit to develop and disseminate malaria messages; and support CHTs to disseminate messages within their catchment areas. SBCC activities will be designed to change attitudes, increase knowledge and practice. These will be targeted to specific malaria interventions such as correct use of nets, IPTp uptake and prompt care seeking behavior. The communication channels that will be used are; posters, leaflets, audio messages both in English and local languages. Mass media and community meetings will be conducted on a regular basis and complemented with community drama/theatre activities.
  - At the central level, Bong, Nimba, Lofa, Margibi, Grand Bassa Counties, and in rural Montserrado. (\$250,000)
  - In the remaining nine counties. (\$350,000)

## **6. Surveillance, monitoring, and evaluation**

### NMCP/PMI objectives

The NMCP is continuing to revise its costed 2016–2020 Surveillance, Monitoring and Evaluation (SM&E) plan to accompany the revised NMSP. The goal of the NMCP’s draft 2016–2020 SM&E Plan is “to provide reliable information on the performance, progress, effectiveness and efficiency of the national response to control malaria” as planned and documented in the 2016–2020 NMSP.<sup>12</sup> The new draft objective is by 2020 to improve routine data monitoring and program evaluation to ensure quality data management at all levels. Monitoring and evaluation activities are conducted by the SM&E Unit at the NMCP in collaboration with the HMIS, Monitoring and Evaluation and Research (HMER) Department at the MOH. Coordination occurs through bi-monthly SM&E coordination meetings.

PMI’s support to SM&E in Liberia aligns with the NMCP’s SM&E plan. Sources of data and information include the routine health information system (including the community data reporting), periodic household and facility surveys, and activity reports from the implementing partners, in addition to activities to monitor specific malaria interventions (e.g., net durability monitoring, therapeutic efficacy monitoring, and entomological monitoring).

### Progress since PMI was launched

PMI and the Global Fund have provided the bulk of the funding for SM&E activities in Liberia over the past several years, with additional funding from WHO. PMI has supported three MIS surveys (MIS 2009, MIS 2011, and MIS 2016) to track the coverage of malaria interventions and malaria parasitemia

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<sup>12</sup> Republic of Liberia Ministry of Health National Malaria Control Program M&E Plan 2016-2020. Scaling up for Impact. Draft November 2015.



and contributed to one DHS (DHS 2013). PMI has been supporting the end-use verification (EUV) surveys to assess the availability of malaria commodities at health facilities since 2010. Global Fund, has provided continuing support for the NMCP to conduct quarterly SM&E supportive supervision visits to strengthen data collection and reporting through the HMIS, based on the District Health Information Software 2 (DHIS2) platform, at all levels. Global Fund also supports data quality audits and validation activities.

The MOH has a fully integrated, computerized HMIS that serves all departments (including inpatient) and programs, including malaria care and treatment and distribution of nets at ANC visits and institutional deliveries. Personnel at all levels have been trained and the system is operational nationwide. Private health care facilities (including some private pharmacies and medicines stores) that receive commodities and support from the government and provide malaria diagnostic services, medications, and case management are also expected to report. As of 2017, approximately 300 private facilities have an MOU with the MOH/NMCP to receive commodities from CMS, as long as they provide them free of charge (with the exception of a consultation fee) to patients and report into DHIS2. These private facilities receive supportive supervision visits from the NMCP SM&E team to address data collection and reporting, data verification, and commodity management. The SM&E team conducts supportive supervision visits to 40% of all health facilities each quarter.

PMI supported sentinel sites until 2010 to track trends in malaria morbidity and mortality. Global Fund support was used to establish new sentinel sites (one per region). Two sentinel sites were established in 2015 and three more in 2016. In this context, “sentinel sites” refers to special support to improve facilities’ ability to report via the DHIS2 system and to ensure the facility is fully stocked with malaria commodities, including diagnostic tests. These data are aggregated (e.g., total number tested and total positives treated for malaria).

#### *Progress during the last 12-18 months*

The review and updating of the HMIS system and reporting forms was put on hold during the EVD outbreak, but resumed over the past year. As a result of this review, new registers, including a revised monthly reporting form, were designed to better capture the data, especially the IPTp indicators and net distribution during institutional delivery. The rollout of the new registers and HMIS training manual is ongoing. PMI, as part of USAID’s integrated health systems strengthening program, supported the embedding of health information system M&E advisors in Bong, Lofa, and Nimba counties, as well as a health information system advisor at the central MOH, to improve data quality, availability and use. The MOH’s integrated Human Resource Information System was also rolled out nationwide in 2016, and the U.S. Government is supporting its use to track and manage personnel data for accountability as well as decision-making to improve equitable distribution of personnel.

