

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 2019 appropriation. If any further changes are made to this plan it will be reflected in a revised posting.



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## U.S. PRESIDENT'S MALARIA INITIATIVE



**PRESIDENT'S MALARIA INITIATIVE**

**LIBERIA**

**Malaria Operational Plan FY 2019**

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## ABBREVIATIONS AND ACRONYMS

ACT	Artemisinin-based combination therapy
AL	Artemether-lumefantrine
ANC	Antenatal care
AS/AQ	Artesunate-amodiaquine
CBIS	Community-based information system
CDC	Centers for Disease Control and Prevention
CDO	County diagnostic officer
CHA	Community health assistant
CHSS	Community health services supervisor
CHT	County health team
CHV	Community health volunteer
CMS	Central medical stores
DHS	Demographic and Health Survey
DHIS2	District Health Information System 2
eLMIS	Electronic logistics management information system
EUV	End-use verification
EVD	Ebola-virus disease
FARA	Fixed Amount Reimbursement Agreement
FY	Fiscal year
GHI	Global Health Initiative
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GOL	Government of Liberia
HFS	Health facility survey
HMIS	Health management information system
iCCM	Integrated community case management
IEC	Information, education, communication
IM	Intramuscular
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LIBR	Liberian Institute of Biomedical Research
LMHRA	Liberia Medicines and Health Products Regulatory Authority
LMIS	Logistics management information system
MIP	Malaria in pregnancy
MIS	Malaria indicator survey
MoH	Ministry of Health
MOP	Malaria Operational Plan
NDS	National Drug Service
NDU	National Diagnostics Unit
NGO	Non-governmental organization
NMCP	National Malaria Control Program
NMSP	National Malaria Strategic Plan
NPHRL	National Public Health Reference Laboratory
OR	Operational research
PBO	Piperonyl butoxide
PMI	U.S. President's Malaria Initiative

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

## I. EXECUTIVE SUMMARY

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

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

In 2017, consistent with an increase in annual appropriations, PMI again launched new country programs in Cameroon, Côte d'Ivoire, Niger, and Sierra Leone, and expanded an existing program in Burkina Faso to PMI focus country status. With the addition of these new focus countries, PMI now has programs in 24 countries in sub-Saharan Africa, in addition to two bilateral programs and targeted support in the Greater Mekong Subregion in Asia.

Liberia began implementation as a PMI focus country in FY 2008.

This FY 2019 Malaria Operational Plan (MOP) presents a detailed implementation plan for Liberia, based on the strategies of PMI and the National Malaria Control Program (NMCP). It was developed in consultation with the NMCP and with the participation of national and international partners involved in malaria prevention and control in the country. The activities that PMI is proposing to support fit in well with the national malaria control strategy and plan and build on investments made by PMI and other partners to improve and expand malaria-related services, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund) malaria grants. This document briefly reviews the current status of malaria control policies and interventions in Liberia, describes progress to date, identifies challenges and unmet needs to achieving the targets of the NMCP and PMI, and provides a description of activities that are planned with fiscal year (FY) 2019 funding.

The proposed FY 2019 PMI budget for Liberia is \$14 million. PMI will support the following intervention areas with these funds:

**Entomologic monitoring and insecticide resistance management:** Liberia’s 2016–2020 National Malaria Strategic Plan (NMSP) includes the objective of institutionalizing entomological and insecticide resistance monitoring with a plan to produce a vector prevalence map of the country, highlighting vector behavior, susceptibility to insecticides, and location, as well as to use the NMCP’s insectary as a testing site for studies of malaria vectors. Over the past year, PMI expanded support for the NMCP to conduct entomological monitoring at four established surveillance sites plus an additional ten sites along a transect from Nimba to Montserrado County. PMI further supported nationwide insecticide susceptibility testing, and initiated pyrethroid resistance intensity and synergist assays at select sites. PMI has continued to support an entomologist embedded within the NMCP to help build capacity for entomological surveillance, supported on-site training for insecticide resistance, and established collaboration between the NMCP and the Liberian Institute of Biomedical Research (LIBR) for laboratory analyses of entomological samples. This has enabled the NMCP to begin testing mosquito specimens for *Plasmodium* sporozoites.

With FY 2019 funds, PMI will continue to build the capacity of the NMCP to maintain a functional insectary; conduct entomological surveillance in areas with limited or no data on vector species composition, abundance, or behavior; conduct insecticide resistance monitoring, with a focus on new insecticides, pyrethroids, and synergists; and perform laboratory analyses for vector species identifications and sporozoite infection rates.

**Insecticide-treated nets:** Liberia’s 2016–2020 NMSP includes the objective of ensuring that 80 percent of the country’s population is protected by malaria prevention measures. Under this objective, Liberia aims to ensure universal access to ITNs by reaching 100 percent of households through mass campaigns conducted every three years. Currently, mass campaigns are the main distribution method, reinforced by continuous distribution of ITNs during the first antenatal care (ANC) visit and at the time of delivery in a registered health care institution to encourage delivery in facilities. Between 2008–2018, approximately 11 million ITNs were distributed in Liberia through campaigns, ANC services, and at institutional deliveries, including approximately 2.9 million ITNs purchased by PMI.

With FY 2019 funds, PMI will continue to support routine distribution of ITNs by procuring ITNs 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, and for the exploration of alternative distribution channels (e.g. school-based distribution). PMI will also support the monitoring of attrition and physical durability of nets distributed during the 2018 mass campaign at two sites.

**Malaria in pregnancy:** Liberia’s policy on malaria in pregnancy (MIP) is a three-pronged approach, consistent with WHO’s recommendation to combat malaria in pregnancy. This approach consists of prompt and effective case management of malaria and anemia, providing IPTp with sulfadoxine-pyrimethamine (SP) at every ANC visit after the first trimester, and use of ITNs. Scaling up implementation of IPTp was slowed during the Ebola-virus disease (EVD) epidemic from 2014 to 2015, but collective PMI and other partner support have contributed to an increase in ANC attendance and IPTp coverage. Results from the 2016 Liberia Malaria Indicator Survey (MIS) indicate that almost all women (98 percent) received ANC from a skilled provider for their most recent birth and 79 percent had the recommended four or more antenatal visits. The percentage of women receiving two doses of IPTp

(IPTp2) increased from 45 percent in the 2009 MIS to 55 percent in the 2016 MIS, and three doses of IPTp (IPTp3) doubled from 10 percent in the 2009 MIS to 22 percent in the 2016 MIS.

PMI assisted the NMCP in finalizing and printing updated MIP protocols and treatment guidelines based on WHO 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, social and behavior change communication (SBCC) module materials, and surveillance, monitoring, and evaluation (SM&E) tools, and were revised for nationwide use. In 2016, PMI supported the update, printing, and distribution of ANC and MIP training manuals and guidelines for ANC and MIP for pre-service and in-service health workers and community level service providers like community health assistants (CHAs), community health volunteers (CHVs), and trained traditional midwives. More than 900 trained traditional midwives of 927 certified midwives and traditional midwives in all 15 counties were trained on the updated ANC and MIP protocols and guidelines. The health management information system (HMIS) registers and forms were revised to capture the IPTp3, IPTp3 plus doses, and ITNs given during ANC and institutional deliveries.

With FY 2019 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 ITN distribution, the new IPTp guidelines, and proper management of malaria in pregnancy. PMI will procure SP and support ANC service providers to improve quality of care and adherence to standards for MIP, capacity building of health providers, in-service training and supervision for health care workers, support for County Health Teams and technical assistance to strengthen the distribution and availability of antenatal care commodities including SP and ITNs.

**Case management:** By 2020, the Liberia Ministry of Health (MoH) strategy for malaria case management aims to reach 85 percent of patients suspected of malaria in the public and private sector with a diagnostic test, and for all positive cases to be appropriately treated with an antimalarial medication. Malaria testing services have been fully restored in all facilities and at the community level since March 2016 when WHO lifted the ban on testing imposed during the EVD outbreak. PMI continues to work with the NMCP/MoH to scale up high-quality prevention services in the community, including testing by CHAs.

With FY 2019 funding, PMI will procure 2.4 million rapid diagnostic test (RDTs) for parasitological testing of suspected malaria cases in health facilities and the community, as well as approximately one million doses of artesunate-amodiaquine (AS/AQ) for treatment of uncomplicated malaria. PMI will also procure injectable artesunate for treatment of severe malaria in facilities and rectal artesunate for pre-referral treatment of children with severe illness seeking care in lower level facilities and in the community. In addition, PMI will expand its support to all 15 counties for the provision and improvement of quality malaria case management, including testing through training and supportive supervision. PMI will also continue to support the extension of malaria case management to the community level and refresher training for facility-level case management. Together with the Global Fund and other partners, PMI expects to fill all ACT and RDT needs for Liberia. PMI will support training and capacity building of MoH staff at both the central and county level, including in the community through support of activities conducted by CHAs (previously called general community health volunteers; gCHVs) and Community Health Service Supervisors (CHSS).

**Pharmaceutical management:** The NMCP's objective in the 2016–2020 NMSP is to strengthen the supply chain system for effective quantification and prompt distribution of commodities under a universal system by 2020. PMI supported the MoH to develop (2010) and revise (2015) its Supply

Chain Master Plan. PMI has assisted the MoH to consolidate all health commodities in a Central Medical Store, thereby increasing transparency and accountability across the supply chain.

With FY 2019 funding, PMI will continue to strengthen the capacity of the Central Medical Store to manage the storage and integrated distribution of commodities and strengthen the Liberia Medicines and Health Products Regulatory Authority for regulation of malaria commodity registration and post-market surveillance of antimalarial drugs. PMI will also continue to support quarterly implementation of an end-use verification survey to monitor the availability of malaria commodities and the quality of malaria case management at the health facility level.

**Social and behavior change communication:** In 2016, the NMCP, in partnership with the MoH National Health Promotion Division, the Community Health Services Division, and malaria partners, revised its Malaria Communication Strategy for 2016–2020 and developed a Malaria Communication Implementation Plan for 2016–2020. The SBCC strategy addresses knowledge, practice, and perception gaps in malaria prevention and treatment, including use of IPTp for pregnant women. PMI supported the development of the SBCC strategy, materials, and tools, provided training to facility-based staff and CHAs, and supported the media to broadcast radio messages on ITN use, IPTp, test and treat, and the use of ACTs. The collective effort of the NMCP and its partners has successfully raised the population’s awareness of malaria. The 2016 MIS indicated that 99 percent of women of reproductive age have heard of malaria. Of those who have heard of malaria, 95 percent know that the illness can be avoided and 90 percent know that mosquitos transmit the parasite from person-to-person. Almost all women (99 percent) who have heard of malaria state that malaria is treatable, with the majority (81 percent) citing the recommended ACTs. However, the 2016 MIS showed knowledge-practice gaps, with high use of monotherapies to treat malaria and misconceptions about the use of SP for IPTp.

With FY 2019 funds, PMI will continue to support the NMCP to implement their Malaria Communication Implementation Plan for 2016–2020. At the facility level, service providers will be trained on counseling skills and standard practices in adhering to national case management and MIP guidelines and protocols. Facility health workers will provide counseling services to clients on all aspect of malaria SBCC, including: prompt care-seeking behavior, the importance of malaria testing for all cases presenting with fever, completion of ACT treatment course, IPTp uptake for pregnant women, and sleeping under ITNs. At the community level, CHV will encourage pregnant women to seek prompt care and attend ANC services regularly at the health facilities. Other SBCC activities will include regular mass media campaigns, community meetings, and drama/theatre.

**Surveillance, monitoring, and evaluation:** The NMCP has finalized 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. The District Health Information System 2 (DHIS2) platform also includes a community-based information system (CBIS). Personnel have been trained and the system is operational nationwide; however, reporting is not uniform and data are underutilized at all levels. PMI will use FY 2017 funding to support the malaria module in the 2018 DHS.

With FY 2019 funding, PMI will work to improve the collection, reporting, and use of HMIS and CBIS malaria data, as well as household survey and implementing partner data through supportive supervision of SM&E activities from the national level, and for malaria data collection and use at the county level across all counties, as well as embedded technical assistance at the MoH, NMCP, and in select counties. PMI will also support training at the national and county level on malaria SM&E.

**Operational research:** 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 operational research (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.

With FY 2019 funds, PMI in collaboration with the NMCP will support an operational research study to assess the barriers to IPTp2+ services uptake at ANC settings in Liberia.

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

With FY 2019 funds, PMI will provide support to the central MoH/NMCP and county health teams to strengthen crosscutting health systems functions to improve management and governance of the health system and support decentralization. PMI will continue to support the NMCP to strengthen their linkages with the other MoH units including the Family Health Services Department, Community Health Services Unit, National Health Promotion Unit, the National Diagnostic Unit, and HMIS Monitoring Evaluation and Research Unit, as well as the newly established National Public Health Institute. PMI will also support Peace Corps to strengthen malaria messaging in schools by supporting two third-year malaria Peace Corps volunteers and malaria education activities carried out by the network of Peace Corps volunteers throughout the country.

## II. STRATEGY

### 1. Introduction

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

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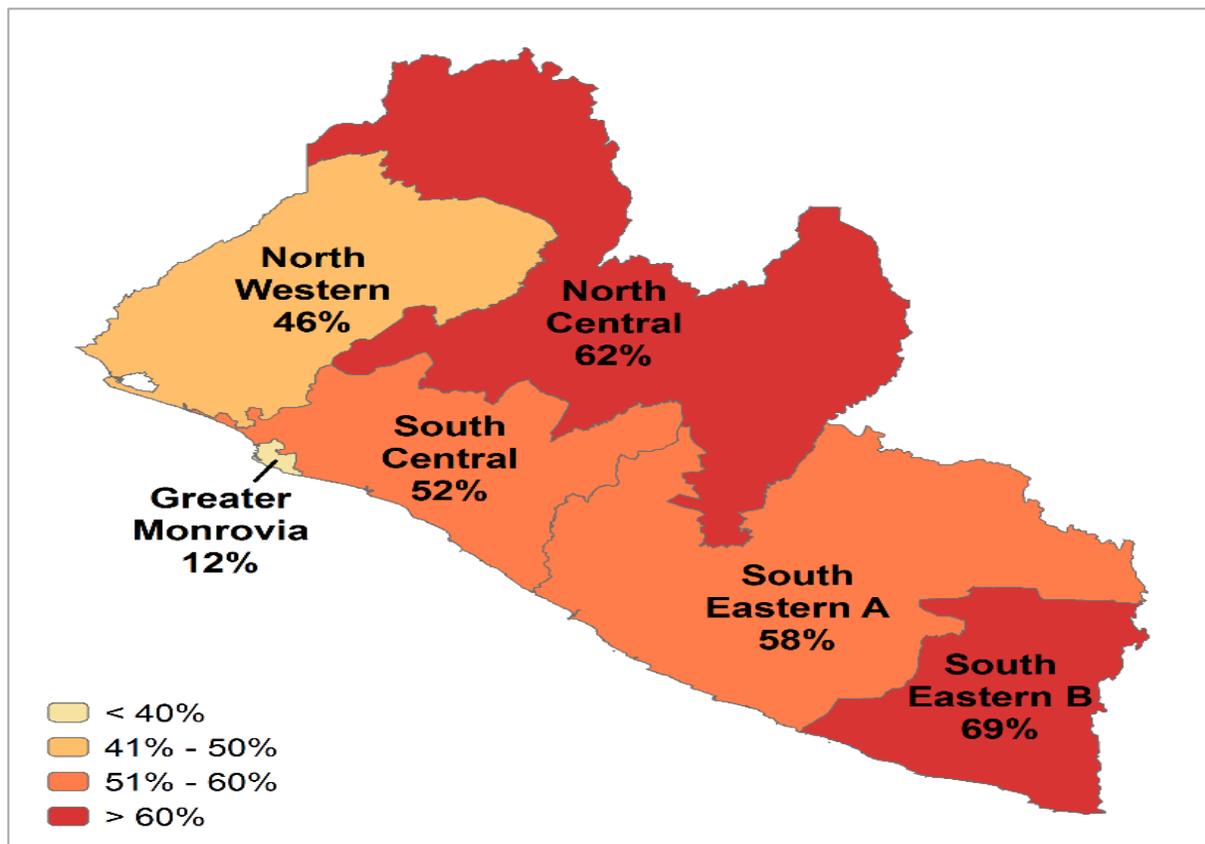
## 2. Malaria situation in Liberia

Liberia covers 43,000 square miles in West Africa and 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 sensu lato*(s.l.) and *An. funestus*. The major parasite species are *Plasmodium falciparum* (>90 percent), *P. ovale*, and *P. malariae*.<sup>1</sup>

According to results from the Malaria Indicator Surveys (MIS), the prevalence of malaria parasitemia in children under five by rapid diagnostic test (RDT) was 66 percent in 2005, 37 percent in 2009, 45 percent in 2011, and 45 percent in 2016. The prevalence rate as measured by microscopy was 32 percent in 2009 and 28 percent in 2011. Malaria prevalence by microscopy was not determined in 2016. The geographical prevalence of malaria according to the 2016 MIS is shown in the map below (Figure 1).

The 2013 Health Facility Survey (HFS), the most recent such study, found that malaria remains the leading cause of morbidity and mortality, accounting for about 42 percent of all clinical consultations and 44 percent of all inpatient deaths among children under five years of age.

**Figure 1: Prevalence of Malaria Parasitemia in Children 6-59 months by RDTs, Liberia 2016 MIS**



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

### 3. Country health system delivery structure and MoH organization

Liberia is administratively divided into 15 counties and 89 political districts. The country is however demarcated into 68 health districts for operational purposes. The 2017 estimate of the population is 4.2 million. The superintendents are the heads of the counties. The president appoints the superintendents and other functionaries (district commissioners, city majors, and town chiefs).

The Liberia health care delivery system is organized into three tiers:

1. Primary health care that consists of clinics and the community health program;
2. Health centers and county hospitals; and
3. Referral hospitals, such as the John F. Kennedy Hospital in Monrovia and Jackson F. Doe Hospital in Nimba.

Health clinics are the primary care unit of the health system and are meant to have at least two professional staff: a nurse and a certified midwife.<sup>2</sup> With catchment areas ten kilometers 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 diagnostics, and 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.

There is strong political commitment to ensure accelerated expansion of primary health care creating a favorable environment for expanding maternal, child, and newborn health services, including deployment of contracted teams to transfer skills to health professionals working in remote and urban areas, accelerated midwifery training, and training of Community Health Assistants (CHAs) on clean and safe delivery.

