

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 2017 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



USAID
FROM THE AMERICAN PEOPLE

U.S. PRESIDENT'S MALARIA INITIATIVE



PRESIDENT'S MALARIA INITIATIVE

LIBERIA

Malaria Operational Plan FY 2017

TABLE OF CONTENTS

ABBREVIATIONS and ACRONYMS	3
I. EXECUTIVE SUMMARY	5
II. STRATEGY	10
1. Introduction.....	10
2. Malaria situation in Liberia.....	10
3. Country health system delivery structure and Ministry of Health (MOH) organization.....	12
4. National malaria control strategy.....	14
5. Updates in the strategy section	15
6. Integration, collaboration, and coordination.....	15
7. PMI goal, objectives, strategic areas, and key indicators	18
8. Progress on coverage/impact indicators to date.....	19
9. Other relevant evidence on progress.....	20
III. OPERATIONAL PLAN	22
1. Vector monitoring and control.....	23
2. Malaria in pregnancy	30
3. Case management	34
4. Health system strengthening and capacity building.....	44
5. Social and behavior change communication.....	48
6. Surveillance, monitoring, and evaluation	51
7. Operational research	57
8. Staffing and administration.....	58
Table 1: Budget Breakdown by Mechanism	60
Table 2: Budget Breakdown by Activity	62

ABBREVIATIONS and ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumifantrine
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 assistants
CHSS	Community health services supervisor
CHT	County health team
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
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
IMCI	Integrated management of childhood illnesses
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LLIN	Long-lasting insecticide-treated mosquito net
LMHRA	Liberia Medicines and Health Products Regulatory Authority
LMIS	Logistics management information system
MCSP	Maternal Child Survival Program
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 behavior change communication
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
USG	United States Government
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 RBM Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and 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 was selected as a PMI focus country in FY 2008.

This FY 2017 Malaria Operational Plan 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 2017 funding.

The proposed FY 2017 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 Strategic Plan 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 continued to support the NMCP to evaluate the spatial and temporal composition of anopheline mosquitoes at two sites and insecticide resistance at six 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 attend a weeklong entomology training in Ghana. With FY 2017 funds, PMI will continue to support NMCP capacity building, 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 National Malaria Strategic Plan (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 ANC visit and at the time of delivery in a registered health care institution to encourage delivery in facilities. Between April and June 2015, approximately 2.8 million nets procured by the Global Fund were distributed throughout Liberia. In addition, in 2015 PMI distributed 318,100 LLINs to 597 health facilities in all 15 counties for continuous distribution through ANC clinics and at institutional delivery.

With FY 2017 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. PMI will provide technical assistance for campaign planning and will support social and behavior change communication activities before, during, and after the campaign. In addition, PMI will support the monitoring of attrition and physical durability of nets distributed during the 2018 mass campaign at two sites.

Indoor residual spraying (IRS): Liberia's 2016-2020 NMSP includes IRS conducted in rural districts with high malaria prevalence if funding is available. However, IRS has not been conducted in Liberia since 2013. 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, and instead focus on increased entomological monitoring and universal LLIN coverage.

Malaria in pregnancy (MIP): Liberia's policy on MIP is a three-pronged approach, which consists of prompt and effective case management of malaria and anemia, IPTp with more than two 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 EVD epidemic from 2014 to 2015, but in the 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. 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 2017 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 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, and technical assistance to strengthen the distribution and availability of antenatal care commodities including SP and LLINs.

Case management: As of 2011, rapid diagnostic tests (RDTs) were distributed to all public facilities and to private facilities that provided clinical services and agreed to report via the Health Management Information System (HMIS). Progress has also been made in expansion of malaria testing to retail pharmacies and medicine shops in Montserrado County, and at the community level through integrated community case management (iCCM), which is currently being implemented in eleven of the fifteen counties. In 2014, the Ebola virus disease (EVD) epidemic and emergency response called for a suspension of malaria diagnostic testing of febrile persons by non-medical personnel such as general community health volunteers (gCHVs) in community settings and by extension to retail pharmacies and medicine shops, and to health care facilities if adequate supplies for infection prevention and control and training were not available. With the EVD epidemic over, malaria testing has resumed in most health facilities. PMI continues to work with the NMCP/Ministry of Health (MOH) on infection prevention measures to reintroduce testing by gCHVs. With FY 2017 funding, PMI will procure laboratory supplies, including reagents for microscopy and approximately 2.4 million RDTs. PMI will also provide support for improving the quality of testing through training and supportive supervision. In 2015, approximately 1.26 million malaria cases were reported via the HMIS. With FY 2017 funding, PMI will procure approximately 1.9 million ACTs for treatment of uncomplicated malaria, as well as artesunate and artemether for severe malaria. In addition, PMI will continue to support the extension of malaria case management to the community level and refresher training for facility-level case management.

In 2013, after imposing a moratorium on distribution of malaria commodities donated by PMI and the Global Fund in response to a surge in the unavailability of health commodities due to diversion, PMI assisted the MOH to develop a “top up interim approach.” An evaluation of this approach in August 2015 found it to have been efficient and effective. Also in 2015, PMI supported revision of the Logistics Management Information System (LMIS), to address the chronic lack of quality supply chain data for decision-making, as well as revision of the Supply Chain Master Plan (SCMP). In 2016 PMI provided technical assistance to develop terms of reference to outsource management of the National Drug Service (NDS) while the new NDS warehouse, jointly financed by PMI and the Global Fund, is being constructed. With FY 2017 funding, PMI will continue its support for the implementation of the revised SCMP along with the revised supply planning, reporting and distribution model for health commodities and consumption data, in collaboration with the Supply Chain Management Unit (SCMU) of the MOH and the Global Fund. In addition, PMI will continue to support the MOH systems for pharmaceutical regulations and post-market surveillance.

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 and 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.

A high priority of the NMCP is to increase the qualifications of its staff, particularly in terms of their managerial and supervisory capacity. Liberia has had a favorable experience with long-term technical assistance recently inaugurated through PMI for assistance with implementation of Global Fund activities; therefore, with FY 2017 funding PMI will support two technical assistance positions in order to sustain and further improve the NMCP's management and oversight capacity. One of these positions will have a focus on improving monitoring and evaluation skills for data analysis and use, while the other will focus on a different technical area (e.g., case management). PMI will also continue to fund scholarships 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 community health teams 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 involved in post EVD health system recovery efforts to leverage health system infrastructure and capacity building investments where possible.

Social and behavior change communication (SBCC): With support from PMI, 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 2017 funds, PMI will support the continued implementation of integrated interpersonal communication, including health provider training, and will support SBCC through community health services interventions/interpersonal communication and mass media communications throughout the country.

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 provide 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. With FY 2017 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 NMCP and in select counties. Planning for the 2016 MIS is underway and the pre-test is expected to begin in June 2016 with the survey fieldwork scheduled for September 2016. 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. Furthermore, with FY 2017 funds, PMI will support continued implementation of the end-use verification survey of the availability of malaria commodities and the quality of services at the health facility level.

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 2017 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.

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 RBM Partnership's second generation global malaria action plan, *Action and Investment to defeat Malaria (AIM) 2016-2030: for a Malaria-Free World* and 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 was selected as a PMI focus country in FY 2008.

This FY 2017 Malaria Operational Plan presents a detailed implementation plan for Liberia, based on the strategies of PMI and the National Malaria Control Program (NMCP) strategy. 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 2017 funding.

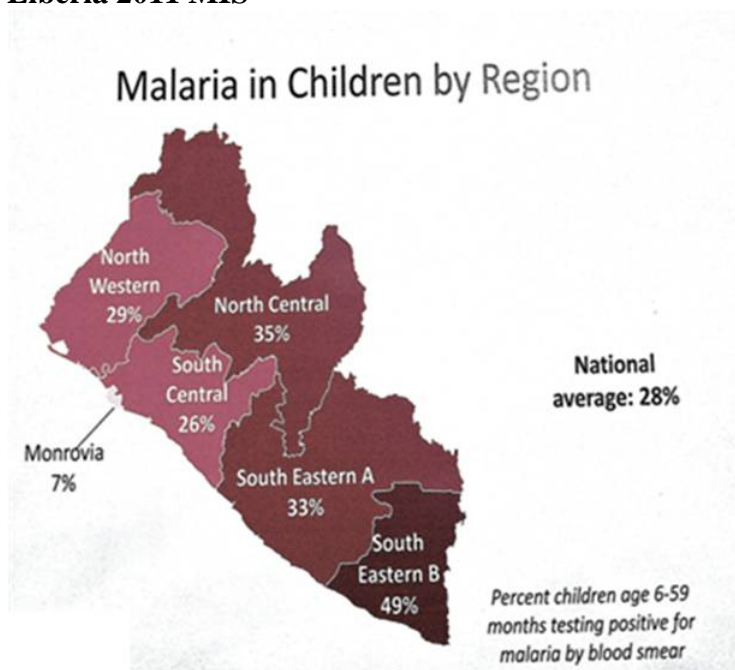
2. Malaria situation in Liberia

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*.¹

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 million² is at risk of the disease; children under five and pregnant women are the most affected groups. According to reports received by the World Health Organization (WHO) in 2010 from the NMCP, approximately 40% of consultations in outpatient departments in all age groups in public health facilities were due to malaria.³ The 2009 Health Facility Survey (HFS) estimated that malaria accounts for 33% of in-patient deaths.

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,

¹ Roll Back Malaria-National Desk Analysis-Liberia- 2001

² 2015 estimate; National Population and Housing Census, 2008 plus a growth rate of 2.1%

³ http://www.aho.afro.who.int/profiles_information/index.php/File:Reported_malaria_cases_by_county.PNG

data suggest that there has been a significant recovery in health system utilization post-EVD. For instance, 1,256,068 cases of malaria were reported via the Health Management Information System (HMIS) in calendar year 2015, compared to 1,057,635 in 2014 and 1,483,408 in 2013.

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.⁴ With catchment areas 10 km in diameter, clinics typically serve populations of 3,500 – 12,000 and are mandated to be open eight hours a day, five 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. 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.

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

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

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 6 months of 2015.⁵ 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%.⁶

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, parasitologic diagnosis was suspended. Outpatient visits dropped 61% nationwide between August and October 2014. And 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 (USG) country team has been working to address urgent short term health needs such as malaria; plan for longer term investments that will shore up health worker capacity, strengthen critical components of the health system, and prepare to address future epidemics.