The MOH HMER team is responsible for HMIS data. Each month health facilities compile an aggregate report (paper-based), which is collected by the District Health Officer and delivered to the County Health Team. Each county is supposed to have an M&E officer who enters the data from the paper forms into the DHIS2 system. In 2015 the MOH decentralized service delivery, setting up district health teams to provide oversight and supervision at the facility and community levels. The district health teams’ data management units collect, collate and analyze data for their decision-making; eventually they may also transmit electronic reports to the county and national levels using the DHIS2 platform as internet capacity is established. This system improves the timeliness of reporting and provides coaching and mentoring capacity to health facilities and community-level staff on a regular basis. In addition, it supports the NMCP SM&E objective of improving data quality and management at all levels of the health system.

PMI supported technical assistance for CHT M&E officers to conduct regular monitoring of reported data in DHIS2 for treatment of malaria at community and facility levels and IPTp at the facility level. Through PMI support, SM&E mentors are assigned to Bong, Lofa and Nimba counties (and will be added to Grand Bassa, Margibi and rural Montserrado counties in 2017) to support the CHT and DHT M&E officers and data managers.

The HMIS currently does not collect data from CHAs. The MOH with support from PMI and USAID designed a community-based information system (CBIS) that will be integrated with the current facility-based HMIS. The system design is complete and training is underway. It is expected that reporting will begin in June 2017. The CHAs will submit the reports to the community health services supervisors (CHSSs) who will aggregate them at the health facility level and submit them to the CBIS. CBIS will be a separate module in DHIS2 and will capture malaria cases seen at the community level, while the facility data will only capture malaria cases seen in the facilities to avoid duplication of reporting.

The 2016 MIS fieldwork took place October-December 2016. Data cleaning is complete and analysis is underway with a final report expected in June 2017 (key indicators are included in the strategy section). The PMI-supported malaria impact evaluation was conducted between 2015 and 2016. The evaluation assessed the impact of the NMCP and partners' malaria control efforts on malaria morbidity and mortality and all-cause mortality between 2005–2013. Two stakeholder meetings were held to review the methods and design and to review the preliminary results in November 2015 and July 2016, respectively. The report is currently being finalized. PMI supported the NMCP M&E and Research focal point to attend the 2016 ASTMH meeting to present the preliminary results from the evaluation.

In partnership with the NMCP and the SCMU, PMI has supported 11 EUV surveys since 2010. The EUV is a rapid survey that collects data from a sample of health facilities each quarter on the availability of malaria commodities and malaria case management indicators. The survey takes eight weeks from the time of facility visits to finalization of the report and includes a follow-up plan to correct any problems found. Follow-up actions have included emergency procurements, training of health workers, facilitating requisitions, and addressing commodity storage conditions.

In order to strengthen the NMCP's capacity for data analysis and use for decision making, PMI is supporting embedding a long-term technical assistance (LTTA) advisor focusing on M&E at the NMCP. The selected candidate arrived in February 2017.

The table below summarizes the available data sources and assessments since 2011 and planned activities through 2019.

**Table 15. Surveillance, Monitoring and Evaluation Data Sources**

Data Source	Survey Activities	Year								
		2011	2012	2013	2014	2015	2016	2017	2018	2019
Household surveys	Demographic Health Survey (DHS) <sup>a</sup>			X						(X)
	Malaria Indicator Survey (MIS)	X					X			
	National census <sup>a</sup>								(X*)	
Health Facility and Other Surveys	Health facility survey			X*				(X*)		
	HMIS assessment—PRISM <sup>b</sup>		X		X					
	SARA survey						X*			
	EUV survey	X	X	X	X	X	X	X	(X)	(X)
	Malaria Prevention & Treatment SBCC survey <sup>c</sup>				X					
	General Health and MIP KAP surveys <sup>d</sup>						X		(X)	
Malaria Surveillance and Routine System Support	Support to HMIS/DHIS2	X	X	X	X	X	X	X	(X)	(X)
	Support to malaria surveillance system (sentinel sites)					X*	X*	X*	(X*)	(X*)
Therapeutic efficacy monitoring	In vivo efficacy testing							(X*)		(X*)
Entomology	Entomological surveillance and resistance monitoring	X	X	X	X	X	X	X	(X)	(X)
Other Data Sources	Malaria Impact Evaluation					X	X			
	Malaria Program Review/ Midterm Review				X*				(X*)	