The Ministry of Health (MoH) is working to decentralize responsibility for service delivery from the central ministry to the counties. 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. Theoretically, County Health Officers (CHOs) manage the county health system, while District Health Officers (DHOs) manage the district health systems. For the last five years, the MoH has contracted out service delivery to 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 County Health Teams (CHTs) and facilities nationwide to directly manage local health systems and oversee service delivery. 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.

Payment of salaries to health care workers, including CHAs and other cadres of community health workers is a challenge in Liberia. Although the GOL contributes 14 percent of the government's annual

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<sup>2</sup> Due to the shortage of certified midwives, this combination also takes the shape of a licensed practical nurse and TTM.

budget to the health sector, in absolute terms, this translates to only \$44.3 million in 2018 and \$58.9 million in 2019. This resource envelop is not enough to support both the capital and recurrent costs of the MoH. Therefore, in the interim, USAID, Global Fund, and other partners are contributing to paying salaries of the facility-based health workers in the counties benefiting from donor support. Similarly, donors are paying a stipend (not salary) of \$70 US dollars to CHAs and between \$269 and \$333 U.S. dollars to Community Health Services Supervisors (CHSS). The stipend is an allowance for transportation and lunch for the CHAs and CHSS for field work and is not a salary. However, discussions have started at a higher level for GOL to clean up the payroll and increase the wage bill so that donors can phase out payment of salary for government workers. USAID has historically contributed to paying some of the facility-based health workers in the three counties of Bong, Lofa, and Nimba through a Fixed Amount Reimbursement Agreement (FARA). In addition, USAID, through one of its implementing partners, is paying stipends for CHAs and CHSS in USAID focus districts in the same three counties. However, starting July 2018, USAID has a phase out plan to transition all previously paid facility-based health workers in the three counties of Bong, Lofa, Nimba to the GOL payroll. With support from donors, the GOL has developed a plan to gradually cover the payment of salaries for the established cadre of health workers starting July 2018.

#### **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 NMSP 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; and
- Includes a more detailed and budgeted strategy in dealing with the malaria situation.

Given lessons learned from the effect of Ebola virus disease (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 and no malaria deaths. The program's mission is to achieve the highest requisite capacity for the provision of comprehensive, coordinated, and evidence-based interventions to eliminate malaria in Liberia.

The goal of the 2016-2020 NMSP is to reduce illnesses and deaths caused by malaria by 50 percent by the year 2020 (using the 2011 Malaria Indicator Survey [MIS] as a baseline). The strategic objectives are outlined below:

- **To strengthen and sustain institutional and human resource capacity of the NMCP 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 percent of the population by 2020.**

Strategies under this objective include conducting parasite-based diagnosis at all levels and strengthening quality assurance/quality control (QA/QC) for malaria diagnostics, scaling-up the management of uncomplicated and severe cases of malaria in both public and private health facilities, 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 percent of the population is protected by malaria preventive measures by 2020**

The key strategies under this objective include ensuring universal access to ITNs, 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 percent and 75 percent 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 logistics management information system (LMIS) tools to reflect key commodities, and 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**

- In December 2017, the MoH disseminated the results of Liberia's third MIS (MIS 2016).
- In December 2017, George Weah was elected as the twenty-fifth President of Liberia following a peaceful, democratic election.

- In February 2018, Ellen Johnson Sirleaf, who served two terms as the president of Liberia (2006 to 2017), won the 2017 Ibrahim Prize for Achievement in African Leadership.
- In March 2018, the United Nations withdrew its peacekeeping mission (United Nations Mission in Liberia).
- On March 22, 2018, President Weah confirmed Dr. Wilhelmina Jallah as Minister of Health. During her confirmation speech, Minister Jallah laid out her priorities, which included health care worker salaries, benefits, and capacity building; availability of essential drugs and supply chain stockouts; infant and maternal mortality; mental health; regulations and policies that provide access to and drive a resilient health care system in every county; and proper funding for priority programs and health care initiatives.
- In May 2018, the NMCP disseminated the results of Liberia’s Malaria Impact Evaluation 2005-2013.

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

In order to achieve maximum ownership and results, USAID/Liberia ensures that all U.S. Government health investments align with Liberia’s 2011–2021 National Health and Social Welfare Policy and Plan and its companion Investment Plan for Building a Resilient Health System 2015–2021, which outline the GOL’s priorities and strategies to expand access to basic health services and to establish the building blocks of equitable, effective, responsive, and sustainable health service delivery. The U.S. Government complements the Liberian MoH’s efforts by concentrating its resources on two key focus areas: (1) improving service delivery through support for the Essential Package of Health Services, and (2) for strengthening health systems to increase institutional capacity and sustainability.

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

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

From 2005 until 2007, the Global Fund constituted the majority of external funding for the implementation of malaria control and prevention activities in Liberia. A \$37 million Global Fund Round Seven grant was signed in April 2008, with the United Nations Development Program as the principal recipient, and in 2011 a \$60 million Round Ten grant was signed with the MoH and Plan Liberia (an NGO) as the two principal recipients. Based on the phase one evaluation of the Round Ten grant that was completed in 2013 and Liberia’s approved phase two award signed in April 2014, the funding available for Round Ten 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 EVD-affected countries in the region. Negotiations were pursued for a grant split between malaria (\$30 million) and health systems strengthening (\$7.3 million). The Global Fund has approved another \$23 million malaria grant for July 2018 - June 2021, with the MoH and Plan International as the principal recipients.

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 Ten 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 Ten grant involved national mass distribution of ITNs. This was a change from the previous strategy of rolling mass distribution of ITNs, during which different parts of the country received nets at different times. Going forward, in coordination with the NMCP, the Global Fund will provide ITNs for nationwide mass campaigns and PMI will provide ITNs for routine distribution through ANC visits and delivery in health care institutions, explore other channels for routine distribution, and provide technical assistance for mass and routine 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 the World Health Organization (WHO). This review effort informed the process of updating Liberia's NMSP. Liberia is preparing for an upcoming Malaria Program Review in 2018.

In Liberia, PMI prioritizes the scale-up of integrated community case management (iCCM) to increase access to health services at the community level. In collaboration with UNICEF and other partners, PMI also supports the Community Health Services Division of the MoH in its efforts 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 Ten grant, had committed support to the expansion of the iCCM program from two percent to five percent 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 period that began in July 2016, the Global Fund has committed to supporting 811 CHAs to cover all of Bomi County and supplement USAID support in Lofa and Nimba.

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

After FY 2013, PMI ended its funding for IRS in Liberia. PMI continues 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 (LIBR) (a subunit of the National Public Health Institute of Liberia), the Armed Forces of Liberia, and other groups who are collecting relevant data related to their individual projects.

PMI investments have been bolstered by additional support from the U.S. Government and other donors for restoration of health services and health system functioning following the EVD epidemic. USAID, with resources under 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 provided additional support to 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 funded a two-and-a-half 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 U.S. Centers for Disease Control and Prevention (CDC) has established a country office to support key activities under the Global Health Security Agenda, which includes a focus on strengthening surveillance, public health laboratory functions, and adherence to infection prevention and control standards. Global Health Security Agenda funding through CDC helps to build epidemiology skills within the public health system at both the national and county level. There is not an explicit focus on malaria; however, broader improvements in the overall public health epidemiology and laboratory systems and training are expected to create opportunities for strengthening management of malaria services. PMI will work with both the U.S. Government, the 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 established with support from CDC.

Liberia is not a beneficiary of the President’s Emergency Plan for AIDS Relief (PEPFAR).

## **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 percent reduction from PMI’s original 2000 baseline levels.
2. Reduce malaria morbidity in PMI-supported countries by 40 percent from 2015 levels.
3. Assist at least five PMI-supported countries to meet WHO’s criteria for national or sub-national pre-elimination.<sup>3</sup>

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

1. Achieving and sustaining scale of proven interventions;
2. Adapting to changing epidemiology and incorporating new tools;

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<sup>3</sup> [http://whqlibdoc.who.int/publications/2007/9789241596084\\_eng.pdf](http://whqlibdoc.who.int/publications/2007/9789241596084_eng.pdf)

3. Improving countries' capacity to collect and use information;
4. Mitigating risk against the current malaria control gains; and
5. Building capacity and health systems towards full country ownership.

To monitor progress toward achieving and sustaining scale of proven interventions (first area of strategic focus), PMI will continue to track key household survey 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 the population with access to an ITN [[See here](#) for a description of this indicator]
- 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 the population that slept under an ITN the previous night
- 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
- Proportion of women who received three 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 Survey Based Malaria Indicators in Liberia from 2005 to 2016**

Indicator	MIS 2005	DHS 2007	MIS 2009	MIS 2011	DHS 2013	MIS 2016
% Households with at least one ITN	18%	30% <sup>a</sup>	47%	50%	55%	62%
% Households with at least one ITN for every two people	n/a	n/a	n/a	17%	22%	42%
% Children under five who slept under an ITN the previous night	3%	n/a	26%	37%	38%	44%
% Pregnant women who slept under an ITN the previous night	n/a	n/a	33%	39%	37%	40%
% Households in targeted districts protected by IRS	n/a	n/a	n/a	9% <sup>b</sup>	11% <sup>b</sup>	n/a
% Children under five years old with fever in the last two weeks for whom advice or treatment was sought	n/a	n/a	n/a	60%	71%	78%
% Children under five with fever in the last two weeks who had a finger or heel stick	n/a	n/a	23%	33%	42%	50%
% Children receiving an ACT among children under five years old with fever in the last two weeks who received any antimalarial drugs	n/a	n/a	45%	70%	43% <sup>d</sup>	81%
% Women who received two or more doses of IPTp during their last pregnancy in the last two years	4%	12% <sup>c</sup>	45%	50%	48%	55%
Under-five mortality rate per 1,000 live births	n/a	110	n/a	n/a	94	n/a
% children under five with parasitemia (by microscopy)	n/a	n/a	32%	28%	n/a	n/a
% children under five with parasitemia (by RDT)	66%	n/a	37%	45%	n/a	45%

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

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

<sup>c</sup> The 2007 DHS only asked about pregnant women who took any sulfadoxine-pyrimethamine.

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

**Table 2: Evolution of Key Malaria Indicators Reported through Routine Surveillance Systems in Liberia from 2012 to 2017**

Indicators	2012	2013	2014	2015	2016	2017
Total # Cases (Confirmed and Presumed) <sup>1</sup>	1,858,373	1,483,468	1,057,635	1,261,247	1,580,083	2,212,467
# Confirmed Cases <sup>2</sup>	1,458,524	1,244,012	864,204	936,265	1,189,873	1,069,997
# Presumed Cases <sup>3</sup>	399,949	239,456	193,431	324,982	390,210	451,657
Total # <5 Cases <sup>4</sup>	760,740	616,987	423,140	506,549	628,530	624,301
Total # Malaria Deaths <sup>5</sup>	1,725	1,191	2,288	1,379	1,260	758
Data Completeness (%) <sup>6</sup>	80%	83%	73%	80%	92%	88%
Test Positivity Rate <sup>7</sup>	69%	63%	71%	64%	61%	61%

<sup>1</sup>Total # Cases: Total number of reported malaria cases. All ages, outpatient, inpatient, confirmed, and unconfirmed cases.

<sup>2</sup># Confirmed Cases: Total diagnostically confirmed cases. All ages, outpatient, inpatient.

<sup>3</sup># Presumed Cases: Total clinical/presumed/unconfirmed cases. All ages, outpatient, inpatient.

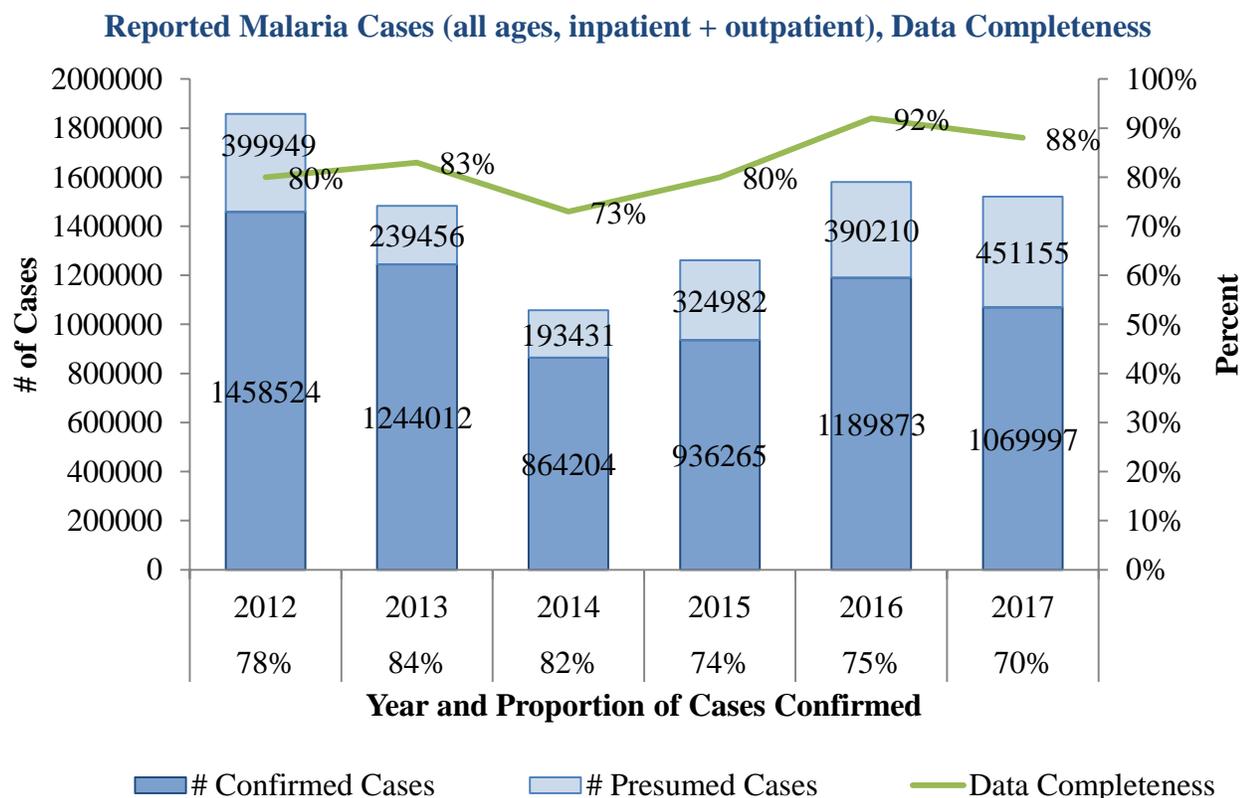
<sup>4</sup>Total # <5 Cases: Total number of <5 cases. Outpatient, inpatient, confirmed, and unconfirmed.

<sup>5</sup>Total # Malaria Deaths Reported: All ages, outpatient, inpatient, confirmed, and unconfirmed.

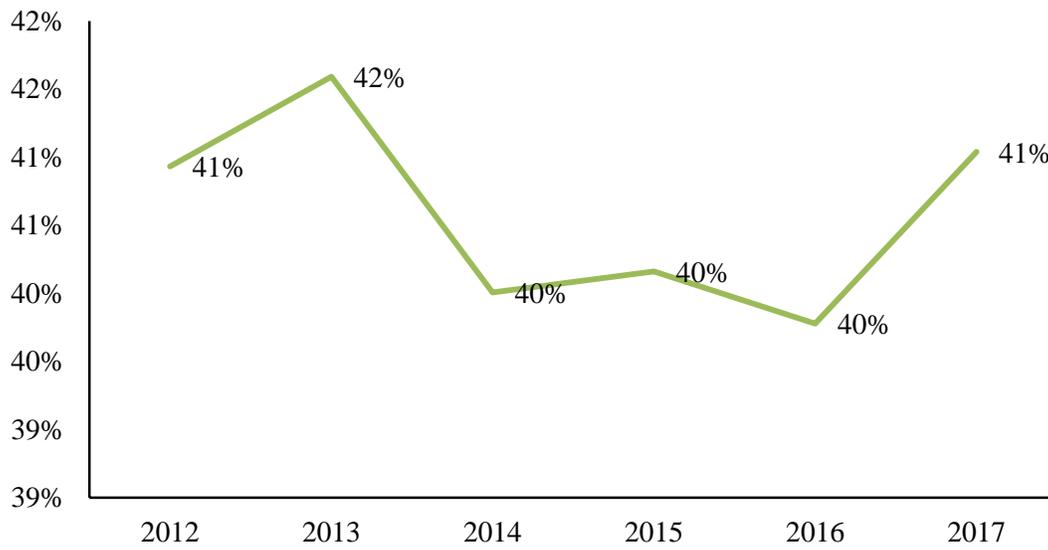
<sup>6</sup>Data Completeness: Number of monthly reports received from health facilities/Number of health facility reports expected (i.e., number of facilities expected to report multiplied by the number of months considered).

<sup>7</sup>Test Positivity Rate: Number of confirmed cases/Number patients receiving a diagnostic test (RDT or microscopy).

**Figures 2 and 3: Trends in Key Malaria Indicators Reported in Routine Surveillance Systems**



### Percent of Malaria Cases <5 Years of Age, Using mRDT



### 9. Other relevant evidence on progress

In 2016, PMI supported a formal impact evaluation for the period 2007 to 2013 using a pre- and post-design with a plausibility assessment. Trends in all-cause childhood mortality were analyzed against trends in coverage of malaria control interventions and contextual factors that affect child survival. Data from the Demographic and Health Surveys (DHS) and MIS, referenced above, and the health management information system (HMIS) were used in the evaluation. During this period the all-cause childhood mortality gradually declined from 109 (95-percent CI: 99-120) in 2007 to 94 (95-percent 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-percent CI: 63-82) to 54 (95-percent CI: 47-61) 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 health care system was being rebuilt, gross domestic product was rising, and other improvements in maternal and child health were taking place. The results indicate the gradual expansion of malaria control interventions likely contributed to the 21 percent decrease in malaria parasitemia (by RDT), but that it is too early in the process of the expansion of malaria control interventions to have observed a significant impact on all cause under-five mortality. Other socioeconomic and child health interventions likely contributed to the decline in all cause under-five mortality during the evaluation period as well. The impact evaluation was completed at the end of 2016, and the report was finalized in 2017 and disseminated May 2018.

### **III. OPERATIONAL PLAN**

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

PMI’s national-level support includes health system strengthening, bolstering the HMIS and LMIS, improving pharmaceutical and commodity supply chain management, improving national clinical standards and strengthening quality improvement systems, and enhancing SBCC activities. Improving diagnostic capacity, promoting quality medicines, supporting ITN 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, enabling PMI to expand its activities beyond what could have been possible otherwise. The PMI team is working with the NMCP to map partner and donor activities by county to improve coordination and avoid duplication of efforts.