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

⁶ UNICEF 2014 (based on analysis of Liberia HMIS 2014 as of October 2014)

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 10-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 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 USG 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 USG complements the Liberian MOH's efforts by concentrating its resources on two key focus areas: 1) improving service

delivery through the Essential Package of Health Services, and 2) strengthening health systems to increase institutional capacity and sustainability.

The USG will invest 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 USG 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 USG 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.

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 two 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 are ongoing 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 grant will cover the 21-month period after the end of the current grant at the end of June 2016. The MOH will thus have to complete another application next year for the subsequent period under the next Global Fund replenishment.

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. The LLIN campaign, originally planned for 2014, was delayed due to the need to reconfigure to an emergency distribution plan in the setting of EVD control efforts and minimizing individual contact for worker and community safety. Going forward, in coordination with the NMCP, it was agreed that the Global Fund would provide the LLINs for nationwide campaigns and that PMI would 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 begins 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. (See map in the Case Management section describing support for the remaining counties).

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 insurance 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.

The MENTOR Initiative supported a pilot 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 Global Fund had planned to support the MOH scale-up of this pilot private sector activity through an implementing partner in their Round 10 Phase 2 grant. However, negotiations were not successfully concluded before the Simplified Application Process began for the period after the current grant ends in June 2016. Therefore, the process will have to be re-competed.

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 concession 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 such as the MENTOR Initiative who are collecting relevant data related to their individual projects.

PMI investments have been bolstered by additional support from the USG 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 will include a focus on strengthening surveillance, public health laboratory functions, and adherence to infection prevention and control standards. Global Health Security Agenda funding through CDC will help to build epidemiology skills within the public health system at both the national and county level. There will not be 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 USG 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-supported 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-supported 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-supported 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-supported countries to meet the World Health Organization's (WHO) criteria for national or sub-national pre-elimination.⁷

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

⁷ http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf

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:

- 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 old 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 old 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 old 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
% Households with at least one ITN	18%	30% ^a	47%	50%	55%
% Households with at least one ITN for every two people	n/a	n/a	n/a	17%	22%
% Children under five who slept under an ITN the previous night	3%	n/a	26%	37%	38%
% Pregnant women who slept under an ITN the previous night	n/a	n/a	33%	39%	37%
% Households in targeted districts protected by IRS	n/a	n/a	n/a	9% ^b	11% ^b
% 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%
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	23%	33%	42%
% 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% ^d
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	4%	12% ^c	45%	50%	48%

^a The 2007 DHS only asked about any net ownership, not specifically about ITNs, and did not ask about net use

^b This is out of all households

^c The 2007 DHS only asked about pregnant women who took any SP

^d 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 amodiquine, which is how AS/AQ is known in Liberia, making it difficult to distinguish between actual use of the mono vs. combination therapy.

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, supported by the Global Fund, and as of April 2016 the report is still being finalized. The protocol and methodology of the 2009 survey was slightly different from the 2013 survey due to budget and other issues. 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 revealed some systematic issues with how the 2013 and previous data had been analyzed, and an effort was made to correct the 2013 report.

Table 2: Key Indicators of the Liberia Health Facility Surveys

	INDICATORS	HFS 2005*	HFS 2009
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

Last year, 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 may have partially contributed to the decrease in mortality, but other factors also likely contributed to the decline. The impact evaluation will be complete by the end of 2016.

III. OPERATIONAL PLAN

The overall PMI support strategy for Liberia is nested within the Global Health Initiative 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.

USAID support at the county level consists of the 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). The FARA is the principal service delivery mechanism for preventive and curative malaria activities and is implemented in three counties (Bong, Lofa, Nimba). These counties were prioritized 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. At the community level, iCCM and SBCC activities have expanded to three additional counties (Margibi, Grand Bassa, and Rural Montserrado), making a total of six counties including the FARA counties. PMI will leverage several other USAID funding streams, including HIV/AIDS, maternal and child health, and family planning for service delivery in the three FARA counties. An additional county (Grand Bassa) was added to USG service delivery capacity with FY 2015 Ebola Emergency Funds through another mechanism. Together with the FARA, this brings the reach of USG-funded service delivery 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.

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 USG-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. Leading up to the EVD crisis, HMIS data showed continued improvements in service delivery within counties supported through the FARA, as well as those supported by other donors. For instance, IPTp2 coverage among pregnant women residing in catchment areas around USAID-supported facilities in Bong in 2012 was 79%, up from 70% the previous year. In Lofa, IPTp went from 45% to 58%.

USAID's first FARA ended on December 31, 2015, and the follow-on FARA 2.0 was awarded in January 2016 for five years. The new agreement maintains key interventions, especially those related to malaria, and its design was influenced by evaluations of the previous FARA. Indicators for the new

FARA have and will continue to be 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.

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.

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's new NMSP aims to ensure households are 100% covered with LLINs. 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 criteria for an effective larviciding program.

Lastly, the 2016-2020 Strategic Plan 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. Entomological monitoring and insecticide resistance management

Progress since PMI was launched

In early 2014, PMI supported the modification of a shipping container for use as an insectary situated next to the NMCP. The insectary is divided into three sections: mosquito rearing, molecular diagnostic testing, and insecticide resistance testing. Having a functional insectary situated next to the NMCP office and developing a rotational schedule for routine surveillance, annual insecticide resistance monitoring, insectary maintenance and active collaboration with other partners, such as the MENTOR Initiative, U.S. Naval Medical Research Unit No. 3, and Armed Forces of Liberia, has provided an opportunity for the vector control unit staff to become more focused in their entomological monitoring work.

Progress during the last 12-18 months

Over the past year, PMI continued to support the NMCP to evaluate the spatial and temporal composition of anopheline mosquitoes at two sites in Liberia (i.e., Tomato Camp in Bong County and Franktown in Montserrado County) through monthly pyrethrum spray catches and CDC light traps collections, and bimonthly human landing catches. *An. gambiae* s.l. was found to be the major vector in both sites. Of 150 specimens sent for sequencing, 145 were identified as *An. gambiae* s.s., while five were identified as *An. coluzzii*. 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.

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 attend a weeklong 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.

Modifications have been made to Liberia's insectary to rear mosquitoes despite electrical interruption. Currently, field mosquitoes are being reared for insecticide resistance trials; however, no susceptible colonies are currently being reared. Insecticide susceptibility testing was conducted at six sites, including three sites that had not been tested in 2014. Where insecticide susceptibility testing has been conducted, significant pyrethroid and DDT resistance has been found in Liberia (Table 3).

Table 3: Results of WHO tube tests using *An. gambiae* s.l.

County	Bendiocarb		DDT		Deltamethrin		Alpha-cypermethrin	Fenitrothion	Pirimiphos-methyl
	2014	2015	2014	2015	2014	2015	2015	2014	2015
Monrovia	99 (100)		27 (100)		46 (100)			95 (100)	
Bong	95 (100)	97 (100)	27 (100)	2 (100)	15 (128)	67 (100)	22 (100)	100 (102)	100 (100)
Grand Gedeh	98 (100)	100 (100)	30 (100)	26 (100)	62 (100)	62.5 (100)	44.8 (125)	100 (100)	
Grand Bassa	99 (100)	94 (100)	54 (100)	4 (100)	78 (100)	68 (100)	27 (100)	100 (100)	100 (100)
Cape Mount			16 (100)		36 (100)				
Maryland	98 (100)		29 (100)		65 (100)			100 (100)	
Nimba		94 (100)		6 (100)		30 (100)	9 (100)		100 (100)
Margibi		97 (100)		49 (100)		22 (100)	5 (100)		100 (100)
Gbarpolu		89 (100)				73 (100)	47 (75)		100 (100)

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

Plans and justification

PMI will continue to assist the NMCP in setting up a comprehensive mosquito surveillance program with fieldwork expanding to four sentinel sites. In addition, insecticide resistance testing will be conducted in the six counties not yet visited before circling back to previously visited counties, with incorporation of the CDC insecticide resistance intensity assay. Furthermore, in 2016 PMI will support two junior level vector control staff to attend an entomology training in Zimbabwe, and will support initiation of enzyme-linked immunosorbent assay testing in country in order to capitalize on the molecular training received by a senior vector control staff member in Benin in 2015. PMI will also support efforts to establish a consistent source of blood for mosquito rearing in an attempt to start a susceptible mosquito colony in the NMCP's insectary. In 2017, PMI will continue to support insecticide resistance surveillance in at least six counties. PMI will also continue to support the determination of the spatial and temporal composition and distribution of anopheline species, as well as maintain and support a functional insectary.

Proposed activities with FY 2017 funding: (\$529,000)

- *Increase NMCP entomology capacity and entomological monitoring.* PMI will provide equipment, supplies, and mentoring for NMCP entomology technicians. PMI will provide mosquito surveillance equipment to the NMCP to enable them to scale-up mosquito density, behavior, species identification, and insecticide resistance activities. Entomological monitoring will be conducted monthly in four sites and resistance testing will occur annually in at least six sites so that over the course of three years all counties in the country will be covered. PMI will also support a full-time entomologist to sit with the NMCP to help build capacity and support on-the-job training. In addition, PMI will continue to support the maintenance of the container insectary established in 2014.
 - Entomology coordinator sitting with the NMCP vector control unit (\$225,000)
 - Support for container insectary (\$100,000)
 - Entomological monitoring activities, including resistance testing at 6 sites and monthly mosquito density/behavior collections at 4 sites (\$175,000)
- 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, mosquito collection techniques, and morphological identifications. In addition, assistance with the establishment of a susceptible mosquito colony will be provided. (\$29,000)

b. Insecticide-treated nets

Progress since PMI was launched

Liberia was one of the first countries to distribute LLINs door-to-door through campaigns in combination with net "hang-up" in households. Between 2008 and 2014 nearly 4.6 million LLINs were distributed in Liberia through rolling campaigns, ANC services, and at institutional delivery, including approximately 1.7 million LLINs purchased by PMI.

Results from the 2013 Liberia DHS indicated that 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 2013⁸, indicating that even after the 2012 campaigns Liberia continued to have an LLIN access constraint, rather than an LLIN-use behavior problem.