\*Not PMI-funded  
<sup>a</sup>The 2018 census will inform the 2018/19 DHS sampling  
<sup>b</sup>Performance of Routine Information System Management—Bong, Lofa, Nimba and Grand Bassa Counties  
<sup>c</sup>Health Communication Capacity Collaborative. Attitudes, Beliefs and Practices Relevant to Malaria Prevention and Treatment in Liberia, 2014.  
<sup>d</sup>General health survey of caregivers of children under five; MIP KAP survey of pregnant women. PACS 2016.

***Plans and justification***

The NMCP SM&E plan 2016–2020 is integrated and financed by three sources: PMI, the Global Fund, and the GOL, with additional activities supported by WHO. PMI support to the NMCP’s SM&E strategy complements Global Fund support and will help provide key population-based indicators for monitoring malaria program implementation. PMI supports population-based surveys such as the DHS and MIS and provides technical assistance with the HMIS. PMI also supports data quality assurance and supportive supervision through the FARA with the MOH, while the Global Fund provides funding to support facility data, such as HMIS, health facility surveys, and supportive supervision for data quality assurance. Funding through the Global Fund supports five sentinel sites for collecting epidemiologic data on malaria.

Improving HMIS data reporting and use will be addressed jointly with the Global Fund and will focus on enhancing the NMCP's capacity to supervise and support counties and districts in their malaria-specific SM&E activities, as well as to strengthen overall capacity of the CHTs to manage and utilize health information systems for analysis of malaria data and use for decision-making and problem-solving. The NMCP staff is stretched thin with all of the data collection and analysis activities in Liberia. In addition to supporting embedded M&E advisors at the central MOH and in up to six CHTs focused on health information systems, PMI will provide support to the NMCP by embedding a long-term technical assistance SM&E advisor at the NMCP starting in February 2017 using funding from previous MOPs.

Proposed activities with FY 2018 funding: (\$980,000)

- **Strengthening data collection and dissemination for decision-making (national level).** Support for strengthening malaria reporting in DHIS2 and to improve translation of HMIS data to strengthen malaria programming at the central level. Support will also be provided for the NMCP to hold quarterly regional data workshops to review data from HMIS, household surveys, health facility surveys, EUV data, and partner reports to inform decision making at the central level. (\$50,000)
- **Strengthen data collection and use (county level).** This activity will support the collection, reporting, and use of malaria data through the HMIS system at the county level. Assistance will be provided to the CHTs, specifically the M&E officers at the county and district levels, to collect and report data. CHTs and DHTs will be supported to analyze the data and begin to use it to inform their programming, such as ordering additional commodities if there is a spike in cases, strengthening surveillance to look for these spikes, etc. This activity will also link with the recording of community data from gCHVs and CHAs in the community module in the HMIS system (e.g. CBIS) and will ensure health facilities are using the proper registers to record patient data.
  - Strengthen malaria M&E at the county-level in Bong, Lofa, Nimba, Grand Bassa, Margibi, and rural Montserrado counties as described above. This funding will contribute to the planned embedded technical assistance (SM&E mentors) in the county health teams in these five counties. (\$250,000)
  - Strengthen malaria M&E at the county-level in the remaining nine counties as described above. (\$280,000)
- **Support Malaria M&E Training.** Support M&E trainings at central and county level based on the needs identified by the LTTA SM&E advisor and NMCP referencing the revised NMCP M&E Plan. The training materials will be designed to address the identified M&E needs. (\$300,000)
- **End-use verification (EUV) survey.** PMI will provide resources to implement the EUV survey on a semi-annual basis in six counties. Emphasis will be placed on sustainability in terms of simplification of reports, dissemination of results, and follow-up action for any problems identified, by strengthening the CHT involvement in the surveys. (\$100,000)

## 7. Operational research

### NMCP/PMI objectives

The NMCP Research, Monitoring, and Evaluation Department is responsible for planning and conducting operational research studies in collaboration with other NMCP focal points and partners. An overarching strategic objective for the NMCP is to contribute to the knowledge of malaria epidemiology and control in coastal West Africa through operational research in partnership with higher educational institutions in Liberia. Outside of PMI-funded operational research, other partners completed a durable wall lining study in Bomi County, and previously conducted a pilot in greater Monrovia to provide ACTs and RDTs to private sector pharmacies and medicines shops.