#### **PMI Liberia scale-up plan**

PMI supports malaria programming throughout the country utilizing several approaches. USAID support has historically been in three priority counties (Bong, Lofa, and Nimba) consisting of support for implementation of Liberia’s Essential Package of Health Services at the facility and community levels through a government-to-government FARA. The two FARA malaria output deliverables for fund reimbursement are: (1) number of suspected malaria cases diagnosed by RDT or microscopy; and (2) number of pregnant women that receive three or more doses of sulfadoxine-pyrimethamine (SP) during pregnancy. In addition, FARA is reporting on the following indicators on a quarterly basis: number of health workers trained in case management with ACTs using USG funds; percent of pregnant women who received the first, second, and third dose of IPTp; number of health workers trained in IPTp with USG funds; percent of health facilities in USAID target counties in compliance with malaria clinical protocols; and percent of health facilities in USAID target counties that can conduct specified diagnostic tests.

In 2018, with FY 2016 and 2017 PMI funding, PMI will expand technical assistance for malaria case management, IPTp, SBCC, and some aspects of surveillance, monitoring, and evaluation (SM&E) to five additional counties (Gbarpolu, Grand Cape Mount, Grand Gedeh, River Gee, and Sinoe) and continue to expand through 2019. Starting in October 2018, PMI and the World Bank will support all 15 counties for all core interventions, except IRS. In addition, the Global Fund malaria grant covers some aspects of malaria case management, especially iCCM, private-sector ACTs, and MIP. The Global Fund program is national in nature and overlaps with PMI and World Bank supported counties. PMI scale-up will be through the existing FARA, an existing implementing partner through September 2019, and a new implementing partner after that. The World Bank will use performance-based financing to support CHTs in Gbarpolu, River Cess, and Sinoe Counties. In the remaining 12 counties, PMI will provide two tiers of technical support for malaria case management and MIP in 2019 and beyond: (1) wrap around technical assistance for the eight USAID FARA counties, and (2) enhanced service delivery technical assistance in the remaining four counties that are without direct support of CHTs (Bomi, Grand Kru, Maryland, and Montserrado). In all counties, PMI will provide support through the CHTs. As a component of integrated service delivery, PMI will continue to leverage other USAID funding streams when providing support for malaria in FARA counties.

Liberia has rolled out iCCM to all the counties in areas of more than five kilometers from the health facilities. USAID is supporting iCCM in the three counties of Bong, Lofa, and Nimba and the rest of the partners, including the Global Fund, World Bank, and other partners are supporting iCCMs in 11 counties. Only Montserrado does not have an iCCM program but the MoH has plans to start an iCCM program in rural Montserrado in 2019. The mission and PMI Liberia are also discussing with the World Bank, Global Fund, and other partners supporting the same standard core interventions for malaria in the counties where they are operating.

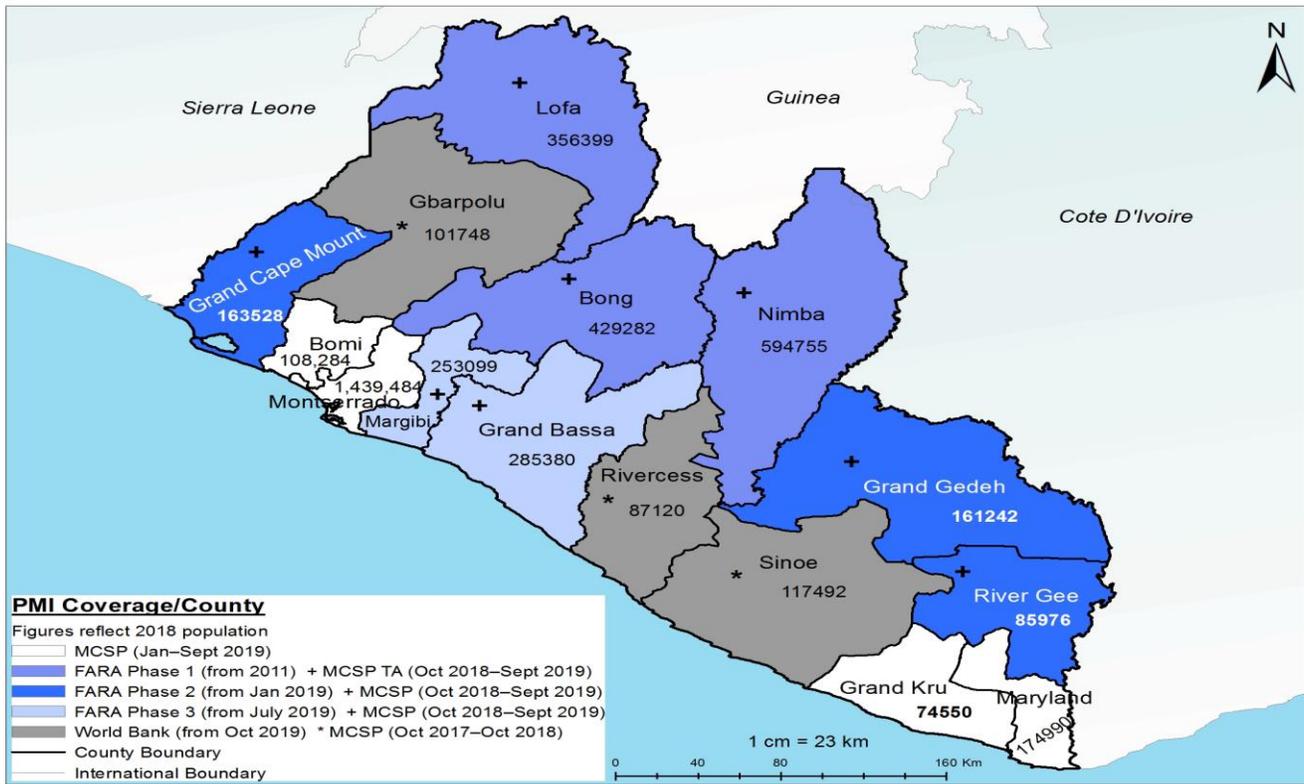
Table 3 depicts PMI Liberia's support by technical area and indicates the expansion to additional counties in 2018 and 2019. Figure 4 depicts the two tiers of PMI support planned for 2019 and beyond.

**Table 3: PMI-Supported Interventions by County and Year**

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

\*Activities expanded to these three counties between 2015-2017 and then stopped when the Ebola funding ended. They will start up again in October 2018.  
\*\*Activities in Gbarpolu, River Cess, and Sinoe will be covered by World Bank, with the exception of routine ITN distribution and supply chain support, which will be PMI.  
<sup>1</sup> (x) parentheses refers to planned expansion of these activities in 2018.  
<sup>2</sup> ITN distribution started in 2009 in counties 1-3, expanded to include counties 4-6 in 2015, and expanded to cover all 15 counties in 2016.  
<sup>3</sup> iCCM is supported by other donors in the remaining counties.  
<sup>4</sup> Supply chain management started in 2009 in counties 1-3, expanded to include counties 4-6 in 2015, and expanded to cover all 15 counties in 2017.

**Figure 4: Three Tiers of PMI Technical Assistance Support by County, 2019 Onwards**



## 1. Vector control

### NMCP/PMI objectives

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

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

Lastly, the 2016–2020 NMSP includes the objective of institutionalizing entomological and insecticide resistance monitoring with a plan to produce a vector prevalence map of the country, highlighting vector

behavior, susceptibility, and location, as well as to use the NMCP's insectary as a testing site for studies of malaria vectors.

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

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

PMI supported IRS in Liberia from 2009 to 2013. In 2014, after consultations within the PMI interagency team and discussions with the NMCP, the decision was made to suspend PMI-supported IRS in Liberia and focus resources on increased entomological monitoring and universal ITN coverage. In 2013, two vector surveillance sites were established in Bong and Montserrado Counties that provided important information on the spatial and temporal composition and distribution of anopheline species. Two additional vector surveillance sites in Margibi and Grand Bassa Counties were established in 2016. From 2014 – 2016, nationwide insecticide resistance monitoring was performed in 13 out of 15 counties across each of the country's five geographical zones plus the capital: South Central, North Western, South Eastern A, South Eastern B, North Central, and Montserrado. In 2014, a functional insectary, modified from a shipping container, was situated next to the NMCP for annual insecticide resistance monitoring and to provide work space for NMCP vector control unit staff. In 2016, the insectary was altered to support a mosquito rearing room, an insecticide resistance and laboratory diagnostics workroom, and an equipment/storage room. In November 2016, a laboratory colony of *An. gambiae sensu stricto* (*s.s.*) Kisumu strain was successfully established and successive generations have been maintained.

Beginning in 2015, PMI supported an entomologist to be embedded with the NMCP to help build capacity for entomological surveillance and supported two NMCP vector control unit staff to attend a one week-long entomology training in Ghana that included refresher training on morphological identification, as well as practical exercises using the CDC bottle insecticide resistance intensity assay. In addition, WHO supported one senior member of the vector control unit to attend a three-month training course in Benin, which included molecular analyses for species identification and malaria infection rates. In 2016, PMI supported two members of the vector control unit to receive training on CDC bottle assays for insecticide resistance intensity testing at CDC in Atlanta.

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

Over the past year, PMI continued to support the NMCP to conduct entomological monitoring at four established surveillance sites: Tomato Camp in Bong County, Franktown in Montserrado County, Bokay Town in Grand Bassa, and Jeneta in Margibi County. All sites are located in rural areas surrounded by human settlements and contain numerous breeding sites such as borrow and brick pits. Mosquito collections were made using monthly pyrethrum spray catches and CDC light trap collections, and bimonthly human landing catches. To gain additional insight on vector abundance, composition, and behavior, and to potentially identify new sites for routine surveillance, monitoring was expanded to include ten sites along a transect from Yekepa in Nimba County to Kollieman Town in Montserrado County. Pyrethrum spray catches and CDC light trap collections were done twice, at the beginning and the end of the rainy season.

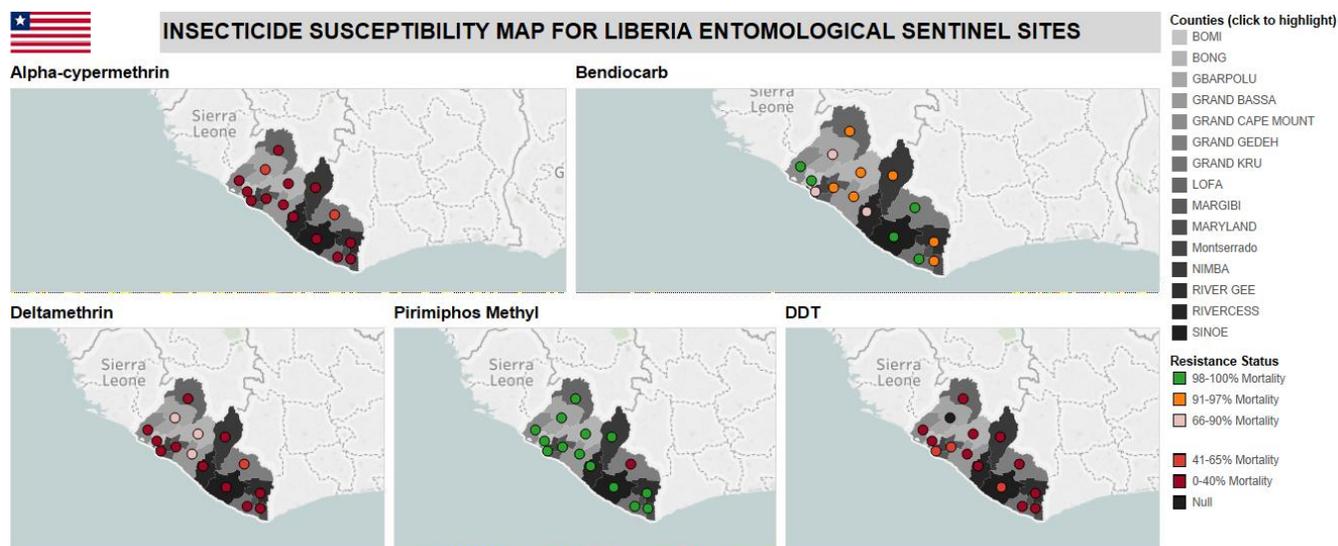
*Anopheles gambiae s.l.* was found to be the major vector in all sites, with peak densities occurring in May and June, at the onset of the rainy season. Biting activity was observed equally both indoors and outdoors across all sites, although in Franktown, where the biting rate was highest, greater numbers of

*An. gambiae s.l.* were collected outdoors as compared to indoors. *Anopheles funestus s.l.*, a secondary vector species not routinely collected at the established sites, was found at most of the transect sites, with the greatest densities observed at the beginning of the rainy season.

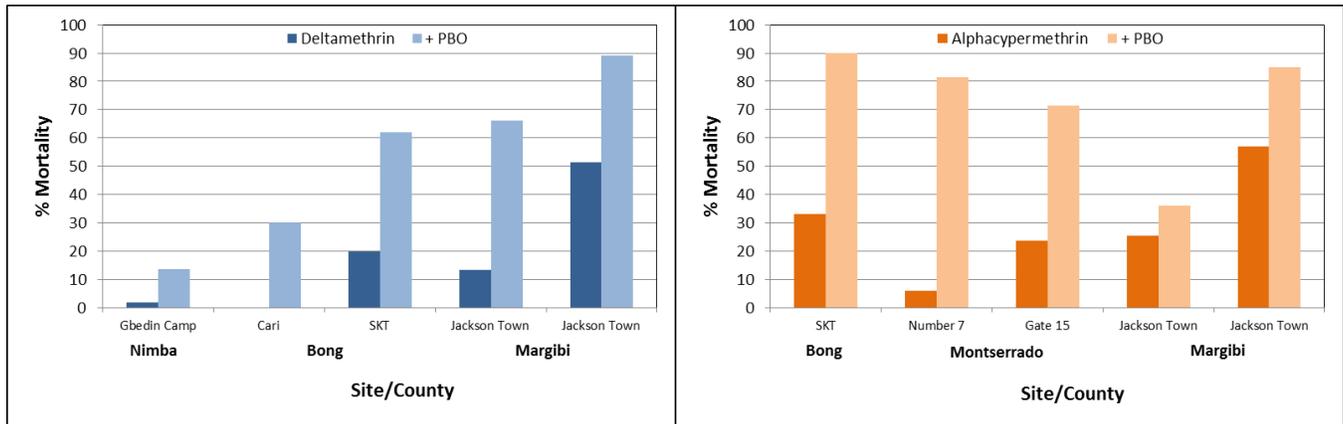
In 2017, laboratory analyses of a subset of mosquito specimens collected from 2015 – 2016 was outsourced to the University of Witwatersrand in South Africa to obtain molecular identifications and insecticide resistance genotypes of *An. gambiae s.l.* These analyses revealed that *An. gambiae s.l.* collected at the established surveillance sites was comprised of *An. coluzzii* (79 percent) and *An. gambiae* (21 percent), with no other members of this sibling species complex identified. To build in-country capacity, PMI supported the NMCP in establishing a collaboration with the Liberian Institute of Biomedical Research (LIBR) for mosquito sample processing and laboratory analyses, and with University of Liberia to support entomology teaching staff there for practical sessions on mosquito collection, identification, and preservation. As part of a CDC on-site training, two technicians (one from the NMCP and one from LIBR) were trained on enzyme linked immunosorbent assays (ELISAs) to detect sporozoites in mosquito specimens and since have begun analyzing samples collected in 2015 – 2016. In addition, PMI supported two persons (one from the NMCP and one from LIBR) to attend training in Tanzania in 2017 on good laboratory practices, including ELISAs and polymerase chain reaction assays for mosquito species identification.

Insecticide susceptibility testing conducted from 2014 – 2016 revealed significant and widespread pyrethroid and DDT resistance in Liberia (Figure 5). PMI supported on-site training of CDC bottle bioassays for insecticide resistance training in 2017, which subsequently allowed for pyrethroid resistance intensity assays to be initiated for the first time in Liberia. These tests indicated high levels (ten times the diagnostic dose) of deltamethrin resistance in *An. gambiae s.l.* in Bomi, Bong, and Grand Bassa Counties. Susceptibility of *An. gambiae s.l.* to this insecticide was not fully restored by the synergist piperonyl butoxide (PBO) at any of the sites, with the exception of Greater Monrovia; however, PBO did restore susceptibility to alphacypermethrin in *An. gambiae s.l.* in two sites (Figure 6).

**Figure 5: Insecticide Susceptibility from Fifteen Counties in Liberia Using WHO Bioassay Tube Tests, 2014 – 2016**



**Figure 6: Percentage Mortalities of *An. Gambiae s.l.* Exposed to Pyrethroids Alone and in Combination with the Synergist PBO Using CDC Bottle Bioassays\* by County, 2017-18.**



\* Synergist assays at SKT in Bong County were performed using WHO tube tests.

Plans and justification for proposed activities with FY 2019 funding

With FY 2019 funding, PMI will continue to support the NMCP to maintain a functional insectary, conduct entomological and insecticide-resistance monitoring, and perform laboratory analyses of vector mosquito specimens. In alignment with the 2016–2020 NMSP, PMI will support the NMCP to identify geographical gaps in coverage of entomological data and will support entomological monitoring to provide information on vector species composition, abundance, and behavior in areas where these data are incomplete or nonexistent, with the goal of obtaining comprehensive monthly vector bionomics data from at least one site in each of the five geographical regions of Liberia. PMI will also use FY 2019 funding to continue to support insecticide-resistance monitoring at one site in each of the country’s 15 counties at least once every two years. Given that ITNs are the primary vector control intervention in Liberia and pyrethroid resistance is geographically widespread, PMI will support the NMCP to collect sufficient evidence to make an informed decision regarding ITN procurement for the next mass distribution campaign, which is planned for 2021. PMI will provide technical assistance to the NMCP to: (1) determine the intensity of pyrethroid resistance, (2) evaluate the ability of PBO to synergize with and restore vector susceptibility to pyrethroids (permethrin, deltamethrin, and alphacypermethrin), and (3) measure baseline susceptibility to new insecticides (chlorfenapyr).