A PMI-supported qualitative assessment of ownership of mass distribution campaign nets was conducted in 2014 to explore possible reasons for low LLIN ownership despite repeated mass 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%).

Recognizing that the LLIN distribution system in Liberia had faced significant challenges including weak tracking of net distribution by counties and sporadic coverage of districts and counties, in 2013 the NMCP opted to revise its strategy and plan its first-ever national mass LLIN distribution campaign, replacing the strategy of phased campaigns. Liberia's first nationwide mass campaign was originally scheduled for the last quarter of 2014. However, due to the EVD epidemic the campaign was delayed until April 2015.

Progress during the last 12-18 months

The EVD epidemic forced Liberia to rethink its strategy for the mass campaign, given that people would not be able to gather at central distribution points and that surveyors would not be able to enter households to do proper enumeration. Under the constraints of the EVD epidemic, the campaign employed a door-to-door strategy of supplying three LLINs per household. PMI supported campaign planning, including helping to finalize the campaign action plan, timeline, budget, and supporting tools and documents. Approximately 2.8 million nets procured by the Global Fund were distributed throughout Liberia between April and June 2015. In contrast to past distributions, there were no reports of attempted diversion. However, the timing of training was not as coordinated as it could have been, resulting in gaps of up to six weeks prior to actual distribution, and some gCHVs delivering three nets per *room* instead of the intended three per *household* in the Monrovia metropolitan area; some communities were not reached at all. PMI donated 100,000 LLINs to fill this gap, and a plan is in place to distribute LLINs to the communities that were missed during the campaign in 2016.

In addition, in 2015 PMI distributed 318,100 LLINs to 597 health facilities in all 15 counties for continuous distribution through ANC clinics and at institutional delivery. Reports on supervision of the health facility-based LLIN distribution conducted during 2015 indicated that the recording and reporting of LLINs given to beneficiaries was a challenge. Based on a review of these findings, activities going forward will focus on ensuring the following: 1) LLINs are given out 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, storage of nets

⁸ LLIN Use and Access for PMI Countries. VectorWorks/JHUCCP. April 2015.

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 forms were revised to capture institutional delivery distribution; however, the forms still need to be disseminated to the county level. Regarding supportive supervision activities for continuous LLIN distribution, 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, was formed and trained, and 172 county and district officers were trained to conduct health facility on-the-job orientations for ANC and institutional delivery staff in LLIN distribution. After orientations are conducted, beginning in May 2016, Community Health Integrated Management Teams will visit and provide monitoring reports from each health facility in their districts on continuous LLIN distribution. All counties have developed three-month monitoring plans to cover all health facilities oriented in their county.

Commodity gap analysis

Table 4: ITN Gap Analysis

Calendar Year	2016	2017	2018
Total Population	4,120,177	4,206,701	4,295,041
Continuous Distribution Needs			
Channel #1: ANC ¹	185,408	189,302	193,277
Channel #2: Institutional Delivery ²	133,906	147,235	161,064
Channel #3: TBD based on 2016 assessment	0	0	10,000
<i>Estimated Total Need for Continuous</i>	319,314	336,537	364,341
Mass Distribution Needs			
2018 mass distribution campaign	0	0	2,386,134
<i>Estimated Total Need for Campaigns</i>	0	0	2,386,134
Total Calculated Need: Routine and Campaign	319,314	336,537	2,750,475
Partner Contributions			
ITNs carried over from previous year	0	686	0
ITNs from Global Fund	0	0	2,386,134
ITNs planned with PMI funding	320,000	335,851	364,341
Total ITNs Available	320,000	336,537	2,740,475
Total ITN Surplus (Gap)	686	0	0
¹ 5% of national population pregnant in a given year with 90% ANC coverage; ² 65% pregnant women deliver in an institution for 2016; 70% for 2017 and 75% for 2018			

Plans and justification

PMI will continue to support routine distribution of LLINs by procuring LLINs to cover the entire ANC and institutional delivery need, and transporting the nets down to the county level twice a year as a national system is not yet in place to move routine LLINs to county warehouses. In addition, PMI will support distribution of nets from county warehouses to facilities across the country. In addition, PMI will provide technical support for the institutionalization and evaluation of these routine distribution methods. Specifically, PMI will look to support an update of Liberia's LLIN strategic plan to maximize continuous LLIN distribution. Furthermore, during the second half of 2016, PMI will support an assessment of the viability of additional continuous distribution channels, in particular school-based distribution in selected counties. Findings from the assessment will be shared with stakeholders at the national level, and PMI will use the results of the assessment to guide decisions on support for additional channels, including potentially piloting an additional channel in 2018.

Liberia's next LLIN mass campaign will take place in quarter one of 2018 with LLINs procured by the Global Fund. Net needs will be 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 (see SBCC section). In addition, PMI will support the monitoring of attrition and physical durability of nets distributed during the 2018 mass campaign at two sites. The 2018/19 DHS will provide coverage indicators for the campaign.

Proposed activities with FY 2017 funding: (\$2,020,600)

- Procure LLINs. PMI will procure approximately 355,000 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 2018. (\$1,216,600)
- Distribute LLINs. PMI will support routine LLIN distribution in all 15 counties, including warehousing and transportation down to the county level twice a year. In addition, PMI will support distribution down to the facility level across the country for those facilities that provide ANC services and/or institutional delivery, while providing technical assistance to the MOH to plan an eventual transition of LLINs to the national supply chain. (\$354,000)
- 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 at the end of 2016. (\$200,000)
- 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 the net durability monitoring activity. (\$200,000)
- Technical assistance for net durability monitoring. PMI will provide technical assistance for the planning and analysis of the net durability monitoring as part of the 2018 LLIN mass campaign. (\$50,000)

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 concession 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 insecticides 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, and instead focus on increased entomological monitoring and universal LLIN coverage given that even in areas of pyrethroid resistance, LLINs act as a physical barrier and the irritancy of pyrethroids on the nets may still reduce mosquito blood-feeding.

Table 5: 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		~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 2017 funding.

Proposed activities with FY 2017 funding: (\$0)

There are no PMI-supported IRS activities planned with FY 2017 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, IPTp with more than two 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 more than two 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 malaria in pregnancy 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, the actual implementation of this policy at the health facility level has not been rolled out. Treatment protocols have been updated but health workers are not yet trained, hence at health facilities, health workers continue to administer quinine to pregnant women during all trimesters for treatment of uncomplicated malaria. The plan to train, disseminate, and reproduce treatment guidelines did not happen in 2014 due to the outbreak of EVD. In May 2016 a comprehensive review was conducted to align the updated MIP and treatment guidelines plus the training material. At the end of the consultation a validation workshop was held with instructors from training institutions and heads of ANC services in the counties to ensure that the language in the protocol is simplified and comprehensible. The comments from the validation are being incorporated, and the final documents will be sent for a formal editing and formatting with a final consensus review likely in late 2016 in an effort to prevent the problem that arose in 2015 of an incorrect version of the guidelines having been printed.

In addition, 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, as well as overuse of SP as treatment by non-targeted populations. The overuse of SP as treatment for non-targeted populations was reported during supervisory visits in private health facilities in early 2014 in Margibi and Montserrado counties. SP was being prescribed not only to pregnant women during ANC, but also to patients presenting with fever in the absence of ACTs. This is not NMCP policy, and the issue is being addressed by the NMCP, which

formed a response team for mentoring and coaching visits to health facilities that receive negative feedback during supervisory visits on adherence and use of ineffective malaria treatment. In addition, discussions are ongoing between the NMCP and the National Drug Service (NDS) to extract SP from the essential medicines package and have it distributed only to those facilities offering ANC.

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. 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 has supported the training of 889 gCHVs of the 1,587 who are within USAID focus counties. Additionally, 70 community health services supervisors (CHSSs) have been recruited and will be trained. These supervisors will be equipped to reach out to communities to supervise gCHVs and eventually community health assistants (CHAs) (see case management section for more information on CHAs) to ensure a successful iCCM program. Community health services supervisors will be responsible for the transportation of commodities to gCHVs/CHAs, and they will verify these commodities in the gCHVs' ledgers, which will also contain stock balance tracking forms.

PMI supported the development of training manuals and protocols used in the training of gCHVs, as well as the training of 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, intermittent preventive treatment in pregnancy, 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's 2012 guidance. 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 supervision and monitoring and evaluation 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 year. During the 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. 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 were educated on encouraging women to demand IPTp and referring them to health facilities for delivery, while 15 reproductive health supervisors were trained on malaria in pregnancy. 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.

Table 6. Status of IPTp policy in Liberia

MIP policy updated to reflect 2012 WHO guidance	2015
Status of training on updated IPTp policy	In process
Number of health care workers trained on new policy in the last year	15 reproductive health supervisors and 900 TTMs oriented
Are the revised guidelines available at the facility level?	Yes in some facilities
ANC registers updated to capture 3 doses of IPTp-SP?	Yes
HMIS/ DHIS updated to capture 3 doses of IPTp-SP?	Yes

Commodity gap analysis

Table 7. SP Gap Analysis for Malaria in Pregnancy

Calendar Year	2016	2017	2018
Total Population	4,120,177	4,206,701	4,295,041
Total number of pregnant women targeted	206,009	210,335	214,752
SP Needs			
Total number of pregnant women attending ANC ¹	185,408	189,302	193,277
Total SP Need (in treatments)²	482,061	492,184	502,520
Partner Contributions			
SP carried over from previous year	0	0	54,687
SP from Global Fund	0	0	0
SP planned with PMI funding	477,666	546,871	450,000
Total SP Available	477,666	546,871	504,687
Total SP Surplus (Gap)	(4,395)	54,687	2,167
¹ 5% of national population pregnant in a given year with 90% ANC coverage; ² Percentage of pregnant women receiving one to four doses of IPTp is 80%, 80%, 80%, 20%, respectively			

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 malaria in pregnancy, including implementation of the new IPTp guidelines. Planned activities with FY 2017 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 2017 funding: (\$804,000)

- Procure SP treatments. PMI will procure approximately 558,000 SP treatments. (\$54,000)
- 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 support implementation of similar activities in the remaining, non-PMI supported counties. (\$450,000)
- Improve quality of care and adherence to standards for MIP in USAID focus counties. This activity is focused on strengthening quality assurance/quality improvement through technical assistance for supportive supervision and other more targeted clinical quality improvement interventions in the three USAID focus counties, Nimba, Lofa, and Bong, at the facility level for improving MIP practices. (\$100,000)
- Improve quality of care and adherence to standards for MIP in non-focus counties. This activity is focused on strengthening quality assurance/quality improvement through technical assistance for supportive supervision in Liberia's other 12 counties at the facility level for improving MIP practices. (\$200,000)

3. Case management

a. Diagnosis and treatment

NMCP/PMI objectives

The revised 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 cases with an ACT. To achieve the malaria diagnostic testing and treatment objectives of the Strategic Plan, the NMCP plans to support improvements in the 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 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) and quality microscopy at hospitals and health centers. According to the 2016 Malaria Strategic Plan, the NMCP plans to increase access to prompt and effective malaria treatment to reach 80% of children under five years of age living in hard-to-reach communities, defined as >5 km from a fixed health facility.