### Progress since PMI was launched

Liberia had one PMI-funded OR study that was completed in 2013 and does not have any ongoing studies or studies planned with FY 2018 funding.

### Summary of dried blood tube sample (DTS) OR study

In 2012, CDC/PMI developed a DTS method that showed potential for use as a stable source of quality control samples to use in an external quality assurance system with RDTs. In order to assess the feasibility of using DTS in field settings, PMI, in conjunction with NMCPs, conducted pilot studies in Liberia and Ethiopia in 2013. The fieldwork in Liberia was conducted from June to December 2013 at the National Drug Quality Control Laboratory and two health facilities. Staff from the NMCP performed the tests at week zero and then every four weeks for six months. Health facility staff were trained to use the DTS and were asked to test a four-sample proficiency panel at 12 and 24 weeks. Analysis of the data suggested DTS stability in Liberia appears to be affected by prolonged storage under ambient conditions, whereas there was no difference in Ethiopia. The report was finalized and shared with the PMI country team, the PMI OR team, and the NMCP in January 2017. Using DTS provided by CDC, the NPHRL together with UNAIDS is planning a pilot proficiency testing activity combining malaria and HIV DTS in selected facilities for the first quarter of 2017. A manuscript combining data from the Liberia OR study and a similar study conducted in Benin has been drafted and is undergoing internal review at CDC.

### Progress during the last 12-18 months

During the past year the NMCP convened one stakeholder meeting to discuss and set operational research priorities. PMI did not fund any operational research studies in the past 12-18 months.

**Table 16. PMI-funded Operational Research Studies**

<b>Completed OR Studies</b>			
<b>Title</b>	<b>Start date</b>	<b>End date</b>	<b>Budget</b>
Field Testing of Dried Malaria-Positive Blood as Quality Control Samples for Malaria RDTs.	June 2013	December 2013	\$10,895*
<b>Ongoing OR Studies</b>			
<b>Title</b>	<b>Start date</b>	<b>End date</b>	<b>Budget</b>
None			
<b>Planned OR Studies FY 2018</b>			
<b>Title</b>	<b>Start date (est.)</b>	<b>End date (est.)</b>	<b>Budget</b>
None			

\*Additionally, a MOP-funded TDY was used to support diagnostics, as well as for training and setting up this activity.

### Plans and justification

There are no PMI-supported operational research activities planned with FY 2018 funding.

### Proposed activities with FY 2018 funding: (\$0)

There are no PMI-supported operational research activities planned with FY 2018 funding.

## **8. Staffing and administration**

Two health professionals serve as Resident Advisors (RAs) to oversee PMI in Liberia, one representing CDC and one representing USAID. In addition, one or more Foreign Service Nationals (FSNs) work as part of the PMI team. All PMI staff members are part of a single interagency team led by the USAID Mission Director or his/her designee in country. The PMI team shares 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 RA positions (whether initial hires or replacements) 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.

The PMI interagency professional staff work together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

The PMI lead in country is the USAID Mission Director. The day-to-day lead for PMI is delegated to the USAID Health Office Director and thus the two PMI RAs, one from USAID and one from CDC, report to the USAID Health Office Director for day-to-day leadership, and work together as a part of a single interagency team. Technical expertise housed in Atlanta and Washington complements PMI programmatic efforts.

The two PMI RAs are physically based within the USAID health office but are expected to spend approximately half of their time with and providing TA to the NMCPs and implementing partners, including time in the field monitoring program implementation and impact.

The number of locally-hired staff and necessary qualifications to successfully 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, in addition to the U.S. Global Malaria Coordinator.