PMI will use FY 2019 funding to continue to build capacity of the NMCP and LIBR through technical trainings, which will focus on improving immunodiagnostic methods for detection of sporozoites and establishing molecular techniques for vector species identification and insecticide-resistance genotyping. PMI will also support refresher trainings on: morphological species identifications and CDC bottle bioassays for insecticide susceptibility; resistance intensity testing, as needed; and mosquito collection methods. In addition, PMI will continue to support the maintenance of a mosquito colony in the container insectary established at the NMCP in 2014, and its potential move if the NMCP office relocates. Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

**b. Insecticide-treated nets**

Progress since PMI was launched

Funding for the mass ITN distribution campaign comes from PMI and the Global Fund. PMI is the only donor that supports continuous distribution of nets to pregnant women at their first ANC visit and after

delivery in a health facility. Between 2008 and the end of 2018, approximately 11 million ITNs will have been distributed in Liberia through campaigns, ANC services, and institutional deliveries, including approximately 2.7 million ITNs purchased by PMI.

In 2016, PMI supported the fourth MIS. The results of the 2016 MIS described a steady increase in the number of households owning at least one ITN. In 2016, 62 percent of households owned at least one ITN, up from 55 percent in 2013. In the 2016 MIS, 42 percent of household members had access to an ITN for every two people and 39 percent of household members slept under an ITN the night before the survey, indicating a high use-to-access ratio (93 percent). Net utilization was higher in rural areas (43 percent) than in urban areas (37 percent). In households with at least one ITN, 66 percent of children and 70 percent of pregnant women slept under an ITN the night before the survey.

In 2012, PMI and the Global Fund supported two sub-national ITN mass distribution campaigns. In total, approximately 1.3 million nets were distributed in nine of the 15 Liberia counties. In 2014, PMI supported a qualitative assessment<sup>4</sup> of ownership of mass distribution campaign nets to explore possible reasons for low ITN ownership despite the two ITN mass campaigns in 2012. 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 the 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 ITN usage was related to access, with the proportion of sleeping spaces that were covered in the four communities averaging 53 percent (ranging from 29 percent to 69 percent). Results of this and the 2013 DHS led the NMCP to revise its strategy to nationwide mass universal coverage campaigns.

Based on this data, Liberia discontinued the older model of distributing ITNs door-to-door through phased mass distribution campaigns in combination with net “hang-up” in households. Liberia conducted its first nationwide mass universal net coverage campaign between April and June of 2015 during the EVD epidemic, distributing approximately 2.8 million ITNs donated by the Global Fund; estimated population was 4.5 million persons. The 2016 MIS conducted after the 2015 universal coverage campaign looked at ownership and use of nets. Although ownership of at least one ITN increased from 55 percent in 2013 to 62 percent, access had a modest increase from 22 percent to 25 percent. Use of ITNs also increased modestly from 32 percent in 2013 to 39 percent in the general population in 2016. Among those who owned at least one ITN, use increased from 56 percent in 2013 to 61 percent in 2016.

After the 2015 universal coverage campaign, PMI procured and distributed 100,000 ITNs to communities in Monrovia that were missed during the 2015 mass campaign. PMI also distributed 168,650 ITNs to facilities in 13 counties for continuous distribution through ANC clinics and at institutional delivery. In 2016, PMI supported the NMCP to distribute 23,350 nets to hospitals and registered residential institutions including orphanages, welfare homes, military barracks, and nursing schools not reached by the 2015 house-to-house mass distribution campaign.

PMI also bolstered supportive supervision of the continuous facility-based ITN distribution system. After 2015 supervision reports indicated that the recording and reporting of ITNs given to beneficiaries was a challenge, PMI supported a series of on-site trainings to address some of the main challenges, ensuring: (1) ITNs are given to the right target groups at the agreed health facility visit; (2) ITNs are

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<sup>4</sup> A Qualitative Assessment of the Ownership and Use of Mass Distribution Campaign Nets in Liberia. 2014. Denise Roth Allen and Kathryn Shuford. Centers for Disease Control and Prevention, Atlanta, Georgia USA

always available and the system for resupply is functioning well; and (3) the recording of ITNs distributed is done correctly and appropriately and a system is in place to record institutional delivery nets until new registers are delivered.

In addition, the storage of nets was found to be a major challenge, thus the second tranche of nets for health facilities were delivered to specific counties in shipping containers. In 2016, PMI supported the training of 2,388 service providers from 13 counties on the processes for ITN distribution and proper documentation and reporting for ANC and institutional delivery. In 2015, PMI supported the formation of a national-level monitoring team comprised of the NMCP, the Family Health Division of the MoH, and the MoH's Supply Chain Management Unit to conduct supportive supervision for continuous ITN distribution. This team trained 172 community health and district officers to conduct on-the-job orientations for ANC and institutional delivery staff on ITN distribution at health facilities. To date, PMI has supported training on the routine ITN distribution program for 845 county and health facility staff and 5,560 reproductive health supervisors across all 15 counties of Liberia.

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

ITNs issued to patients after delivery are currently being captured on the postpartum ward register. The PMI and USAID supported the MoH to revise HMIS monthly summary forms and ANC registers to capture institutional delivery distribution. In 2017, PMI supported the development, printing, and distribution of necessary tools for routine ITN distribution, including monitoring checklist, *big belly* (ANC) cards, postnatal ledgers, and continuous distribution job aids. In addition, PMI supported the training of health workers on the use of the revised registers. Quarterly monitoring of counties and health facilities has shown improvement in routine ITN issuing and recording at ANC clinics and at delivery, and health workers knowledge on ITN use has improved. Health workers are providing correct messaging to pregnant women during ANC visits and during delivery.

In 2017, PMI supported a national level monitoring team from the NMCP, the Family Health Division of the MOH, and the MOH's Supply Chain Management Unit to conduct quarterly supportive supervision for continuous ITN distribution in all the 15 counties. In addition, PMI provided support to the NMCP, Family Health Unit, and CHMTs to conduct review meetings and comprehensive assessments of the trainings, health workers' knowledge of the facility-based ITN distribution process, and ITN distribution logistics management and reporting.

PMI continued to promote routine distribution of ITNs by procuring and supporting storage and distribution of sufficient ITNs to meet ANC and institutional delivery needs, as well as nets for specialized institutes including orphanages, hospitals, and boarding schools. PMI will support the Central Medical Stores (CMS) in the storage, transportation, and distribution of the nets. With FY 2018 funding, PMI will continue to support the CMS through technical assistance to move routine ITNs from the central level to county warehouses semi-annually, and from the county depots to the health facilities through a resupply system. In addition, PMI will provide technical support for the institutionalization and evaluation of this routine distribution method including exploring the question of whether or not an additional distribution channel is needed.

Liberia's most recent ITN mass campaign was launched on World Malaria Day (April 25) in 2018. From April through May, approximately 2.4 million ITNs procured by the Global Fund were distributed, with net needs calculated based on one net per 1.8 persons. With FY 2016 funds, PMI supported technical assistance for campaign planning, and with FY 2017 funds, PMI supported SBCC before, during, and after the campaign. Monitoring of attrition and physical durability of nets distributed during

the 2018 mass campaign will be supported by PMI at two sites for a three-year period (2018–2020) beginning in July 2018. The Global Fund will perform a commodities audit that will provide limited information on ITN coverage in 2018. A 2018 DHS, partially supported by PMI, will be implemented at the end of 2018 and provide essential coverage and use data from the most recent ITN distribution campaign.

In 2016, PMI and the NMCP had planned to conduct an update of Liberia’s ITN strategic plan and an assessment of the viability of additional continuous distribution channels such as school-based distribution in selected counties but these activities were delayed to allow time to ensure that ANC and institutional delivery channels were functioning. The assessment has been postponed until later in 2018 and will start with a field exploration to gather information on available structures and feasibility of channels for ITN distribution, with a focus on school-based distribution. A stakeholders meeting will be organized to share and discuss findings from the exploratory trip, as well as draft process guidelines. Once an alternate channel is identified, PMI will collaborate with the NMCP to support a pilot to evaluate feasibility in-country.

Commodity gap analysis

**Table 4: ITN Gap Analysis**

<b>Calendar Year</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Total Targeted Population	4,295,042	4,385,238	4,477,328
<b>Continuous Distribution Needs</b>			
Channel #1: ANC <sup>1</sup>	214,752	219,262	223,866
Channel #2: Institutional Delivery <sup>2</sup>	154,622	166,639	179,093
Channel #3: Institutions (e.g. hospitals, orphanages, boarding schools, military)	20,000	25,000	25,000
Channel #4: School Distribution <sup>3</sup>	0	0	20,000
<i>Estimated Total Need for Continuous</i>	389,374	410,901	439,005
<b>Mass Distribution Needs</b>			
2018 Mass Distribution Campaign	2,386,134	0	0
<i>Estimated Total Need for Campaigns</i>	2,386,134	0	0
<b>Total Calculated Need: Routine and Campaign</b>	2,775,508	410,901	439,005
<b>Partner Contributions</b>			
ITNs Carried Over from Previous Year	243,700	244,326	8,425
ITNs from Global Fund	2,386,134	0	0
ITNs Planned with PMI Funding	390,000	175,000	439,000
<b>Total ITNs Available</b>	3,019,834	419,326	447,425
<b>Total ITN Surplus (Gap)</b>	244,326	8,425	8,421

<sup>1</sup> Five percent of the national population pregnant in a given year with 100 percent ANC coverage.

<sup>2</sup> Four percent of population under one with 90 percent, 95 percent, and 100 percent of pregnant women delivering in an institution for 2018-2020.

<sup>3</sup> PMI and NMCP are exploring adding a school-based distribution channel and would pilot in 2020.

Plans and justification for proposed activities with FY 2019 funding:

With FY 2019 funds, PMI will continue to procure and distribute ITNs for routine distribution through traditional channels, including ANC, institutional delivery, and state-run facilities (e.g., hospitals, orphanages, boarding schools, and military installations). This will include warehousing and distribution from CMS to county warehouses. PMI support is essential to help protect these select populations from malaria through ITNs. Technical assistance to ensure these activities are achieved as well as planning for the next nationwide campaign will be provided with FY 2019 funds. PMI will continue to support net durability monitoring of the nets distributed during the 2018 mass ITN campaign. PMI will also explore procuring and distributing ITNs through a new channel in Liberia—select primary school districts—with the goal of increasing net access and use of ITNs.

The 2016 MIS, conducted after the 2015 ITN mass campaign, shows national ITN access at 42 percent. The average number of residents per household in Liberia is five (2016 MIS). Therefore, the ideal number of nets per household to achieve universal ITN access is three, but the 2016 MIS shows that the mean number of ITNs per household was 1.2, and over 80 percent of ITNs owned by households were distributed during mass campaigns. Thirty-four percent of households reported having disposed ITNs during the 12 months preceding the survey, with tearing (89 percent) being the main reason. In order to reduce the net access gap and maintain a certain level of net access between consecutive mass campaigns, PMI Liberia and the NMCP plan to scale up continuous net distribution using multiple channels beyond ANC and health facility delivery. School net distribution is part of Liberia's 2016–2020 NMSP.

PMI Liberia and NMCP are proposing to pilot a school net distribution in 2020, starting in two hard-to-reach counties in the southeast with low net access (based on the planned 2018 DHS) and high gross school enrollment ratio (per current data from the Liberia Education Statics Report). The rationale behind conducting the school net distribution in 2010 based on 2018 DHS net access data is that the 2016 MIS does not have net access data by county and that net access will change after the 2018 mass ITN campaign. Data collection for the 2018 DHS is planned for September–December 2018 and the final report is expected in June 2019. The 2018 DHS will provide the most updated net access data by county. Selection of the two counties will be in consultation with the NMCP, the Service Delivery Department of MoH, the Health School Department of the Ministry of Education, Peace Corps, and the USAID Education Office. The NMCP and PMI will discuss the strategy for distributing nets in schools with the school health program in the Ministry of Education and counties before implementation of the pilot. PMI FY 2019 funds will also support the 36-month time point for durability monitoring of ITNs.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

**c. Indoor residual spraying**

Progress since PMI was launched

PMI supported IRS in Liberia from 2009 to 2013. As part of the IRS program, PMI collaborated with private companies to support implementation of IRS. The Arcelor Mittal Steel Company conducted three rounds of spraying in its concessional areas in Nimba and Grand Bassa Counties from 2010 to 2012, and the Liberia Agriculture Company supported one round of spraying in its concessional area in Grand Bassa County in 2011. PMI provided insecticide and technical support, including training and mentoring, to these companies to build capacity to conduct IRS.

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

**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	Two	Pyrethroid	~22,000	N/A	~160,000
2010	Four	Pyrethroid	52,468	98 percent	420,532
2011	Five	Pyrethroid and carbamate	89,710	96 percent	834,671
2012	Five	Pyrethroid and carbamate	96,901	98 percent	869,707
2013	One	Organophosphate	42,708	96 percent	367,930

Progress during the last 12-18 months

PMI did not support IRS in Liberia during the last 12 – 18 months.

Plans and justification for proposed activities with FY 2019 funding:

PMI does not plan to support IRS in Liberia with FY 2019 funding.

**2. Malaria in pregnancy**

NMCP/PMI objectives

Liberia's 2016 – 2020 NMSP encompasses a three-pronged approach toward MIP, which consists of prompt and effective case management of malaria and anemia, IPTp with SP at every ANC visit after the first trimester with a month between doses, and use of ITNs. Current objectives related to MIP include:

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

PMI and the Global Fund remain the biggest donors supporting the NMCP to meet its MIP objectives. With the support of PMI, and based on WHO's guidance, the NMCP has changed the policy for treatment of MIP from oral quinine as the first-line treatment for uncomplicated malaria throughout all trimesters to oral quinine in the first trimester and use of ACTs in the second and third trimester. For severe malaria, the 2015 revised case management guidelines recommend intramuscular/intravenous artesunate or intramuscular artemether as first-line treatments, including pregnant women in all trimesters. The NMCP and partners rolled out the implementation of this policy at the health-facility level in May 2016, after a comprehensive review process to align the updated MIP and treatment guidelines and training materials.

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 of ferrous sulfate and folic acid.

### *Progress since PMI was launched*

The MoH, through the NMCP, the Family Health Division, the Community Health Division, and the Health Promotion Unit continue to make efforts to improve ANC attendance through outreach efforts and the quality of ANC service delivery throughout the country. The MoH has an MIP working group to assist with these efforts. Certified midwives provide 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.

Despite challenges faced in the scaling up and implementation of IPTp, particularly during the EVD epidemic from 2014 to 2015, some significant results have been achieved. PMI supported the development of training manuals and protocols used in the training of CHAs, CHVs, and trained traditional midwives. 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 SBCC at the community level through reproduction of comprehensive community health education materials that promote ANC attendance and the prevention of malaria during pregnancy, as well as nationwide radio campaigns and printing of posters on MIP.

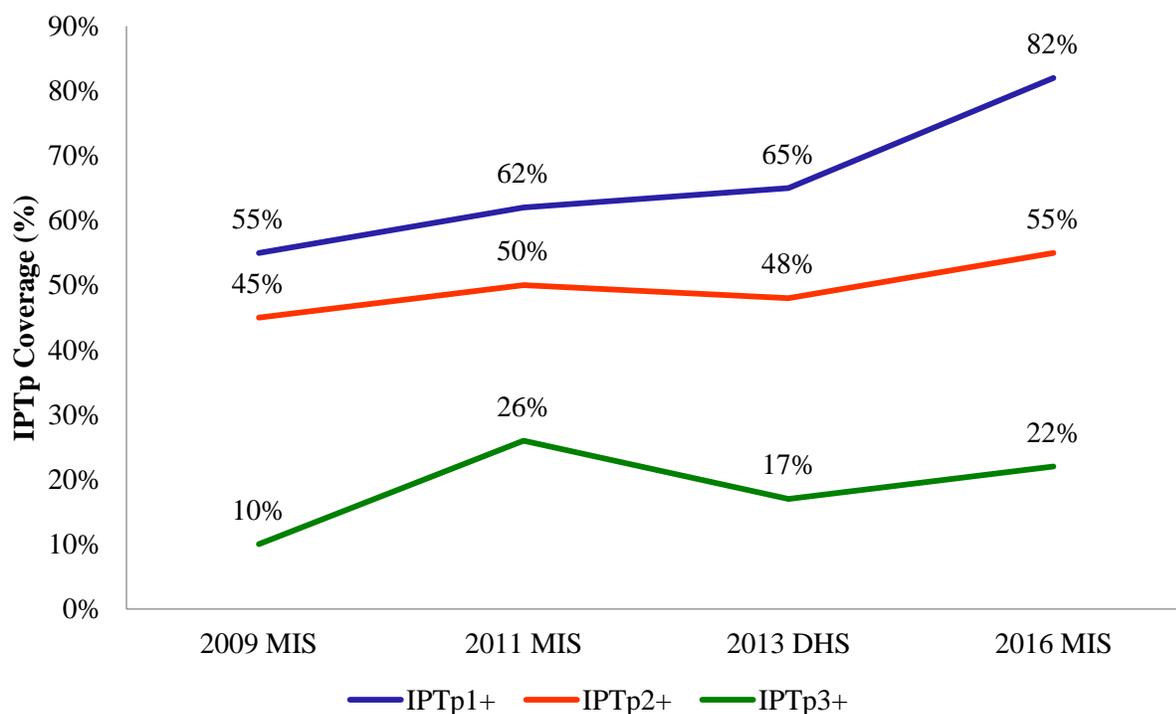
PMI assisted the NMCP in finalizing and printing updated MIP protocols and treatment guidelines based on WHO 2012 guidance. The revised content focused on encouraging pregnant women to seek IPTp (and receive three or more doses of SP throughout their pregnancy) and on recognizing danger signs that warrant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

In 2015, PMI, USAID, and the Global Fund supported the MoH to revise the HMIS tools, including ANC and postnatal registers. The revised ANC registers and HMIS reporting form include a column to capture IPTp3, and IPTp3 plus SP doses. The MoH also revised the postnatal care register to capture nets given out during institutional deliveries. The MoH Family Health Division participated in the revision of the registers. In 2016, PMI supported the NMCP, Reproductive Health Division of the MoH,

instructors from midwife training institutions, and heads of ANC in different counties in an update of training manuals and protocols used for ANC and MIP. In 2017, PMI supported the printing and distribution of the new registers to all clinics providing ANC services in all 15 counties. In 2017 and part of 2018, PMI used FY 2017 funds to train ANC service providers on the use of the revised registers. In addition, over 900 trained traditional midwives and 927 certified midwives and traditional midwives in the country were educated on encouraging women to demand IPTp and referring them to health facilities for delivery, while 15 reproductive health supervisors (one per county) were trained on MIP. The reproductive health supervisors are the focal people from each county based at the facility level to whom CHVs/CHAs report.