According to the 2015 Malaria Case Management Technical Guidelines, the recommended first-line treatment for uncomplicated malaria in children, adolescents, and adults is artesunate-amodiaquine (AS/AQ), with artemether-lumefantrine (AL) as an alternative. Oral quinine is the first-line treatment for uncomplicated malaria in the first trimester of pregnancy with use of ACTs in the second and third trimesters. For severe malaria, the 2015 revised case management guidelines recommend intramuscular/intravenous artesunate or intramuscular artemether as first-line treatments, and in their absence intravenous quinine, for all patients, including pregnant women in all trimesters. Rectal artesunate is not in the national guidelines and not used in Liberia; however, in the future, the NMCP intends on adding this to the guidelines for pre-referral treatment, at which point this would be covered under PMI-funded training. PMI is supporting finalization, printing, and distribution of the new severe malaria guidelines, in addition to updating the corresponding training materials and eventually in-service training to all health care staff on the new guidelines.

Progress since PMI was launched

PMI funded nationwide implementation of an outreach training and supportive supervision program for facility-based malaria diagnosis 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. In addition to supportive supervision, PMI has also funded microscopy training for county diagnostic supervisors and microscopists from the NPHRL.

As of 2013, malaria diagnostics and treatment drugs are provided to all public facilities and all private facilities that provide diagnostic and treatment services through a memorandum of understanding with the MOH that requires 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, the MENTOR Initiative 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 further activities are now on hold while an appropriate sub-recipient is identified to continue/expand services using Global Fund resources.

In order to increase the coverage of malaria diagnostics and treatment, in 2013 the MOH conducted a mapping of gCHVs in all 15 counties in Liberia. Based on the mapping exercise, it was determined that there were approximately 8,000 gCHVs nationwide who were tasked with providing malaria diagnostics and treatment coverage for hard-to-reach communities that are greater than 5 km from a health facility. Between 2012 and 2013, 3,727 of the gCHVs were trained in malaria case management as part of iCCM. The role of gCHVs in malaria case management is to offer ACTs upon RDT confirmation of malaria and, in the case of severe disease, referral to a higher level of care. The gCHVs also perform 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. Nationwide, in addition to gCHVs, there are 2,396 Community Health Committees and 2,022 Community Health Development Committees that were established to encourage community responsibility, ownership, and participation in health and social welfare. Currently, iCCM activities have been rolled out in 11 of the 15 counties in Liberia.

This concerted effort to improve access to malaria testing and treatment services has contributed to progress in diagnosing and treating uncomplicated malaria at the community level in hard-to-reach locations and to increased referrals of persistent febrile cases to health facilities. According to HMIS data, 80% of reported malaria cases prior to the EVD epidemic in 2014 were confirmed with a laboratory test.

Progress during the last 12-18 months

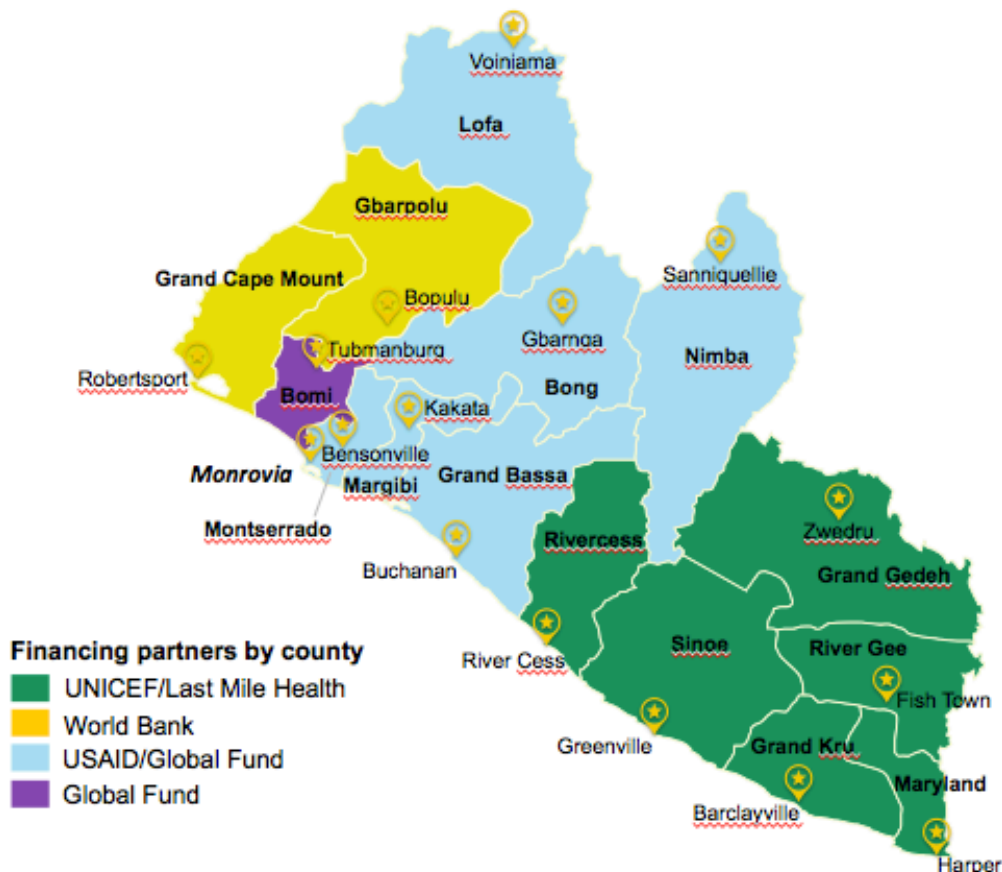
As a result of the near complete control of the EVD epidemic, basic health services are gradually being restored in most of Liberia, and malaria testing has resumed in most health facilities. Diagnostic testing and access to appropriate treatment for malaria has improved from levels seen in 2014 at the height of the EVD epidemic. PMI continues to work with the NMCP to plan for reintroduction of testing by gCHVs by providing support for training of safe practices during malaria testing. In 2015, 591 health workers in 5 southeastern counties received training, mentoring and coaching in malaria case management supported by other donors. As of 2015, there are an estimated 10,000 to 11,000 health care workers nationwide. This number includes public and private facility staff, covering both diagnostics and treatment.

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 to remunerated community health workers over the period 2015-2017. As a result, a new group of paid health workers called community health assistants (CHAs) has been introduced into the health workforce. CHAs are being recruited with certain pre-requisite 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. The duties of CHAs will include treating diarrhea and respiratory infections and conducting malaria testing and treatment of patients, while gCHVs will primarily perform community services and SBCC activities to increase uptake of prevention services for malaria and other childhood diseases. According to the MOH, CHAs will be recruited from the current cohort of gCHVs who meet eligibility criteria. In 2015, a community health policy and strategy document was developed and validated. This led to the

development of a training curriculum for CHAs and the training of 889 gCHVs in 6 counties (Bong, Lofa, Nimba, Grand Bassa, Margibi, and rural Montserrado) and 34 CHSS trained in iCCM in the 5 counties supported by UNICEF. See figure below for a mapping of CHA/iCCM support in Liberia.

There is continued improved collaboration between all the partners implementing iCCM, including a quarterly meeting led by the iCCM focal point at the NMCP. Each partner is training gCHVs in the districts where they work and these gCHVs will transition to CHAs if they meet the criteria set by the Ministry of Health. PMI will contribute to a pool of funds to support trainings of CHAs (e.g., transportation and materials) but not salaries.

Figure 2. Partners supporting CHAs and iCCM in Liberia by County



In order to improve the quality of malaria case management in Liberia, a National Quality Strategy document is being developed. This quality strategy document will guide the coordination and roll out of Quality Assurance/Quality Improvement (QA/QI) approaches for malaria case management in the third quarter of 2016 onwards, including new approaches such as improvement collaboratives, which are being prioritized by the MOH to address the lack of systems within facilities to promote mutual accountability and adherence to clinical protocols. The improvement collaboratives will be used to support planning of diagnostic quality improvements by county diagnostic supervisors, as well as to improve dissemination and use of new MIP protocols and other clinical guidelines. In addition, in order to increase the pool of qualified laboratory technicians to fill the dire need for such health workers in Liberia, 50 scholarships have been granted by USAID to individuals enrolled in laboratory technician schools in Liberia, as well as scholarships to nursing students. PMI support covers ten students.

Central level capacity strengthening for malaria diagnosis at the NPHRL/NDU and the NMCP remains a priority activity for PMI. However, a drop in the WHO certification levels for NPHRL staff and low scores for the county diagnostic officers (CDOs) was noted at a refresher training in the spring of 2014, attributed in part to a gap in training of over three years and expanded roles that reduced clinical time. Remedial actions were postponed due to bans on travel and mass gatherings associated with EVD. The next opportunity for PMI to support refresher training for these staff was not until January/February 2016, and only 13 of 15 CDOs were able to attend. The CDOs were then expected to conduct cascade training, preferentially to staff performing microscopy at hospitals and health centers. However, although five staff from the NPHRL and laboratory teaching schools reached the equivalent of WHO Level 1 microscopists, only about half of the CDOs reached the equivalent level on a revised curriculum that focused on parasite identification and density. In addition, a shortage of quality Giemsa was identified as a gap, as was the ability of CDOs to travel.