### Proposed activities with FY 2018 funding: (\$1,463,546)

- **In-country staffing and administration.** Coordination and staff salaries and benefits, office equipment and supplies, and routine expenses for PMI activities in Liberia.
  - CDC resident advisor staffing and administration costs (\$612,000)
  - USAID resident advisor, FSN, and USAID/Liberia Mission-wide costs (\$851,546)

**Table 1: Budget Breakdown by Mechanism  
President's Malaria Initiative – Liberia  
Planned Obligations for FY 2018**

<b>Mechanism</b>	<b>Geographic Area</b>	<b>Activity</b>	<b>Budget (\$)</b>	<b>Sub-Total</b>	<b>%</b>
TBD - IRS project	Nationwide	Increase NMCP entomology capacity and entomological monitoring	500,000	500,000	3.6
GHSC-PSM	Nationwide	Procure LLINs	1,248,000	5,132,454	36.7
	Nationwide	Distribute LLINs	416,000		
	Nationwide	Procure SP	39,480		
	Nationwide	Procurement of RDTs	646,449		
	Nationwide	Procure laboratory supplies	200,000		
	Nationwide	Procure ACTs	932,525		
	Nationwide	Procure severe malaria medications	450,000		
	Nationwide	Support warehousing and distribution of malaria commodities at CMS	200,000		
	Central	Strengthen supply chain management (central level)	300,000		
	Nationwide	Strengthen supply chain management (county/district level)	700,000		
PQM	Nationwide	Monitor antimalarial drug quality and support regulation and rational use of pharmaceuticals	400,000	400,000	2.9
VectorWorks	Nationwide	Technical assistance for continuous distribution	250,000	250,000	1.8
Liberia Strategic Analysis (LSA)	At selected sites	Net durability monitoring	200,000	200,000	1.4
CSH	Central	NMCP technical capacity and program management	150,000	595,000	4.3
	Nationwide	Human resource capacity building for malaria diagnosis	45,000		
	Central	Strengthen data collection and dissemination for decision making (national level)	50,000		

	Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	Strengthen data collection and use (county level)	250,000		
	Nationwide	End-use verification tool	100,000		
FARA	Bong, Nimba, Lofa	In-service training and supervision for health care workers at ANC facilities	300,000	900,000	6.4
	Bong, Nimba, Lofa	Support for strengthening malaria case management	400,000		
	Bong, Nimba, Lofa	SBCC support to facility health workers	200,000		
TBD - bilateral	Nationwide	Improve quality of care and adherence to standards for MIP	500,000	3,330,000	23.8
	Central, Nationwide	Support for strengthening malaria case management	1,100,000		
	Central	Strengthen NMCP case management capacity	200,000		
	Central, other 9 counties	Support for iCCM	900,000		
	non-FARA Counties (outside PACS counties)	SBCC support to central and CHT level	350,000		
	Non-CSH counties (9)	Strengthen data collection and use (county level)	280,000		
PACS	Bong, Nimba, Lofa, Grand Bassa, Margibi, rural Montserrado	Support for iCCM	600,000	850,000	6.1
	Central, Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	SBCC support to central and CHT level	250,000		
Peace Corps	Nationwide	Support for malaria messaging to reach adolescent populations	30,000	30,000	0.2
Measure Evaluation	Nationwide	Support Malaria M&E training	300,000	300,000	2.1
CDC	Nationwide	Technical assistance for malaria diagnostics	10,000	49,000	0.4



	Nationwide	Technical assistance for LLINs	10,000		
	Nationwide	Technical assistance for vector control activities	29,000		
USAID/CDC	Monrovia	In-country staffing and administration	1,463,546	1,463,546	10.5
<b>TOTAL</b>			<b>14,000,000</b>	<b>14,000,000</b>	<b>100</b>

**Table 2: Budget Breakdown by Activity  
President's Malaria Initiative – Liberia  
Planned Obligation for FY 2018**

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
<b>PREVENTIVE ACTIVITIES</b>					
<b>VECTOR MONITORING AND CONTROL</b>					
<b>Entomological monitoring and insecticide resistance management</b>					
Increase NMCP entomology capacity and entomological monitoring	TBD - IRS project	500,000	0	Nationwide	Provide training, equipment and supplies for NMCP entomology technicians, including insectary support, support for entomology sentinel site monitoring and resistance testing, and support for molecular analysis of mosquito samples
Technical assistance for vector control activities	CDC	29,000	0	Nationwide	Two visits to assist with training and to monitor planning and implementation of vector control activities
<b>Subtotal Ento monitoring</b>		<b>529,000</b>	<b>0</b>		
<b>Insecticide Treated Nets</b>					
Procure LLINs	GHSC-PSM	1,248,000	1,248,000	Nationwide	Procure about 416,000 LLINs for routine distribution (ANC, institutional delivery, and institutions) and alternate channel pilot (e.g. school-based)