The collective support from PMI and other partners has contributed to an increase in ANC attendance and IPTp coverage. Results from the 2016 MIS indicate that almost all women (98 percent) who gave birth in the five years preceding the survey received ANC from a skilled provider for their most recent birth; 79 percent had the recommended four or more ANC visits. The median months of pregnancy at first visit is three months. Antenatal care coverage is high in both rural and urban areas, all regions, and for women of all education and wealth levels. The percentage of women receiving IPTp1 increased from 55 percent in the 2009 MIS to 82 percent in the 2016 MIS, while IPTp2 increased from 45 percent in the 2009 MIS to 55 percent in the 2016 MIS, and IPTp3 doubled from 10 percent in the 2009 MIS to 22 percent in the 2016 MIS.

**Figure 7: Trends in IPTp Coverage, 2009-2016**



While uptake of IPTp2 has increased nationally from 4.5 percent in 2005 to 48 percent in 2013 and 55 percent in 2016, IPTp3 is still very low at 22 percent in 2016 and the gap between the four ANC visits and IPTp3+ is high at 57 percent. The ANC and IPTp3 gap is partly attributable to SP stockouts, SP misuse to treat uncomplicated malaria, delayed implementation of new IPTp policy and guidelines, including delayed training/orientation of health workers on the new policy, and missed opportunities even when the health workers are trained and SP is available at the ANC clinics. Data on SP stockouts

comes from end-use verification that shows, on average, stockouts of SP on three consecutive months in the last three months of 26 percent in 2015, 13 percent in 2016, and 17 percent in 2017. Stockouts of SP is a result of delayed last mile distribution of commodities, including antimalarial commodities. USAID supports commodity distribution from the central warehouse to county depots, and the MoH, which is the principal recipient to the Global Fund, is responsible for last mile delivery. Last mile distribution of commodities is not functioning well in Liberia due to delayed disbursement of funds and lack of a streamlined process for funding last mile distribution of commodities. USAID and other donors are addressing this issue through discussions with the Global Fund and the MoH.

The source of information on misuse of SP is anecdotal and is obtained from analyzing OPD registers where SP, and sometimes quinine, is used to treat uncomplicated malaria. This practice is currently being addressed through ongoing nationwide trainings on case management, as well as through interpersonal SBCC at health facilities.

The supply chain issues related to SP availability for IPTp are being addressed in the pharmaceutical management section. Drivers of inappropriate use of SP and SBCC to change this are being addressed in the SBCC section. The ANC/IPTp gap are being studied through upcoming operational research (OR).

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

In the past 12–18 months, PMI scaled up the implementation of the updated MIP policy from three to an additional five counties. The support included an initial assessment of the capacity gap that showed a lack of knowledge on the new IPTp guidelines, inconsistent provision of IPTp SP at health facilities, and missed opportunities for IPTp and ITN distribution at ANC clinics. The baseline assessment showed that midwives had not been trained to conduct RDT testing at ANC clinics and were referring pregnant women with fevers to the laboratories. This created a data gap for malaria test rate for pregnant women with fevers, and the type of treatment given for the malaria-positive cases. As a result, PMI has supported the training of midwives in RDT testing and capturing data for HMIS reporting in five counties. In addition, for the scale-up of Gbarpolu, Grand Cape Mount, Grand Gedeh, River Gee, and Sinoe Counties, PMI supported printing updated MIP training manuals and guidelines, training of 286 of the targeted 290 health workers on the new IPTp policy and guidelines, strengthening the routine distribution of nets at ANC clinics and during institutional deliveries, and on the job supportive supervision and mentoring. With PMI and Global Fund support, an additional 422 health workers were trained in MIP in the three USAID focus states of Bong, Nimba, and Lofa and the remaining six counties. As a result, 267,500 ITNs were distributed to pregnant women during ANC visits and at the time of delivery. In 2017, PMI supported the distribution of 675,000 doses of SP for health facilities nationwide.

**Table 6: Status of IPTp Policy in Liberia**

Status of Training on Updated IPTp Policy		Number and Proportion of CHVs Trained on New Policy in Last Year (If training on new policy is not completed)	Revised Guidelines Available at Facility Level?	ANC Register Updated to Capture Three Doses of IPTp-SP	HMIS/DHIS Updated to Capture Three Doses of IPTp-SP
Completed/ Not Completed	Date (Completed or expected)				
Completed	2017	100 % - All reproductive health supervisors 97% - 900 Trained Traditional Midwives Oriented	Yes, in some facilities	Yes	Yes

**Table 7: Status of ANC Guidelines in Liberia**

Status of 2016 WHO ANC Guidelines Adoption		Number and Proportion of CHVs Trained in New ANC Guidelines in the Last Year	Guidelines Available at Facility Level?	Additional IPTp Contact Added to ANC Schedule at 13 Weeks?	ANC Register Updated to Capture 8-9 ANC Contacts?	HMIS/DHIS2 Updated to Capture 8-9 ANC Contacts?
Started/ Completed/ Not Completed	Date (Completed or expected)					
Not Started	N/A	Training has not started	No	Yes	No	No

**Table 8: SP Gap Analysis for Malaria in Pregnancy**

Calendar Year	2018	2019	2020
Total Population	4,295,042	4,385,238	4,477,328
Total Number of Pregnant Women Targeted	214,752	219,262	223,866
<b>SP Needs</b>			
Total Number of Pregnant Women Attending ANC <sup>1</sup>	214,752	219,262	223,866
<b>Total SP Need (in Treatments)<sup>2</sup></b>	<b>644,256</b>	<b>657,786</b>	<b>671,599</b>
<b>Partner Contributions</b>			
SP Carried Over from Previous Year	222,545	204,289	1,503
SP from Global Fund	0	0	0
SP from UNICEF	0	0	0
SP Planned with PMI Funding	626,000	455,000	675,000
<b>Total SP Available</b>	<b>848,545</b>	<b>659,289</b>	<b>676,503</b>
<b>Total SP Surplus (Gap)</b>	<b>204,289</b>	<b>1,503</b>	<b>4,904</b>

<sup>1</sup> Assumes five percent of national population is pregnant in a given year with 100 percent ANC coverage.

<sup>2</sup> Assumes each woman receives three doses.

### Plans and justification for proposed activities with FY 2019 funding

PMI will procure 675,000 SP treatments to ensure an adequate supply for pregnant women to receive at least three doses during pregnancy. PMI will continue to provide technical assistance to support the NMCP in the implementation, scale-up, and monitoring of activities to prevent MIP, including implementation of the new IPTp guidelines. Planned activities with FY 2019 funding include:

- Scaling-up implementation of the revised MIP guidelines to cover all the 15 counties in collaboration with Global Fund and other partners;
- Providing support for training on the new HMIS forms and revised registers to enter data on IPTp3 and IPTp3+ doses of SP;
- Procuring and distributing ITNs to all pregnant women nationwide during ANC visits and at institutional delivery, and ensuring that ITNs given out are captured in the postpartum ward register;
- Training of new midwives and low performing health facilities and ensuring that pregnant women with malaria symptoms are tested and treated as directed by national standard treatment guidelines;
- Strengthening the supply chain and management system to ensure availability of ITNs, SP, and antimalarial drugs in all targeted health facilities (see Pharmaceutical Management section for more details); and
- Strengthening SBCC for MIP, including SBCC aimed at (1) health care workers on the importance of having medication onsite and avoiding stockouts; (2) the community level regarding use of SP for the prevention of malaria in pregnant women; (3) promoting the continuous use of ITNs during pregnancy, and (4) encouraging prompt care-seeking behavior for malaria in pregnancy. SBCC will also be used to discourage off-label use of SP by health care workers and the public. See the SBCC section for more details.

The allocation of funds for training take into account: (1) that most of the training on the new IPTp policy and guidelines will be supported with FY 2017 and FY 2018 PMI funds; (2) that additional funds will come from the Global Fund grant of \$367,000 for printing of ANC registers and supporting supervision for IPTp; and (3) the integrated training and supervision of MIP with malaria case management (additional funding for training and supervision included in the Case Management section).

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

### **3. Case management**

#### NMCP/PMI objectives

The Liberia NMSP 2016–2020 adheres to the WHO recommendation for parasitological confirmation of all suspected malaria cases with quality assured microscopy or RDT and prompt effective treatment of positive uncomplicated cases with an ACT. To achieve the malaria diagnostic testing and treatment objectives of the strategic plan, the NMCP supports provision of quality 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. According to the 2016 Liberia MIS, among children with fever who sought care with a health care provider, an estimated 59 and 34 percent sought care in public and

private facilities, respectively. Approximately eight percent sought care elsewhere. PMI-procured RDTs and ACTs are provided to the public, as well as faith-based facilities and CHAs. The NMCP has also engaged with the private sector (private facilities and retail medicine vendors) to provide malaria testing and treatment services. The NMCP has established a memorandum of understanding with some private facilities in which the facilities receive malaria commodities with the expectation that they report malaria data to the HMIS. However, the private sector policy awaits full adoption and implementation.

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. Although quarterly supervision visits are planned, this number is rarely achieved. PMI supports the NMCP to focus on RDT use at the primary level (health posts and community), as well as some health centers, and quality microscopy at hospitals and health centers with adequate capacity, although RDTs can be used at all levels.

The Liberia MoH conducts a Joint Integrated Supportive Supervision activity that combines supervision to determine health facility readiness to provide care for diseases such as malaria, HIV, and TB with immunization, family planning, and mental health services. While the tool used for the Joint Integrated Supportive Supervision activity captures whether patients are examined for malaria according to national guidelines, it does not examine details on the quality of the service. According to the 2016 NMSP, the NMCP plans to increase access to prompt and effective malaria treatment, with the goal of reaching 85 percent of the population and 90 percent of children under five years of age living in hard-to-reach communities (defined as greater than 5 kilometers from a fixed health facility) by 2020. In order to reach most communities, the Liberia MoH has revised its health care workforce structure to include CHAs who will work in communities greater than 5 kilometers from a health facility. Once fully trained, CHAs, who will receive monthly stipends of \$70, are expected to offer a range of iCCM services, including testing for malaria using RDTs and pre-referral rectal artesunate for severe cases. Other CHA activities include offering essential malaria prevention information, as well as water, sanitation, and hygiene and immunization activities. CHAs are supervised by CHSSs, who are affiliated with the closest health facility. With the recent introduction of artemether-lumefantrine (AL) as an alternate ACT, the NMCP plans to have all health workers reached with a combination of training, standard operating procedures, and job aids on the appropriate use of AL. Specific recommendations from the Liberia Technical Guidelines for Malaria Case Management are listed in Table 9.

**Table 9: Status of Case Management Policy and Implementation in Liberia**

Status of Case Management Policy in Liberia According to the Liberia Technical Guidelines for Malaria Case Management (2017)		Currently Being Implemented? Are There Plans to Modify the Recommendations?
What is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Artesunate + amodiaquine	Yes
What is the second-line treatment for uncomplicated <i>P. falciparum</i> malaria?	Artemether + lumefantrine	Yes, limited training has been conducted to support nationwide implementation*
What is the first-line treatment for severe malaria?	<ul style="list-style-type: none"> <li>- Artesunate (IM/IV)</li> <li>- Artemether (IM)</li> <li>- Quinine (IM)</li> </ul>	Yes, preferred order for treatment: <ul style="list-style-type: none"> <li>- Artesunate (IV/IM)</li> <li>- Artemether (IM)</li> <li>- Quinine (IM)</li> </ul>
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the first trimester?	Oral quinine	Yes
In pregnancy, what is the first-line treatment for uncomplicated <i>P. falciparum</i> malaria in the second and third trimesters?	Artesunate + amodiaquine <i>or</i> artemether + lumefantrine	Yes
In pregnancy, what is the first-line treatment for severe malaria?	Artesunate (IV/IM)	Yes
Is pre-referral treatment of severe disease recommended at peripheral health facilities? If so, with what drug(s)?	<ul style="list-style-type: none"> <li>- Rectal artesunate for children &lt; 6 years</li> <li>- IM artemether or artesunate for adults or children ≥ 6 (and children &lt; 6 where rectal artesunate is not available)</li> </ul>	Yes, IM artemether is being phased out and rectal artesunate has yet to be rolled-out country wide
Is pre-referral treatment of severe disease recommended for community health workers? If so, with what drug(s)?	Rectal artesunate for children < 6 years	Rectal artesunate has yet to be rolled-out country wide
If pre-referral rectal artesunate is recommended, for what age group? ( <i>Note: current international guidelines do not recommend administering to those ≥ 6 years.</i> )	Children < 6 years	Rectal artesunate has yet to be rolled-out country wide

\*Based on the results of the ongoing therapeutic efficacy study and ACT acceptability studies, the NMCP may revise their malaria case management guidelines with respect to the first-line treatment.

### Progress since PMI was launched

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

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

Since 2007, PMI has procured 20.9 million ACT treatments for management of uncomplicated malaria and 12.9 million RDTs in Liberia. PMI has also procured severe malaria medications in the country. Malaria diagnostics and antimalarials are provided to all public and private facilities that provide diagnostic and treatment services through a memorandum of understanding with the MoH that requires private facilities to report via the HMIS. In addition, beginning in 2013 with support from Comic Relief, and later the USAID Office of Foreign Disaster Assistance, partners worked with the NMCP to train and supply subsidized RDTs and ACTs through 213 registered private retail pharmacies and medicine shops in three communities in Montserrado County (where a majority of these outlets operate). The planned expansion of these services to other communities in Montserrado following the successful pilot in 213 facilities in the communities of West Point, Bushrod Island, and Paynesville was interrupted by the EVD epidemic. However, with support from the Global Fund, plans are now underway to scale-up the private sector initiative to the entire Montserrado County with anticipated coverage of approximately 450 pharmacies and medicine stores.

According to a 2016 Service Availability and Readiness Assessment, 701 health facilities exist in the country: 36 hospitals, 48 health centers, and 615 clinics. Of those, roughly 62 percent are public and 38 percent are private (although data on the percentage of patients with fever seeking care in the private sector is lacking). Approximately 200 medical doctors, 500 physician assistants, and 3100 nurses work in the country. In 2016, UNICEF conducted a country-wide mapping of CHVs and determined that approximately 4000 CHVs were responsible for providing malaria case management and performing house-to-house education on a range of malaria topics, including the proper use of ITNs and management of fever in children less than five years of age.

### Progress during the last 12-18 months

Over the past 12 months, PMI has procured approximately 2 million ACT treatment courses, 2.4 million RDTs, 84,000 vials of intravenous quinine, and 483,336 vials of injectable artemether. With PMI's

support, the Malaria Case Management Technical Guidelines were updated in 2017, printed, and distributed to facilities. Training sessions incorporating the new guidelines reached a total of 350 facility-based health care workers in January –June 2017. In October 2017, PMI support expanded malaria service delivery including case management to five additional counties (Gbarpolu , Grand Cape Mount, Grand Gedeh, River Gee, and Sinoe). This support covers all districts and the 128 public, faith-based, and private facilities. Activities conducted include training and supervision using the Joint Integrated Supportive Supervision activity. An additional 288 health workers in the five expansion counties have been trained on malaria case management and (testing with RDTs and treatment) and 20 national level supervisors have received training on mentoring and coaching. In total, 638 facility-based health workers were trained in malaria case management in 2017 and 2018.

In addition, in January 2017, onsite training and supportive supervision was conducted in 151 health facilities spanning six counties and reached a total of 453 health care workers. The updated guidelines and training sessions address rectal artesunate use in peripheral health facilities, as well as the community, although this modality has not yet been used in the country. With PMI support, the NMCP began creation of a malaria laboratory manual to guide health workers in confirmatory testing of malaria. Feedback on a draft document was provided to the NMCP in the third quarter of 2016. However, additional input is needed to finalize the document.

The concept of paid community health workers, or CHAs, was introduced into the health workforce. CHAs possess certain prerequisite qualifications, as opposed to CHVs who are volunteers trained to perform certain functions. CHAs are expected to form the backbone of the iCCM program and will be supervised by CHSSs. The transition of volunteer CHVs to CHAs is at scale and CHAs now offer malaria testing (with RDTs) and treatment services. CHAs also now report malaria case management activities to the community-based information system (CBIS). As of April 2018, 2,936 CHAs have been trained in the 14 counties targeted for the intervention. Between July 2017 and April 2018, PMI-supported CHAs in Bong, Lofa, and Nimba treated approximately 65,000 children under the age of five for malaria.

Stockouts of RDTs and ACTs at health facilities and in the community remain a major challenge for malaria case management. Per in-country arrangements, PMI supports distribution of malaria commodities from the central warehouse in Monrovia to county depots, while the Global Fund is expected to support last mile distribution of commodities from the county depots to health facilities. However, last mile distribution of case management commodities remains a major challenge.

A Global Fund-supported therapeutic efficacy study (TES), including both artesunate-amodiaquine (AS/AQ) and AL, is ongoing at four sites in Liberia and is expected to be completed in late June 2018, following parasite molecular characterization of late parasite clearance to determine whether the cases are reinfections or recrudescence parasites. TES conducted in 2008-2009 in Nimba County using fixed dose AS/AQ and AL, and another in 2010-2011 in Grand Gedeh using fixed dose AS/AQ, found both ACT types to be highly efficacious for the treatment of uncomplicated malaria for children under five.

**Table 10: PMI-Funded TESs**

<b>Completed TESs</b>			
<b>Year</b>	<b>Site Name</b>	<b>Treatment Arm(s)</b>	<b>Plans for k13 Genotyping</b>
2008-2009 <sup>#</sup>	Comprehensive Health Care Center, Saclepea	ASAQ an AL	Not done
2010-2011 <sup>+</sup>	Martha Tubman Hospital, Zwedru	ASAQ	Not done
<b>Ongoing TESs</b>			
<b>Year</b>	<b>Site Name</b>	<b>Treatment Arm(s)</b>	<b>Plans for k13 Genotyping</b>
2018 (ongoing)*	Bensoville Hospital	ASAQ	K13 genotyping planned with WHO collaborating laboratory support (all four sites)
	C.H. Rennie	AL	
	Saclepea Hospital	ASAQ	
	Senji Hospital	AL	
<b>Planned TESs (Funded with Previous or Current MOP)</b>			
<b>Year</b>	<b>Site Name</b>	<b>Treatment Arm(s)</b>	<b>Plans for k13 Genotyping</b>
2020 <sup>**</sup>	Two sites - TBD	AL and AS/AQ	Yes
2020 <sup>*</sup>	Two sites - TBD	AL and AS/AQ	Yes

\* Funded by Global Fund.