The lack of a well-characterized set of training slides has been one of the factors hampering adequate microscopy competency and training for central and county level staff. In 2015, PMI supported the procurement of a set of microscopy slides to be used in training and proficiency testing of malaria microscopists. The slide set is currently undergoing WHO validation and is expected to be available for use in late 2016. The presence of local WHO Level 1 microscopists, coupled with the expected arrival of the training slide set, will provide Liberia with the tools to address the training issues noted above. PMI is working with the MOH and other partners to develop and implement individualized plans for each county to demonstrate and maintain competence.

Malaria diagnostics had reached scale prior to the EVD epidemic with staff trained on microscopy and/or RDTs. However, high staff turnover in health facilities and a high attrition rate among gCHVs coupled with loss of large numbers of health workers during the EVD epidemic means that continued training of such staff is essential to maintain the progress made in promoting malaria testing. Investments in community health services, including iCCM, planned through PMI, Ebola Supplemental Funding, and other donors and partners seek to support MOH priorities around building up Liberia's community health workforce, including transition of qualified gCHVs to paid CHAs. 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.

The MENTOR Initiative conducted the only therapeutic efficacy study (TES) in Liberia 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." The NMCP had included support for a TES in their Global Fund Round 10 grant; however, it was not implemented before the grant's ending. Therefore, WHO identified funds for which Liberia has submitted an application to conduct a TES in late 2016.

Commodity gap analysis

Table 8: RDT Gap Analysis

Calendar Year	2016	2017	2018
RDT Needs			
Total population ¹	4,120,177	4,206,701	4,295,041
Population at risk for malaria	4,120,177	4,206,701	4,295,041
Total number of projected fever cases ²	7,614,087	7,773,983	7,937,237
Percent of fever cases confirmed with RDT	80%	80%	80%
Total RDT Needs³	4,077,344	4,229,047	4,452,790
Partner Contributions			
RDTs carried over from previous year	0	0	0
RDTs from Global Fund ⁴	1,023,270	1,680,517	0
RDTs planned with PMI funding	2,095,000	2,400,000	2,400,000
Total RDTs Available	3,118,270	4,080,517	2,400,000
Total RDT Surplus (Gap)	(959,074)	(148,530)	(2,052,790)
<p>¹The total population is at risk for malaria, 2008 population census, 2.1% population growth rate ²Assumption 3.5 fevers in under-fives (16.1%), 2.5 fevers in 5-14 year olds (29.7%), 1 fever in 15+ (54.2%); population breakdown based on 2013 DHS ³85% seek care and of these 75% seek care in the public sector (Malaria Quantification Report Dec. 2015); public sector includes private sector facilities receiving drugs from NDS; and 3, 4, and 6% of these seek care in the community for 2016 to 2018 (NMCP Quantification & costing of malaria Global Fund SAP commodities 2016); assumption that 100% of those seeking care receive a diagnostic test ⁴At the time of writing there is no estimate for Global Fund procurements in 2018</p>			

Table 9: ACT Gap Analysis

Calendar Year	2016	2017	2018
ACT Needs			
Total population ¹	4,120,177	4,206,701	4,295,041
Population at risk for malaria	4,120,177	4,206,701	4,295,041
Total projected number of malaria cases ²	3,281,291	3,393,149	3,552,112
Total ACT Needs³	3,457,976	3,575,857	3,743,379
Partner Contributions			
ACTs carried over from previous year	0	0	0
ACTs from Global Fund ⁴	655,067	1,062,652	0
ACTs planned with PMI funding	2,534,394	1,900,000	1,800,000
Total ACTs Available	3,189,461	2,962,652	1,800,000
Total ACT Surplus (Gap)	(268,515)	(613,205)	(1,943,379)
¹ The total population is at risk for malaria, 2008 population census, 2.1% population growth rate ² Assumption 3.5 fevers in under-fives (16.1%), 2.5 fevers in 5-14 year olds (29.7%), 1 fever in 15+ (54.2%); population breakdown based on 2013 DHS; 85% seek care and of these 75% seek care in the public sector (Malaria Quantification Report Dec. 2015); public sector includes private sector facilities receiving drugs from NDS; assumption that 100% of those seeking care receive a diagnostic test; and 3%, 4%, and 6% of these seek care in the community from 2016 to 2018 (NMCP Quantification & costing of malaria Global Fund SAP commodities 2016); 65% of tested fevers are positive for malaria (Malaria Quantification Report Dec. 2015); note that cases are increasing due to population growth and that any effects of increasing ITN coverage were not factored into these calculations. ³ Total ACT needs include malaria cases plus 10% noncompliance (negative cases still treated with ACTs) (Malaria Quantification Report Dec. 2015) ⁴ At the time of writing there is no estimate for Global Fund procurements in 2018			

Plans and justification

With FY 2017 funding, PMI will provide support for laboratories in Liberia, especially the NPHRL, and in collaboration with the Global Fund, will work to strengthen the diagnostic capacity of the MOH at the central and county levels through continued capacity strengthening for training and supervision that will ensure continuous quality improvements in malaria diagnostic testing. For malaria diagnostics, the program plans to provide continuous training to improve the competency of at least one county diagnostics supervisor for each of the 15 counties (two 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 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 USAID focus counties, as well as the remaining 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 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. 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 plan to procure RDTs and ACTs to help fill Liberia's needs in coordination with the Global Fund. Although there are challenges with timely arrival of Global Fund commodities, PMI will work with the NMCP and Global Fund to ensure that the RDT and ACT needs for 2017 and 2018 are met in the NMCP's revised procurement and supply management plan to be submitted during 2016. PMI will also procure medications for treatment of severe malaria.

PMI and WHO resources will support a TES with WHO (two sites) supporting 2016 activities and PMI (two sites) support planned for 2017, splitting the number of sites between the two years.

Proposed activities with FY 2017 funding: (\$5,369,854)

- Procurement of RDTs. Liberia relies entirely on the Global Fund and PMI to provide RDTs for public facilities and private sector facilities that get their supplies through the NDS and report via the HMIS, as well as iCCM providers. PMI-procured RDTs will help fill any remaining gap or strategically bridge transitions in Global Fund mechanisms and procurements. In FY 2017, PMI will procure approximately 2.4 million RDTs. (\$1,320,000)
- Procure laboratory supplies. PMI will procure quality laboratory supplies, including Giemsa stain, slides, slide boxes, bulbs, and replacement parts for microscopes in health facilities across the country or 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 gCHVs and CHAs. Funds under this activity will also be used to support work in collaboration with Global Health Security activities to transport slides to the NPHRL for reference purposes. (\$100,000)
- Procure ACTs. PMI will assure continuity of operations by procuring approximately 1.8 million ACT treatments for the public sector, community case management providers, and private sector facilities in 2018. Based on the Global Fund's planned procurements, PMI-procured ACTs will be programed to overcome predicted gaps and bridge transitions in Global Fund procurements. (\$1,124,854)
- Procure severe malaria medications. PMI will procure parenteral medicines to treat severe malaria cases. PMI will procure a higher proportion of injectable artesunate—as opposed to IM artemether or IV quinine. (\$200,000)

- Central and facility level capacity development and supportive supervision. 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 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 for facility-based health workers 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. (\$550,000)
 - Technical assistance for capacity development and supportive supervision for malaria case management at the central level and in Bong, Lofa, and Nimba Counties. This activity includes effective training and supportive supervision at the county and facility level for improving malaria diagnostics and case management. (\$300,000)
 - Technical assistance for capacity development and supportive supervision for malaria case management in the 12 non-USAID focus counties. (\$400,000)
- Capacity development of community-based health workers in prompt and appropriate treatment of malaria and technical assistance for iCCM scale-up.
 - Capacity development and support to the NMCP through a FARA to provide iCCM through service delivery partners in Bong, Lofa, and Nimba Counties. (\$400,000)
 - Technical assistance to expand iCCM in Grand Bassa, Margibi, and rural Montserrado, and complement by filling gaps not covered by FARA partners or Global Fund in Bong, Lofa, and Nimba. This support will be provided to the MOH at the central and county levels to fund iCCM scale up through grants to NGOs. (\$800,000)
- Human resource capacity building for malaria diagnosis
 - Support the laboratory/diagnostic training costs for at least ten pre-service training students or in-service training for laboratory assistants to obtain laboratory technician certification. (\$15,000)
- Support for strengthening malaria case management and diagnosis in private sector facilities.
 - Technical assistance to expand malaria diagnosis and treatment at private sector health facilities nationwide. (\$150,000)
- Technical assistance for malaria diagnostics. CDC will provide technical assistance to the NMCP and the NDU/NPHRL 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 MOH, through the NMCP, continues to collaborate with PMI and other partners in demonstrating its commitment to maintain an effective and functional supply chain system for the distribution of health commodities.

Progress since PMI was launched

The 10-year Supply Chain Master Plan (SCMP), developed in 2010, integrated all pharmaceutical logistics into a single system to ensure transparency and responsiveness. Significant progress has been made toward scaling up access to antimalarial drugs and other commodities nationally, and a national LMIS has been established. Following the pilot of an 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. Assessed in 2015 with technical assistance from PMI, this “top-up” delivery system has improved the availability of malaria and other health products; increased availability of logistics data for decision-making (including forecasting and quantification) and monitoring and evaluation through the routine conduct of end-use verification (EUV) surveys; and, received broad support and participation amongst diverse in-country stakeholders of the health sector. The 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 NDS. Lingering challenges continue to affect the collection, analysis and interpretation of data through the LMIS. PMI continues to provide technical assistance to support the MOH to review and improve the LMIS to ensure greater availability and utilization of supply and logistics data.

The Liberia Medicines and Health Products Regulatory Authority (LMHRA), established with support from PMI in 2010, has been addressing the problem of drug quality. Significant quantities of poor quality medicines have been removed from commercial medicine stores and pharmacies and destroyed by the LMHRA following quality control testing. 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 LMHRA, working alongside law enforcement agencies, has also been supportive in removing diverted drugs and health commodities found in commercial medicine stores and pharmacies that are donated by donors and partners that should not be on the retail market. These commodities are returned to the NDS for redistribution to public health facilities across Liberia.