Distribute LLINs	GHSC-PSM	416,000	0	Nationwide	LLIN distribution (including warehousing and transportation down to county level and then health facilities at an average cost of about \$1 per net)
Technical assistance for continuous distribution	VectorWorks	250,000	0	Nationwide	Assistance for LLIN distribution through routine channels (e.g. ANC, institutional delivery, and exploring an alternate channel); assistance with LLIN durability monitoring
Net durability monitoring	Liberia Strategic Analysis (LSA)	200,000	0	At selected sites	Monitor attrition and physical durability of nets distributed during the 2018 mass campaign at two sites (Year 2)
Technical assistance for LLINs	CDC	10,000	0	Nationwide	Technical visit to support LLIN activities
<b>Subtotal ITNs</b>		<b>2,124,000</b>	<b>1,248,000</b>		
<b>Indoor Residual Spraying</b>					
<b>Subtotal IRS</b>		<b>0</b>	<b>0</b>		
<b>SUBTOTAL VECTOR MONITORING AND CONTROL</b>		<b>2,653,000</b>	<b>1,248,000</b>		
<b>Malaria in Pregnancy</b>					
Procure SP	GHSC-PSM	39,480	39,480	Nationwide	Procure about 313,000 SP treatments

In-service training and supervision for health care workers at ANC facilities	FARA	300,000	0	Bong, Nimba, Lofa	At the facility level, continue in-service training for malaria in pregnancy; support CHT for supervision of health workers; community outreach
Improve quality of care and adherence to standards for MIP	TBD - bilateral	500,000	0	Nationwide	Strengthen CHT capacity to deliver quality malaria in pregnancy services through effective training and supportive supervision at county and facility level; also support for health worker interpersonal communication
<b>SUBTOTAL MIP</b>		<b>839,480</b>	<b>39,480</b>		
<b>SUBTOTAL PREVENTIVE</b>		<b>2,963,480</b>	<b>1,287,480</b>		
<b>CASE MANAGEMENT</b>					
<b>Diagnosis &amp; Treatment</b>					
Procurement of RDTs	GHSC-PSM	646,449	646,449	Nationwide	Procure approximately 1,175,000 RDTs to help fill gap
Procure laboratory supplies	GHSC-PSM	200,000	200,000	Nationwide	Procure laboratory supplies, including reagents, for health facilities and national reference lab
Procure ACTs	GHSC-PSM	932,525	932,525	Nationwide	Procure approximately 1,123,000 ACT treatments for public and private facilities and community treatment

Procure severe malaria medications	GHSC-PSM	450,000	450,000	Nationwide	Procure treatments for severe malaria (e.g. injectable and rectal artesunate)
Support for strengthening malaria case management	FARA	400,000	0	Bong, Nimba, Lofa	Strengthen CHT capacity for supportive supervision at county, district and facility level for improving malaria case management
	TBD - bilateral	1,100,000	0	Central, Nationwide	Strengthen CHT capacity for training and supportive supervision at county, district, and facility level for improving malaria case management; TA to MOH (NPHRL, NDU, NMCP) to achieve and maintain quality malaria laboratory diagnostics nationwide
Strengthen NMCP case management capacity	TBD - bilateral	200,000	0	Central	Technical assistance embedded with NMCP to strengthen malaria technical capacity in case management with a focus on laboratory capacity building

Support for iCCM	PACS	600,000	0	Bong, Nimba, Lofa, Grand Bassa, Margibi, rural Monsterrado	Support CHT oversight and supportive supervision of iCCM
	TBD - bilateral	900,000	0	Central, other 9 counties	Support MOH/NMCP for iCCM training, coordination and oversight, and support CHT oversight and supportive supervision of iCCM
Human resource capacity building for malaria diagnosis	CSH	45,000	0	Nationwide	Support the laboratory/diagnostic training costs for at least ten students to complete lab tech certification (nationwide placement)
Technical assistance for malaria diagnostics	CDC	10,000	0	Nationwide	Technical assistance visit to support efforts of the NMCP to review diagnostic guidelines and improve the rollout of malaria diagnostics
<b>Subtotal Diagnosis &amp; Treatment</b>		<b>5,483,974</b>	<b>2,228,974</b>		
<b>Pharmaceutical Management</b>					
Support warehousing and distribution of malaria commodities at CMS	GHSC-PSM	200,000	0	Nationwide	Support warehousing and distribution costs of malaria commodities
Strengthen supply chain management (central level)	GHSC-PSM	300,000	0	Central	Support new CMS warehouse operations, ongoing mentoring to CMS, supervision, forecasting, quantification, implementation of the new LMIS in line with revised SCMP