\*\* Funded by PMI.

# Funded by Doctors Without Borders and Drugs for NTDs Initiative.

+ Funded by USAID.

**Table 11: RDT Gap Analysis**

<b>Calendar Year</b>	<b>2018</b>	<b>2019</b>	<b>2,020</b>
<b>RDT Needs</b>			
Total Country Population	4,295,041	4,385,237	4,477,327
Population At Risk for Malaria <sup>1</sup>	4,295,041	4,385,237	4,477,327
PMI-Targeted At Risk Population	4,295,041	4,385,237	4,477,327
Total Number of Projected Fever Cases <sup>2</sup>	3,289,106	2,938,405	3,000,112
Percent of Fever Cases Confirmed with RDT <sup>3</sup>	85%	80%	80%
<b>Total RDT Needs</b>	<b>2,795,740</b>	<b>2,350,724</b>	<b>2,400,089</b>
<b>Partner Contributions</b>			
RDTs Carried Over from Previous Year	0	0	0
RDTs from Global Fund	0	0	0
RDTs Planned with PMI Funding	2,400,000	2,350,724	2,400,089
<b>Total RDTs Available</b>	<b>2,400,000</b>	<b>2,350,724</b>	<b>2,400,089</b>
<b>Total RDT Surplus (Gap)</b>	<b>(395,740)</b>	<b>0</b>	<b>0</b>

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

<sup>2</sup> The number of malaria cases was determined from HMIS data in 2012, which was the last year with a full year's worth of data under "normal" circumstances. The HMIS data includes cases seen by CHAs working in the community on iCCM program. In 2013 there was a moratorium on commodity distribution and in 2014 and 2015 there was EVD. Malaria cases reported in HMIS adjusted for reporting rate (80%) and access to a reporting facility (71%); malaria negativity rate (40%), and increasing vector control coverage (NMCP Quantification & Costing of Malaria Global Fund SAP Commodities 2017).

<sup>3</sup> 85%, 80%, 80% RDT use (NMCP Quantification & Costing of Malaria Global Fund SAP Commodities 2017). The 80% target of testing with RDTs includes testing done at community level by CHAs. The policy of the MoH is for the health facilities to provide 20% of needed commodities to CHAs. The target of 80% RDT use in 2019 and 2020 assumed an increase in malaria testing using microscopy at county hospitals. In the event 20% microscopy cannot be reached, PMI Liberia will negotiate with the Global Fund to address the RDT gap.

**Table 12: ACT Gap Analysis**

Calendar Year	2018	2019	2020
<b>ACT Needs</b>			
Total Country Population	4,295,041	4,385,237	4,477,327
Population At Risk for Malaria <sup>1</sup>	4,295,041	4,385,237	4,477,327
PMI-Targeted At Risk Population	4,295,041	4,385,237	4,477,327
Total Projected Number of Malaria Cases <sup>2</sup>	2,936,702	2,998,372	3,061,338
<b>Total ACT Needs<sup>3</sup></b>	<b>2,176,140</b>	<b>2,244,282</b>	<b>2,291,412</b>
<b>Partner Contributions</b>			
ACTs Carried Over from Previous Year	0	931,140	1,758,858
ACTs from Global Fund	3,107,280	1,200,000	158,000
ACTs Planned with PMI Funding	0	1,872,000	1,000,000
<b>Total ACTs Available</b>	<b>3,107,280</b>	<b>4,003,140</b>	<b>2,916,858</b>
<b>Total ACT Surplus (Gap)</b>	<b>931,140</b>	<b>1,758,858</b>	<b>625,447</b>
<sup>1</sup> Total population at risk for malaria, 2008 population census, 2.1% population growth rate, 100% at risk.			
<sup>2</sup> The number of malaria cases was determined from the HMIS data in 2012, which was the last year with a full year's worth of data under "normal" circumstances. In 2013, there was a moratorium on commodity distribution and in 2014 and 2015 there was EVD. Malaria cases reported in HMIS are adjusted for growth rate (2.1%), reporting rate (80%), and access to a reporting facility (71%) (NMCP Quantification & Costing of Malaria Global Fund SAP Commodities 2017).			
<sup>3</sup> The quantification factors in increasing diagnosis (assuming 40% test negative) and vector control coverage (25% reductions) (NMCP Quantification & Costing of Malaria Global Fund SAP Commodities 2017).			

*Quantification of microscopes*

PMI does not plan to procure microscopes using FY 2019 funds.

*Quantification of IV artesunate/IM artemether*

Based on the estimated 5 percent of all malaria cases presenting as severe, approximately 153,000 severe malaria cases are expected in 2020. PMI will procure 175,000 vials of injectable artesunate (~one third of the need) for public hospitals, with the remaining gap expected to be filled by the Global Fund.

### *Quantification of rectal artesunate*

PMI will procure 10,000 capsules of rectal artesunate for use by community health workers and small peripheral facilities as pre-referral management of severe malaria cases. The target age group is children under six years of age.

### *Plans and justification for proposed activities with FY 2019 funding*

With FY 2019 funding, PMI plans to procure all RDTs and half of the ACTs required for Liberia, with the other half being procured by Global Fund or other donors. PMI will also procure medications for the treatment of severe malaria. To remain consistent with recent Liberian Case Management Technical Guidelines, NMCP preference, and ongoing Global Fund health worker training, PMI will exclusively procure injectable artesunate. The quantities of injectable artesunate needed will be based on the number of severe malaria cases, which is estimated to be five percent of total malaria cases in the country. PMI will procure a third of this need, with the remainder to be procured by the Global Fund. The NMCP has trained 638 frontline health workers in eight counties on the correct use of injectable artesunate, and an additional 850 health workers from the remaining nine counties will be trained by the end of 2018. Although pre-referral rectal artesunate has not been used in the country yet, it is now part of health care worker and CHA training modules. To support this new modality in all 15 counties receiving iCCM assistance, 10,000 capsules of rectal artesunate pre-referral treatments will be procured by PMI to be provided to CHAs and health clinics unable to adequately manage severe malaria. This is based on the NMCP's treatment guidelines recommending management of five percent of the severe malaria cases at the lower-level health facilities and in the community (in all 15 iCCM-supported counties) using this modality. Depending on uptake and other sources of data, such as the revised LMIS, this amount could be altered in future years.

PMI will fund two TES sites in Liberia to complement the two sites that will be funded with Global Fund support in 2020. PMI will analyze the samples for resistance markers at the CDC Malaria Lab as part of a training session involving a Liberian laboratory worker (i.e., PMI Artemisinin Resistance Monitoring in Africa [PARMA] Network). PMI will also work with the NMCP and WHO to further evaluate any concerning findings and to adjust ACT selection if necessary.

With FY 2019 funding, PMI will provide support for facility laboratories with a focus on the county level. In addition, in collaboration with the Global Fund, PMI will work to strengthen malaria case management capacity of the MoH at the central and county levels through continued capacity strengthening for training and supervision and for continuous quality improvements in malaria diagnostic testing and treatment. Unlike in previous years, PMI support will be provided to CHTs in all 15 counties in Liberia. 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, which has a large number of facilities), as well as provide tools to conduct high-quality supervision. These supervisors will be supported in the development of operational plans for conducting onsite supervision activities for malaria, including external quality assurance, in their respective counties aimed at quality improvements in diagnostics.

Through coordinated efforts with the MoH, NMCP, Global Fund, World Bank, and other partners, PMI will continue to support capacity development of facility-based health workers to appropriately diagnose and treat malaria cases in all 15 counties by the end of October 2018. PMI will also support malaria case management capacity development at the community level through Liberia's iCCM program and work closely with other partners such as World Bank and UNICEF to ensure improved support for iCCM in the southeastern region, where UNICEF is heavily invested and where up to 65 percent of residents

utilize community health services due to difficulty in accessing health care. PMI support to the Liberia MoH for case management is through the USAID FARA and implementing partner mechanisms. By July 2019, the FARA program will expand from three to eight counties (will take over five counties from the PMI implementing partner) with a strategic shift to output deliverables meant to better measure effectiveness of this manner of support. The FARA case management deliverable for funds reimbursement is the number of suspected malaria cases diagnosed by RDT or microscopy. In addition, FARA is reporting on the following indicators on a quarterly basis: (1) number of health workers trained in case management with ACTs using U.S. government funds; (2) percent of health facilities in USAID target counties in compliance with malaria clinical protocols; and (3) percent of health facilities in USAID target counties that can conduct specified diagnostic tests.

Over the last few years, the NMCP has lacked the needed capacity to coordinate and lead malaria diagnostics activities in Liberia. The NPHRL/NDU is the arm of the Liberia MoH that is charged with conducting training and supportive supervision for the entire country. However, because the NPHRL/NDU's mandate is broad laboratory technical capacity, there is minimal focus on malaria diagnostics. In addition, because Liberia depends heavily on malaria RDT use outside of laboratory settings, additional focus is needed to guide the quality of testing in these settings. PMI will therefore support technical assistance for a malaria diagnostics expert to be embedded with the NMCP. In collaboration with the NPHRL/NDU and other PMI implementing partners, the diagnostics technical advisor will coordinate training, supportive supervision, and other quality assurance activities. The technical advisor will work closely with the National Reference Laboratory to make sure malaria diagnostics activities are adequately covered under the national lab program. This is especially so as the MoH plans to move more towards an integrated approach to lab training and supervision. The NMCP also depends on microscopists from the national lab for training and supervision. These microscopists have been trained and WHO-certified with PMI funds. In addition, since EVD, the National Reference Laboratory has received resident and non-resident technical assistance for lab strengthening from WHO, the World Bank, Global Fund, and the Academic Consortium to Combat Ebola in Liberia.

To further strengthen diagnostics, PMI Liberia will provide technical assistance to the NMCP, National Reference Lab, and county diagnostics officers. The assistance will include training of county diagnostics supervisors to conduct supervision and onsite mentoring. PMI Liberia is also planning for a diagnostics temporary duty assignment to guide the process once the implementing partner is in place. In addition, PMI Liberia provided significant input into the development of the laboratory manual document that was finalized and printed in 2018. Printed and/or electronic copies have not yet been widely distributed to health facilities. PMI Liberia will work with NMCP to distribute the manuals to all counties. The planned case management training in 2018 onwards will use the new printed laboratory manual.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

#### **4. Cross-cutting and other health systems strengthening**

In order to successfully implement the aforementioned activities, PMI Liberia supports a suite of activities that cut across and benefit insecticide- and drug-based prevention and case management activities. For example, availability of high-quality commodities is necessary to ensure high ITN coverage and effective case management, and health-seeking behavior of individuals and communities is necessary to improve coverage of all interventions. In addition, the gains achieved in malaria control in Liberia can only be sustained if there are strong health systems and local capacity. Hence, systems strengthening and capacity building are intrinsic in all PMI intervention-specific activities previously

mentioned (e.g., training and supervision of health workers, technical assistance for planning and monitoring interventions, etc.). Non-intervention specific or cross-cutting health systems strengthening activities are described below.

#### **a. Pharmaceutical management**

##### NMCP/PMI objectives

The NMCP's objective in the 2016–2020 NMSP is to strengthen the supply chain system for effective quantification and prompt distribution of commodities under a universal system by 2020. The MoH continues to strengthen its collaboration with PMI and other partners to implement and maintain an effective and functional supply chain system for the distribution of health commodities. A transition plan that has been in place since 2017 has resulted in solidified consolidated storage for health commodities that are being distributed routinely (quarterly) in an integrated manner. The outcome of the transition plan is a more transparent and responsive supply chain management system that is characterized by routine commodity inventory, decreasing commodity vulnerability, increasing visibility of commodity supply planning, and sustained commodity delivery from the central level to the county level.

##### Progress since PMI was launched

The Supply Chain Master Plan (SCMP), developed in 2010, was revised in 2015 with technical assistance from PMI. The revised SCMP (2015–2020) maintains a uniform integrated supply and distribution system for malaria and other health commodities and pharmaceutical logistics at all levels through a network of regional storage hubs and county depots, which are supported by an effective and efficient CMS. The revision of the SCMP was the result of lingering challenges associated with the effective and efficient delivery of health commodities from the central level to the facility level. An interim approach—a modified “top-up” distribution system initiated by the MoH with assistance from PMI in 2013 to remedy a surge in the unavailability of health commodities due to diversion—was a result of a moratorium on distribution of malaria commodities donated by PMI and the Global Fund. Following the pilot of the interim “top-up” delivery system to supply health commodities directly to health facilities 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 2016.

The dissolution of the National Drug Service in late 2015 by the MoH, led to the formation of a new strategic plan that laid out the roadmap for implementation of the revised SCMP in 2016. The CMS has been developed and tasked with the responsibility of executing this plan. The key objectives of the strategic plan were the consolidation of storage for health commodities from dispersed locations to a central location and to align parallel commodity distribution systems with a uniformed integrated model. Significant progress has been made toward scaling up access to antimalarial drugs and other commodities nationally through the national Community Health Program and its cadre of CHAs.

The Liberia Medicines and Health Products Regulatory Authority (LMHRA), established with support from PMI in 2010, continues to address the problem of drug quality. Mini-labs have been stationed in five counties that border neighboring countries to further strengthen the LMHRA's efforts to curtail the import of substandard and counterfeit medicines. In addition, medicines imported into Liberia that do not meet the full registration requirements established by LMHRA for the importation of medicines are confiscated and destroyed. The inspectorate of LHMRA, working alongside law enforcement agencies, has also been supportive in removing diverted donor-procured drugs, monotherapies for malaria, and

substandard and counterfeit health products found in commercial medicine stores and pharmacies. Donor-procured commodities are returned to the CMS for redistribution to public health facilities across Liberia while other monotherapies for malaria along with substandard, counterfeit, and expired commodities are destroyed by LMHRA through incineration.

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

The transition plan which laid out the roadmap for the revised SCMP is being implemented by the MoH. The CMS, a new pharmaceutical management structure, was developed with a technical oversight committee headed by the MoH and that consists of donors and partners who provide oversight. In accordance with the MoH's strategic plan, PMI provided support for renting and renovating the A-Z Warehouse situated in the Freeport of Monrovia, which will serve as central storage for all health commodities pending the completion of the new central warehouse. PMI also supported the movement of all health commodities of the MoH from dispersed locations (11 separate warehouses) to the A-Z Warehouse in 2017. Routine commodity inventory has resulted in increased visibility of malaria products and other health commodities through effective inventory management leading to decreasing commodity loss due to expiration and diversion. Malaria commodities remain the largest program commodity stock, accounting for 20 percent of the total commodity stock at the central warehouse and 6 percent of all commodities at risk or nearing expiration in FY 2018.

With the recent completion of the new commodity warehouse in Caldwell, PMI will also support the relocation of commodities from the Freeport warehouse to the new warehouse by the end of 2018 through continued technical assistance. Other support will include the transfer of office equipment, thirty-two surveillance cameras with two monitors, four trucks, assorted warehouse equipment, and a warehouse management system.

USAID supported the CMS to reform its commodity distribution system from multiple parallel channels to a uniformed integrated model, which has become institutionalized. Quarterly commodity distributions are comprised of all health commodities, including all program commodities, and are delivered in a comprehensive manner. PMI aided the MoH in designing and piloting a redesigned network-optimization model that enhanced last mile distribution of health commodities from county depots to health facilities through predetermined routes and reconfigured resupply volumes.

Equally critical to pharmaceutical management over the past 12 months was the automation of LMIS tools, which enhanced the collection and reporting of data from the county level to the central level. Although continued challenges affected the collection, analysis, and interpretation of data through LMIS, PMI provided technical assistance to the MoH to revise the LMIS in 2016. With improved data reporting, the availability of supply and logistics data has increased, leading to greater utilization of the LMIS. As a result, utilization of the LMIS was enhanced and full automation was achieved in 2018 with PMI support. Other achievements include training of twelve national trainers who serve as system administrators; upload of anatomic and therapeutic codes for all health products into the electronic LMIS (eLMIS); roll-out of the eLMIS to nine counties; printing and distribution of a system user guide; and uploading of a master health facility register. The automation of the LMIS tool will further strengthen visibility at the county and central level.

Lingering challenges with commodity distribution from county depots to the facility-level persist due to intermittent funding from the MoH to the CMS and contribute to commodity stockouts in health facilities. Although the Global Fund reportedly funds this activity, lack of managerial oversight at the central level coupled with a lack of transparency and accountability at the CMS and county levels

remain unresolved. This has also inhibited the pilot to transform county depot to health facility commodity delivery from quarterly to monthly and has stalled the scale-up of the pilot from two counties to five counties. Additionally, efforts to develop organizational core values for health workers at the national and sub-national level, which are intended to increase self-esteem among health workers in an effort to promote individual and institutional performance, have been inhibited from determining the required HR competencies and training requirements that ensure efficient pharmaceutical management.

The entities responsible for supply chain management in Liberia are the Supply Chain Management Unit (SCMU) and CMS. Both the SCMU and the CMS are functional units within MoH. The CMS is responsible for storage and warehouse management of all commodities at the central and county level, carries out distribution of all commodities from central to county depots (except in Montserrado County, where commodity delivery is carried to the last mile), and provides periodic commodity stock reports. The SCMU is responsible for commodity forecasting and quantification, supply planning for procured commodities, monitoring of the LMIS (both paper-based and electronic), and verification of last mile commodity delivery. In partnership with the NMCP and the SCMU, PMI has supported 14 end-use verification (EUV) surveys since 2010. The EUV is a rapid survey that collects data from a sample of health facilities each quarter on the availability of malaria commodities and malaria case management indicators. The survey takes eight weeks from the time of facility visits to finalization of the report and includes a follow-up plan to correct any problems found. Follow-up actions have included emergency procurements, training of health workers, facilitating requisitions, and addressing commodity storage conditions.

#### *Plans and justification for proposed activities with FY 2019 funding*

With FY 2019 funding, PMI will continue to support the storage and distribution of health commodities at the central, county, and facility levels. At the central level, technical assistance to the CMS will be provided to strengthen organizational development of the CMS and effectively manage the new central warehouse at Caldwell. PMI will also continue to assist the CMS to train technical specialists in warehouse maintenance, data analysis, inventory management, and fleet management. At the county level, PMI will also support the provision of technical assistance to CHTs to institutionalize demand-driven resupply of commodities based on analysis from the eLMIS.