Progress during the last 12-18 months

The 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. Through the interim approach, PMI-supported distribution of malaria commodities in five counties (Bong, Nimba, Lofa, Margibi and Montserrado), while Global Fund supported distribution in

the remaining 10 counties. The interim approach was evaluated in August 2015 and provided the GOL and partners the opportunity to analyze the existing situation evolving around supply chain management and determine the best option for implementing supply chain activities that ensures the supply chain system in Liberia has adequate infrastructure and systems in place to identify, document, monitor, and report inventory movement and health commodity transactions. Key findings from the evaluation revealed a significant increase in the availability of malaria and other health products from approximately 28% to approximately 70%; however, intermittent stockouts persist particularly at clinics. This was primarily due to the over-supply or under-supply of products to clinics owing to the failure of delivery teams to fully adhere to order fulfillment guidelines and the insufficiency of consumption data. A cost analysis of the interim approach also revealed that approximately \$2 million was spent to resupply health commodities to all of Liberia's 15 counties from October 2013 to June 2015. The key cost drivers included facility staff time, distribution costs, and NDS operational costs. With transport cost declining over time coupled with an improvement in logistics performance over the same period, the interim approach was assessed to have been efficient and effective in improving stock availability at facilities for an estimated \$0.15 for the delivery of every dollar worth of commodity procured, which is in line with international norms. Following a review of the interim approach evaluation by the MOH, PMI expressed support for a MOH initiative, leveraging other donor financing, to design an outsourcing model for NDS operations via a management contractor to support internal financial management and procurement systems. In 2016, PMI provided technical assistance for the development of terms of reference for an initial three-year outsourcing period, while the new NDS warehouse jointly financed by PMI and the Global Fund is being constructed.

Monthly stock balance reports produced by the NDS remain sporadic due to capacity and logistical challenges. PMI supported technical assistance to the NDS by embedding a warehouse advisor to ensure accountability for PMI's commodities and assist with NDS operations. PMI supported revision of the LMIS in 2015. The revised tool has been piloted in selected counties and is being rolled out to the all health facilities in Liberia for improved data collection and increased reporting. In addition, a review of the national forecast and quantification for malaria commodities was conducted, providing an updated supply and procurement plan for antimalarials through 2017, with consideration of storage and pharmaceutical managerial capacities.

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. 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 are also priorities. Equally critical to pharmaceutical management is the development of dedicated county-level supply chain management capacity within county health teams to effectively coordinate the planning, supply, and distribution of health commodities between NGOs operating in the counties and the NDS, and to monitor stock levels to ensure full availability of commodities nationwide.

PMI has provided support for training and equipment to build the capacity of the quality control laboratory of LMHRA (LMHRA-QCL). The LMHRA-QCL has established an action plan to obtain International Standards Organization 17025 certification and has completed over 39 standard operating procedures in the process. With PMI support, the QCL participated in an international proficiency-testing program achieving a number 1 status of all participating laboratories. In the past year, 40 new regulatory actions were taken against drug vendors (wholesalers and retailer) based on drug quality information provided by the QCL. These actions have led to the seizure of sub-standard antimalarial

drugs by law enforcement agents. Within the past year, with PMI support, two staff members of the LMHRA have received training on dossier evaluation at the US Pharmacopeia Center for Pharmaceutical Advancement and Training in Ghana.

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 SCMU and the Global Fund. 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. PMI will also continue its support for system-wide efforts to maintain the revised supply chain distribution system following the interim approach, and a revised LMIS system aimed at providing more reliable routine reporting data.

Proposed activities with FY 2017 funding: (\$1,300,000)

- Support the LMIS. Implement the revised LMIS and improve the availability and use of consumption data at the county and facility levels. (\$100,000)
- Strengthen supply chain management (central level). Support new NDS warehouse operations, ongoing mentoring to the SCMU to oversee the NDS and other supply chain activities, distribution of malaria commodities, supervision, forecasting, and quantification in line with the revised SCMP. (\$450,000)
- Strengthen supply chain management (county/district). Expand support to county depots and CHTs to rationalize commodity management, storage, supervision, distribution, and reporting in line with the SCMP. Support the distribution of malaria commodities under the revised SCMP. (\$450,000)
- Monitor antimalarial drug quality and support regulation and rational use of pharmaceuticals. PMI will help strengthen LMHRA, Pharmacy Board, and the MOH systems for pharmaceutical regulations, including support for post-market surveillance and antimalarial drug quality testing. This activity will be nationwide and will work to strengthening existing Medicines Regulatory Authorities at the county level and establishment of regulatory authorities in counties with none. At the central level, support to LMHRA will include training of monitoring and quality management teams. (\$300,000)

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 County Health Teams 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 Ministry of Health, 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 from 2008 to 2014 to build the capacity of the NMCP and counties for management of service delivery has helped to achieve 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 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. Qualitative findings highlighted variability across counties and operating units, but also substantial progress in most system functions.

Progress during the last 12-18 months

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 public financial management in county health teams. 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 has undertaken 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.

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. A national health information strategy was developed and the USG 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 USG health information systems interventions at the county level. A new design for the national LMIS was also developed, which will be rolled out over the coming year in collaboration with Global Fund resources.

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 malaria interventions. PMI also provided significant support and technical input for development of the new Global Fund malaria/health systems strengthening grant proposal submitted in 2016.

Plans and justification

With FY 2017 funding PMI will support two long-term technical assistance positions in order to sustain and further improve the NMCP's technical, as well as management and oversight capacity. One of these positions will have a focus on improving SM&E skills for data analysis and use (see SM&E section), while the other will focus on a different technical area (e.g., case management). In addition, PMI will provide support to the central MOH/NMCP and community health teams 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 involved in post-EVD health system recovery efforts to leverage health system infrastructure and capacity building investments where possible.

Table 10: Health Systems Strengthening Activities

HSS Building Block	Technical Area	Description of Activity
Health Services	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 malaria treatment guidelines
Health Workforce	Health Systems Strengthening	Build, through training and technical assistance, host country managerial and leadership capacity for effective malaria control
Health Information	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
		Support implementation of the updated LMIS and national plans to design an eLMIS system in the coming years
		Support monitoring of commodity availability at health facilities through EUV surveys
Essential Medical Products, Vaccines, and Technologies	Pharmaceutical Management	Support improved forecasting, procurement, quality control, storage and distribution of malaria commodities, such as insecticide-treated nets, artemisinin-based combination therapies and rapid diagnostic tests
		Strengthen the regulatory environment for pharmaceutical management and routine monitoring of drug quality
Leadership and Governance	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 Country Health Teams

Proposed activities with FY 2017 funding: (\$550,000)

- Technical assistance to strengthen the malaria technical capacity of the NMCP. PMI will support long-term technical assistance to strengthen the NMCP's technical capacity (e.g., in malaria case management) by embedding a mentor within the NMCP. (\$200,000)
- Support for strengthening MOH 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. In addition, PMI will support NMCP staff technical capacity building (including attendance at international meetings and training courses), as well as updating/renovations for new NMCP office space. (\$350,000)

5. Social and behavior change communication

NMCP/PMI objectives

Liberia's 2016-2020 NMSP has been finalized and the Malaria Communication Strategy has been revised. 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 fever is tested and receives an ACT within 24 hours if positive for malaria, that pregnant women receive two 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.

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.⁹ 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. This is a key achievement given that the last strategy was finalized in 2005. 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.

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, innovative 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.

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;

⁹ 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.

- 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.

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:

- Evidence-based decision-making;
- Strategic selection of priorities; and
- Integrated, context-appropriate and gender sensitive approaches

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 Community Health Assistants (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, Community Health Services Division, NMCP, and National Health Promotion Department. 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 5 years of age.

Proposed activities with FY 2017 funding: (\$950,000)

- Interpersonal communication and SBCC. PMI will support the implementation of integrated interpersonal communication activities, including health care worker training, to promote all aspects of malaria interventions in Bong, Nimba, Lofa and Montserrado. (\$400,000)
- Support for SBCC through community health services interventions/interpersonal communication; TA for mass media communications. PMI will support training of gCHVs and TTMs in interpersonal communication messaging in alignment with Liberia’s revised SBCC strategy for all malaria interventions, including a focus on SBCC for LLINs, iCCM, and testing prior to treatment. Messages will be in local languages and tailored for various locations/groups.
 - At the central level and in Grand Bassa, Margibi, rural Montserrado, Bong, Nimba, and Lofa Counties. (\$200,000)
 - In nine non-USAID focus counties. (\$250,000)
- Support for SBCC for 2018 mass LLIN campaign. Support for SBCC pre, during, and post 2018 mass campaign with Global Fund procured nets. (\$100,000)

6. Surveillance, monitoring, and evaluation

NMCP/PMI objectives

The NMCP is finalizing its 2016–2020 SM&E plan to accompany the revised NMSP. The draft SM&E plan is currently being vetted with stakeholders. The goal of the NMCP’s 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.¹⁰ 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 Department at the MOH. Coordination occurs through 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 will include the routine health information system, periodic household and facility surveys, and activity reports from the implementing partners, in addition to activities to monitor specific malaria interventions.

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 two MIS surveys (MIS 2009 and MIS 2011) to track the coverage of malaria interventions and malaria parasitemia and contributed to one DHS (DHS 2013). PMI has been supporting the 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

¹⁰ Republic of Liberia Ministry of Health National Malaria Control Program M&E Plan 2016-2020. Scaling up for Impact. Draft November 2015.

through the HMIS, based on a (District Health Information Software 2) DHIS2 platform, at the health facilities through the county level and finally to the national level. Global Fund also supports data audits and validation activities.

The MOH has a fully integrated computerized HMIS based on data collected manually from health facilities through the CHTs 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. Approximately 200 private facilities treated and reported on malaria as of 2015. These private facilities receive SM&E supportive supervision visits. During the supportive supervision visits to all facilities visited by the SM&E team, data collection and reporting is addressed. These visits include data verification and stock status review.

PMI supported sentinel sites up until 2010 to track trends in malaria morbidity and mortality. Global Fund support will be used to establish new sentinel sites (one per region). Two sentinel sites were established in 2015 and three more health facilities have been assessed to be included as sentinel sites for a total of five. In this context sentinel sites refers to special support to facilities to improve their ability to report via the DHIS2 system. The data collected is at the aggregate level (e.g., total number tested and total positives treated for malaria).