Strengthen supply chain management (county/district level)	GHSC-PSM	700,000	0	Nationwide	Expand support to regional or county depots and CHTs to rationalize commodity management, storage, supervision, and reporting (LMIS) in line with revised SCMP
Monitor antimalarial drug quality and support regulation and rational use of pharmaceuticals	PQM	400,000	0	Nationwide	To help strengthen LMHRA, Pharmacy Board & MOH systems for pharmaceutical regulation, including antimalarial quality testing and sampling
<b>Subtotal Pharmaceutical Management</b>		<b>1,600,000</b>	<b>0</b>		
<b>SUBTOTAL CASE MANAGEMENT</b>		<b>7,083,974</b>	<b>2,228,974</b>		
<b>HEALTH SYSTEM STRENGTHENING/CAPACITY BUILDING</b>					
NMCP technical capacity and program management	CSH	150,000	0	Central	NMCP staff technical capacity building including attendance at international meetings and conferences and training courses
Support for malaria messaging to reach adolescent populations	Peace Corps	30,000	0	Nationwide	Support Peace Corps volunteers to educate school-age children on malaria prevention; PMI will support two malaria Peace Corps volunteers and provide support for malaria education activities carried out by other volunteers

<b>SUBTOTAL HSS &amp; CAPACITY BUILDING</b>		<b>180,000</b>	<b>0</b>		
<b>SOCIAL AND BEHAVIOR CHANGE COMMUNICATION</b>					
SBCC support to facility health workers	FARA	200,000	0	Bong, Nimba, Lofa	Implement interpersonal communication activities with health facility workers, to promote all aspects of malaria interventions
SBCC support to central and CHT level	PACS	250,000	0	Central, Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	TA to MOH Health Promotion and Community Health Unit to develop and disseminate malaria messages; support CHTs to disseminate messages within their catchment areas.
	TBD - bilateral	350,000	0	non-FARA Counties (outside PACS counties)	Implement interpersonal communication activities with health facility workers and support CHTs to disseminate messages within their catchment areas
<b>SUBTOTAL SBCC</b>		<b>800,000</b>	<b>0</b>		
<b>SURVEILLANCE, MONITORING, AND EVALUATION</b>					
Strengthen data collection and dissemination for decision making (national level)	CSH	50,000	0	Central	Strengthen malaria reporting in DHIS2; support NMCP to hold quarterly regional workshops to review data from HMIS, household surveys, health facility surveys, EUV data, and partner reports to inform decision making at the central level



Strengthen data collection and use (county level)	CSH	250,000	0	Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	Support the CHTs through the individuals (M&E mentors) embedded there to collect data through the HMIS (including community data from gCHVs and CHAs) and utilize the data to track malaria trends in the health facilities and communities in each county
	TBD - bilateral	280,000	0	Non-CSH counties (9)	Support the CHTs to collect data through the HMIS (including community data from gCHVs and CHAs) and utilize the data to track malaria trends in the health facilities and communities in each county
Support Malaria M&E training	Measure Evaluation	300,000	0	Nationwide	Support M&E trainings at central and county level based on the needs identified by the LTTA M&E advisor and NMCP referencing the revised M&E Plan
End-use verification tool	CSH	100,000	0	Nationwide	Support the MOH to conduct and utilize data from the End-Use Verification Tool
<b>SUBTOTAL SM&amp;E</b>		<b>980,000</b>	<b>0</b>		
<b>OPERATIONAL RESEARCH</b>					
<b>SUBTOTAL OR</b>		<b>0</b>	<b>0</b>		
<b>STAFFING AND ADMINISTRATION</b>					

In-country staffing and administration	USAID/CDC	1,463,546	0	Monrovia	Salaries and benefits, as well as administrative-related costs of in-country PMI staff, and support of activities as needed by the Mission
<b>SUBTOTAL IN-COUNTRY STAFFING</b>		<b>1,463,546</b>	<b>0</b>		
<b>GRAND TOTAL</b>		<b>14,000,000</b>	<b>3,516,454</b>		