Funding for last mile distribution of commodities, which is provided by the Global Fund through the MoH, is not regular. This results in stockouts of commodities at service delivery points even when commodities are available at county depots. This is a result of delayed disbursement of funds and an unclear process for disbursing funds to county health teams for last mile distribution. USAID and other donors are discussing with the MoH and the Global Fund how to address the bottlenecks. The most recent distribution (Round 9) has seen some improvements, and PMI Liberia will continue to monitor the situation. In 2019, PMI is proposing to roll-out the last mile distribution model developed by Project Last Mile to eight of Liberia's most affected and remote counties (Bong, Grand Kru, Grand Gedeh, River Gee, Sinoe, River Cess, Maryland, and Grand Bassa) and has included some short-term funding for last mile distribution to the southeastern counties in FY 2018 reprogramming to ensure adequate and timely resupply of health commodities from county depots to health facilities. PMI Liberia will reassess the need for continued funding for last mile distribution during reprogramming of FY 2019 funds. Technical assistance will be provided for the establishment of county-level supply chain management capacity within CHTs, particularly in the southeastern region where malaria prevalence is unacceptably high. Concerted capacity building will be required to coordinate supply planning and distribution of health commodities at the county-level and to ensure health commodities are available and secure from

the central to health facility level. This effort will continue to be evaluated through routine monitoring and reporting coordinated through EUVs and the eLMIS to visualize ongoing performance relative to targets. PMI will also continue its support for system-wide efforts to maintain the reformed commodity distribution system following the transition plan. The eLMIS will provide more reliable routine reporting data. PMI implementing partners will provide the critical link between CHTs and health facilities in order to strengthen delivery channels for commodities from county depots to health facilities; determine content and volumes for commodity delivery; and improve the reporting and documentation of sub-national commodity transactions. PMI will also support strengthening LMHRA capacity for commodity regulation, including registration, and post-market surveillance of antimalarial drug quality.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

#### **b. Social and behavior change communication**

##### NMCP/PMI objectives

Liberia's 2016–2020 Malaria Communication Strategy focuses on the dissemination of malaria-related messaging through mass media, interpersonal communication, and community engagement activities to help ensure that: (1) everyone presenting with fever is tested and receives an ACT within 24 hours if positive for malaria, (2) pregnant women receive two or more doses of IPTp, and (3) community members are aware of the benefits of, and are using, ITNs to prevent malaria. Current national malaria health promotion targets include:

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

The strategy seeks to facilitate the achievement of the following NMSP 2016–2020 objectives:

- To increase access to prompt diagnosis and effective treatment targeting 85 percent of the population by 2020;
- To ensure that 80 percent 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 percent and sustain knowledge at 98 percent by the end of 2020.

Table 13 (below) provides the baseline and targets for the NMCP Malaria Communication Strategy. The 2016 MIS provides the baseline for most of the behavioral and communication objectives. PMI Liberia will obtain the rest of the baseline information from the upcoming 2018 DHS and 2019 MIS. The 2016 MIS shows that while many caretakers of children do not perceive their children to be in danger if they do not seek treatment after onset of fever, they nonetheless take their children for treatment after onset. PMI Liberia will further explore the reasons behind this finding and will use other means like community mobilization and education to increase health-seeking behavior.

**Table 13: Behavioral and Communication Objectives for Key Malaria-Related Behaviors**

Behavioral Objective: Vector Control	Baseline	Target
Increase the proportion of pregnant women and children under five who receive an ITN at ANC and at institutional delivery.	<ul style="list-style-type: none"> <li>• 40% (PW)</li> <li>• 44% children under five years</li> </ul>	80%
Communication Objectives	Baseline	Target
1. Increase the proportion of pregnant women who are aware they are entitled to one free ITN at their first ANC visit and one free ITN at institutional delivery.	To be determined	90%
2. Increase the proportion of pregnant women and caregivers of children under five who perceive themselves and their children to be at risk if they do not sleep under an ITN year-round.	To be determined	90%
3. Increase the proportion of pregnant women and caregivers who believe that using an ITN will reduce their risk of malaria.	To be determined	90%
4. Increase the proportion of providers who believe that issuing ITNs during ANC and institutional delivery will reduce the risk of malaria for pregnant women and children under five.	To be determined	90%
5. Increase the proportion of providers who feel confident that they can distribute ITNs to pregnant women at ANC clinics and during delivery when ITNs are available at the facility.	To be determined	90%
Behavioral Objective: Malaria Case Management	Baseline	Target
1. Increase the proportion of caretakers of children under five with recent fever who seek treatment for malaria.	78% (2016 MIS)	90%
2. Increase the proportion of caregivers of children under five who have accurate knowledge of malaria transmission.	90% (2016 MIS)	90%
3. Increase the proportion of individuals who seek treatment when they suspect they have malaria.	To be determined	80%
Communication Objectives	Baseline	Target
1. Increase the proportion of caretakers of children under five who perceive their children to be in danger if they do not promptly seek treatment for malaria after the onset of fever.	32% (2016 MIS)	90%
2. Increase the proportion of caretakers of children under five who perceive prompt treatment seeking to be the norm in their community.	To be determined	90%

3. Increase the proportion of caretakers of children under five who encouraged friends or relatives to seek care promptly for fever in the past year.	To be determined	90%
4. Increase the proportion of caregivers of children under five who state only mosquitoes cause malaria.	90% (2016 MIS)	95%
5. Increase the proportion of individuals and caretakers of children under five who expect a provider to administer a blood test to confirm presence or absence of malaria.	To be determined	80%
<b>Behavioral Objective: Malaria in Pregnancy</b>	<b>Baseline</b>	<b>Target</b>
1. Increase the proportion of pregnant women who attend ANC visits.	79% (2016 MIS)	90%
2. Increase the proportion of pregnant women who sleep under an ITN.	40%	60%
3. Increase the proportion of pregnant women who demand an ITN at their first ANC visit and at institutional delivery.	To be determined	80%
<b>Communication Objective(s)</b>	<b>Baseline</b>	<b>Target</b>
1. Increase the proportion of pregnant women who believe that early and regular ANC visits ensure they receive appropriate services to protect the health of their children.	79%	85%
2. Increase the proportion of pregnant women who are encouraged by their family and friends to sleep under a net during their pregnancy.	To be determined	60%
3. Increase the proportion of pregnant women who are aware they are entitled to receive an ITN at their first ANC visit and at institutional delivery.	To be determined	80%

### Progress since PMI was launched

In late 2013, the NMCP established a malaria technical working group for SBCC at the national/central level. This active working group focuses on technical issues related to malaria SBCC strategy development, materials/messaging, message medium, appropriate target audiences, timing, monitoring and evaluation of SBCC activities, and community outreach.

In 2014, PMI provided support for a strategic behavior change communication survey in four counties (Bong, Grand Cape Mount, Grand Kru, and River Cess Counties) to examine attitudes, beliefs, and practices regarding net use, receipt of ACTs by children with fever, IPTp for pregnant women, and to identify communication gaps associated with current malaria SBCC messaging.<sup>5</sup> The study included a total of 1200 women and 360 men from households where a child under five years of age resided. Most participants had heard of malaria, were familiar with its symptoms, and mentioned mosquito nets as a prevention method. Nevertheless, only 41 percent 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, 82 percent of the 2014 SBCC survey participants recalled having heard or seen a malaria message within the past 12 months. Despite this, only 19 percent 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

<sup>5</sup> Health Communication Capacity Collaborative. Attitudes, Beliefs and Practices Relevant to Malaria Prevention and Treatment in Liberia, 2014.

need for improvements in SBCC messaging and dissemination for IPTp specifically, as well as for malaria in general.

In 2015 and in 2017, PMI supported the development (2015) and review (2017) of a job aid for ITN distribution at ANC and institutional delivery. The job aid includes information for health providers on how to record ITNs distributed and how to request for a resupply of nets and ledgers. PMI support to the MoH included the redesign and reformatting of the monthly HMIS forms to include ITNs distributed through ANC and institutional deliveries. In 2017, PMI supported the printing of 45,000 *big belly* ANC cards. The 45,000 *big belly* cards have been distributed to all health facilities. There was no planned evaluation of belly card distribution, but central level monitoring teams check the availability of these cards at health facilities during supervision visits. The NMCP is conducting a health facility assessment that will provide information on availability and use of tools at health facilities. The results of the health facility survey will be available in January 2019.

In 2016, USAID supported a knowledge, attitudes, and practice survey in three USAID focus counties (Bong, Lofa, and Nimba) in order to collect information on individual health behaviors and the factors that shape those behaviors. Findings of the survey showed that approximately 50 percent of the surveyed population has knowledge of how malaria is transmitted. Although nearly 85 percent of respondents have at least one mosquito net in the house, only 38 percent reported a sufficient number of nets for everyone in the home to sleep under.

In 2016, the NMCP, in partnership with the MoH National Health Promotion Division, the Community Health Services Division, and malaria partners, used the results of two surveys—a strategic behavior change communication survey and the knowledge, attitudes, and practice survey to revise the Malaria Communication Strategy for 2016–2020. The strategy addresses knowledge, practices, and perception gaps in malaria prevention and treatment, including use of IPTp for pregnant women. The development of the strategy was followed by the development of a Malaria Communication Implementation Plan 2016–2020.

The Malaria Communication Strategy and Implementation Plan (2016–2020) guide the implementation of SBCC activities in Liberia. PMI supported the development of SBCC materials and tools and provided training to facility-based staff and community health assistants (CHAs) on various malaria prevention, case management, and MIP interventions. PMI funding also supported the broadcasting of radio messages on ITN use, IPTp, test and treat, and use of ACTs.

In 2017, PMI supported the NMCP to develop four creative briefs on ITNs, IPTp, diagnosis, and treatment. The briefs, which were validated through the Messages and Materials Development Working Group, were based on Liberia’s existing communication strategy, as well as the latest research on behavior determinants. The briefs are used by the NMCP and SBCC partners to guide and direct the development of SBCC materials and messages on ITNs, IPTp, and case management.

Concerted efforts of the NMCP, PMI, Global Fund, and other malaria stakeholders have successfully raised the population’s awareness of malaria. The 2016 MIS indicated that 99 percent of women of reproductive age have heard of malaria, an increase from 97 percent in 2011 MIS. Among women who saw or heard a malaria message a few months before the survey, the majority (98 percent) heard about bed nets, such as “use your mosquito net” or “everywhere, every night, sleep under the net.” Other messages women reported hearing include: “if you have fever, go to the health facility” (93 percent), and “pregnant women should take drugs to prevent malaria” (91 percent).

The 2016 MIS showed that 95 percent of those who have heard of malaria know that the illness can be avoided, and 90 percent know that mosquitoes transmit the parasite from person-to-person. This is an increase from the 2011 MIS, where only 82 percent of respondents cited mosquitoes as the cause of malaria. Almost half (49 percent) of women who have heard of malaria and know that it can be avoided perceive that people do not take actions to protect themselves from getting malaria because they do not take malaria seriously or perceive that there is no risk.

Almost all women (99 percent) who have heard of malaria state that malaria is treatable. This is an increase from 61 percent in the 2011 MIS. The majority of respondents (81 percent) recommended ACTs for the treatment of malaria. However, quinine was cited by 26 percent of respondents. The 2016 MIS shows that only 56 percent have heard of SP and, of those, only half (55 percent) said that it is used to prevent malaria during pregnancy; 39 percent said it is used to treat malaria. Among women who know SP is used to prevent malaria in pregnant women, 45 percent perceive that pregnant women do not use SP because they are worried about the side effects.

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

The key messages developed for the 2016–2020 Malaria Communication Strategy placed an emphasis on positive, actionable messages for communities and individuals. Messages included the importance of consistently sleeping under ITNs, seeking early treatment for fever, completing ACT therapy, and preventive malaria medicine for pregnant women. In 2017 and 2018, PMI supported several SBCC activities, including:

- Training for facility-based health workers, CHVs, and CHAs;
- Printing of SBCC materials;
- Community mobilization activities like dramas, road shows, community dialogues, and school health promotion activities; and
- Reminders for reproductive health supervisors and health workers on net distribution to pregnant women and net hanging and care.

In addition, PMI used mass media, TV shows, and radio spots, which have wider national coverage, to share SBCC messages. PMI also supported the development of messages and materials for ANC education campaigns and World Malaria Day.

In 2017 and early 2018, PMI supported the SBCC component of the country's ITN mass distribution campaign by leading the process for developing the SBCC strategy and messages and conducting 14 advocacy and social mobilization meetings with local authorities in seven counties. A total of 514 participants (374 male and 172 female) participated in the training. Participants included chiefs, paramount chiefs, pastors, teachers, security forces, clan chiefs, and others. Participants were sensitized to the ITN campaign strategy, household registration, roles and responsibilities of local leaders, importance of ITNs in malaria control, and how to hang, use, and care for nets. PMI also supported mass media activities that included developing standard messages for airing on the radio before, during, and after the campaign. Pre-campaign messages included informing people about the change of net distribution strategy from household distribution to distribution points; the household registration exercise for net vouchers; the dates for the mass distribution campaign; and the location of net distribution points. During the campaign, SBCC messages focused on how to redeem the voucher for nets, as well as how to hang, use, and care for the nets. Post-campaign messages focused on how to consistently use the nets every night and day and how to care for the nets. Messages also informed people that did not redeem their vouchers during the campaign dates to go to the nearest health facility

to exchange their vouchers for a net. The messages were aired on 22 radio stations, covering a total population of 1,761,427 persons.

*Plans and justification for proposed activities with FY 2019 funding*

The 2011 and 2016 MIS, as well as other recent surveys, indicate high community knowledge about the cause of malaria and how to prevent it; however, there are gaps between knowledge and practice. PMI FY 2019 funding will be used to address SBCC gaps at the national, county, health facility, and community level. SBCC interventions will target planners and policymakers at the national and county level, service providers at operational levels, community leaders, and the community. FY 2019 funding will be used to strengthen community and interpersonal behavioral change communications and address gender gaps and disparities in the uptake and use of malaria control interventions.

PMI support for SBCC will use the channels that have been found to be effective in order to close gaps between malaria knowledge and practice. The 2016 MIS indicated that 66 percent of women that had seen or heard a message about malaria in the past few months had heard a message from the radio and that 62 percent had heard a message from a community health worker, traditional birth attendant, or health promoter. FY 2019 funding for SBCC will focus on using community-based approaches in addressing challenges due to inadequate or lack of behavior change. Though the knowledge of malaria is high in the country, it has not resulted in positive behavior change. Community leaders will be engaged in ensuring that the right messaging is available at the community level. The messaging will include perceived risk and severity.

*Increase correct and consistent use of ITNs:*

A high priority in the NMCP Malaria Communication Strategy is increasing ITN use among pregnant women and children less than five years of age. FY 2019 funding will be used to engage political and administrative officials at national and county levels in malaria advocacy meetings and mass media campaigns for ITN distribution. At the community level, community health cadres, including CHVs, CHAs, trained traditional midwives, and local leaders (e.g., chiefs and traditional and religious leaders) will mobilize communities for year-round net care and use. In 2020, Liberia is considering starting school-based net distribution, which will include messaging on net care and use (refer to the ITN section for more details). PMI will promote ITN use and care using various channels, including schools. PMI will continue to work with Peace Corps to improve malaria education in schools and malaria awareness projects in the community. SBCC activities in schools will be implemented in partnership with Peace Corps, NMCP, and the School Health Division in the Ministry of Education.

*Increase in use of MIP services:*

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, CHVs, CHAs, and trained traditional midwives are responsible for communicating with pregnant women. SBCC activities encouraging pregnant women to use MIP services will be planned and coordinated at the central level by the Family Health Services Department, the Community Health Services Division, NMCP, and National Health Promotion Department. The percentage of women who attend four or more ANC visits is high at 79 percent (2016 MIS). IPTp1 attendance is also high at 82 percent. However, IPTp3 attendance is only 22 percent. Given this, FY 2019 funding will be used to address service provider attitudes towards IPTp. Liberia will also start to monitor the IPTp1 –IPTp3 dropout rate/gap.

SBCC activities will target service providers and clients with behavior change messaging using interpersonal communication. Service providers will be trained to adequately understand malaria case management in pregnancy and build counseling skills. Training will focus on building the skills service providers need to test pregnant women who present with fever and to treat only positive cases as opposed to all pregnant women with fever. In addition, service providers will be trained to adhere to the new IPTp guidelines and protocols, encourage pregnant women to complete their treatment dosage, and encourage IPTp uptake and sleeping under ITNs.

Community health volunteers and trained traditional midwives will encourage ANC attendance up to the eight recommended visits. They will also remind pregnant women to demand both SP and ITNs. At the facility level, service providers 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 for malaria. They are expected to encourage patients to complete the full course of ACT treatment. At the community level, CHVs and CHAs encourage prompt care-seeking behavior among individuals with fever, particularly pregnant women and children under five years of age. The HMIS and MIS data show gaps in delivery of case management interventions that are not attributable to stockouts of commodities or other factors. For example, the number of children being treated for malaria in 2016 and 2017 exceed those that had a confirmatory test with RDTs or microscopy. District Health Information System 2 (DHIS2) data shows that the number of children under the age of five that tested positive for malaria (RDTs or microscopy) in 2016 and 2017 was 462,908 and 410,295, respectively. However, the number of children treated for malaria in 2016 and 2017 was 577,042 and 538,960, respectively. This is an indication of irrational use of antimalarial drugs. Service providers will be trained to: (1) test all fever or suspect malaria cases and adhere to test results; (2) adequately understand malaria case management in pregnancy; and (3) build counseling skills. In addition, service providers will be trained to adhere to malaria treatment guidelines and protocols.

#### *Monitoring SBCC:*

NMCP and partners use the MoH JISS tool to monitor malaria activities. The NMCP has a regular monitoring and evaluation plan that includes specific questions on SBCC monitored every quarter. Key performance indicators include the number of people reached with a set of key messages, the number of advocacy meetings held, the visibility of print and frequency of broadcast messages, the number of people who can recall key messages, and the preferred source of these messages.

Data from these key indicators will be triangulated with periodic population-based surveys like the DHS and MIS or special SBCC surveys. The results from the various monitoring approaches will be used to review the messages, segment the audiences for effective targeting and messaging, and prioritize the most effective channels to communicate. The monitoring activities will be carried out at both national and county levels. The county health promotion unit will be supported to monitor the process and output indicators on a monthly basis. National monitoring will be done quarterly, and PMI will support one knowledge, attitudes, and practices survey a year. Information from population-based surveys like MIS and DHS will also be used to improve SBCC activities aimed at promoting positive malaria-related behaviors. USAID Liberia is planning a comprehensive assessment of SBCC activities for various health areas, including malaria, in 2018. Data from this assessment will be used to target SBCC activities, including interpersonal communication. The planned SBCC monitoring activities are included in Table 14 of the SM&E section.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

**c. Surveillance, monitoring, and evaluation**

NMCP/PMI objectives

The NMCP finalized its 2016–2020 SM&E Plan to accompany the revised NMSP. The goal is to provide reliable information on the performance, progress, effectiveness, and efficiency of the national response to control malaria. The plan’s objective is to improve routine malaria data monitoring and program evaluation to ensure quality data management at all levels by 2020. The NMCP SM&E Unit conducts monitoring and evaluation activities in collaboration with the HMIS Monitoring and Evaluation and Research Department at the MoH.