Progress during the last 12-18 months

PMI contributed to the MOH's review of the HMIS system in March 2014. The process included a review of the indicators and revision of the recording and reporting instruments. The first step in the review process was to review the national list of indicators with each division, including the NMCP, and data users at central and county levels. In April 2014, a national stakeholder meeting was convened where the revised list of indicators was presented to all users to provide feedback. The second step in the process was to review the current HMIS reporting and recording forms in light of the revised list of indicators. 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 expected to be completed by the end of 2016. PMI, as part of USAID's integrated health systems strengthening program, supported the embedding of health information system advisors in Bong, Lofa, and Nimba, as well as a health information system advisor at the central MOH, to support capacity-building in HMIS to improve data quality, availability and use. The MOH's integrated Human Resource Information System was also rolled out nationwide in 2016, and the USG 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 M&E 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 rolled out the policy of decentralizing service delivery to the district level. This new approach is aimed at setting up district health teams that will provide oversight and supervision at the facility and community levels. The district health teams will have data management units that will collect, collate and analyze data for their decision-making; and also transmit electronic reports to the county and national levels using the DHIS2 platform. This system will improve

timely reporting and provide coaching and mentoring capacity to health facilities and community level staff on a regular basis. In addition, it will support the NMCP M&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. Through PMI support, SM&E mentors are assigned to several of the counties to support the CHT and DHT M&E officers and data managers.

The HMIS currently does not collect data from gCHVs. In 2013, the MOH with support from PMI and USAID began designing a community-based information system (CBIS) that will be integrated with the current facility-based HMIS. The EVD crisis resulted in delays in implementing CBIS, though it has now emerged as a priority for post-EVD health service restoration and is expected to be finalized and rolled out as part of the launch of the Community Health Strategy in June of 2016. The gCHVs will submit the reports to the CHSSs who will aggregate them at the health facility level and submit them to the CBIS.

Planning for the 2016 MIS is underway and the pre-test is expected to begin in June 2016 with the survey field work scheduled for September 2016. This survey was originally scheduled for 2015 but was delayed because of the EVD epidemic. The PMI-supported malaria impact evaluation is also underway. The evaluation will assess the impact of the NMCP and partners' malaria control efforts on malaria morbidity and mortality and all-cause mortality between 2005–2013. A stakeholder meeting was held in November 2015 to review the methods and design and a final report is expected by the end of 2016.

In partnership with the NMCP and the SCMU, PMI has supported 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 facility visits to the production of the final report and includes a follow-up plan to correct any problems found. Follow-up actions have included emergency procurements, training of health workers, and facilitating requisitions. The latest EUV survey in January 2016 was being combined with data collection for verification of the implementation of the “interim approach” for the supply chain given the reporting needs overlapped. This EUV survey indicated that 8–11% of health facilities were stocked out of AS/AQ, depending on the presentation, 5% were stocked out of RDTs and 18% were stocked out of SP on the day of visit.¹¹

Despite a sound SM&E vision, the MOH and NMCP have had problems implementing their routine systems, such as the HMIS, because of limited technical capacity, funding, oversight, and turnover of health facility staff. This has resulted in issues with the quality, timeliness, and completeness of the data and the system is still primarily used for the creation of required reports and underutilized for surveillance, supportive supervision, monitoring, and planning. PMI is continuing to provide support to strengthen the collection, reporting, and use of HMIS data. The DHIS2 software is available and SM&E staff members are in place in all county health offices, both of which present opportunities for improving the quality and use of data reported through the HMIS system. Reporting dipped significantly through November 2014 because of EVD but is recovering, as is the entire health system. Reporting is a key portion of a resilient health system thus there are a variety of partners, particularly USAID and World Bank, who are working specifically on improving reporting at a general high level (e.g., enhanced internet capacity) all the way to the data entry person.

¹¹ PMI End-Use Verification Liberia January 2016. USAID/Collaborative Support for Health (CSH) Project.

To build capacity of the NMCP SM&E staff, PMI provided support for the NMCP M&E research focal point to attend the SM&E training in Ghana in 2015. An additional M&E focal point each from the NMCP and MOH were supported by other partners to attend the training.

The table below summarizes the available data sources and assessments since 2010 and planned activities through 2018.

Table 11. Surveillance, Monitoring and Evaluation Data Sources

Data Source	Survey Activities	Year								
		2010	2011	2012	2013	2014	2015	2016	2017	2018
Household surveys	Demographic Health Survey (DHS) ^a				X					(X)
	Malaria Indicator Survey (MIS)		X					X		
	National census ^a									(X*)
Health Facility and Other Surveys	Health facility survey				X*				(X*)	
	HMIS assessment—PRISM ^b			X		X				
	SARA survey							X*		
	EUV survey	X	X	X	X	X	X	X	(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*)	(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
^aThe 2018 census will inform the 2018/19 DHS sampling
^bPerformance of Routine Information System Management—Bong, Lofa, Nimba and Grand Bassa Counties

Table 12. Routine Surveillance Indicators for 2015

Indicators	Value	Comments
1. Total number of reported malaria cases Data source: HMIS	1,256,068	
Total diagnostically confirmed cases	931,086	
Total clinical/presumed/unconfirmed cases	324,982	The proportion of cases presumptively treated had been steadily declining (only 8% in Montserrado, 16% outside of Montserrado from January to June) until mid-2014. With the arrival of EVD, absolute numbers of cases reported from health facilities decreased, the proportion of positive RDTs increased (from 49% in the first half of the year to 69% in the second half), and the proportion of cases presumptively treated doubled. The proportion of cases presumptively treated and the proportion of RDTs that are positive steadily declined in 2015, while the number of cases reported from facilities increased concomitant with increased attendance. Note a universal LLIN distribution occurred mid- 2015.
2. Total number of reported malaria deaths Data source: HMIS		
Aggregate “malaria” deaths	1,397	
3. Malaria test positivity rate Data source: HMIS	0.64	
Numerator: Number of confirmed malaria cases	931,086	Reported as an aggregate of all cases, inpatient and outpatient
Denominator: Number of patients receiving a diagnostic test for malaria (RDT or microscopy)	1,456,110	
4. Completeness of monthly health	73%	

facility reporting Data source: HMIS		
Numerator: Number of monthly reports received from health facilities	3,847	Through August 2015
Denominator: Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered)	5,288	Through August 2015

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 will also be used to establish up to 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 going on in Liberia. In addition to supporting embedded advisors at the central MOH and CHTs focused on health information systems, PMI will provide support to the NMCP by embedding a long-term technical assistant SM&E advisor at the NMCP starting in May 2016.

Proposed activities with FY 2017 funding: (\$1,100,000)

- Strengthening data collection and dissemination for decision-making (national level). The goal of this activity is to improve the collection, reporting, and use of various sources of data including household survey data, HMIS data, implementing partner data, and health facility survey data for decision-making at the national level by the MOH and NMCP. Support will also be provided to strengthen malaria reporting in DHIS2 and to improve translation of HMIS data to strengthen malaria programming 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 in Bong, Lofa, and Nimba Counties. There is a need for the CHTs to analyze the monthly HMIS data and use it to track trends in malaria indicators and properly respond. This funding will contribute to the

planned embedded technical assistance (SM&E mentors) in the county health teams to ensure that malaria cases and deaths are properly tracked from the health facility level to the county level and to support the county health team to analyze and use the data on malaria trends in responding to changes in the number of malaria cases and planning commodity needs. This activity will also link with the recording of community data from gCHVs 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. (\$100,000)

- 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. Resources will be provided for technical assistance and to support visits by the MOH and NMCP to the remaining 12 counties, which are, with the exception of Montserrado where the MOH is located, much less populated, at which lessons learned from the three counties above will be shared with the respective county health teams as part of on-site supportive supervision. (\$250,000)

Long-term technical assistance for SM&E at the NMCP. PMI will support an SM&E technical advisor embedded at the NMCP to assist with data analysis and data use, SM&E capacity building at the NMCP and SM&E training. This will be the third year of funding for this LTTA and will be dependent on a continued need after the first two years. (\$390,000)

- Support for the malaria module in the 2018/19 DHS. 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 support the malaria module in the next DHS. (\$200,000)
- End-use verification (EUV) survey. PMI will provide resources to implement the EUV survey on a quarterly basis in five 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)
- Technical Assistance. CDC will conduct one technical assistance visit to support the NMCP on SM&E activities. (\$10,000)

7. Operational research

Table 13. PMI-funded Operational Research Studies

Completed OR Studies			
Title	Start date	End date	Budget
Field Testing of Dried Malaria-Positive Blood as Quality Control Samples for Malaria RDTs.	June 2013	December 2013	\$10,895*
Ongoing OR Studies			
Title	Start date	End date	Budget
None			
Planned OR Studies FY 2017			
Title	Start date (est.)	End date (est.)	Budget
None			

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

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, the MENTOR Initiative is completing 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 2017 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 has been finalized and will be shared with the NMCP and NDU/ NPHRL. Data from this study and a similar study conducted in Benin will be combined into a single manuscript for publication in a peer-reviewed journal.

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.

Plans and justification

There are no PMI-supported operational research activities planned with FY 2017 funding.