During the last 12 months, NMCP SM&E focal points and partners have updated the malaria specific Surveillance, Monitoring, Evaluation and Research Technical Working Group (Malaria SMER-TWG) terms of reference. Members include staff from NMCP/MoH, PMI, WHO, and implementing partners, and the group meets regularly to review malaria control progress and provide technical guidance to the NMCP on surveillance, monitoring, evaluation, and research at the national, regional, and county levels.

PMI’s support to SM&E in Liberia aligns with the NMCP’s 2016–2020 SM&E Plan. Sources of data and information include the routine health information system (including community data reporting through a CBIS), periodic household and facility surveys, and progress reports from implementing partners, in addition to activities to monitor specific malaria interventions (e.g., net durability monitoring, therapeutic efficacy monitoring, and entomological monitoring).

The table below summarizes available data sources and assessments since 2012, as well as planned activities through 2020.

**Table 14: Surveillance, Monitoring, and Evaluation Data Sources, 2012–2020**

Data Source	Survey Activities	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Household Surveys	Demographic Health Survey (DHS)		x					(x)		
	Malaria Indicator Survey (MIS)					x				(x)
Health Facility Surveys	Health Facility Survey		x*					x*		
	Service Availability Readiness Assessment (SARA) Survey					x*		x*		
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System					x*	x*	x*	(x*)	(x*)
	Support to HMIS	x	x	x	x	x	x	x	(x)	(x)
Other Surveys	End-Use Verification (EUV)	x	x	x	x	x	x	x	(x)	(x)
	Malaria Impact Evaluation				x	x				
	Malaria Program Review/ Midterm Review			x				(x*)		
	Therapeutic Efficacy Monitoring							(x*)	(x*)	
	Knowledge, Attitudes and Practices Survey				x		x	x	x	x
	SBCC Assessment								x	

\* Not PMI funded

( ) Planned

*Progress since PMI was launched*

PMI and the Global Fund have provided the majority of funding for SM&E activities in Liberia over the past ten years, with some additional funding from WHO. PMI has supported three MIS surveys (MIS 2009, MIS 2011, and MIS 2016) and contributed to one DHS (DHS 2013) to track progress of malaria control core interventions and malaria parasitemia in the general population. PMI has been supporting EUV surveys to assess the availability of malaria commodities at health facilities since 2010. Global Fund has provided continuing support for the NMCP to conduct quarterly SM&E supportive supervision visits to strengthen data collection and reporting through the HMIS, at all levels. Global Fund also supports data quality audits and validation activities.

The MoH has a fully integrated, computerized HMIS on the DHIS2 platform 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.

In 2015, there were 727 health facilities (including 37 hospitals) in the country. In 2016, the MoH conducted an assessment on 701 of the 727 health facilities and ownership was 62.3 percent public and 37.6 percent private (30.8 percent private-for-profit and 6.8 percent private-not-for-profit). However, during the most recent reporting period (June 2018), 574 health facilities (including 404 public and 170 private) reported in HMIS. As of 2017, approximately 300 private facilities have a memorandum of understanding with the MoH/NMCP to receive commodities from CMS as long as they provide them free of charge (with the exception of a consultation fee) to patients and report into DHIS2. These private facilities receive supportive supervision visits from the NMCP SM&E team to address data collection and reporting, data verification, and commodity management. The SM&E team conducts supportive supervision visits to 40 percent of all health facilities each quarter.

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

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

The review and updating of the HMIS tools and forms was completed in 2017. As a result of this review, new registers, including a revised monthly reporting form, were designed to better capture the data, especially IPTp indicators and net distribution during ANC and institutional delivery. PMI assisted in printing and distributing the new HMIS tools, forms, and registers and is currently supporting the training of CHTs and health workers on the new tools. PMI, as part of USAID’s integrated health systems strengthening program, supported the embedding of health information system Monitoring and Evaluation Advisors in Bong, Lofa, and Nimba Counties, as well as Monitoring and Evaluation Advisors at the central MoH and NMCP to improve data quality, availability, and use.

The MoH HMIS Monitoring and Evaluation and Research Department 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 CHT. Each county is supposed to have a Monitoring and Evaluation Officer who enters the data from the paper forms into the DHIS2 system. The district health teams’ data management units collect, collate, and analyze data for decision-making; eventually, as internet capacity is established, they may also transmit electronic reports to the county and national levels using the DHIS2 platform. This system improves the timeliness of reporting and provides coaching and mentoring capacity to health facilities and community-level staff on a regular basis. In addition, it supports the NMCP SM&E objective of improving data quality and management at all levels of the health system.

PMI supports technical assistance for CHT Monitoring and Evaluation Officers to conduct regular monitoring of reported data in DHIS2 for treatment of malaria at community and facility levels and IPTp at the facility level. Through PMI support, SM&E mentors were assigned to Bong, Lofa, and Nimba counties to support the CHT and DHT Monitoring and Evaluation Officers and Data Managers.

The HMIS currently collects data from CHAs. The MoH, with support from PMI and USAID, designed a CBIS that integrates with the current facility-based HMIS. CHAs submit reports to CHSSs, who aggregate them at the health facility level and submit them to the CBIS. The CBIS is a separate module in the DHIS2 and captures malaria cases seen at the community level, while the facility data only captures malaria cases seen in facilities to avoid duplication of reporting.

The 2016 MIS final report was disseminated in December 2017. The PMI-supported malaria impact evaluation was conducted between 2015 and 2016. The evaluation assessed the impact of the NMCP and partners' malaria control efforts on malaria morbidity and mortality and all-cause mortality between 2005–2013. The final report was presented to the MoH and stakeholders in May 2018.

In order to strengthen the NMCP's capacity for data analysis and use, PMI is supporting embedding a long-term technical assistance advisor focusing on monitoring and evaluation at the NMCP. The selected candidate arrived in April 2017.

*Plans and justification for proposed activities with FY 2019 funding:*

The NMCP 2016–2020 SM&E Plan 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. With FY 2018 funding, PMI will support the malaria module in the DHS. With FY 2019 funding, PMI will provide technical assistance with the HMIS. PMI also supports data quality assurance and supportive supervision through the FARA and PMI's implementing partners with the MoH, while the Global Fund provides funding to support facility data, such as HMIS, health facility surveys, and supportive supervision for data quality assurance. Funding through the Global Fund supports five sentinel sites for collecting epidemiologic data on malaria.

Improving HMIS data reporting and use will be addressed jointly with the Global Fund and will focus on enhancing the NMCP's capacity to supervise and support counties and districts in their malaria-specific SM&E activities, as well as to strengthen overall capacity of CHTs to manage and utilize health information systems for analysis of malaria data and use for decision-making and problem-solving.

Given that the NMCP staff is stretched thin with all of the data collection and analysis activities in Liberia, PMI Liberia has been providing support to the NMCP in the form of a long-term technical advisor for monitoring and evaluation that is embedded with the NMCP. He will be extended to the end of the current project in 2020. SM&E will be further supported by PMI, the Global Fund, WHO, and other agencies who will support the NMCP to strengthen the Surveillance, Monitoring, Evaluation and Research Technical Working Group, and encourage the NMCP to work more closely with the MoH Monitoring and Evaluation Team. The MOH will strengthen monitoring and evaluation by supporting data analysis and integrated training of about two monitoring and evaluation staff from each of the 15 counties in the country. NMCP and partners will strengthen the capacity of the county monitoring and evaluation team to carry out routine monitoring and evaluation activities and provide needed support to district and health facilities. Support will include developing tools and job aids for routine data quality assessment.

With FY 2019 funding, PMI we will be using one monitoring and evaluation implementing partner, who will be incorporating monitoring and evaluation activities into other technical assistance activities taking place at health facilities; thus, leveraging the funding PMI is putting in for MIP and case management and strengthening the CHTs. There will also be an increased focus at national level. With FY 2018 funding, PMI will support a one-time training of county-level Monitoring and Evaluation Officers. PMI

will not support a similar training with FY 2019 funding, but will reassess the need for specific malaria monitoring and evaluation trainings going forward.

PMI Liberia will be supporting an evaluation of the FARA II mechanism (January 1, 2016 - June 30, 2021) in October - December 2020. The objective of the evaluation is to assess the extent to which the FARA has impacted PMI output and outcome indicators for case management, MIP, and SBCC. PMI and USAID Liberia will use the results of the evaluation to update the PMI scale-up plan and inform new designs for service delivery.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

#### **d. Operational research**

##### *NMCP/PMI objectives*

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

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

Liberia had one PMI-funded operational research (OR) study that was completed in 2013 and does not have any ongoing studies. PMI Liberia, working with the National Reference Laboratory and a Global Fund laboratory consultant, had planned a joint pilot malaria/HIV dried tube specimen based proficiency testing activity. However, the absence of a diagnostics focal person at the NMCP to coordinate this activity with the Global Fund and the National Reference Laboratory meant that the malaria portion of the pilot was dropped.

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

PMI did not fund any operational research studies in the past 12-18 months.

**Table 15: PMI-Funded Operational Research Studies**

<b>Completed OR Studies*</b>			
<b>Title</b>	<b>Start Date</b>	<b>End Date</b>	<b>Budget</b>
Field Testing of Dried Malaria-Positive Blood as Quality Control Samples for Malaria RDTs	June 2013	December 2013	\$10,895*
<b>Ongoing OR Studies</b>			
<b>Title</b>	<b>Start Date</b>	<b>End Date</b>	<b>Budget</b>
No PMI-supported OR			
<b>Planned OR Studies FY 2019</b>			
<b>Title</b>	<b>Start date (est.)</b>	<b>End date (est.)</b>	<b>Budget</b>
Assessment of Barriers to IPTp2+ Services Uptake at ANC Settings in Liberia	October 2019	March 2020	TBD

\* A report has been submitted to NMCP and the manuscript is in final stages for review.

### Plans and justification for proposed activities with FY 2019 funding

With FY 2019 funding, PMI will propose to support operational research to assess barriers to IPTp2+ services uptake at ANC settings. In Liberia, the vast majority (79 percent) of pregnant women attended at least the four recommended ANC visits (MIS 2016). Overall, 72 percent of these pregnant women attend their first ANC visit during the first trimester. Skilled health care providers saw 96 percent of pregnant women during ANC visits (MIS 2016). To protect pregnant women from malaria, the Liberian MoH recommends administration of IPTp at each ANC visit after the first trimester, with at least one month between doses according to 2012 WHO guidelines. From 2009 to 2016, coverage of IPTp1 increased from 55 percent to 82 percent, IPTp2 from 45 percent to 55 percent, and IPTp3 from 10 percent to 22 percent respectively (MIS 2009, MIS 2016). In 2016, IPTp3 uptake was slightly higher among rural woman (25 percent) than urban women (20 percent) and its uptake varied from 14 percent in Greater Monrovia (Capital City) to 35 percent in South Eastern B region. In Liberia, a high malaria endemic country with year round transmission, and with a high proportion of pregnant women attending at least four ANC visits, it remains unclear why IPTp2 and IPTp3 uptake remain far below the national goal of 80 percent. To support the MoH effort to scale up malaria prevention for pregnant women, PMI Liberia and the NMCP propose to conduct a cross-sectional study to identify potential barriers to IPTp uptake at ANC<sup>6</sup> and strategies to address identified challenges. This addresses PMI Strategic Priority #3, to identify barriers to uptake of IPTp, and is expected to directly influence NMCP programs and guidance.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

#### **e. Other health systems strengthening**

##### 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

<sup>6</sup> Rassi C et. al. Assessing demand-side barriers to uptake of intermittent preventive treatment for malaria in pregnancy: a qualitative study in two regions of Uganda. *Malar J.* 2016 15(1):530

decentralize services to the county and district levels and to integrate health services at both the health facility and community level in order to improve access to health care. Strengthening the capacity of lower levels of the health care system, 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 in-service training, supervision, and strengthening of the HMIS and eLMIS. DHIS2 has been operating for several years, but continues to suffer from data quality issues. The eLMIS is being rolled out as of the writing of this MOP in June 2018.

PMI's objectives align with those of the MoH and NMCP, and PMI plans to support the decentralization of services by providing support and technical assistance at the central level, as well as to the 15 counties through support to the CHTs. PMI supports a broad array of health system strengthening activities which cut across intervention areas, such as strengthening in-service training of health workers, supply chain management, health information systems, regulation of health services and pharmaceuticals, and capacity-building of the NMCP and other relevant MoH departments, as well as that of CHTs and supervisors to monitor and improve the quality of malaria interventions in the health system. PMI supports strengthening NMCP relationships with various MoH units and agencies like the National Public Health Institute of Liberia and LMHRA. In addition, PMI provides a portion of its support for malaria service delivery and quality improvement directly to the GOL through USAID's FARA with the MoH, while supporting technical assistance and capacity building of MoH systems to utilize FARA and other resources to improve the delivery of malaria services.

#### *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 Family Health Division, Community Health Services Division, Maternal and Child Health Division, and the NDU. However, additional coordination is still needed. PMI has encouraged engagement with regulatory bodies and professional associations such as the Liberia Medical and Dental Council, LMHRA, 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, that prevention and control measures are well conducted, and that 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.

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

percent in Bong, Lofa, and Nimba.<sup>7</sup> Qualitative findings highlighted variability across counties and operating units, but also substantial progress in most system functions.

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

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

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

In 2017, PMI supported the MoH/Quality Management Unit to finalize the National Health Quality Strategy 2017-2021, which aims to improve the health of the population by increasing universal access to, and utilization of, quality health services that are patient-centered, equitable, and responsive to the community's needs by 2021. The MOH initiated development and roll-out of the improvement collaborative approach to expanding adherence to clinical protocols, combined with revisions to clinical protocols and routine supportive supervision tools. The national MIP and case management guidelines were both updated and aligned such that ACTs are the first-line therapy. A national health information strategy was developed and the U.S. Government, with PMI resources, provided significant support to a Health Information Systems Technical Working Group to finalize the strategy and coordinate donor investments to improve data collection and use. The NMCP is a key participant in the technical working group, and routine recording, reporting, and analysis of malaria data is a key focus of U.S. Government health information systems interventions at the county level. A new design for the national eLMIS was also developed with USAID and PMI support, and was completed in April 2018 with user acceptance testing. USAID Ebola funding supported a national Ttraining of trainers for 15 counties (County Pharmacist and Monitoring and Evaluation Officer) and administrators training for the HMIS Monitoring Evaluation and Research Unit and SCMU. USAID and PMI will support the roll out to Bong, Nimba, Lofa, Montserrado, Margibi and Grand Bassa Counties this year, and Global Fund will support the roll out in the other nine counties.

The PMI-supported, embedded technical advisors played a crucial role in helping NMCP staff navigate the post-EVD landscape and ensure the MOH maintained focused attention on scaling up malaria

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<sup>7</sup> Capacity Assessments of Central MOHSW, Bong County, Lofa County, and Nimba County. Rebuilding Basic Health Services. 2012 & 2014.

interventions. PMI also provided significant support and technical input for the development of two Global Fund malaria/health systems strengthening grant proposals. The first was submitted under the new funding model. In 2016, this was awarded and will run through June 2018 to cover the 2018 mass campaign. The technical advisor assisted the NMCP in the development of a new malaria grant application for a three-year period (July 2018-June 2021) that was awarded in April 2018.

Peace Corps volunteers returned to Liberia in 2016 after being evacuated during the EVD outbreak. PMI has been supporting two volunteers and providing funding for all Peace Corps volunteers to conduct malaria awareness activities. The majority of Peace Corps volunteers in Liberia are education volunteers. They have incorporated malaria messaging into the various classroom and extracurricular activities, including a malaria unit in science classes, malaria statistics in math lectures, and adding malaria activities to health clubs at school. Volunteers working with teenage parents have included prevention of MIP in their workshops. The health volunteers will support the CHSS who supports CHAs and will focus on maternal and child health, including malaria. In 2018, 70 percent of the ~100 volunteers had a project focused on malaria during the month of April around World Malaria Day. Peace Corps volunteers also participated in the planning and distribution of ITNs during the 2018 campaign.

PMI is currently supporting a long-term technical assistance advisor, embedded at the NMCP, focused on improving SM&E skills for data analysis and use (see SM&E section). The advisor started full time in April 2017.

#### *Plans and justification for proposed activities with FY 2019 funding*

The bulk of the capacity building activities are embedded in the relevant technical sections. By 2020, the projects supporting a long-term technical assistance advisor for management and SM&E will have ended. The specific long-term technical assistance advisor for entomological monitoring will continue. The focus of a second planned embedded long-term technical assistance advisor will be on case management. It is anticipated that this will be for laboratory support, because, as noted in the Case Management section, there is still a shortage of trained laboratorians. As of May 2018, the NMCP has not replaced the two laboratorians provided to the EVD response in 2014. In addition, PMI will continue to focus support to the central MoH/NMCP and CHTs to strengthen crosscutting health systems functions to improve management and governance of the health system and support decentralization. PMI will continue to strengthen the collaboration and coordination of malaria activities with other MoH units and agencies like the National Public Health Institute of Liberia and LMHRA. Activities will include organization of coordination meetings, joint support supervision visits of NMCP, and related MoH units and agencies, and annual NMCP data and program review meetings where various MoH units and agencies like the National Public Health Institute of Liberia and LMHRA are invited to contribute to technical discussions. The PMI team will continue reaching out to the other donors and technical partners in Liberia to encourage this coordination. PMI will also collaborate closely across U.S. Government agencies involved in post-EVD health system recovery efforts, such as CDC, Department of Defense, National Institutes of Health, and USAID, to leverage health system infrastructure and capacity building investments where possible. PMI will promote ITN use and care using various channels, including schools. PMI will continue to work with Peace Corps to improve malaria education in schools and malaria awareness projects in the community. SBCC activities in schools will be implemented in partnership with Peace Corps, NMCP, and the School Health Division in the Ministry of Education.

**Table 16: Health Systems Strengthening Activities**

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

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.

## **5. 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 technical assistance to, the NMCP 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.

Please see Table 2 for a detailed list of proposed activities with FY 2019 funding.