Proposed activities with FY 2017 funding: (\$0)

There are no PMI-supported operational research activities planned with FY 2017 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 2017 funding: (\$1,376,546)

- 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 (\$525,000)
 - USAID resident advisor, FSN(s) and USAID/Liberia Mission-wide costs (\$851,546)

Table 1: Budget Breakdown by Mechanism**President's Malaria Initiative – Liberia
Planned Malaria Obligations for FY 2017**

Mechanism	Geographic Area	Activity	Budget (\$)	%
CDC	Nationwide	Technical assistance for M&E, malaria diagnostics, and vector control	49,000	0.4%
CSH	Central, Bong, Lofa, Nimba	Improve quality of care and adherence to standards for MIP; support monitoring and strengthening of diagnostics QA/QC system; support strengthening malaria case management; support use of consumption data at county and facility level; strengthening pharmaceutical regulation and NMCP and CHT capacity for program management; strengthening data collection and use at the central and county levels; end-use verification	815,000	5.8%
FARA	Central, Bong, Lofa, Nimba	Capacity development and supportive supervision for malaria diagnostics, in-service supervision and training at ANC facilities, capacity development of facility-based and community-based health workers in malaria treatment, interpersonal SBCC	1,800,000	12.9%
GHSC-PSM	Nationwide	Procurement of LLINs, ACTs, severe malaria drugs, RDTs, and laboratory supplies; distribution of LLINs; supply chain management support	5,269,454	37.6%
IRS TO6	Nationwide	Increase NMCP entomology capacity and entomological monitoring	500,000	3.6%
Liberia Strategic Analysis	At selected sites	Net durability monitoring	200,000	1.4%
MEASURE Evaluation	Nationwide	LTTA for M&E at NMCP	390,000	2.8%
PACS	Central, Bong, Lofa, Nimba, Margibi, Grand Bassa, rural Montserrado	Technical assistance for iCCM scale-up and support for SBCC	1,000,000	7.1%
PQM	Nationwide	Monitoring of antimalarial drug quality	300,000	2.1%
TBD	Nationwide	Technical assistance to strengthen technical capacity of NMCP; DHS	400,000	2.9%

		2018/9		
TBD – Case management	Nationwide	Technical assistance for capacity development and supportive supervision for malaria laboratory diagnosis and case management	300,000	2.1%
MCSP	12 non-USAID focus counties	Improve quality of care and adherence to standards for MIP; support monitoring and strengthening of diagnostics QA/QC system and malaria case management; support iCCM scale up and strengthening malaria case management in the private sector; support for SBCC; strengthening data collection and use at the county level	1,250,000	8.9%
USAID/CDC	Nationwide	In-country staffing and administration	1,376,546	9.8%
VectorWorks	Nationwide	Technical assistance for continuous distribution and 2018 mass campaign planning	350,000	2.5%
Total			14,000,000	100%

Table 2: Budget Breakdown by Activity

**President's Malaria Initiative – Liberia
Planned Malaria Obligations for FY 2017**

Proposed Activity	Mechanism	Budget		Geographical area	Description
		Total \$	Commodity \$		
PREVENTIVE ACTIVITIES					
VECTOR MONITORING AND CONTROL					
Entomological monitoring and insecticide resistance management					
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
Subtotal Ento monitoring		529,000	0		
Insecticide Treated Nets					
Procure LLINs	GHSC-PSM	1,216,600	1,216,600	Nationwide	Procure about 365,000 LLINs for routine distribution (ANC and institutional delivery)
Distribute LLINs	GHSC-PSM	354,000	0	Nationwide	LLIN distribution (including warehousing and transportation down to county level at an average cost of about \$1 per net)

Technical assistance for continuous distribution	VectorWorks	200,000	0	Nationwide	Assistance for institutionalization of LLIN distribution at health facilities
Net durability monitoring	Liberia Strategic Analysis	200,000	0	At selected sites	Monitor attrition and physical durability of nets distributed during the 2018 mass campaign at two sites
Technical assistance for net durability monitoring	VectorWorks	50,000	0	At selected sites	Assistance for planning and analysis of durability monitoring
Subtotal ITNs		2,020,600	1,216,600		
Indoor Residual Spraying					
Subtotal IRS		0	0		
SUBTOTAL VECTOR MONITORING AND CONTROL		2,549,600	1,216,600		
Malaria in Pregnancy					
Procure SP	GHSC-PSM	54,000	54,000	Nationwide	Procure about 558,000 SP treatments
In-service training and supervision for health care workers at ANC facilities	FARA	450,000	0	Bong, Nimba, Lofa	At the facility level continue in-service training and supervision of health workers for malaria in pregnancy; community outreach

Improve quality of care and adherence to standards for MIP	CSH	100,000	0	Bong, Nimba, Lofa	Strengthen QA/QC and quality improvement through technical assistance for supportive supervision at county and facility level for improving MIP practices
Improve quality of care and adherence to standards for MIP	MCSP	200,000	0	12 non-USAID focus counties	Strengthen QA/QC and quality improvement through technical assistance to enable effective training and supportive supervision at county and facility level for improving MIP practices; also support for health worker interpersonal communication
SUBTOTAL MIP		804,000	0		
SUBTOTAL PREVENTIVE		2,824,600	1,216,600		
CASE MANAGEMENT					
Diagnosis & Treatment					
Procurement of RDTs	GHSC-PSM	1,320,000	1,320,000	Nationwide	Procure approximately 2.4 million RDTs to help fill gap
Procure laboratory supplies	GHSC-PSM	100,000	100,000	Nationwide	Procure laboratory supplies, including reagents, for health facilities and national reference lab
Procure ACTs	GHSC-PSM	1,124,854	1,124,854	Nationwide	Procure approximately 1,800,000 ACT doses for public and private facilities and community treatment

Procure severe malaria medications	GHSC-PSM	200,000	200,000	Nationwide	Procure treatments for severe malaria (e.g. injectable artemether and/or injectable artesunate)
Capacity development and supportive supervision for facility-based health workers in malaria diagnosis and in prompt and appropriate treatment of malaria	FARA	550,000	0	Bong, Nimba, Lofa	Continue support to health facilities for early and accurate diagnosis of malaria cases and appropriate and prompt treatment
Technical assistance for capacity development for malaria laboratory diagnosis and supportive supervision for malaria case management	TBD - Case management	300,000	0	Central, Bong, Lofa, Nimba	Enable effective training and supportive supervision at county and facility level for improving malaria laboratory diagnostics and case management
Technical assistance for capacity development for malaria laboratory diagnosis and supportive supervision for malaria case management	MCSP	400,000	0	12 non-USAID focus counties	Strengthen QA/QC and quality improvement through technical assistance to enable effective training and supportive supervision at county and facility level for improving malaria diagnostics and case management
Support capacity development of community-based health workers in prompt and appropriate treatment of malaria	FARA	400,000	0	Bong, Nimba, Lofa	Continue support for appropriate and prompt treatment and early referral of malaria cases, with an emphasis on iCCM

Technical assistance for iCCM scale-up	PACS	800,000	0	Central, Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	Support MOH at central and county level to scale up iCCM, and support service delivery grants to civil society organizations to accelerate scale-up
Human resource capacity building for malaria diagnosis	CSH	15,000	0	Nationwide	Support the laboratory/diagnostic training costs for at least ten students to complete lab tech certification (nationwide placement)
Technical assistance to support supervision for private sector health facilities	MCSP	150,000	0	Nationwide	Support for strengthening malaria case management in the private sector facilities
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
Subtotal Diagnosis & Treatment		5,369,854	2,744,854		
Pharmaceutical Management					
Support the LMIS	CSH	100,000	0	Nationwide	Implement revised LMIS and improve availability and use of consumption data at county and facility level
Strengthen supply chain management (central level)	GHSC-PSM	450,000	0	Nationwide	Support new NDS warehouse operations, ongoing mentoring to SCMU, supervision, forecasting, and quantification in line with revised SCMP

Strengthen supply chain management (county/district level)	GHSC-PSM	450,000	0	Bong, Nimba, Lofa, Margibi, Montserrado	Expand support to county depots and CHTs to rationalize commodity mgmt, storage, supervision distribution, and reporting in line with revised SCMP
Monitor antimalarial drug quality and support regulation and rational use of pharmaceuticals	PQM	300,000	0	Nationwide	To help strengthen LMHRA, Pharmacy Board & MOH systems for pharmaceutical regulation, including antimalarial quality testing and sampling
Subtotal Pharmaceutical Management		1,300,000	0		
SUBTOTAL CASE MANAGEMENT		6,669,854	2,744,854		
HEALTH SYSTEM STRENGTHENING/CAPACITY BUILDING					
Technical assistance to strengthen malaria technical capacity of NMCP	TBD	200,000	0	Central	LTTA to strengthen NMCP's technical capacity (e.g., case management)
Support for strengthening NMCP and CHT technical capacity and program management	CSH	350,000	0	Central, Bong, Nimba, Lofa	Support to the central MOH/NMCP and CHTs to strengthen crosscutting health systems functions to improve management & governance of the health system, and support decentralization; support NMCP staff technical capacity building (including attendance at international meetings and training courses); support updating/renovations for new NMCP office

SUBTOTAL HSS & CAPACITY BUILDING		550,000	0		
SOCIAL AND BEHAVIOR CHANGE COMMUNICATION					
Interpersonal communication and SBCC	FARA	400,000	0	Bong, Nimba, Lofa	Implement integrated interpersonal communication activities, including health care worker training, to promote all aspects of malaria interventions
Support for SBCC through community health services interventions / interpersonal communication; TA for mass media communications	PACS	200,000	0	Central, Bong, Nimba, Lofa, Margibi, Grand Bassa, rural Montserrado	Disseminate messaging for all malaria interventions, including a focus on SBCC for LLINs, iCCM, and testing prior to treatment
Support for SBCC through community health services interventions / interpersonal communication at the community and health facility level	MCSP	250,000	0	9 non-USAID focus counties	Disseminate messaging for all malaria interventions, including a focus on SBCC for LLINs, iCCM, and testing prior to treatment, including private sector; includes a focus on interpersonal communication at health facility level
Support for SBCC for 2018 mass campaign	VectorWorks	100,000	0	Nationwide	Support for SBCC pre, during, and post 2018 mass campaign
SUBTOTAL SBCC		950,000	0		
SURVEILLANCE, MONITORING, AND EVALUATION					

Strengthen data collection and dissemination for decision making (national level)	CSH	50,000	0	Central	Improve the triangulation of malaria data from HMIS, household surveys, health facility surveys and partner reports to inform decision making at the central level; strengthen malaria reporting in HMIS; improve translation of HMIS data to strengthen malaria programming at the central level
Strengthen data collection and use (county level)	CSH	100,000	0	Bong, Nimba, Lofa	Support the county health team and 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
Strengthen data collection and use (county level)	MCSP	250,000	0	12 non- USAID focus counties	Support the county health team and 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
LTTA for M&E at NMCP	MEASURE Evaluation	390,000	0	Nationwide	Support a LTTA to strengthen the M&E capacity of the NMCP, including planning , collection, and analysis of data
DHS 2018/9	TBD	200,000	0	Nationwide	Malaria contribution to planning for the next DHS

End-use verification tool	CSH	100,000	0	Nationwide	To support NMCP in the implementation of End-Use Verification Tool
Technical assistance for M&E	CDC	10,000	0	Nationwide	Technical visit to support monitoring and evaluation activities
SUBTOTAL SM&E		1,100,000	0		
OPERATIONAL RESEARCH					
SUBTOTAL OR		0	0		
STAFFING AND ADMINISTRATION					
In-country staffing and administration	USAID/CDC	1,376,546	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
SUBTOTAL IN-COUNTRY STAFFING		1,376,546	0		
GRAND TOTAL		14,000,000	3,961,454		